Investigating the Form-Meaning Mapping in
the Acquisition of English and Japanese Measure Phrase Comparatives

Tomoe Arii*, Kristen Syrett, Takuya Goro

*Corresponding author

Department of English, University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-0033, Japan

e-mail: ariitomoe@gmail.com
Abstract

We present a set of experiments investigating how English- and Japanese-speaking children interpret measure phrase comparatives (e.g., *X is 10 meters taller than Y*/*X-wa Y-yori 10-meters takai*). We show that despite overt cues to the comparative interpretation (i.e., the comparative –*er* morpheme in English, explicit linguistic and visual reference to a contextual standard), children representing both languages diverge from their adult counterparts and access the same non-adult-like interpretation: absolute measurement (i.e., *X is 10 meters tall*). We propose to account for their response pattern by appealing to proposals by Svenonius and Kennedy (2006) and Sawada and Grano (2011) that *Meas* in the head of the DegP in which the differential is housed selects for a minimal value. We argue that children appeal to an absolute zero minimum in lieu of the correct derived standard, and must learn to override this value by appealing to the context to set the standard of comparison when interpretation requires them to do so.

Keywords

Language Acquisition, Measure Phrases, Differentials, Comparative constructions, English, Japanese
1. Introduction

It is by now well established that English gradable adjectives (GA) such as tall have a comparative interpretation not only in the comparative form with the -er morpheme, as in (1a) and (1b), but also in the bare, positive form, as in (1c).

(1)    a. This building is taller than that building.

       b. This building is taller.

       c. This building is tall.

The –er comparative morpheme in English expresses an explicit comparison between the maximal height of the two individuals—either between the individual in the subject position and the one in the standard phrase introduced by than, as in (1a), or between the subject and a salient contextually retrievable standard, as in (1b). However, the bare form of the adjective in (1c) also expresses a comparison—albeit an implicit one—between the height of the individual in the subject position and a contextual standard generated from a comparison class (e.g., buildings in the same district, architectures around the world, etc.) (Bierwisch 1989; Cresswell 1976; Kamp 1975; Kamp & Partee 1995; Klein 1980; Siegal 1976; a.o.).

This pattern holds, because tall and other gradable adjectives have a denotation that performs a mapping between individuals and totally-ordered degrees on a scale, and requires that the truth value of the sentence in which the GA appears to depend on the relation between these
degrees, one of which serves as the standard of comparison. These comparisons can be
schematized as in (2), where the degrees mapping to the two buildings (B1 and B2, the standard)
and the contextual standard, are captured on a scale whose dimension here as determined by the
adjective tall is height (See especially Cresswell 1976; Heim 1985; Hellan 1981; Hoeksema
1983; Kennedy 1999, 2001; Pinkal 1989; among others.).

(2)  a. This building is taller than that building.

![Diagram]

b. This building is tall.

![Diagram]

The same pattern of implicit and explicit comparison occurs in a language such as Japanese,
as illustrated in (3), despite the fact that there is no overt comparative morphology in this
language (Beck, Oda & Sugisaki 2004; Kennedy 2007a; Sawada 2009). In (3a), the explicit
standard is provided by the yori phrase, which is comparable to the English than phrase.
Although there is no comparative morpheme in (3b), the sentence indicates that the building is
tall as compared to some stored or contextually-retrievable standard.

(3)  a. Kono biru-wa ano biru yori takai.

This building-TOP that building than tall

‘This building is taller than that building.’
b. Kono biru-wa takai.

This building-TOP tall

‘This building is tall.’

The English sentences in (1) allow for the introduction of a measure phrase (MP), as seen in the underlined phrases in (4). Here, however, two semantically distinct interpretations emerge, according to the form of the adjective.

(4)  
   a. This building is 10 meters taller than that building.  differential comparative
   b. This building is 10 meters taller.  differential comparative
   c. This building is 10 meters tall.  absolute

In (4a) and (4b), the GA tall carries the overt comparative morphology –er, and the MP serves as a measurement of the extent to which the target degree (i.e., the degree of the building’s maximal height) exceeds the standard degree (i.e., the degree of the second building’s height in (4a), or the contextual standard in (4b). The comparative force of the original sentence is retained in both cases. In what follows, will refer to this type of interpretation as differential comparative\(^1\). In

\(^1\) The term differential comparative is generally used to refer to the relevant form in languages like English (i.e., MP+comparative GA), and also associated semantic interpretation (e.g., von Stechow 1984). In this paper, however, we will restrict this term’s referent to a particular type of semantic interpretation, due to the morpho-syntactic differences in the relevant constructions in
contrast, (4c), where the GA is in its bare form, obligatorily expresses the absolute height of the building, not how much it deviates from a shiftable contextual standard. In this case, the MP specifies the degree to which the building extends relative to the dimension of height. The two semantically distinct contributions of the MP in English is illustrated in (5).

(5)  

a. This building is 10 meters taller (than that building).

b. This building is 10 meters tall.

The Japanese comparatives in (3) also allow for the introduction of a MP into the sentences, as illustrated in (6). In contrast to the English counterparts, those forms obligatorily yield comparative interpretations, regardless of whether there is an explicit standard phrase or not:

(6)  

a. Kono biru-wa ano tawaa yori 10 metoru takai.

This building-TOP that tower than 10 meters tall

‘This building is 10 meters taller than that tower.’ differential comparative

English and Japanese. We use MP comparative to refer to the surface form in either language that yields the differential interpretation.
Due to the absence of overt comparative morphology in Japanese, the sentence in (6b) appears at first glance to correspond to the English (4c): a MP composed with a bare GA. These sentences, however, yield distinct semantic interpretations. The Japanese counterpart is obligatorily comparative, indicating that the building is 10 meters taller than some retrievable contextual standard (Hayashishita 2009; Kikuchi 2006; Kubota 2011; Nakanishi 2007; Snyder, Wexler, and Das 1995). The absolute interpretation that is associated with the English counterpart is not available in this Japanese example. In order to express an absolute measurement, speakers of Japanese must resort to an explicitly non-comparative construction: a copular sentence with a nominalized GA (e.g., Watanabe 2013).

(7)  a. Kono biru-wa takasa(-ga) 10 meetoru da.

    This building- TOP height(-NOM) 10 meters COP

    'The height of this building is 10 meters.'
The possible patterns of form-meaning mapping in English and Japanese are summarized in (8) and (9).

(8) English form-meaning mapping patterns

<table>
<thead>
<tr>
<th>Form</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>bare GA (e.g., tall)</td>
<td>comparative</td>
</tr>
<tr>
<td>comparative GA (e.g., taller)</td>
<td>comparative</td>
</tr>
<tr>
<td>MP+bare GA (e.g., 10 meters tall)</td>
<td>absolute</td>
</tr>
<tr>
<td>MP+comparative GA (e.g., 10 meters taller)</td>
<td>differential comparative</td>
</tr>
</tbody>
</table>

(9) Japanese form-meaning mapping patterns

<table>
<thead>
<tr>
<th>Form</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>bare GA (e.g., takai)</td>
<td>comparative</td>
</tr>
<tr>
<td>MP+bare GA (e.g., 10 metoru takai)</td>
<td>differential comparative</td>
</tr>
</tbody>
</table>

Schwarzschild (2005) has pointed out that there are further complications to this paradigm. First, not all GAs in English allow MP modification in its bare form (e.g., *2 pounds heavy, *2 dollars expensive). Second, not all languages license the combination of an MP with a bare GA. For example, Spanish seems not to, as shown in (10a) (although we return to the example of Spanish later to show that this is not entirely true).\(^3\) However, even if a language does not allow the combination of an MP with a bare GA, and even if certain GAs do not allow MP modification in their bare, positive form, the combination of an MP with a GA in the

---

\(^3\) See Eguren and Pastor (2014) for relevant references and discussion, but also for evidence that an absolute interpretation is available for MP+GA combinations in Spanish in a nominal ‘MP+de+A’ construction.
comparative form is allowed, as shown in (10b) and (11). Based on this pattern, Schwarzschild (2005) has argued that if a language allows an absolute interpretation of the MP+GA combination, it also allows a differential comparative interpretation, but the reverse does not hold.

