

Psych 56L/ Ling 51:  
Acquisition of Language

Lecture 11  
Lexical Development III

Announcements

Pick up your midterm & HW1 if you haven't yet

Be working on HW2 (due 2/23/12)

- Note: Remember that working in a group can be very beneficial.



What does "gavagai" mean?



## What does “gavagai” mean?

Rabbit?  
Mammal?  
gray rabbit?  
Animal?  
Carrot eater?  
vegetarian?

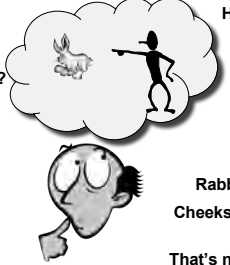
Ears?  
Long ears?  
Is it gray?  
Fluffy?  
What a cutie!

Thumping  
Hopping  
Scurrying

Stay!  
Look!

Meal!  
Rabbit only until eaten!  
Cheeks and left ear!

That's not a dog!



## Same problem the child faces



## A little more context...

“Look! There’s a goblin!”

Goblin = ????



## The Mapping Problem

Even if something is explicitly labeled in the input (“Look! There’s a goblin!”), how does the child know what *specifically* that word refers to? (Is it the head? The feet? The staff? The combination of eyes and hands? Attached goblin parts?...)

Quine (1960): An infinite number of hypotheses about word meaning are possible given the input the child has. That is, the input underspecifies the word’s meaning.

So how do children figure it out? Obviously, they do....

### One solution: fast mapping

Children begin by making an initial fast mapping between a new word they hear and its likely meaning. They guess, and then modify the guess as more input comes in.

Experimental evidence of fast mapping

(Carey & Bartlett 1978, Dollaghan 1985, Mervis & Bertrand 1994, Medina, Snedecker, Trueswell, & Gleitman 2011)

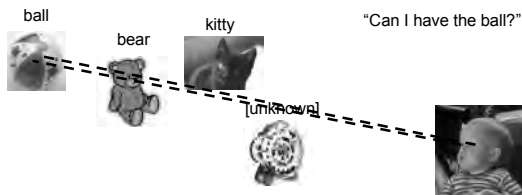


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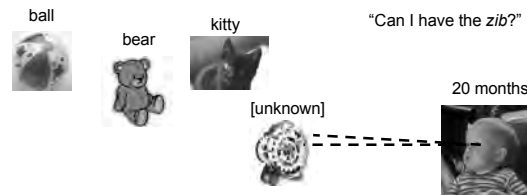


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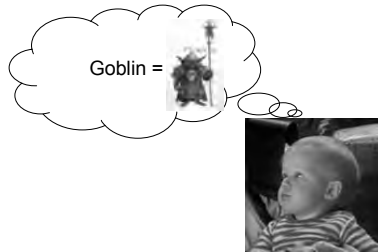
(Carey & Bartlett 1978, Dollaghan 1985, Mervis & Bertrand 1994, Medina, Snedecker, Trueswell, & Gleitman 2011)



## Knowing what to guess

### Lexical constraints

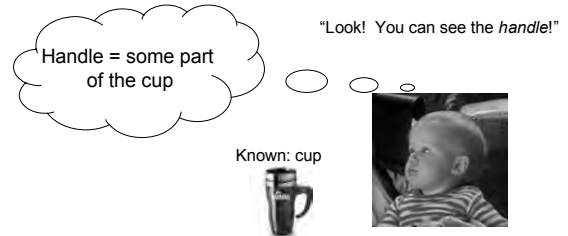
Whole-object assumption: new word refers to entire object, rather than some subset of it



## Knowing what to guess

### Lexical constraints

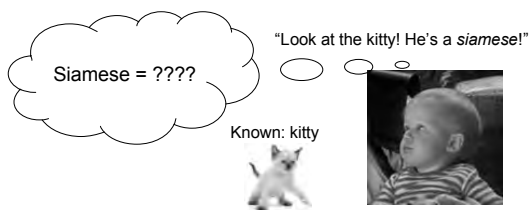
Mutual-exclusivity assumption: assume new word does not overlap in meaning with known word (can be used to overcome whole-object assumption)



