Speech-Gesture Integration at LF: Evidence from English Demonstrative Degree Modifier *yay*/*yea* and Gestures of Measurement

T. Hendrik Kim
University of California, Los Angeles

Cara Feldscher
Michigan State University

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Abstract

The English demonstrative degree modifier *yay*/*yea*, as in *Adam is yay tall*, must be uttered synchronously with a gesture of measurement. This short paper takes it as evidence that some lexical items must have co-speech gestural information in order to become interpretative, and that in order to account for them, the integration of the information from speech and gesture should be able to take place at the level of Logical Form (LF).

1 Introduction

Co-speech gestures are the non-random, informative hand movements that co-occur with speech (McNeill 1992, 2005), and may present information that is similar to or different than the information from speech. A number of studies have shown that listeners—both adults and children—can integrate speech and gestural information into a unified interpretation (Cassell et al. 1999, Goodrich Smith & Hudson Kam 2012, 2015). The exact timing at which the integration takes place has been debatable (Hadar & Krauss 1999). Based on the nature of the English demonstrative degree modifier *yay*/*yea*, which requires a synchronous gesture of measurement that completes its meaning, this paper suggests that there are lexical items that demand that the integration of speech and gestural information take place at Logical Form (LF).

§2 shows that a distribution of *yay* is different from that of measure phrases like *6 feet*, and further shows that its distribution is also different from that of ordinary demonstratives like *this* in that it is much more restricted in terms of syntax, semantics, and gestural requirement. Based on these observations, §3 develops an analysis of *yay* that accounts for its behavior. §4 concludes.

2 The distribution of *yay*

The earliest mention of *yay* in the literature is by Charles J. Fillmore, in his 1971 Santa Cruz *Deixis Lectures*, in a succinct sentence (Fillmore 1975: 41):

> In English, as far as I can tell, the only word which is obligatorily accompanied by a gesture is the nonstandard size demonstrating word "yea" as in "She's about yea tall".

We believe that Fillmore's observation is correct. However, we believe that there is much more to be said about *yay*, especially with respect to how it compares with its cousin *this* and measure phrases like *6 feet*. In this section, we begin by pointing out the differences between *yay* and *6 feet*, and draw comparisons between *yay* and *this*.

2.1 Comparison with and measure phrases

The element that seems to be intuitively related to *yay* is a phrase that denotes some measure, such as *6 feet*, which we refer to as MEASURE PHRASES.

2.1.1 Similarities

For instance, there are certain positive gradable adjectives, such as *tall*, *long*, and *high*, with which measure phrases are compatible (Schwarzschild 2005). *Yay* is also compatible with them, as in (1).

(1) Fred is { yay / 6 feet } tall.

Also, both measure phrases and *yay* are quite odd with absolute adjectives, as in (2).

(2) *This rod is { yay / 2 degrees } straight.

Moreover, like measure phrases, *yay* is incompatible with *very*, as in (3).

(3) a. *Fred is { very yay / yay very } tall.

b. Fred is { ??very 6 feet / *6 feet very } tall.

c. Fred is { very very / very terribly } tall.

2.1.2 Differences

Nevertheless, many of the positions in which measure phrases normally appear are the places in which *yay* cannot occur: *yay* is unable to modify any non-adjectival expressions. First, *yay* cannot modify prepositional phrases (PPs) as in (4), including locative PPs headed by *above* or *below* (or *under*) as in (5).

(4) Andrew's desk is { *yay / 10 inches } [$_{PP}$ from Cara's desk].

(5) a. The pigeon flew past { *yay / 5 inches } [$_{PP}$ above my head].

b. My bed is { *yay / 2 feet } [$_{PP}$ below/under Jensen's].

Second, *yay* cannot modify adverbs as in (6), cf., *far* in (7).

(6) Andrew's desk is { *yay / 10 inches } [$_{Adv}$ away] from Cara's desk.

(7) Andrew's desk is { ?yay / 10 inches } [$_{A}$ far] from Cara's desk.

Third, *yay* cannot modify measure nouns as in (8).

(8) a. *Andrew's desk is yay inches away from Cara's desk.

b. *The pigeon flew past yay inches above my head.

c. *My bed is yay feet below Jensen's.

