

# Semantically-constrained gestures: A case study of English *yay* (*yea*)

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ECOM Workshop on Pointing and Gestural Communication  
March 7, 2015

## Introduction

### Data

'yay' v. 'this'

'yay' v. measure phrases

### Analysis

Background

The semantics of 'yay'

### Conclusion

## Speech and gesture

- ▶ The information from speech and gesture leads to a unified interpretation (Cassell et al 1999, Singer & Goldin-Meadow 2005, Smith & Kam 2012, Smith & Kam 2015)
- ▶ The level at which the integration takes place has been debatable (McNeill 1992 & 2005, Hadar & Krauss 1999)

## The semantics of *yay* informs us of the timing of the integration

- ▶ The interpretation of an indexical degree-modifier *yay* is incomplete without a specific synchronous gesture
- ▶ Which gestural information to incorporate for *yay*'s interpretation is encoded in the lexicon
- ▶ The integration of speech and gesture must be done at the level of Logical Form

## A demonstrative *this* in degree modification

- ▶ *this*: compatible with both pointing and “measure gestures”

(1) The box is *this* big.

- ▶ *yay*: compatible only with “measure gestures”

(2) The box is *yay* big.



## Adnominal & pronominal uses

- (3) a.  $\left\{ \begin{array}{l} \text{This} \\ *Yay \end{array} \right\}$  man is on fire.
- b. I am busy  $\left\{ \begin{array}{l} \text{this} \\ *yay \end{array} \right\}$  week.
- c.  $\left\{ \begin{array}{l} \text{This} \\ *Yay \end{array} \right\}$  is the captain speaking.
- d. Listen to  $\left\{ \begin{array}{l} \text{this} \\ *yay \end{array} \right\}$  .

## Associated gestures

### “Measure gestures”

- ▶ Utterances with *yay* must be accompanied by gestures illustrating a measurement of the dimension of the object under discussion



Figure: *yay big* or *yay long*



## Associated gestures (cont.)

- ▶ Utterances with *yay* must be accompanied by gestures illustrating a measurement of the dimension of the object under discussion



Figure: *yay tall* or *yay high*

## Pointing

Pointing is not a compatible associated gesture in utterances with *yay*

- (4) 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.

- ▶ ✓ *this/that* (pointing)
- ▶ \**yay* (pointing)

## Pointing (cont.)

Pointing is also okay with the eyes or a head movement

- (5) a. My chair at home is this big.  
b. My podium at Rutgers is this high.

## Absence of gesture

- (6) a. Hendrik: This building is freezing.  
b. Cara: My apartment is *this* cold.
- ▶ ✓ *this* (sans gesture)
  - ▶ ✓ *this* (“emotive gestures”)

## “Abstract adjectives”

- ▶ Adjectives associated with the scale of abstract measurement are not compatible with *yay*
- ▶ *This* can occur with abstract adjectives

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

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

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

## Physicality restriction on arguments of adjectives

- ▶ Adjectives that can be associated with the scale of physical measurement naturally accompany *yay*
- ▶ Their arguments require to be imaginable physical objects in the field of vision for the participants in the conversation

## Physicality restriction on arguments of adjectives (cont.)

- (8) a.  $\left\{ \begin{array}{l} *The\ price\ of\ oil \\ *The\ glass\ ceiling \\ The\ cliff \\ The\ shelf \\ The\ hook \end{array} \right\}$  is yay high.
- b.  $\left\{ \begin{array}{l} *The\ wage\ gap \\ *Ambition \\ *My\ fear\ of\ spiders \\ Tom \\ The\ cake \\ The\ table \\ The\ boat \\ The\ human\ heart \end{array} \right\}$  is yay big.