## Knowing what to guess

### Lexical constraints

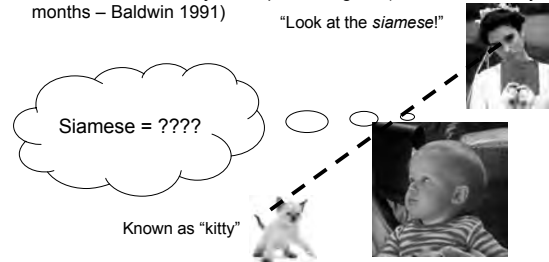
Mutual-exclusivity assumption: assume new word does not overlap in meaning with known word (can be used to overcome whole-object assumption)...not without its own problems (overlapping labels for the same referent)



## Knowing what to guess

### Social Cues

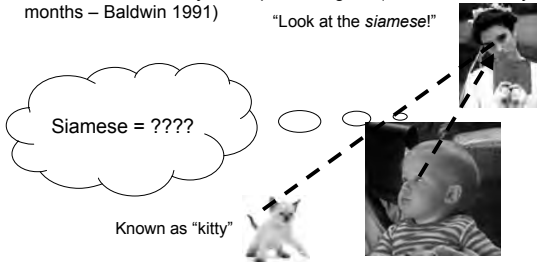
Speakers will look at the novel thing they're talking about: assume new word refers to object of speaker's gaze (children do this by 18 months – Baldwin 1991)



## Knowing what to guess

### Social Cues

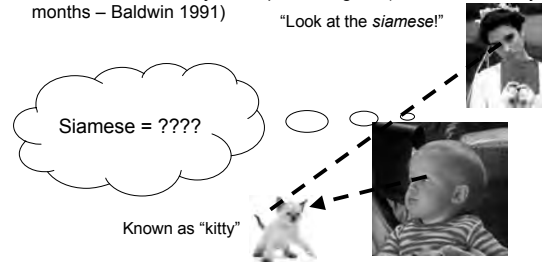
Speakers will look at the novel thing they're talking about: assume new word refers to object of speaker's gaze (children do this by 18 months – Baldwin 1991) "Look at the *siamese*!"



## Knowing what to guess

### Social Cues

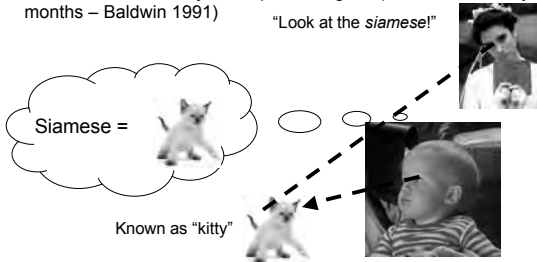
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## Knowing what to guess

### Social Cues

Speakers will look at the novel thing they're talking about: assume new word refers to object of speaker's gaze (children do this by 18 months – Baldwin 1991) "Look at the *siamese*!"



## Knowing what to guess

### Clues from the input

Speakers generally talk to children about the here and now (Quine's problem is not nearly so serious in child-directed speech)

"Look at the *siamese*!"



(Not "I just took her to the vet yesterday. Poor thing's been sick all of last week.")

### Knowing what to guess

Clues from the input

Speakers also sometimes provide explicit correction for meaning, and provide additional information about the word's meaning.



"Can I see the bugs again?"

"Those are goblins, honey, not bugs. Goblins live in the Labyrinth and occasionally take naughty children away."

### Carey & Bartlett 1978

Children can use input to figure out which aspect of their experience is being lexicalized



"What colors are these?"

### Carey & Bartlett 1978

Children can use input to figure out which aspect of their experience is being lexicalized



"red" "yellow" "green" "green" "blue"

### Carey & Bartlett 1978

Children can use input to figure out which aspect of their experience is being lexicalized

"a blue tray"



"a chromium tray"



Note: none of the children knew either the word "olive" as a color or the word "chromium" as a property

### Carey & Bartlett 1978

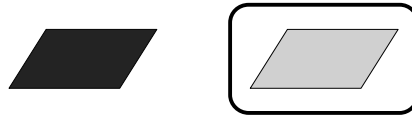
Children can use input to figure out which aspect of their experience is being lexicalized



"Bring me the chromium tray; not the blue one, the chromium one."

### Carey & Bartlett 1978

Children can use input to figure out which aspect of their experience is being lexicalized



Children learned to give the olive tray.