Another striking contrast between measure phrases and *yay* is found in differential comparatives. And here, we also found a potential dialectal/lexical difference between two groups of speakers. To form differential comparatives, speakers naturally use measure phrases. However, *yay* cannot appear in the positions in which measure phrases occur in differentials, as in (9).

(9) a. This boat is { one foot / *yay } bigger than that boat.

b. Finn is { one foot / *yay } taller than Jake.

c. This skirt is { 5 inches / *yay } longer than that skirt.

The group of speakers who judged *yay -er* in (9) ungrammatical uniformly accepted *yay much -er* in (10) as a grammatical form.

(10) a. Fred is $\left\{ \begin{array}{l} *5 \text{ inches} \\ \text{yay} \end{array} \right\}$ much taller/shorter than Alex.[1]

b. Abe has grown $\left\{ \begin{array}{l} *10 \text{ inches} \\ \text{yay} \end{array} \right\}$ much since (October).

c. The sugar is stored $\left\{ \begin{array}{l} *\text{a foot} \\ \text{yay} \end{array} \right\}$ much above/under the flour.

However, the other group of speakers had the exactly opposite pattern of judgment: They judged *yay -er* grammatical but judged *yay much -er* ungrammatical.[2] We will leave the explanation of this dialectal difference to future research, and will assume the dialect that accepts *yay much -er* but does not accept *yay -er* as a grammatical form for the rest of this paper. Nonetheless, both group of speakers deem *this much* perfectly acceptable as in (11), regardless of whether they like *yay much -er* in (10).

(11) a. This boat is this much bigger than that boat.

b. Finn is this much taller than Jake.

c. This skirt is this much longer than that skirt.

We can still find at least three more differences between measure phrases and *yay*. First, in *too*-differentials, as in (12), measure phrases can appear with *too* but *yay* cannot.

(12) a. This boy is $\left\{ \begin{array}{l} 10 \text{ inches} \\ *\text{yay} \end{array} \right\}$ too tall (for a 5-year-old).

b. This skirt is $\left\{ \begin{array}{l} 5 \text{ inches} \\ *\text{yay} \end{array} \right\}$ too long (for a miniskirt).

c. This puppy is $\left\{ \begin{array}{l} 10 \text{ inches} \\ *\text{yay} \end{array} \right\}$ too small (for a Golden Retriever).

Second, measure phrases can, but *yay* cannot, independently appear in a *than*-clause in simple comparatives, as in (13), cf. (14).

(13) a. This boat is bigger than $\left\{ \begin{array}{l} 6 \text{ feet} \\ *\text{yay} \end{array} \right\}$.

b. Finn is taller than $\left\{ \begin{array}{l} 4 \text{ feet} \\ *\text{yay} \end{array} \right\}$.

c. This skirt is longer than $\left\{ \begin{array}{l} 8 \text{ inches} \\ *\text{yay} \end{array} \right\}$.

(14) a. This boat is more than yay big.

b. Finn is more than yay tall.

[1] Among those speakers who judged *yay much -er* grammatical, some suggested *Fred is taller/shorter by yay much than Alex* as a preferred form for *Fred is yay much taller/shorter than Alex* in (10a).

[2] We found a near 50:50 split among the speakers we consulted.

c. This skirt is more than yay long.

Third, measure phrases are incompatible with negative gradable adjectives, although *yay* is, as in (15).

(15) a. Becca is { *4 feet / yay } short.

b. My puppy is { *one foot / yay } small.

2.2 Comparison with *this*

2.2.1 Gestural differences

Speakers use deictic gestures during discourse to inform participants of the relation between indexicals and their referents. Demonstratives like *this* belong to the category of indexicals (Kaplan 1989).

A pair of sentences in (16) shows that both *this* and *yay* can appear preadjectivally and can modify the degree of tallness that is associated with an individual, mapping it to what is gestured.[3]

(16) a. Adam is yay tall.

b. Adam is this tall.