## Emotive and exaggerative gestures

Only *this* permits the use of emotive and exaggerative gestures

- (9) The spider was THIS big! (✓exaggerative, \*size)
- (10) The spider was yay big! (\*emotive/exaggerative, ✓size)



## Absolute gradable adjectives

- ▶ Yay is not compatible with absolute gradable adjectives

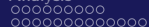
(11) a. The rod is  $\left\{ \begin{array}{l} \text{this} \\ *yay \end{array} \right\} \left\{ \begin{array}{l} \text{bent} \\ \text{straight} \end{array} \right\} .$

b. The door is  $\left\{ \begin{array}{l} \text{this} \\ *yay \end{array} \right\} \left\{ \begin{array}{l} \text{open} \\ \text{closed} \end{array} \right\} .$

- ▶ Max. std. adj. (*straight, closed*): ✓ *this* (emotive gestures)
- ▶ Min. std. adj. (*bent, open*): ✓ *this* (angled hands)

# Summary

	<i>yay</i>	<i>this</i>
Has adnominal & pronominal uses	X	✓
Used with pointing	X	✓
Used without gesture	X	✓
Modifies abstract adjectives	X	✓
Takes abstract arguments	X	✓
Used with emotive & exaggerative gesture	X	✓
Modifies absolute adjectives	X	✓
Modifies physical adjectives with physical arguments	✓	✓
Used with measure gesture	✓	✓



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## yay v. measure phrases

- ▶ Measure phrase: a phrase that denotes some measure
- ▶ e.g. *6 feet*

- (12) a. Bill is 6 feet tall.
- b. Bill is  $\left\{ \begin{array}{l} \text{yay} \\ \text{this} \end{array} \right\}$  tall.

- ▶ *yay* is unable to modify any non-adjectival expressions

# \*yay P

yay cannot modify prepositions

(13) Andrew's desk is  $\left\{ \begin{array}{l} *yay \\ 10 \text{ inches} \end{array} \right\}$  [<sub>P</sub> from] Cara's desk.

(14) a. The pigeon flew past  $\left\{ \begin{array}{l} *yay \\ 5 \text{ inches} \end{array} \right\}$  [<sub>PP</sub> above my head].

b. My bed is  $\left\{ \begin{array}{l} *yay \\ 2 \text{ feet} \end{array} \right\}$  [<sub>PP</sub> below/under Jensen's].

## \*yay Adv

yay cannot modify adverbs

(15) Andrew's desk is  $\left\{ \begin{array}{l} *yay \\ 10 \text{ inches} \end{array} \right\}$  [*Adv* away] from Cara's desk.

(16) Andrew's desk is  $\left\{ \begin{array}{l} ?yay \\ 10 \text{ inches} \end{array} \right\}$  [*A* far] from Cara's desk.

# \*yay N

yay cannot modify measure nouns

- (17) 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.

## \*yay -er than

yay cannot appear in the positions where MPs occur in differentials

(18) a. This boat is  $\left\{ \begin{array}{l} \text{one foot} \\ *yay \\ *very \end{array} \right\}$  bigger than that boat.

b. Finn is  $\left\{ \begin{array}{l} \text{one foot} \\ *yay \\ *very \end{array} \right\}$  taller than Jake.

c. This skirt is  $\left\{ \begin{array}{l} \text{5 inches} \\ *yay \\ *very \end{array} \right\}$  longer than that skirt.



## ✓ *yay much -er than*, and dialectal difference

- (19) a. Fred is  $\left\{ \begin{array}{l} *5 \text{ inches} \\ \text{yay} \\ \text{very} \end{array} \right\}$  much taller/shorter than Alex.
- b. Abe has grown  $\left\{ \begin{array}{l} *10 \text{ inches} \\ \text{yay} \\ \text{very} \end{array} \right\}$  much since (October).
- c. The sugar is stored  $\left\{ \begin{array}{l} *a \text{ foot} \\ \text{yay} \\ \text{very} \end{array} \right\}$  much above the flour.

✓ *this much -er than* sans dialectal difference

- (20)
- 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.