### Carey & Bartlett 1978

Children can use input to figure out which aspect of their experience is being lexicalized

5 weeks later...



"What colors are these?"

### Carey & Bartlett 1978

Children can use input to figure out which aspect of their experience is being lexicalized

5 weeks later...



"red" "yellow" "green" "???" "blue"

Via input (contrast with blue), children figured out that "chromium" referred to a color the same way that blue does...

"I don't know"  
[other previously unused color term like "gray"]

### Carey & Bartlett 1978

Children can use input to figure out which aspect of their experience is being lexicalized

5 weeks later...



"red" "yellow" "green" "???" "blue"

...and also that the dark green-ish color had a different name from "green"

"I don't know"  
[other previously unused color term like "gray"]

### Knowing what to guess

Clues from the syntactic structure

Different grammatical categories (nouns, verb, etc.) tend to have different meanings. Once children have identified some grammatical categories (after ~18 months), they can use the syntactic structure (how words appear together) as a clue to meaning.



"Those are goblins."

goblins = noun

nouns = objects

goblins =

### Knowing what to guess

Clues from the syntactic structure

He's sebbing!



Brown, 1957

seb = verb  
verb = action  
seb

### Knowing what to guess

Clues from the syntactic structure

Look - a seb!



Brown, 1957

seb = noun with "a"  
noun = countable object like "bowl"  
seb



### Knowing what to guess

Clues from the syntactic structure

Look – some seb!



seb = noun with "some"  
noun = mass substance  
like "stuff"

seb

Brown, 1957

### Knowing what to guess

Clues from the syntactic structure

Experimental evidence with 4-year-olds (Gelman & Markman 1985)



"Find the *fep* one."



### Knowing what to guess

Clues from the syntactic structure

Experimental evidence with 4-year-olds (Gelman & Markman 1985)



"Find the *fep* one."



the\_\_one = adjective  
adjective = property (like spotted)  
fep =~ spotted

### Knowing what to guess

Clues from the syntactic structure

Experimental evidence with 4-year-olds (Gelman & Markman 1985)



"Find the *fep* one."



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adjective = property (like spotted)  
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## Knowing what to guess

Clues from the syntactic structure

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"Now find the *zib*."



## Knowing what to guess

Clues from the syntactic structure

Experimental evidence with 4-year-olds (Gelman & Markman 1985)



"Now find the *zib*."



the\_\_ = noun  
noun = object  
zib =~ new object that's more familiar

## Knowing what to guess

Clues from the syntactic structure

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"Now find the *zib*."



the\_\_ = noun  
noun = object  
zib =~ new object that's more familiar

## Knowing what to guess

Syntactic Bootstrapping Hypothesis: primarily using the syntactic structure to get to meaning

Naigles (1990): 2-yr-olds can use syntactic structure to guess aspects of word meaning, even the difference between transitive and intransitive verbs

Transitive: The rabbit is gorging the duck.

(expectation: rabbit is doing something to the duck)

Intransitive: The rabbit and the duck are gorging.

(expectation: rabbit and duck doing actions separately)

### Knowing what to guess

Syntactic Bootstrapping Hypothesis: primarily using the syntactic structure to get to meaning

Gertner, Fisher, & Eisengart (2006): even before children are 2 years old, they know the subject of an English sentence should be the one doing the action (the agent)

Wugs hug blicks.  
(expectation: the ones doing the hugging are wugs)

### Knowing what to guess

Syntactic Bootstrapping Hypothesis: primarily using the syntactic structure to get to meaning

Gordon (2003): 10-month-old children are sensitive to the fact that events (which we indicate with verbs) have key participants (which correspond to subjects and objects in adult language). This is the precursor to realizing the mapping from sentence form to meaning.



### Knowing what to guess

Syntactic Bootstrapping Hypothesis: primarily using the syntactic structure to get to meaning

Goldin-Meadow & Mylander (1998): Children seem to naturally translate their prelinguistic understanding of events into linguistic structures. Studies of deaf children who are forced to create their own home-sign systems show that they systematically use syntactic position to signal semantic roles like agent.