At first blush, *this* and *yay* in degree modification as in (16) appear to serve a very similar function. However, *this* differs from *yay* in a number of different, and interesting ways. Upon closer inspection, we find that *yay* has much more restricted distribution than the demonstrative *this* with respect to the types of gestures and adjectives with which it can be used.

Most prominently, while utterances with *yay* must be accompanied by gestures illustrating a measurement of the dimension of the object under discussion, which we refer to as GESTURES OF MEASUREMENT, as in Figure 1, *this* can be used without gesture or can be accompanied either by pointing gestures or by gestures of measurement.

The measurement of some dimension approximately corresponds to the size of the gap between two hands in Figure 1-(a). The size of the gap could be easily understood if we draw an imaginary line from one hand to the other. This gesture type naturally occurs in utterances with adjectives like *big* and *long*, and therefore the gap in this gesture typically measures length and width.

In contrast, the gesture in Figure 1-(b) is typically associated with the measurement of height, as it appears with adjectives like *tall* and *high*. Height is designated almost always by a single-handed gesture, in which case the gesturing hand corresponds to the upper limit of the gap and the base to the lower limit of the gap, or vice versa. Since

[3]All data in this paper were judged for acceptability by multiple native speakers of American English, and unless otherwise stated, all judgments for *yay* are for a context involving a specific accompanying gesture along the lines to be discussed.

(a) *yay big* or *yay long*

(b) *yay tall* or *yay high*

Figure 1: Gestures of measurement associated to (a) and (b).

height is measured from base to top or from head to foot, the base (for example, the floor) is the ubiquitously understood lower or upper limit of the gap associated with height.[4] In other words, the gesture in Figure 1-(b) and like measure the gap between the base and the gesturing hand.

Importantly, pointing is not a compatible associated gesture in utterances with *yay*.[5] Only exceptional case which allows pointing gestures to accompany *yay* is where the size of the gap associated to the dimension of the object under discussion is so small that both upper and lower limits of the gap associated with size could be clearly identified within the focal point in visual field, which the speaker indicates with the pointing gesture.

For instance, discourse participants can get a reasonably good understanding of the measurement of an object from pointing with utterances in (17) if the referent of the pointing gesture is reasonably far away from the participants of the conversation such that the size of the gap for the referent can be recognized within the gesturally indicated point in the field of vision with clarity.

(17) a. My house is $\left\{ \begin{array}{l} \text{this/that} \\ \text{yay} \end{array} \right\}$ big.

b. The tree is $\left\{ \begin{array}{l} \text{this/that} \\ \text{yay} \end{array} \right\}$ tall.

On the other hand, *this* is not only compatible with pointing and the gestures in Figure 1 but it also allows a number of different gestures with which *yay* is incompatible, including

[4]We did not find a similar default limit for length and width. For instance, a nearby-wall cannot be the lower or upper limit of the gap associated with length and width; each hand must each refer to either the lower or upper limit of the gap.

[5]It appears that while *yay* requires its co-speech gesture to designate a specific dimension for interpretability, *this* allows the freedom of interpretation. The following example demonstrates this fact:

(i) Context: I want to describe the width of my kitchen table. There happens to be a kitchen table in front of me that bears a close resemblance to mine. So, I say...

a. My kitchen table is **this** long.
✓(a) *while pointing* / ✓(b) *while making a sweeping gesture*

b. My kitchen table is **yay** long.
?#(a) *while pointing* / ✓(b) *while making a sweeping gesture*

emotive, exaggerative gestures in which both arms are fully extended.

For instance, in (18a), the referent of *this* can range from an expressive content to a precise degree of size, depending on the type of gestures. If *this* is focused, and possibly emphatically vowel-lengthened, as in (18b), only exaggerative gestures can co-occur. On the other hand, *yay* can only be accompanied by gestures of measurement, as in (18c), regardless of whether it is focused and/or emphatically vowel-lengthened, as in (18d).

(18) a. The spider was this big. (✓exaggerative, ✓measurement)
b. The spider was THI(IIIIII)S big! (✓exaggerative, *measurement)
c. The spider was yay big. (*exaggerative, ✓measurement)
d. The spider was YA(AAAAAA)Y big! (*exaggerative, ✓measurement)

Also, in the conversation in (19), *this* can be used without gesture to mean that the extent to which Jill's apartment is cold equates to the temperature of the building Jack and Jill are in.

