

Ling 51/Psych 56L:
Acquisition of Language

Lecture 10
Lexical development II

Announcements

Be working on review questions for lexical development

HW4 due 11/10/16

The course of early lexical development



First words

10-15 months: first words produced that actually sound like the words the child is trying to approximate (and they have a fixed meaning, as opposed to being sound sequences the child likes to say)

Note: This doesn't mean children don't **understand** words before this age, though. Bergelson & Swingley (2012, 2014, 2015) show that 6- to 9-month-olds understand familiar concrete object words like "nose" and "cookie", and Bergelson & Swingley (2013) show that 10- to 13-month-olds understand words like "all gone", "hug", "bye", and "wet".



Words as referential

<https://www.sciencedaily.com/releases/2015/09/150902093259.htm>

Marno, Farroni, Dos Santos, Ekramnia, Nespor, & Mehler 2015: **4-month-olds** expect speech sounds uttered by a human who's looking at them to refer to something in the world (i.e., be referential).

"This suggests that infants at this early age already have some knowledge that **language implies a relation between words and the surrounding physical world**. Moreover, they are also ready to find out these relations, even if they don't know anything about the meanings of the words yet. Thus, a good advice to mothers is to speak to their infants, because infants might understand much more than they would show, and in this way their attention can be efficiently guided by their caregivers." — Hanna Marno

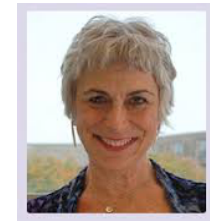


Not-just-words as referential [Extra]

<https://www.sciencedaily.com/releases/2015/11/151102152720.htm>

Ferguson & Waxman 2016: **6-month-olds** can learn that beep sounds can be used for conceptual categorization after seeing those beeps used by people in communicative contexts.

"This shows that infants have the social capacity to recognize an entirely new social communicative signal in their environment. And once recognized, they can use it to support cognition. Babies, like adults, are already on the lookout for new ways that the people around them communicate with one another." — Sandra Waxman



First words

10-15 months: first words produced that actually sound like the words the child is trying to approximate (and they have a fixed meaning, as opposed to being sound sequences the child likes to say)

These tend to be **context-bound**:

ex: "car" said when looking at cars out of apartment window, but not when looking at cars up close or when seeing a picture of a car

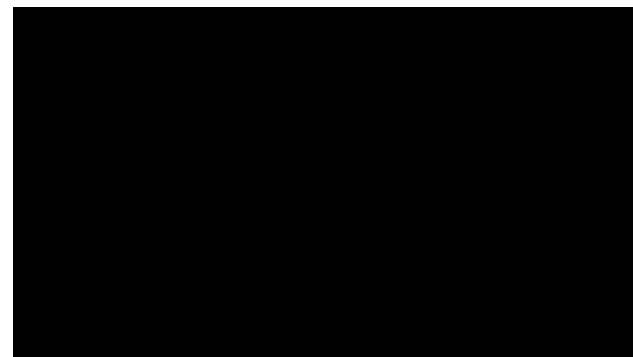
Children's usage: have simply identified one particular event in the context of which it's appropriate to use that word, but haven't realized its more abstract coverage

First words

First words video & why might these words be learned earlier

http://www.ted.com/talks/deb_roy_the_birth_of_a_word.html

(~5:45 through ~11:00 of 19:52)

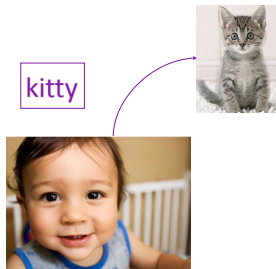


First words

Even if children realize a word has more extended use, they still may not realize it has the meaning that adults have for it

Ex: “more” = request for more, not general comparison

Often, first words are parts of routines or language games. Children must then realize that these words can be extended.

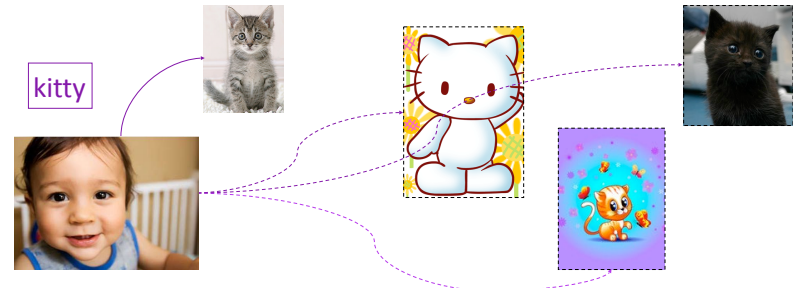


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First words

The extension process doesn't happen at the same time for all words. Some referential words may coexist with words that are contextual. Which words are which will vary from child to child.

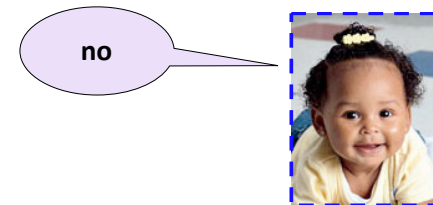
Jacqui: “no” = context-bound, used when refusing something offered by her mother (wouldn't say it when offered by someone else or while indicating her dislike of something, etc.)