### Knowing what to guess

Syntactic Bootstrapping Hypothesis: primarily using the syntactic structure to get to meaning

Yuan & Fisher (2009), Scott & Fisher (2009): 2-year-olds can keep track of the syntactic structures in which a verb appears and use that to infer a verb's meaning.



Transitive dialogue  
A: Guess what? Jane blicked the baby!  
B: Hmm. She blicked the baby?  
A: And Bill was blicking the duck.  
B: Yeah, he was blicking the duck.  
Intransitive dialogue  
A: Guess what? Jane blicked!  
B: Hmm. She blicked?  
A: And Bill was blicking.  
B: Yeah, he was blicking.

## Knowing what to guess

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Causal dialogue  
A: Matt dacked the pillow.  
B: Really? He dacked the pillow?  
A: Yeah. The pillow dacked.  
B: Right. It dacked.  
Unspecified-object dialogue  
A: Matt dacked the pillow.  
B: Really? He dacked the pillow?  
A: Yeah. He dacked.  
B: Right. He dacked.

## Knowing what to guess

Syntactic Bootstrapping Hypothesis: primarily using the syntactic structure to get to meaning

Alishahi & Pyykkönen (2011): Note that the ability to track and combine multiple contexts of a word and infer its meaning seems to work much better for verbs than for nouns, given realistic child-directed speech (the Brown corpus from the CHILDES database). They speculate that this may be because nouns are not as dependent on syntactic context in order to learn their meaning (for example, nouns may be observable objects).

## Knowing what to guess

Syntactic Bootstrapping Hypothesis: primarily using the syntactic structure to get to meaning

Fisher, Klingler, & Song (2006)

FIGURE 4 | Sample stimulus items, Fisher et al.<sup>28</sup> Children saw training trials in which a hand pointed to a duck or a box, while the new word was presented as a noun or as a preposition. At test, children saw two test events: in each, the hand pointed to another duck on the box, while children heard the test sentence for their condition. The location-match screen showed a different object (a non-duck) on the box, and the object-match screen showed another duck beside the box.



Noun context: This is acorp.

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Preposition context: This is acorp my box.

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At test, those trained with the noun-context (this is acorp) looked at the object match (inferred it was an object).



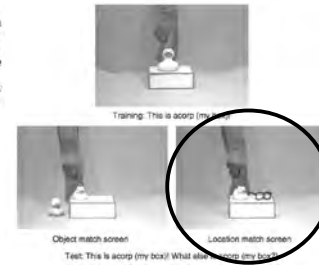
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At test, those trained with the preposition-context (this is acorp my box) looked at the location match (inferred it was a relationship between objects).



## Getting a sense of how a child might feel

From *But n Ben A-Go-Go*, Matthew Fitt (2000), p.85

But his hert cawed him on. He nou had the information he had been tryin tae jalouse on his ain aw these years. Or pairt o it onyway. A whusper. A hauf truth. An the time had come tae mak siccar. He would meet with Broom an tak fae him whit wis needed.

Some contextual clues available (syntactic bootstrapping + known words).

## Getting a sense of how a child might feel

From *But n Ben A-Go-Go*, Matthew Fitt (2000), p.85

But his heart called him on. He now had the information he had been trying to jalouse on his ain all these years. Or part of it anyway. A whisper. A half truth. And the time had come to make siccar. He would meet with Broom and take fae him what was needed.

Add in knowledge of "near-words" that sound close to recognizable words.

Remaining: jalouse, ain, siccar, fae?

### Getting a sense of how a child might feel

From *But n Ben A-Go-Go*, Matthew Fitt (2000), p.85

But his heart called him on. He now had the information he had been trying to jalouse on his own all these years. Or part of it anyway. A whisper. A half truth. And the time had come to make siccar. He would meet with Broon and take from him what was needed.

Guess common words by their position in the sentence (syntactic bootstrapping).

Still remaining: jalouse, siccar?

What are your guesses as to what these words mean? Why?

### Lexical Development Recap

Children have to figure out what concept a word refers to. They may have different learning strategies they use when hearing a word for a first time, such as the whole-object assumption and mutual-exclusivity assumption. While these are helpful, they may lead to errors sometimes.

Children may benefit from a number of different sources of information, including social knowledge and knowledge of syntactic structure.

### Questions?



You should be able to do all the questions on HW2 and all the review questions for lexical development.