(10) a. *2 metros alto
    2 meters tall
    *‘2 meters tall’

b. 2 metros más alto
    2 meters more tall
    ‘2 meters taller’

(11) a. *2 pounds heavy / *20 dollars expensive

b. 2 pounds heavier / 20 dollars more expensive

These observable variations in the interpretation of the comparative and MP constructions in English and Japanese (and across languages in general) would appear to pose a challenge for the child acquiring language. Not only does she need to determine whether or not there is comparative morphology in the language she is acquiring and how comparative constructions are instantiated in general, she also needs to determine the range of possible interpretations associated with these various forms. On the first sight, in English, it might
ostensibly seem simple: there is a comparative morpheme in English, and when it is present, the sentence carries a comparative interpretation. However, there is a challenge with bare-form GA constructions. Even in the absence of the comparative morpheme, the bare-form GA yields a (implicit) comparative interpretation, as we have observed in (1). But when an MP is introduced with this bare GA, the comparative force completely disappears, and an absolute interpretation is the only one available. Furthermore, when an MP is combined with a GA in the comparative form, the absolute interpretation is not available. That is, the range of possible interpretations for each MP construction is highly restricted, and determining both what kind of interpretation is possible and what is impossible with a certain form is by no means a simple task.

Perhaps, then, Japanese is the more consistent and transparent language for the first language learner: despite the lack of comparative morphology, a comparative interpretation is always present with a GA, even when an MP is introduced with the bare GA. Therefore, it is tempting to expect that Japanese children have it relatively easy, in that they can always stick with a comparative interpretation.

What is striking, though, is that in our research, we find a consistent strategy recruited by children across languages that does not fit this expectation. Previewing our results, we show that children acquiring English and Japanese resemble each other in that they are inclined to interpret MP comparative constructions as expressing absolute measurement, even though the
interpretation is licensed in their target language. Furthermore, they are seemingly oblivious to fact that the than/yorì standard phrase obligatorily signals the presence of comparison relative to a contextually retrievable standard. This pattern appears to persist well into five to six years of age, indicating that children arrive at these interpretations despite any input they have encountered that should have led them to opposite conclusions. We are therefore led to conclude that children from both languages recruit a strategy provided for them by the semantics of the MP construction.

The rest of the paper is structured as follows. In Section 2, we review the theoretical background concerning MP comparative constructions and differential interpretations. In Section 3, we briefly review previous developmental findings relevant to children’s interpretation of comparative constructions. In Sections 4 through 6, we present a set of experiments on children’s interpretation of differential comparatives with and without a standard phrase. Finally, in Section 7, we summarize our combined results, and argue that the source of children’s non-adult-like interpretations of the target constructions may lie in the semantics of the Measure Phrase itself.

2. Theoretical Background

We begin by presenting a basic semantics for comparatives in general. As we mentioned in the introduction, in a comparative such as (1a), repeated here, the degrees of the building’s and the tower’s height are compared along a scale whose dimension is height.
This building is taller than that building.

We assume, following Kennedy and McNally (2005) and Kennedy (2007b) that bare, positive form relative GAs such as big and tall encode in their semantics reference to a contextually-relevant standard of comparison, and further, that they compose with the pos morpheme, whose function is to relate the GA to a standard of comparison provided by a salient comparison class.

In a comparative such as (1a), however, the standard is provided by the than phrase, and the sentence is true as long as the degree of the first building’s height exceeds that of the second building’s. That is, there is some threshold of height that the building meets (and exceeds), but the second building does not (Schwarzschild 2008). We further assume, following Bhatt & Takahashi (2011), Hackl (2001), and Lechner (2001, 2004) that the –er morpheme takes two arguments—the one provided by the main clause, and the one provided by the standard—and that the Degree phrase headed by this morpheme undergoes Quantifier Raising at Logical Form for interpretation (Bhatt and Takahaski 2011; Heim and Kratzer 1998).

We follow Sawada and Grano (2011) and Svenonius and Kennedy (2006) in assuming that when a bare, positive form GA appears with an MP, as in (4c), repeated here, the structure provided in (12) is generated for the underlined portion of the sentence.
(4)  
   c. This building is **10 meters** tall.

(12)

```
Meas
    DegP
        NumP
            (differential)
        Deg'
            Deg
            AP
            Meas
            GA
```

Meas is of type <<e, d>, <d, et>>, and composes with a GA of type <e, d>. This structure yields a property of an individual (e.g., 4 feet tall) of type <e, t>, which then composes with the individual (type e) in the subject position.

In the case of a MP combined with a comparative GA, as in (4a-b), repeated here, the MP (e.g., 10 meters) does not measure the absolute height of the individual, but instead measures the difference between heights (Kennedy and McNally 2005), as the re-inserted deleted material indicates.

(4)  
   a. This building is 10 meters taller than that building (**is d-many meters tall**).

   b. This building is 10 meters taller (**than s, is d-many meters tall**).

As a consequence, instead of Meas composing with an AP containing a GA in its bare form, it

---

4 For simplicity sake, we assume here, along with the authors cited above, a semantic type of GAs is <e, d>. An alternative type is <d, <e, t>> (cf. Alrenga, Kennedy, and Merchant 2012; Kennedy and McNally 2005; a.o.). This difference in theoretical assumption should not make a difference for the purposes of this paper.
composes with a QP containing the comparative adjective, morpheme, and standard phrase, as captured in (13) (Svenonius and Kennedy 2006).

(13)

3. Developmental Background

Before we consider children’s comprehension of MP comparatives, we first provide a baseline for how children of the same age (five to six years) fare with related expressions, namely comparative expressions without MPs, and MPs in the absence of comparatives. To begin, by three to four years of age, children recognize that relative GAs such as big and tall rely on a contextually-set standard of comparison in the positive form, and that this standard not only depends on a contextually salient comparison class, but also shifts from context to context (Barner and Snedeker 2008; Ebeling and Gelman 1994; Gelman and Ebeling 1989; Syrett et al. 2006; Syrett, Kennedy, and Lidz 2010). Thus, they are aware that the truth conditions of the sentences that involve a GA vary according to the context in which the sentence is uttered,
because the denotation of these GAs relies on the context.