## \*yay too-differentials

Measure phrases can appear with *too* but *yay* cannot

- (21) a. This boy is  $\left\{ \begin{array}{l} 10 \text{ inches} \\ *yay \end{array} \right\}$  too tall (for a 5-year-old).
- b. This skirt is  $\left\{ \begin{array}{l} 5 \text{ inches} \\ *yay \end{array} \right\}$  too long (for a miniskirt).
- c. This puppy is  $\left\{ \begin{array}{l} 10 \text{ inches} \\ *yay \end{array} \right\}$  too small (for a Golden Retriever).

## \**than yay*

Measure phrases can, but *yay* cannot, independently appear in a *than*-clause in simple comparatives

- (22) a. This boat is bigger than  $\left\{ \begin{array}{l} 6 \text{ feet} \\ *yay \end{array} \right\}$ .
- b. Finn is taller than  $\left\{ \begin{array}{l} 4 \text{ feet} \\ *yay \end{array} \right\}$ .
- c. This skirt is longer than  $\left\{ \begin{array}{l} 8 \text{ inches} \\ *yay \end{array} \right\}$ .

## \*MP negative adjectives

Measure phrases are incompatible with negative gradable adjectives, although *yay* is

(23) a. Becca is  $\left\{ \begin{array}{l} *4 \text{ feet} \\ \text{yay} \\ \text{very} \end{array} \right\}$  short.

b. My puppy is  $\left\{ \begin{array}{l} *one \text{ foot} \\ \text{yay} \\ \text{very} \end{array} \right\}$  small.

## Similarities

Nevertheless, *yay* and measure phrases sometimes do behave similarly

- ▶ There are certain positive gradable adjectives, such as *tall*, *long*, and *high*, with which measure phrases are compatible (Schwarzschild 2005)

(24) Fred is  $\left\{ \begin{array}{l} \text{yay} \\ 6 \text{ feet} \end{array} \right\}$  tall.

## Similarities (cont.)

Also, both *yay* and measure phrases are quite odd with absolute adjectives

(25) \*This rod is  $\left\{ \begin{array}{l} \text{yay} \\ 2 \text{ degrees} \end{array} \right\}$  straight.

# Summary

	yay	MP
Modifies prepositions	X	✓
Modifies adverbs	X	✓
Modifies measure nouns	X	✓
Appears in differentials	X	✓
Appears in <i>too</i> -differentials	X	✓
Appears in a <i>than</i> -clause	X	✓
Appears with <i>much</i>	✓	X
Modifies negative gradable adjectives	✓	X
Modifies certain positive gradable adjectives	✓	✓
Modifies absolute gradable adjectives	X	X



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## A semantic ontology with degrees

- ▶ “Degrees” are objects in our semantic ontology, like individuals and truth-values (Seuren 1973, Cresswell 1976, von Stechow 1984, Kennedy 1997, Schwarzschild & Wilkinson 2002, a.m.o.)

## Gradable adjectives relate individuals to degrees

(26) Johnny Depp <sub>$d_2$</sub>  is **taller** than Jack Black <sub>$d_1$</sub> .

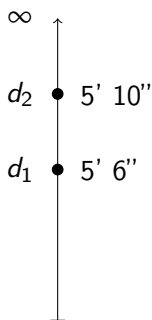


Figure: *height-scale with tall-ordering*

## Gradable adjectives relate individuals to degrees

(27)  $\exists d_2 \exists d_1 [\text{height}(\text{Johnny}, d_2) \wedge \text{height}(\text{Jack}, d_1) \wedge d_2 > d_1]$

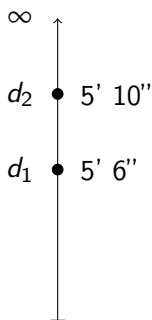


Figure: *height*-scale with *tall*-ordering

## Gradable adjectives relate individuals to degrees

(28) Jack Black <sub>$d_1$</sub>  is **shorter** than Johnny Depp <sub>$d_2$</sub> .