(19) Jack: This building is freezing.
Jill: My apartment is this cold.

In these examples, the lexical semantics of demonstratives per se neither specifies nor restricts the possible referents. This property of *this* is in stark contrast with the property of *yay*. For both *this* and *yay*, the use of gestures during discourse makes the referent known. However, only *yay* restricts the range of possible referents.

2.2.2 Semantic differences

Now we turn to the semantic differences between *this* and *yay*. First, while *this* can appear with adjectives that are not associated with size, such adjectives are not compatible with *yay*, as shown in (20).[6]

(20) a. She is $\left\{\begin{array}{l}\text{this}\\ \text{*yay}\end{array}\right\}\left\{\begin{array}{l}\text{old}\\ \text{drunk}\\ \text{cute}\end{array}\right\}$.

b. A Porsche is $\left\{\begin{array}{l}\text{this}\\ \text{*yay}\end{array}\right\}\left\{\begin{array}{l}\text{fast}\\ \text{expensive}\\ \text{cool}\end{array}\right\}$.

c. This soup is $\left\{\begin{array}{l}\text{this}\\ \text{*yay}\end{array}\right\}\left\{\begin{array}{l}\text{cold}\\ \text{spicy}\\ \text{delicious}\end{array}\right\}$.

Not only do adjectives that express size-related information accompany *yay* naturally, but the individual argument of such adjectives are also limited to physical objects that can be measured along certain dimensions in physical space, as in (21).

[6]Klipple & Gurney (2002: 373) mention *yay*'s s-selectional restriction on adjectives, but not the one on the subject of adjectives.

(21) a. { *The request / Julie / The glass } is (about) yay tall.

b. { *The price of oil / %The glass ceiling / The cliff/shelf/hook } is yay high.

c. { *The class / *From 4pm to 6pm / The ruler/skirt/trail } is yay long.

d. { *The wage gap / *His ambition / *My fear of spiders / Tom / The cake/table/boat/human heart } is yay big.

A metaphorical item, such as *the glass ceiling* in (21b), forces a reading of the height of a physical glass ceiling instead of the intended commentary.

On the contrary, all of the infelicitous utterances in (21) would be acceptable if *this*, often accompanied by emotive and exaggerative gestures, were used as a substitute for *yay*. And if so, they would lead to interpretations associated to the degree of emotive intensity with respect to the dimension of adjectives, as expressives (Kratzer 1999, Potts 2007) do.

Second, while *this* is compatible with absolute gradable adjectives, *yay* is not, as in (22).

(22) a. The rod is { this / *yay } { bent / straight }.

b. The door is { this / *yay } { open / closed }.

There are two classes of absolute adjectives: minimum standard and maximum standard absolute adjectives (Kennedy 2007). The former requires an object with a smallest qualifying level of the property of the adjective as an argument, and for the latter, arguments have to bear a greatest possible level of the property associated with the adjective.

The two minimum standard absolute adjectives, *bent* in (22a) and *open* in (22b), are acceptable in utterances with *this* accompanied by a gesture, in which two hands touch together to illustrate a measurement of angle to which an object is bent or open. On the other hand, emotive and exaggerative gestures can accompany the maximum standard absolute adjectives with *this*, such as *this straight* in (22a) and *this closed* in (22b), leading to the interpretation similar to that of *very straight* and *very closed*.

Lastly, there is a syntactic distributional difference between *this* and *yay*: Only *this* has adnominal and pronominal uses, as in (23).

(23) a. { This / *Yay } man is on fire.

b. I am busy { this / *yay } week.

c. { This / *Yay } is the captain speaking.

d. Listen to { this / *yay } .

2.3 Vagueness and *yay*

The intuition shared by many consulted speakers is that the measurement that *yay* conveys always appears to be uncertain. Whether this uncertainty comes from imprecision (Lasersohn 1999) or vagueness (e.g. Kennedy 2007) can be diagnosed. Vague predicates can be a complement of *seem* but imprecise predicates cannot (Matushansky 2002: 253), as in (24).