Moreover, English-speaking children frequently produce comparatives in the absence of an explicit *than* standard phrase well into four years of age (Hohaus, Tiemann, and Beck 2014), and are exposed to the occurrence of comparative GAs without an explicit standard phrase in the input. To illustrate the latter point, we conducted a search of child-directed speech from six major corpora in the CHILDES database (MacWhinney 2000), including Adam, Naomi, Nina, Peter, Sarah, and Shem. Using the CLAN program, we targeted a list of frequent GAs in the comparative –*er* form, which are also known to occur early in children’s production: *big, close, easy, early, fast, happy, high, nice, old, tall, wide*. This search yielded 499 occurrences. Of these, 45.5% featured the comparative adjective in utterance-final position (thus, with no standard phrase following), and only 22.0% of the total occurrences included an overt *than* standard. Thus, the input pattern in English clearly indicates to the child that a standard phrase is optional. In other words, children do not receive evidence that a standard phrase is required to link the interpretation of the comparative GA to a contextually-relevant standard.

Third, although the form of comparative constructions produced by children sometimes deviates from that of adults’, most notably in terms of the standard marker and the choice of the comparative morpheme (cf. Donaldson and Wales 1970; Hohaus, Tiemann, and Beck 2014; Layton and Stick 1978; Moore 1999), they have still been shown in both judgment tasks and
act-out tasks to correctly interpret comparative constructions, such as those as in (14) (Gor and
Syrett 2014; Syrett and Lidz 2011).

(14)  a. Sheriff Woody fed more bear cubs than Jessie.

b. The monkey pushed the rock further than the elephant did.

This kind of production-comprehension asymmetry is oft-attested in the literature on language
acquisition and development. Relative clauses (e.g., the dog that caught the ball) provide a prime
example: while they may not be productive in children’s utterances until later in development,
and while children may appear to misinterpret relative clauses in act-out tasks (Sheldon 1974;
Tavakolian 1981), children demonstrate an early ability to correctly interpret relative clauses
when certain contextual features of the experiment are controlled for (Hamburger and Crain
1982) or when morphosyntactic cues help to disambiguate interpretation (Guasti, Stavrakaki, and
Arosio 2008).

Finally, by at least four years of age, children begin to demonstrate an understanding of
MPs in the absence of comparatives, varying their interpretation with the syntactic environment
in which the MP appears. For example, four-year-olds appear to understand that three-pound
strawberries is not interpreted in the same way as three pounds of strawberries, thereby
distinguishing between an MP in an attributive phrase and an MP in the pseudopartitive
construction (Syrett 2013). Furthermore, they recognize that there are differences in the
consequences of operations (such as subtraction) performed on a set described by one or the other expression, indicating an awareness that the two measurement expressions differ with respect to monotonicity (Syrett 2013).

Taken together, this background suggests that (at least English-speaking) children may possess a command of the components of the MP comparative construction by five years of age, the approximate mean of children in the studies presented here. However, a command of the subparts does not ensure proper compositionality for the whole. Nor does it ensure that children acquiring different languages, such as English or Japanese, will be aware of the language-specific constraints regarding which interpretations are licensed or not. Thus, the following questions remain: (a) Do English-speaking children understand that interpretations for (15a) and (15b) are obligatorily differential, and therefore that the MP signals the extent to which the individual in subject position deviates from the contextual standard? (b) Do Japanese-speaking children understand the same obligatory differential comparative interpretation with (16), even though there is no comparative morpheme present in the sentence?

The answers to these questions will provide a window into children’s developing semantic representation of degree constructions, and their reliance (or not) on evidence from the input for acquiring the language-specific constraints on interpretation.

(15) a. This building is 10 meters taller than that building.
b. This building is 10 meters taller.


‘This building is 10 meters taller than that building.’

b. Kono biru-wa 10 meetoru takai.

‘This building is 10 meters taller.’

4. Experiment 1

4.1 Participants

All child participants in all experiments reported here were native speakers of their language, and no other language was spoken in the home environment more than 20% of the time. The Japanese-speaking children and adults were recruited and run in Tokyo, Japan. The English-speaking children and adults were recruited and run in a state in the northeast of the United States. Children were run in their local preschools, and were from a comparable socioeconomic status. All adults were undergraduate college students.

Participants in Experiment 1 included 16 children acquiring Japanese (4;2-6;2; Mean: 5;3), 16 Japanese adults, 16 American English-speaking children (4;1-5;4, Mean: 4;9), and 27 American English-speaking adults. 3 additional Japanese children were excluded due to a response bias. 4 additional English adults and 1 additional English child were excluded due to non-native speaker status.
### 4.2 Stimuli and Procedure

The experiment was designed so that participants were engaged in a series of trials asking them to compare amounts or extents. The experimental session was divided into two tasks, whose order of presentation was counterbalanced across participants. In one task, participants were asked to compare the height or length of individuals according to a novel unit of measurement (a ‘kirari’ in Japanese, and a ‘chipani’ in English)\(^5\). This unit was portrayed by yellow stars, which were either aligned vertically on a tree for height, or horizontally along a log for length (see the left and center picture in Fig. 1). This novel unit was used, because it did not require children to rely on their prior lexical knowledge of units of measurement (e.g., meters, feet, etc.). This task began with a brief training session to acclimate participants to using the novel unit to measure objects and making comparative judgments based with it. Children had no difficulty with this training. In the second task, participants were asked to compare amounts of known objects or substances (e.g., piles of sand, oranges, etc.). Stimuli were presented via a series of PowerPoint slides, with child-friendly images, as shown in Fig. 1.

<table>
<thead>
<tr>
<th>Task 1 (taller/longer)</th>
<th>Task 2 (more)</th>
</tr>
</thead>
</table>

\(^5\) The difference in phonological form was based on the phonotactics of the two languages, and what seemed more natural in each.
Fig. 1 Example of representative images appearing in tasks 1 and 2 of Experiment 1

The experiment was designed as a version of the Truth-Value Judgment Task (Crain and McKee 1985; Crain and Thornton 1998) using a prediction mode (Boster and Crain 1993; Chierchia et al. 1998). For example, in task 1, the participant and puppet (for children; adults heard a prerecorded background narration) were first shown an animal (e.g., a tiger) against the tree with *kiraris/chipanis*, and this animal’s height was indicated. They were then shown a second animal (e.g., a lion) on a separate screen, and the puppet made a prediction about the difference in height/length/quantity between the two animals (e.g., “I think the lion is 2 chipanis taller!”). The experimenter then said, “Let’s place the lion against the tree and the tiger to see if you’re right!” This phrasing was used so that explicit reference was made to using the contextual standard for comparison. The next slide was then shown, with the two animals side by side next to the tree. The puppet reminded the child of his prediction (e.g., “Remember, I said that the lion is 2 chipanis taller!”), and asked the child whether he was right or wrong. The child provided a ‘yes’/‘no’ answer, and was often encouraged to provide a justification for his/her response. Task 2 proceeded in the same way, with the quantities being compared shown side by side in the final
scene of the trial.

A template for the measurement expressions used in Experiment 1, in the English and Japanese versions, respectively, is presented in (17)-(18). (The ‘#’ stands for a numeral, such as two.) Note two aspects of these stimuli in particular. First, in neither language is there an explicit standard than/yori phase in the target utterance. Second, the GA in English carried the –er morpheme, indicating a comparative interpretation. Japanese lacks such a morpheme, but this sentence has an obligatory comparative interpretation for adults. Thus, in both languages, the stimulus sentences should have the semantic force of a differential comparative.