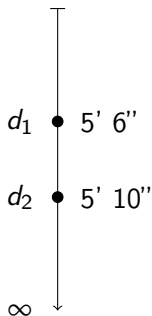


Figure: *height*-scale with **short**-ordering

## Gradable adjectives relate individuals to degrees

$$(29) \quad \exists d_2 \exists d_1 [\text{height}(\text{Johnny}, d_2) \wedge \text{height}(\text{Jack}, d_1) \wedge d_2 > d_1]$$

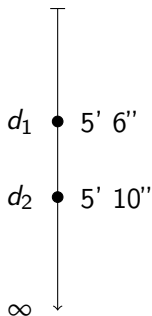


Figure: *height*-scale with **short**-ordering

MP describes a gap between two points on a scale

(30) Johnny Depp is **5 feet 10 inches** tall.

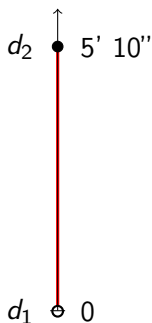


Figure: *height-scale with tall-ordering*

MP describes a gap between two points on a scale

$$(31) \quad \{d : 5'10'' \geq \text{height}(\text{Johnny}) > 0\}$$

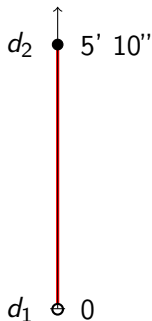


Figure: *height-scale with tall-ordering*



MP describes a gap between two points on a scale

$$(32) \quad \exists I [I = \{d : 5'10'' \geq \mathbf{height}(\mathbf{Johnny}) > 0\}]$$

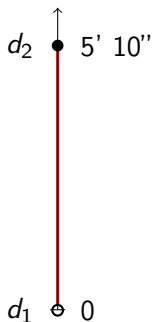


Figure: *height-scale with tall-ordering*

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# Measure gestures assign values to free variables for UB & LB

The adjective provides an interval on the scale

- (33) #The ruler is yay<sub>[no gesture]</sub> long.  
 1 iff  $\exists I [I = \{d : \mathbf{length}(\mathbf{ruler}) \geq d\}]$

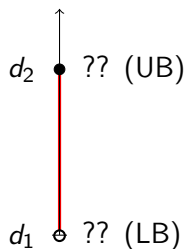


Figure: *length*-scale with *long*-ordering



# Measure gestures assign values to free variables for UB & LB

The gesture supplies the values for the free degree variables

(35) The ruler is  $\text{yay}_{[\text{gesture}]}$  long.

1 iff  $\exists I [I = \{d : \Gamma^U \geq d \geq \gamma^L\} \wedge I = \{d : \text{length}(\text{ruler}) \geq d\}]$

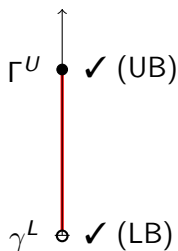
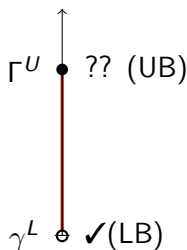
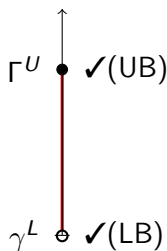


Figure: *length-scale with long-ordering*

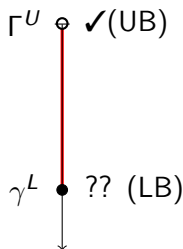
## Measure gestures assign values to free variables for UB &amp; LB

Positive adjective *tall*(36) # Jake is yay<sub>[no gesture]</sub> tall.1 iff  $\exists I [I = \{d : \Gamma^U \geq d \geq \gamma^L\} \wedge I = \{d : \text{height}(\text{Jake}) \geq d\}]$ Figure: *height*-scale with *tall*-ordering

## Measure gestures assign values to free variables for UB &amp; LB

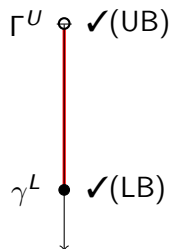
Positive adjective *tall*(37) Jake is yay<sub>[gesture]</sub> tall.1 iff  $\exists I [I = \{d : \Gamma^U \geq d \geq \gamma^L\} \wedge I = \{d : \text{height}(\text{Jake}) \geq d\}]$ Figure: *height*-scale with *tall*-ordering