(24) a. Jake seems tall.

b. *Jake seems 6 feet tall.

Furthermore, the amount of imprecision can be restricted by "slack regulators", in the sense of Lasersohn (1999), like *precisely*, as in (25).

(25) a. Jake is precisely 6 feet tall.

b. *Jake is precisely tall.

Applying these tests, as in (26), we can conclude that utterances with *yay* are vague, not imprecise.

(26) a. Jake seems yay tall.

b. *Jake is precisely yay tall.

The example in (26a) shows that *yay tall* can be a complement of *seem*, and the example in (26b) shows that slack regulators cannot combine with *yay tall*.[7]

Based on these data, we present the analysis of *yay* in the following section.

3 The analysis

There are three important facts that an adequate analysis of *yay* should capture:

(27) a. *yay* always appears to the left of an adjective or *much*.

b. *yay* can only appear with adjectives that express size-related information, whose subjects are physical objects with measurable dimensions.

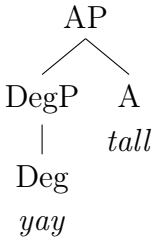
c. *yay* requires a co-speech gesture of measurement.

[7] On the other hand, *precisely* can appear with *this tall*, where *this* is accompanied by a co-speech gesture, as in *Jake is precisely this tall.*

3.1 The syntax of *yay*

As for the first fact that we should account for, that *yay* always appears immediately to the left of an adjective or *much*, we propose that this follows because *yay* is the head of a DegP. The tree in (28) illustrates the structure of *yay tall* as an example.[8]

(28)



There are plenty of evidences for our claim. We list a few crucial ones. First, *yay* is in complementary distribution with the elements that are conventionally regarded as the head of a DegP, such as *-er* in (29a), *very* in (29b), *so* in (29c), and *too* in (29d).

(29) a. *Finn is yay taller than Jake.

b. *Karen is { yay very / very yay } tall.

c. *Mulder is { yay so / so yay } tall.

d. *Dana is { yay too / too yay } tall.

Second, like other Deg heads, *yay* is an affix and needs to be spelled out with adjectives or *much*/*many*, as in (30), cf. (31).[9]

(30) *Charlie is taller than yay.

(31) a. ?Charlie is taller than yay much.

b. Charlie is more than yay tall.

3.2 The semantics of *yay*

We propose that the remaining two facts in (27) follow from the semantics of *yay*, which we develop in this section.

Yay can only appear with adjectives that express size-related information, such as *tall*, *high*, *long*, and *big*, as in (32) (as discussed in §2.2.2). These adjectives are members

[8] We follow the revised classical view of DegP along the lines of Bhatt & Pancheva (2004), where DegP is an argument of the gradable predicate.

[9] For some speakers, *yay* is also compatible with *many*:

(i) a. ??I have yay many papers to read.

b. ??There are yay many things that I want to buy.

of the class of adjectives called DIMENSIONAL ADJECTIVES (Bierwisch & Lang 1989). As the name suggests, each dimensional adjective is associated with certain dimensions. For instance, *tall* and *heavy* are associated with the dimensions of height and weight.

(32) a. My cousin is yay {tall/short/high/big/small}.
b. *My cousin is yay {old/drunk/cute/fast/heavy}.

To encode the dimensional sensitivity of *yay*, we assume that *yay* makes use of the function **dim** (dimensions) that maps expressions to sets of their related dimensions (Morzycki 2012). For instance:

(33) a. **dim**(high) = {**height**}
b. **dim**(long) = {**length**}
c. **dim**(big) = {**length**,**width**,**height**,...}

Especially, we assume that *yay* only selects the adjectives which are related to dimensions **length**, **width**, or **height**. The evidence for this comes from the examples like the following:

(34) The box is yay full.

The intuition is that (34) does not describe the volume of the box, but rather the height to which the inside of the box is full. This suggests that *yay*-expressions encode dimensions related to one- and two-dimensional space, but not three-dimensional space.