(17) Template of English stimuli for tasks 1 and 2

   a. X is # chipanis taller/longer.

   b. X has # more [nouns].

(18) Template of Japanese stimuli for tasks 1 and 2

   a. X-wa #-kirari  takai/nagai.

       X-TOP #kirari tall/long

       ‘X is # kiraris taller/longer.’

   b. X-no [noun]-wa  #-ko  ooi.

       X-GEN [noun]- TOP  # CL many

       ‘X has # more [nouns].’
There were three types of trials within each task: Differential, Absolute, and Neutral (control), as summarized in Fig.2. In the Differential trials, the MP+GA combination was true under a differential comparative interpretation of the measurement expression (i.e., ‘2 chipanis taller’ / ‘2 more [nouns]’), but false under an absolute interpretation (i.e., ‘2 chipanis tall’ / ‘2 [nouns]’). In the Absolute trials, the MP+GA combination was false under a differential comparative interpretation of the measurement expression, but true under an absolute interpretation. In the Neutral trials, the MP+GA combination was false under both a differential comparative interpretation and an absolute interpretation. The Neutral trials provided us with a control that allowed us to identify participants who had a response bias to accept the puppet’s response, even when it was not true under any circumstance. Each task had either 12 or 13 trials, including one to three filler items with no MP accompanying the GA, and an equal number of test trial types.
If participants assign an adult-like interpretation to the target measurement expressions, then they should accept the target utterances in the Differential trials, and reject them in the Absolute and Neutral trials. If, in task 1, English children are unaware of the presence or interpretive force of the comparative –er morpheme (and consequently think that the MP measures absolute height), then they should reject the target utterances in the Differential and Neutral trials (albeit for different reasons for these trial types) and accept them in the Absolute trials. Similarly, if Japanese children are at a disadvantage in that their language lacks a comparative morpheme to signal comparison, then they should also reject the target utterances in the Differential trials, and accept them in the Absolute trials.

The same general logic should apply to task 2. However, in this task, there is no novel unit of measurement, and we deliberately introduced measurements of quantities whose
comparison is signaled by the periphrastic comparative in both languages (i.e., ‘2 more’/ ‘2-kooi.’). While one could argue that the –er morpheme in English both lacks stress and is utterance-final, and is therefore not in a prosodically-privileged position, the same cannot be said about more. No parent would object to our claim that this word is produced early in development, and young children are well aware of its interpretation. (This anecdotal evidence is supported by a search of the Cross-Linguistic Lexical Norms database (http://www.cdi-clex.org), which indicates that by 18 months of age, over 80% of children understand more, and over 50% are producing it (Dale and Fenson 1996).)

4.3 Results

The results in terms of overall percentage correct for the Differential and Absolute trials for the English participants are presented in Fig. 3, and results for the Japanese participants are presented in Fig. 4. We exclude the Neutral trials as controls here, since both groups of children demonstrated perfect or near-perfect performance on this trial type (Japanese children: 100% correct; English children: 90% correct). This indicates that they had no difficulty with the task itself, and were not providing the same affirmative response across the board.
As the figures indicate, both Japanese and English adults demonstrated near-ceiling performance, correctly interpreting the measurement expression throughout the trials and in both tasks. Both groups of children, however, performed significantly worse. The overall low percentage of correct responses indicates that they incorrectly rejected the utterances in the Differential trials, and incorrectly accepted the utterances in the Absolute trials. The difference between the adults and children was significant for both languages (Japanese: t(62)=8.14,
Within each language, there was no difference between two tasks for either the adults or the children (Japanese: adults \( t(30)=0.65, p=0.52, \) children \( t(30)=0.05, p=0.96; \) English: adults \( t(51)=1.16, p=0.25, \) children \( t(30)=0.17, p=0.87 \)). There was also no difference between the age groups across languages (adults: \( t(62)=0.98, p=0.33; \) children: \( t(83)=1.20, p=0.24 \)).

**4.4 Discussion**

In Experiment 1, both English and Japanese children appear to have assigned a non-adult interpretation to the target utterances, leading them to incorrectly reject it in the Differential trials and incorrectly accept it in the Absolute trials. This pattern of responses appears to indicate that children from both languages consistently interpreted the MP comparative expression ‘absolutely’ (e.g., ‘The lion is 2 chipanis tall’ not ‘…taller’). Children’s responses to the training items for task 1 and to the filler items, which involved no numerical expression preceding the GA, indicated that they were able to make accurate comparisons with the comparative GA. In both languages, it was the presence of the numerical phrase that hindered their performance.

What could be the source of their difficulty? One possibility is that it was not sufficiently clear to either group of children that they were supposed to make a comparison between the individuals or quantities in the scene. On the one hand, they may be so accustomed to numerals denoting the cardinality of a set that they thought the experimenter and puppet were concerned
with evaluating absolute size or quantity. And on the other, the linguistic cue to comparison (in the case of English) was so subtle, that they may have overlooked it and focused on the numerical phrase preceding the GA. If it is correct that children were oblivious to the fact that they needed to make a comparison, then we would predict that introducing an explicit standard phrase into the stimulus sentences, as in (1a) and (6a), might improve their performance. We test this hypothesis in Experiment 2.

5. Experiment 2

5.1 Participants

16 Japanese children (4;4-6;3, Mean: 5;4) and 18 American English children (3;9-6;3, M: 4;8) participated. 10 additional Japanese children and 6 additional English children were excluded due to a ‘yes’ response bias across all trials.6

5.2 Design

The only difference between Experiments 1 and 2 was in the verbal stimuli. In Experiment 2, we introduced an explicit standard phrase, as shown in the underlined part of the examples in

6 This number collapses over both the ‘taller’ and ‘more’ experiment sessions. Children who exhibited a ‘yes’ bias for one session were not tested on the subsequent session, and were therefore excluded from data analysis. Also excluded were children who were tested on both sessions, but whose overall responses, particularly to the Neutral trials, indicated a response bias.
(19)-(20), in an attempt to signal deviation from a salient standard and unambiguously indicate that the construction should be interpreted as a differential comparative.

(19) Template of English stimuli for tasks 1 and 2

   a. X is # chipanis taller/longer than Y.

   b. X has # more [nouns] than Y.

(20) Template of Japanese stimuli for tasks 1 and 2


      X-TOP Y-than #-kirari tall/long

      ‘X is # kiraris taller/longer than Y.’

   b. X-no [noun]-wa Y-no-yori #-ko ooi.

      X-GEN [noun]-TOP X-GEN-than #-CL many

      ‘X has # more [nouns] than Y.’

5.3 Results

As before, we analyze the results from the Differential and Absolute test trials. Children again consistently rejected the Neutral items (Japanese: 90%; English; average 79% correct). The results of Experiment 2 are presented below, paired with those from Experiment 1 for comparison. The results from the English children are presented in Fig. 5, and the results from the Japanese children are presented in Fig. 6.
As can be seen, adding the standard phrase to the test sentences generally accomplished little to no change in either group. For the Japanese participants, there was no difference in the children’s performance between Experiments 1 and 2 (t(62)=0.50, p=0.62). For the English children, the difference between Experiments 1 and 2 was marginally significant (t(66)= 1.96, p=0.05). This marginal effect was driven by the fact that for the taller/longer Absolute trials, children were slightly more successful when they were provided with a standard phrase, although their

---

Fig. 5 Overall percentage correct for the English children in Experiments 1 and 2

Fig. 6 Overall percentage correct for the Japanese children in Experiments 1 and 2
performance was still not anywhere near that of the adults in Experiment 1. As before, there was no difference between the taller/longer items or the more items for either group (Japanese: taller/longer $t(30)=0.50, p=0.62$, more $t(30)=0.20, p=0.85$; English: taller/longer $t(32)=1.53, p=0.13$, more $t(32)=1.20, p=0.24$).