## Measure gestures assign values to free variables for UB &amp; LB

Negative adjective *short*(38) Frodo is yay<sub>[no gesture]</sub> short.1 iff  $\exists I [I = \{d : \Gamma^U \geq d \geq \gamma^L\} \wedge I = \{d : \mathbf{height}_{\text{short}}(\mathbf{F}) \geq d\}]$ Figure: *height*-scale with *short*-ordering



## Measure gestures assign values to free variables for UB &amp; LB

Negative adjective *short*(39) Frodo is yay<sub>[gesture]</sub> short.1 iff  $\exists I [I = \{d : \Gamma^U \geq d \geq \gamma^L\} \wedge I = \{d : \mathbf{height}_{\text{short}}(\mathbf{F}) \geq d\}]$ Figure: *height*-scale with **short**-ordering

# yay lexically restricts the type of gestures

## Why does *yay* restrict the type of gestures?

Because *yay* requires its accompanying gesture to be able to specify upper and lower bounds of a scale associated to an adjective

- ▶ *this* doesn't — it's all pragmatics

## yay is inherently vague

Utterances with yay are vague

- (40) a. Finn is  $\left\{ \begin{array}{l} \text{precisely} \\ \text{exactly} \end{array} \right\} \left\{ \begin{array}{l} *yay \\ \text{this} \end{array} \right\}$  tall.
- b. Finn is about  $\left\{ \begin{array}{l} yay \\ \text{this} \end{array} \right\}$  tall.

# yay is inherently vague

Utterances with *yay* lack speaker commitment

- (41) I don't know exactly how tall he is, but...
- a. #He's this tall.
  - b. He's *yay* tall.



## Denotations

 $\llbracket \text{yay} \rrbracket$ 

$$\llbracket \text{yay} \rrbracket = \lambda f_{\langle I, \text{et} \rangle} \lambda x_e. \exists I [f(x)(I) \wedge I = \{d : \Gamma^U \succeq d \succeq \gamma^L\}],$$

where  $\Gamma^U$  and  $\gamma^L$  are free variables of type  $d$ , whose values are assigned by gesture in the context of utterance

 $\llbracket \text{yay tall} \rrbracket$ 

$$\llbracket \text{yay} \rrbracket(\llbracket \text{tall} \rrbracket) = \lambda x_e. \exists I [I = \{d : \text{tall}(x) \geq d\} \wedge I = \{d : \Gamma^U \succeq d \succeq \gamma^L\}]$$

 $\llbracket \text{Fred is yay tall} \rrbracket$ 

$$1 \text{ iff } \exists I [I = \{d : \text{tall}(\text{Fred}) \geq d\} \wedge I = \{d : \Gamma^U \succeq d \succeq \gamma^L\}]$$

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## Final words

Certain coverbal gestures are a requisite for semantics

- ▶ LF is sensitive to, and requires, the information conveyed in gesture as well as that in speech
- ▶ The integration of the information from speech and from gesture into a unified interpretation occurs at LF
- ▶ The lexicon restricts the selection of gesturally-conveyed information



## Final words

Certain coverbal gestures are a requisite for semantics

- ▶ The lexical semantics of *yay* serves as strong argument for incorporating gesture into the model of grammar
- ▶ Grammaticality judgments are an effective tool for the study of gesture and its interface with semantics

# Acknowledgements

We are grateful to

Marcin Morzycki and Adam Gobeski. We also thank the semantics research group at Michigan State University: Curt Anderson, Haley Farkas, Hannah Forsythe, Kyle Latack, Alicia Parrish, Gabriel Rodrigues, Kay Ann Schlang and Ai Taniguchi. Thanks also to Adina Williams and Andrew Armstrong. And we thank YOU.