We propose the denotation for *yay* in (35).[10]

(35) $[\![\text{yay}]\!] = \lambda G_{\langle d,et\rangle} : \mathbf{l} \vee \mathbf{w} \vee \mathbf{h} \in \mathbf{dim}(G).\lambda x.\ \mathbf{max}\{d : G(d)(x)\} = d_\gamma$,
where **l** stands for **length**, **w** for **width**, and **h** for **height**, and d_γ is the free degree variable designated by a gesture of measurement in the context of utterance.

Since *yay* is a degree modifier, the head of a DegP, we assume that it is a function of type $\langle\langle d, et\rangle, et\rangle$. In prose, (35) says that the largest degree in the set of degrees associated with the gradable adjective G is equal to the degree designated by a co-speech gesture of measurement. Given that the domain of $[\![\text{yay}]\!]$ is restricted to the subset of gradable adjectives of type $\langle d, et\rangle$, which are associated with the dimensions **length**, **width**, or **height**, we may further succinctly say that (35) expresses the gesturally-designated maximal degree to which x is long, wide, or high.[11]

[10]The maximality operator **max** yields the largest degree in D, a set of degrees, as defined below (Heim 2000: 42):

(i) $\mathbf{max}(D) \stackrel{\text{def}}{=} \iota d[D(d) = 1 \wedge \forall d'[D(d') = 1 \rightarrow d' \leq d]]$

[11]One may fully understand the specific size conveyed via *yay* with a gesture of measurement in terms of real world imagery, while not knowing an equivalent numerical value of units on a spatial scale, such as *feet*. Clarification questions illustrate this fact. Following a *yay*-demonstration of height, as in *Jordan is yay tall*, one can respond with: *yeah, but how tall is that (in feet)?* Following a measure phrase height indication, one can instead ask: *yeah, but how tall is 6 feet?* The former indicates that a specific measurement in terms of *feet* is wanted, whereas the latter indicates that a visual approximation indicating the relevant interval for comparison is wanted.

Composition of *yay* with *tall* yields (36) as the denotation for *yay tall*.[12]

(36) $[\![\text{yay}]\!]([\![\text{tall}]\!]) = \lambda x : \mathbf{l} \vee \mathbf{w} \vee \mathbf{h} \in \mathbf{dim}(\text{tall}).\ \mathbf{max}\{d : \mathbf{height}(x) \geq d\} = d_\gamma$

So, the co-speech gesture of measurement determines the largest degree to which x is tall. In this sense, that *yay* must be accompanied by a co-speech gesture of measurement follows from the fact that gestures of measurement are required to determine d_γ, whose identity is necessary to calculate the highest degree of length/width/height of an object. At the same time, this context-dependency explains the fact that utterances with *yay* are vague, as discussed in §2.3.

On the other hand, the dimensional sensitivity of *yay* that is implemented in terms of the restricted domain of $[\![\text{yay}]\!]$, accounts for why *yay* is incompatible with the adjectives that are not related to the dimensions **length**, **width**, or **height**. So, *yay cold* is ruled out because the adjective *cold* is not associated with **length**, **width**, or **height**, but is associated with **temperature**:

(37) a. *The soup is yay cold.
b. $\mathbf{dim}(\text{cold}) = \{\mathbf{temperature}\}$

And naturally, the individuals that such adjectives map to their respective degrees must be able to be associated with the dimension that the adjective is associated with. Since *the request* in **The request is yay tall* is not related to the (non-metaphoric) dimension **height**, with which *tall* is associated, the measure function **height** cannot yield the relevant highest degree of height for *the request*:

(38) a. *The request is yay tall.
b. 1 iff $\mathbf{max}\{d : \mathbf{height}(\mathbf{the.request}) \geq d\} = d_\gamma$

This also explains why *yay* is not compatible with absolute gradable adjectives. For instance, in (39), since the adjective *open* is associated with **angle**, rather than **length**, **width**, or **height**, as in *The door is 90 degrees open*, *open* is not in the domain of $[\![\text{yay}]\!]$ and renders (39) unacceptable:

(39) a. *The door is yay open.
b. $\mathbf{dim}(\text{open}) = \{\mathbf{angle}\}$

4 Conclusion

In this paper, we presented a novel analysis of the syntax and semantics of English demonstrative degree modifier *yay*, which accounted for its properties and distribution.