5.4 Discussion

English- and Japanese-speaking children in Experiment 2, who were this time given an explicit standard phrase that should have signaled comparison to a salient perceptual standard in the context, still patterned with the children in Experiment 1. The combined results of Experiments 1 and 2 reveal that while adults (perhaps unsurprisingly) correctly interpret MP comparatives in their respective languages as differential, children acquiring these languages consistently interpret the relevant forms absolutely. This conclusion comes from the low percentage correct in both the Differential and Absolute trials: children incorrectly rejected the Differential trials, and incorrectly accepted the Absolute trials. Children from both languages behave more or less the same, even though there are several significant differences in linguistic forms in English and Japanese (presence/absence of a comparative morpheme, word order, etc.). This would suggest that English and Japanese-speaking children share their source of difficulty.

One might be led to hypothesize that the source of children’s difficulty was in their incremental processing of these sentences, and failure to revise an incorrect syntactic structure.
What might such an account entail? Take as a starting point the English comparative used in Experiments 1 and 2, repeated here.

(19)  a.  X is # chipanis taller/longer (than Y).

Upon hearing the beginning of the utterance, *X is # chipanis tall/long*, children may posit that the utterance expresses an absolute measurement of the individual in question. (The same would apply to *X has #* in the ‘more’ task.) They would therefore build the syntactic structure corresponding to this interpretation. However, upon encountering the –er morpheme afterwards (and the than phrase in Experiment 2), they would be unable to revise this representation, or unable to inhibit the response based on the initial structure, and would appear to be stuck in the absolute interpretation. The process of being stuck in the initial parse has been documented in children’s misinterpretation of locally ambiguous sentences (Choi and Trueswell 2010; Trueswell et al. 1999; See Omaki and Lidz (2014) for a review of literature on children’s incremental processing of syntactic material).

Something similar might even be argued to apply to the Japanese examples from Experiment 1. The template for task 1 is repeated here. Upon encountering the numeral, a child of four, who is by now accustomed to a numeral frequently denoting exact cardinality of a set, might think that the numeral picks out an absolute amount associated with the individual in subject position.
This explanation falls short, however, as soon as one turns to the Japanese sentence counterpart from Experiment 2, repeated here.

(18) a. X-wa #-kirari takai/nagai.

X-top #kirari tall/long

‘X is # kiraris taller/longer.’

(20) a. X-wa Y-yori #-kirari takai/nagai.

X-top Y-than #kirari tall/long

‘X is # kiraris taller/longer than Y.’

In contrast to the word order of the English sentence, in the Japanese example, the *yori* standard phrase precedes the MP. Thus, children in this experiment should encounter a signal early in the utterance that a comparison between individuals is being made, and therefore should not be led down the garden path. It is striking, then, that the Japanese children in this experiment patterned just like all the others, and fared no better in their interpretation of differential comparatives.

It also seems unlikely that children are simply ignoring the lexical material in the standard phrase. We see no independent motivation for assuming that they would selectively ignore the standard phrase. We are therefore left in search of an explanation for our experimental findings that does not rely upon their failure to revise an incorrect syntactic structure constructed from incremental processing of the speech stream, or their decision to ignore superfluous or
confusing material. Let us assume for the moment, then, that children are attempting to correctly integrate all of the information from the speech stream. We now return to the Neutral control trials to see if they could shed light on this unexpected response pattern.

Recall that the Neutral trials differed from the Differential and Absolute trials in that the sentence was false under either interpretation. For example, in a display in which a frog is one chipani tall, and a penguin is three chipanis tall (as in Fig. 2), the statement, *The penguin is 1 chipani taller (than the frog)* is false under both a differential (1 chipani taller) and absolute (1 chipani tall) interpretation. Children robustly responded to the puppet’s statements correctly, rejecting these descriptions of the scene. It is possible, though, that they were doing this for the wrong reason, and were positing an incorrect representation for the comparative construction.

One possibility comes to us from the literature on children’s interpretation of nominal modifiers, such as attributive adjectives and relative clauses. Previous research has documented that when faced with nominal modifiers that are presented in an infelicitous context, or that require demands on processing, children appear to mistakenly interpret the target statement as if it were a simple conjunction. For example, when asked to point to *the second green ball* in a series of green and red balls, children might point to the ball that is in the second ordinal position and is green, rather than the intended target (the second of the green balls) (Hamburger and Crain 1982; Matthei 1982; Roeper 1972). Likewise, when asked to act out the sentence *The cow bumps*
into the dog that jumps over the pig, children have been shown manipulate the toys so that the cow first bumps into the dog, and then jumps over the pig (Sheldon 1974; Tavakolian 1981).

Let us consider the possibility, then, that although children performed successfully with the Neutral trials, they did so based on an incorrect conjunction representation of the target statement. In this case, they might interpret (21a) as (21b) (and similarly for Japanese, taking into account differences in word order). The statement in (21b) is false in the situation in Fig. 2, since although the penguin is taller than the frog, it is not one chipani tall, and the conjunction of a true and false proposition yields a truth value of ‘false’.

(21)  
   a. The penguin is 1 chipani taller (than the frog).  
   b. The penguin is 1 chipani AND taller (than the frog).

Could this strategy explain children’s responses to the Differential and Absolute trials? Consider the scenes depicted in Fig. 2 once more. In the Differential trial, the lion is three chipanis, and the tiger is one chipani tall. The target statement is, *The lion is 2 chipanis taller (than the tiger)*. Because this statement is false under an absolute interpretation, it is also false under a conjunctive interpretation (since the first conjunct expresses absolute interpretation). The lion is not two chipanis tall, and the conjunction of a false proposition with the true one (that he is taller than the tiger) results in a truth value of ‘false’. In the example Absolute trial, the cat is two chipanis tall, and the chick is one chipani tall. Thus, the absolute interpretation of the target
The cat is 2 chipanis taller (than the chick) is true, as is the conjunctive interpretation, since the cat is both two chipanis tall AND taller than the chick.

Thus, the response pattern observed in children could be explained by their erroneously interpreting the puppet’s statements as conjunction. Experiment 3 was designed to test this hypothesis. To do so, we incorporated key manipulations into the design in order to target the truth conditions of conjunction.

6. Experiment 3

6.1 Participants

33 Japanese children (4;1-6;2, Mean: 5;5), 16 Japanese adults, 23 American English children (4;0-5;8, Mean: 4;9), and 16 American English-speaking adults participated. 4 additional Japanese children and 10 additional English children were excluded due to response bias (Japanese: three ‘yes’ and one ‘no’; English: nine ‘yes’ and one ‘no’). 1 additional English adult was excluded due to non-native speaker status.

6.2 Stimuli and Procedure

7 The difference in sample size for the child groups arose from the variability we observed in the response pattern of the Japanese children, which we discuss in the Results section. We therefore increased the sample size of that population during data collection to allow for more noticeable trends to surface within that group.
This experiment made use of the same experimental methodology as Experiments 1 and 2. As in Experiment 2, the test sentences appearing in Experiment 3 included an overt standard of comparison in the form of a *than/yori* phrase, so that we could supply children with enough lexical material for them to posit two distinct propositions, according to a possible conjunction interpretation. However, in addition to the three kinds of trials incorporated into Experiments 1 and 2 (as shown in Fig. 2 earlier), we introduced a new trial type, as shown in Fig. 7.

<table>
<thead>
<tr>
<th>Differential</th>
<th>Absolute-taller</th>
<th>Absolute-shorter (New)</th>
<th>Neutral (control)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
<td><img src="image3.png" alt="Image" /></td>
<td><img src="image4.png" alt="Image" /></td>
</tr>
</tbody>
</table>

The ‘Absolute-taller’ trials are the same as the Absolute trials in Experiment 1 and 2: the test sentence is true under the Absolute interpretation and the Conjunction interpretation (e.g., 'The cat is 2 chipanis and is taller'). Like the Absolute-taller and Neutral trials, the new ‘Absolute-shorter’ trial type differs from the Differential trials in that the differential interpretation of the target statement is false. It shares with the Absolute-taller trials the fact that...
the absolute interpretation of the test sentence is true. This allows us to determine whether children are indeed just disregarding the standard phrase (and allows it to differ from the Neutral trials). However, it differs from the Absolute-taller trials in that the conjunction interpretation is false in these new trials. We accomplished creating this difference by having the (degree of the) height of the animal in subject position be less than that of the animal in the standard phrase. The Neutral trials remain a control in this experiment, since the statement is false under all of the target interpretations. There were three instances of each trial type, for a total of 12 trials in the experimental session. This time, we only presented children with task 1 (taller/longer) to zero in on the differences between these four trials in one task.

6.3 Results

As in Experiment 1, Japanese and English adults demonstrated near-ceiling performance (Japanese adults: 99.0%; English adults: 98.3% overall average correct). And, as before, children’s success rate was significantly below that of the adults (Japanese: 53.3% overall correct, t(47)=7.40, p<0.0001; English: 44.2% overall correct, t(37)= 8.45, p<0.0001). In this experiment, however, the overall percentage correct does not reveal much about the nature of the children’s responses.

To analyze children’s responses for response type and a potential conjunction interpretation, we began by identifying all children who had correctly rejected at least two of the
three Neutral trials, since accepting these trials would indicate that the child was not accessing any of the candidate interpretations (i.e., differential, absolute, conjunction). This process left us with 18 of the 23 English children and 28 of the 33 Japanese children. Interestingly, three of the excluded English children and four of the excluded Japanese children accepted the statements on the Differential, Absolute-taller, and Neutral trials, but rejected them on the Absolute-shorter trials—the only trials where the subject did not exceed the standard—indicating that they may have been ignoring the MP altogether and attending just to the comparative GA in making their judgment. In other words, they appeared to interpret \(X \text{ is } MP \text{ taller than } Y\) as ‘\(X \text{ is taller than } Y\)’.

At least one child’s justifications reflect this possibility, since this child appealed to the animal being taller. We will therefore refer to this type of non-adult interpretation as a *Simple Comparative* interpretation.

Let us now turn our attention to those children who accurately rejected the statement on the Neutral trials and displayed no response bias (English: \(n=18\), Japanese: \(n=28\)). Within this group, there was one group of children who appeared to access a correct, adult-like differential interpretation of the test sentences: they accepted the statements on the Differential trials, and consistently rejected them throughout the other trials (where the differential interpretation was always false). Four English children and seven Japanese children patterned in this way.

The remaining bulk of the responses (13 English and 21 Japanese children), however,
reflected an Absolute interpretation, in that the children rejected the statements in the Differential and Neutral trials, but accepted them in the Absolute-taller and Absolute-shorter trials. That is, these children only accepted the puppet’s statement when the MP reflected an absolute measurement of the individual in subject position, and also accepted them regardless of whether this individual’s height exceeded the standard or not.

For all of the children described above, then, it is clear that they are not consistently accessing a conjunction interpretation. If they were, then they would have accepted the statements in the Absolute-taller trials (as in Experiments 1 and 2) but rejected them in all of the other trials. In fact, none of the English children appeared to pattern in this way, and only five of the 33 Japanese children did so. There were three English children and six Japanese children whose response patterns did not lend themselves to a classification. 8 We present the complete categorization of responses in Table 1.

---

8 For some of these children, their responses appeared to reflect a variable treatment of the target statement within the experimental session, in that the child sometimes appeared to be comparing the subject individual either to the other individual indicated in the standard phrase, and sometimes accessing an absolute interpretation. However, our efforts to categorize such children neatly into the categories in Table 1 was in vain.
<table>
<thead>
<tr>
<th>Response type</th>
<th>English</th>
<th>Japanese</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Absolute (‘MP tall’)</td>
<td>13</td>
<td>11</td>
<td>24</td>
</tr>
<tr>
<td>Simple Comparative (‘taller’)</td>
<td>3</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Conjunction (‘MP and taller’)</td>
<td>0</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Differential (correct)</td>
<td>4</td>
<td>7</td>
<td>11</td>
</tr>
<tr>
<td>Unclassifiable</td>
<td>3</td>
<td>6</td>
<td>9</td>
</tr>
<tr>
<td>TOTAL number of children</td>
<td>23</td>
<td>33</td>
<td>56</td>
</tr>
</tbody>
</table>

Table 1 Response types exhibited by child participants in Experiment 3

6.4 Discussion

The results of Experiment 3 demonstrate that children are by and large not appealing to a conjunction strategy when interpreting MP comparative constructions. When they are not accessing an adult-like interpretation, the most frequent interpretation they appear to access is the Absolute one, although other interpretive strategies appear to have manifested themselves across a subset of children. What is particularly important here is the number of children who accepted the test sentences in the Absolute-taller trials and in the Absolute-shorter trials: their non-adult response patterns cannot be due to the conjunction strategy, because if they resorted to the strategy, they would have rejected the test sentences in the Absolute-shorter trials. Given that the Absolute response pattern represents the largest subset of children, and neither mis-parsing nor erroneous syntactic structure explains this type of response for both languages, we need an independent account for this type of non-adult interpretation.
What is also evident is that the two groups patterned by and large the same, indicating that whatever interpretive strategy is being recruited, it is apparently not a language-specific one. Thus, regardless of the cross-linguistic variations between English and Japanese (i.e., the presence/absence of comparative morphology, word order, and the range of interpretations that the MP+GA combination allows), children in both languages display a similar response pattern. In what follows, we argue that this pattern may in fact emerge, because these children are driven by a common interpretive source, stemming from the syntax-semantics of the MP.