[12] We are assuming that gradable adjectives are functions of type $\langle d, et\rangle$. For instance, the denotation of *tall* is defined in the following way:

(i) $[\![\text{tall}]\!] = \lambda d \lambda x.\ \mathbf{height}(x) \geq d$,
where **height** is a measure function that maps individuals to their highest degree of height.

The crucial aspect of our analysis is that the lexical semantics of *yay* requires a co-speech gesture of measurement for interpretability. The fact that there is a lexical item which imposes a specific requirement on its co-speech gesture strongly suggests that the integration of, at least some, speech and gestural information takes place at LF with respect to the Minimalist T-Model of grammar (Chomsky 1995).

References

Bhatt, Rajesh & Roumyana Pancheva. 2004. Late Merger of Degree Clauses. *Linguistic Inquiry* 35. 1–45.

Bierwisch, Manfred & Ewald Lang (eds.). 1989. *Dimensional Adjectives: Grammatical Structure and Conceptual Interpretation*. Berlin: Springer-Verlag.

Cassell, Justine, David McNeill & Karl-Erik McCullough. 1999. Speech-gesture mismatches: Evidence for one underlying representation of linguistic and nonlinguistic information. *Pragmatics and Cognition* 7(1). 1–34.

Chomsky, Noam. 1995. *The Minimalist Program*. Cambridge, MA: MIT Press.

Fillmore, Charles J. 1975. *Lectures On Deixis 1971*. Indiana University Linguistics Club.

Goodrich Smith, Whitney & Carla L. Hudson Kam. 2012. Knowing 'who she is' based on 'where she is': The effect of co-speech gesture on pronoun comprehension. *Language and Cognition* 4(2). 75–98.

Goodrich Smith, Whitney & Carla L. Hudson Kam. 2015. Children's use of gesture in ambiguous pronoun interpretation. *Journal of Child Language* 42. 591–617.

Hadar, Uri & Robert K. Krauss. 1999. Iconic gestures: the grammatical categories of lexical affiliates. *Journal of Neurolinguistics* 12(1). 1–12.

Heim, Irene. 2000. Degree Operators and Scope. In Brendan Jackson & Tanya Matthews (eds.), *Proceedings of SALT X*, 40–64. CLC Publications.

Kaplan, David. 1989. Demonstratives. In Joseph Almog, John Perry & Howard Wettstein (eds.), *Themes from Kaplan*, 481–563. New York: Oxford.

Kennedy, Christopher. 2007. Vagueness and grammar: the semantics of relative and absolute gradable adjectives. *Linguistics and Philosophy* 30. 1–45.

Klipple, Elizabeth & John Gurney. 2002. Some Observations on Deixis to Properties. In Kees van Deemter & Rodger Kibble (eds.), *Information Sharing: Reference and Presupposition in Language Generation and Interpretation*, 355–390. Stanford: CSLI.

Kratzer, Angelika. 1999. Beyond *ouch* and *opps*: How descriptive and expressive meaning interact. A comment on David Kaplan's paper, Cornell Conference on Theories of Context Dependency.

Lasersohn, Peter. 1999. Pragmatic Halos. *Language* 75. 522–551.

Matushansky, Ora. 2002. Tipping the scales: The syntax of scalarity in the complement of *seem*. *Syntax* 5(3). 219–276.

McNeill, David. 1992. *Hand and Mind: What Gestures Reveal about Thought*. Chicago: University of Chicago Press.

McNeill, David. 2005. *Gesture and Thought*. Chicago: University of Chicago Press.

Morzycki, Marcin. 2012. The Several Faces of Adnominal Degree Modification. In Jaehoon Choi, E. Alan Hogue, Jeffrey Punske, Deniz Tat, Jessamyn Schertz & Alex Trueman (eds.), *Proceedings of the 29th West Coast Conference on Formal Linguistics*, 187–195. Somerville, MA: Cascadilla Proceedings Project.

Potts, Christopher. 2007. The expressive dimension. *Theoretical Linguistics* 33. 165–198.

Schwarzschild, Roger. 2005. Measure phrases as modifiers of adjectives. *Recherches linguistiques de Vincennes* 34. 207–228.