7. General Discussion

We began this paper by asking how children acquiring English and Japanese interpret MP comparatives. The answer to this question sheds light on children’s acquisition of the syntax-semantics mapping of comparative constructions and their ability to integrate measurement expressions into such constructions. Across three experiments, we found that while adults representing each language experience no difficulty accessing the intended differential

9 The one exception to this observation may be the five Japanese children who appear to have accessed a conjunction interpretation. It is possible that this pattern arose from the word order difference between the two languages: because the standard precedes the MP and GA in the Japanese sentences, children may have represented the standard phrase, but then failed to integrate the rest of the lexical material into the correct syntactic structure, and therefore resorted to conjunction, as described in section 5.4.
comparative interpretation, regardless of whether or not there is an explicit standard phrase, children representing each language diverge noticeably from adults. Furthermore, children from both languages pattern similarly, despite the fact that adult English and Japanese display different patterns of syntax-semantics mapping in MP comparatives. They consistently access an absolute – and not a differential – interpretation of the target construction, regardless of any cues to the intended differential interpretation: a salient visual standard referenced explicitly in the task, the presence of –er comparative morphology (in English), or the presence of an explicit than/yori standard phrase.

In fact, we are not the first to uncover children’s non-adult-like interpretation of a MP comparative. Donaldson (1963) and Duthie (1963) (later referenced by H. Clark (1970)) observed anecdotally that children sometimes seem to interpret sentences such as (22) as expressing that Tom is four years old.\footnote{Of course, this particular example also raises questions of how the adjective young is being interpreted, and whether substituting negative polar adjectives in for positive ones (e.g., short for tall or long) would influence children’s performance. We leave this interesting question aside here.}

(22) Tom is four years younger than Dick.

Our study, however, is the first to our knowledge to systematically investigate children’s
interpretation of such MP comparatives through formal experiments, and bring cross-linguistic data to the field. Furthermore, recent advances in linguistic theory of measurement expressions permit us to be the first to appeal to the theoretical devices to attempt to explain children’s non-adult-like response pattern.

Let us, then, consider what might serve as a common underlying source of children’s deviation from the adult-like interpretation. We begin by recalling our assumptions from section 2 based on Svenonius and Kennedy (2006) and Sawada and Grano (2011) regarding the constructions in which an MP+GA combination appears: the MP+bare GA combination (e.g., *10 meters tall*) as in (23), and the MP+comparative GA combination (e.g., *10 meters taller (than y)*) as in (24).

(23) MP+bare GA
An important cross-linguistic contrast is that English and Japanese do not license the same interpretations in the structure in (23), in which *Meas* composes with a bare GA. It should be clear by now that while the absolute interpretation is the only interpretation available in English, the differential comparative interpretation is obligatory in Japanese.

(25) X-wa 10 meetoru takai/nagai.

X-TOP 10 meters tall/long

‘X is 2 meters taller/longer.’

#‘X is 2 meters tall/long.’

In fact, Japanese is not the only language to place restrictions on the MP+bare GA construction. As Schwarzschild (2005) and Sawada and Grano (2011) have observed, in Spanish, both the combination of MP and bare GA itself—and consequently, the absolute interpretation—appear to be barred. (The same appears to be true for Korean and Russian as
well.) However, Spanish *does* allow the MP+GA combination in the comparative construction, as in (24). This difference is illustrated in (26).

(26) Spanish

   a. *2 metros alto

      2 meters tall

      *‘2 meters tall’

   b. 2 metros más alto (que y)

      2 meters more tall (than y)

      ‘2 meters taller (than y)’

Recall, too, that not every relative GA in English is licensed in the MP+bare GA structure. For example, while *tall* and *long* are, *heavy* and *expensive* are not.

Here we have a puzzle: why does English allow the MP+bare GA construction with some GAs but not others, Spanish bar it, and Japanese license it, but with an obligatory comparative interpretation? Sawada and Grano (2011) (hereafter S&G) account for the cross-linguistic and language-internal variations of the form-meaning mapping of the MP+GA combination by focusing on the selectional restrictions of the Degree head *Meas*. In doing so, S&G first point out an exception to the rule in Spanish and Japanese that, we think, is especially relevant to our acquisition data. S&G observe that despite the overall generalization about the MP+bare GA
construction in these languages, Spanish and Japanese *do* allow some bare GAs to appear in this construction with the absolute interpretation that seems to otherwise be barred. The relevant examples are presented in (27) and (28).

(27) Spanish

doblada 20 grados

bent 20 degrees

‘20 degrees bent’

(28) Japanese

20-do magat-teiru

20-degree bent-ING

#‘20 degrees more bent’

‘20 degrees bent’

What makes these examples an exception? In Kennedy and McNally (2005)’s taxonomy of GAs, relative GAs such as *tall* and *long* make reference to a contextual standard, while absolute GAs make reference to an endpoint-oriented standard, either minimal (e.g., *bent*, *spotted*) or maximal (e.g., *full*, *straight*). S&G observe that in languages such as Spanish and Japanese, an absolute interpretation is licensed *only* with GAs whose standard makes reference to the minimal endpoint of a lower-bounded scale. This observation relates to Svenonius and
Kennedy's (2006) independent proposal that the head of the MP (Meas) has a selectional restriction such that it can only compose with GAs that denote functions that map their arguments onto bounded, measurable, positive degrees. S&G insert an additional stipulation that the GA must have a minimal scalar element. Their restriction, presented in their (51), is stated in (29).

\[(29) \quad \text{[[Meas]]} = \lambda_{g \in [e,d]} \cdot g \text{ is a function from objects to measurable degrees and } g \text{ has a minimal element } \lambda_d \lambda_x. g(x) > d \quad (\text{Sawada and Grano 2011: 211})\]

Given Meas’s requirement of a minimal scalar element, one might expect that no relative GAs in English would allow MP modification and an absolute interpretation. S&G argue, however, following Schwarzschild (2005), that English has a set of lexically idiosyncratic relative GAs, which allow an absolute interpretation when they are combined with an MP.

Svenonius and Kennedy argue that GAs are of type \(<e,d>\), and Sawada and Grano (2011) follow them in treating GAs with this semantic type. Another possibility, as we stated earlier, is that they are instead of type \(<d, <e,t>>\) (Alrenga, Kennedy, and Merchant 2012; Kennedy and McNally 2005). The type proposed for the GA, of course, has implications for the type proposed for pos and MP; however, we follow their treatment of GAs for simplicity’s sake, without any theoretical commitment one way or the other here.
As a result, *Meas* can compose with a minimum-standard GA, such as *bent*, in Spanish and Japanese, because it is able to supply *Meas* with the minimal value it requires.

S&G argue, following Kennedy and Levin (2008), that composition between *Meas* and a comparative GA, as in (24), is always licensed across languages, regardless of the scalar structure of the GA, because the comparative morphology turns the basic measure function into a difference function. The scale, then, has a ‘derived zero’, as illustrated in (30), which is the comparative standard (signaled by the *than* phrase) that serves as the minimal scalar element.

(30)

Thus, relative GAs and minimal standard GAs are licensed in the comparative form, because they can both have a derived minimal scalar element, and the relevant semantic differences of the root GAs are neutralized in the comparative form.

Something similar happens with the Japanese MP+bare GA combination. S&G propose that the scale associated with a relative GA is forced to take on a contextually recoverable minimal scalar element in a process that they term ‘scale shift’. In Japanese, a covert operator C intervenes to prevent the clash between *Meas*’s requirement of a minimal scalar element and the open scale associated with the relative GA. This process yields a differential interpretation of the
structure in (23). Because Spanish lacks such a covert mechanism, the MP+GA combination is ungrammatical, as indicated above.

Let us now return to our experimental findings, and ask why – given the interpretive differences between these two languages in the MP+bare GA constructions – *both* English and Japanese children have difficulty interpreting MP comparatives, and resolve the construction in a similar way. We would like to entertain the possibility here that it is the selectional restrictions of *Meas* that guide children in both languages towards the same non-adult behavior. Specifically, *Meas* (and consequently DegP) in both languages (and perhaps universally) signals the presence of a minimal scalar element. We assume that children are aware of this property of *Meas*. It appears, however, that the most salient minimum value for children—and one that is consistent across contexts—is zero. Thus, despite the presence of comparative morphology in English, and despite the presence of a linguistically explicit standard indicated by a *than/yori* phrase that makes reference to a salient visual standard in the context, children are consistently led by *Meas* to look for a minimal value of bounded, measurable positive degrees: zero.

We assume that English-speaking children correctly interpret the MP comparative as having the structure in (24), but they set the derived minimal element that results from composing the GA with the comparative morpheme to be zero. On the other hand, Japanese children apply adult-like 'scale shift' coercion to the structure in (23), but again set the derived
minimal element to be zero. As a result, they arrive at what appears to be 'the absolute interpretation' time and time again. Under our account, children are not ignoring the comparative force of the test sentences: they have the semantic representation of comparative, but with the wrong value (i.e., zero) for the standard. That is, we are arguing that it is precisely because children have an adult-like syntax-semantics structure for Degree Phrases that they arrive at the non-adult-like interpretations.

This cross-linguistic pattern would suggest that the developmental trajectory would involve children’s recognition at some point (apparently after approximately five years of age) that the contextual standard can—and sometimes should—override absolute zero. When it comes to comparative without a MP (e.g., *X is taller than Y*), there is no push from Meas to look for a minimal value, and what matters is just that the degree represented by X is a greater value than that of Y, or that X exceeds some threshold degree value on the scale that Y does not. Thus, children typically have no difficulty interpreting this construction.

Recall, though, that not every child accessed the Absolute interpretation of the target construction in Experiment 3. Some children accessed the correct Differential interpretation. These children appear to have figured out that the semantics of the target construction makes reference to a derived zero set by the context, rather than absolute zero. What, then, of the children who accessed the Conjunction and Simple Comparative interpretations, or even those
that could not be classified? It is possible that what we are witnessing in these children is the deployment of alternative interpretive strategies in an attempt to reconcile ostensibly conflicting linguistic information under the duress of memory and/or processing limitations.

Take, for example, an English-speaking child who encounters the sentence in (19). Upon hearing the start of this utterance, this child may start building the structure in (23), but when she subsequently encounters the comparative material after the GA, rather than revise her structure (something that requires advances computational capacity), she abandons it for a basic comparative, and renders her judgments on the that structure instead. Likewise, a Japanese-speaking child who encounters (20) might begin by building a basic comparative once she hits the Y-yori material, and then is subsequently unable to revise the structure for one with an MP afterwards. These ‘failures to revise,’ or *kindergarten-path effect* (e.g., Trueswell et al. 1999) could account for the small number of comparative interpretations witnessed in Experiment 3.

(19) \( X \) is # chipanis taller/longer (than \( Y \)).

(20) \( X \)-wa \( Y \)-yori #-kirari takai/nagai.

Failure to revise or properly integrate lexical material could also account for the conjunction pattern observed in the Japanese children in Experiment 3. The child who encounters (20) could begin building a comparative construction, but then encounter the MP and not know
how to incorporate it into the structure already built. The comparative construction and the MP
are then composed in an incorrect way, through conjunction, instead of by incorporating the MP
into DegP, yielding the interpretation that ‘X is taller/longer than Y AND X is #-kirari tall’.

Summarizing, we have determined, through several cross-linguistic experiments, the most
prominent pattern of non-adult interpretations of MP comparatives is the Absolute one, in which
children assign non-comparative interpretations to MP comparative constructions, regardless of
presence/absence of the explicit standard phrase. We then argued that it is the semantics of the
MP that led children to the non-adult behavior. By age 4-5, children have correctly identified the
semantics of Meas and understand that it requires a minimal scalar element, which they often
default to zero. In other words, our account asserts that children's adult-like semantic knowledge
of Meas is the source of the Absolute interpretation.

Under our approach, children are always faithful to the selectional restriction of Meas when
interpreting MP comparatives. This entails that children interpret the MP comparative
constructions compositionally, rather than directly associating MP+comparative combinations as
a whole with a differential interpretation. This point relates to the issue on the nature of the
process of the acquisition of semantics, or form-meaning mapping in general: in particular,
whether the process of associating phrasal ‘constructions’ with their meanings characterizes
young children’s acquisition of semantics, as proposed in some versions of Construction
Grammar (e.g., Goldberg 2006). In the input data, children should encounter utterances that would allow them to associate the relevant phrasal forms with the differential semantics (e.g., hearing “I want one more X” when the speaker has more than one X). Our experimental data suggest that children do not take advantage of such an opportunity. A question that arises here is to what extent this bias towards compositional semantics extends, which we would like to leave for future research.

The crucial component of our account for children’s non-adult-like semantic interpretation is Sawada & Grano’s (2011) assumption on the selectional restriction of *Meas*. This theoretical device was originally proposed to account for a cross-linguistic puzzle in adult language, and we incorporated their insight into child language acquisition research. In this respect, our approach is comparable to previous language acquisition studies that have referred to an independently-proposed theoretical device in order to account for children’s non-adult behavior. For example, Hyams (1986) used the *pro*-drop parameter (e.g., Rizzi 1986) to account for the observation that young English-speaking children often omit the sentential subject. Grodzinsky and Reinhart (1993) and Chien and Wexler (1900) invoked the distinction between bound-variable and coreference, originally proposed by Reinhart (1983), to account for children’s apparent insensitivity to a Condition B violation. Although these approaches have subsequently faced serious challenges (e.g., Valian 1990, Hyams 1992: Conroy et al. 2009), their
contributions are nonetheless invaluable, because they advanced our understandings of the nature of language acquisition and linguistic knowledge, by bringing data from language acquisition research to bear on issues in theoretical linguistics. We hope that our account of children’s interpretation of MP comparatives likewise might engender similar debate and enrich our understanding of the semantics of comparatives and measure phrases.

8. Conclusions

In this paper, we have argued, based on our experimental results on English and Japanese differential comparatives, that children and adults share the same Degree Phrase structure, in which *Meas* selects for *GA* that have a minimal scalar element. As a consequence, children are led to look for a minimum standard, and set the default to zero, thereby resulting in an incorrect, Absolute interpretation of differential comparatives. Regardless of the language they are acquiring, they appear to ignore any linguistic or contextual information that would override this minimal value. Future research may shed further light on this phenomenon by examining the time course of their interpretations and judgments, and expanding the languages under investigation to those such as Spanish, Korean, and Russian, which reflect both the cross-linguistic variability and similarities in the interpretation of MP constructions.
References


Boster, Carole and Stephen Crain. 1993. On children's understanding of *Every* and *Or*. In *Proceedings of Early Cognition and Transition to Language*, University of Texas at Austin.

Chien, Yu-Chin, and Ken Wexler. 1990. Children's knowledge of locality conditions in binding
as evidence for the modularity of syntax and pragmatics. *Language Acquisition* 1, 225-295.


Gor, Vera, and Kristen Syrett. 2015. Picking up after sloppy children: What pronouns reveal