First words

The extension process doesn't happen at the same time for all words. Some referential words may coexist with words that are contextual. Which words are which will vary from child to child.

Jenny: “no” = referential, used when pushing a drink away, while crawling to a step she was not allowed to climb, while refusing a request by her mother

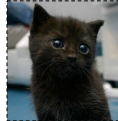
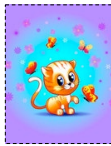


First words

In general, it's *not* because children don't hear these words in different contexts that they have a narrower meaning than adults do. Their parents used the words in many different contexts.

So what's the problem?

It's not an easy task to extract the common meaning from different contexts.



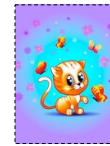
kitty = ?

First words

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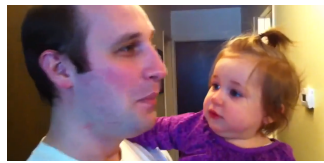
cute = ?

Even basic words can be hard [Extra]

Even learning what seem like very basic words ("Daddy") can be hard when the appearance of the referent changes in unexpected ways.

https://www.youtube.com/watch?v=k0fnTiKEMc&feature=player_embedded

(Until about 1:08)



The word form itself may vary

In multilingual environments where words may be spoken in different accents (e.g., "bean" /bin/ pronounced as "bin" /bɪn/), children have to **generalize across different phonological word forms**. This ability increases steadily with age (Creel 2014), starting at 12 to 13 months. Also, acoustic variation within a single speaker can actually be helpful for figuring out the important parts of word forms at 14 months (Galle, Apfelbaum, & McMurray 2015).



From 0 to 50 words

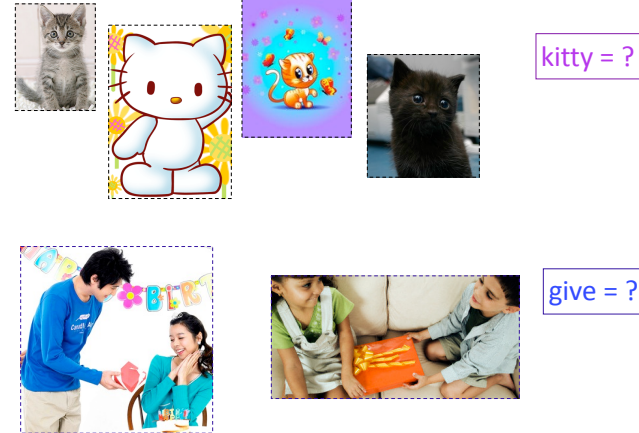
Vocabularies of children with 50 or less words are heavily concentrated on experiences child has: names for people, food, body parts, clothing, animals, household items. (In general, **a lot of nouns = noun bias**).

— Braginsky, Yurovsky, Marchman, & Frank 2015: large-scale analysis over tens of thousands of children in English, Spanish, Norwegian, & Danish confirming an “over-representation of nouns” in early vocabularies.

Adult and older children have more variety, including more abstract nouns, as well as other grammatical categories like prepositions (*with, from*), determiners (*the, a*), and adjectives (*silly*).

The preponderance of nouns

One idea: the meaning of nouns is easier to identify than the meaning of other words, like verbs



The preponderance of nouns

How do we test if it's true that the meaning of nouns is easier to learn from observation than the meaning of verbs?

Snedeker, Gleitman, & Brent (1999) asked adult speakers (who are presumably “cognitively mature”) to view scenes of what mothers are saying to their children and see which words they could learn.

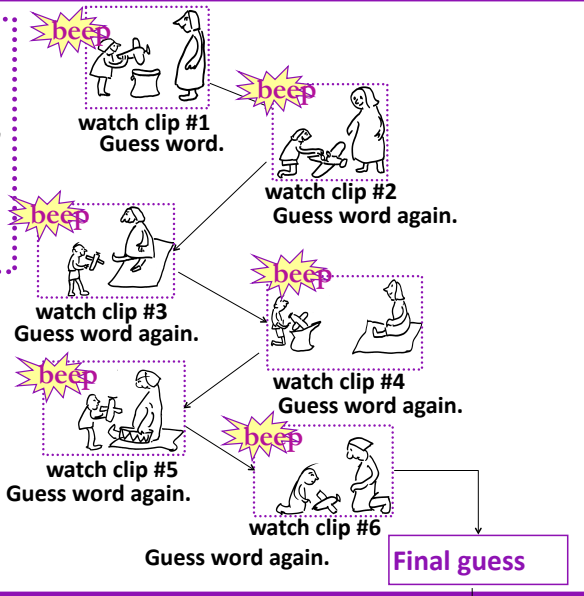


Experiment with English Speakers Snedeker, Gleitman, and Brent 1999

Stimuli preparation

1. Videotape English speaking mothers playing with their 18- to 24-month-old children
2. Transcribe video tape for mothers' 24 most frequent nouns and 24 most frequent verbs.
3. For each of the most frequent words, randomly select 6 uses of the word.
4. Edit each instance for 40 second clips.
Audio was removed and a beep is sounded at instant word uttered.

Subject's Task:
Identify the
"mystery word"
represented by
the beep.



On to next mystery word

Human Simulation Paradigm ("Guess the mystery word")

<http://sites.sinauer.com/languageinmind/wa05.01.html>

Videos 3-10

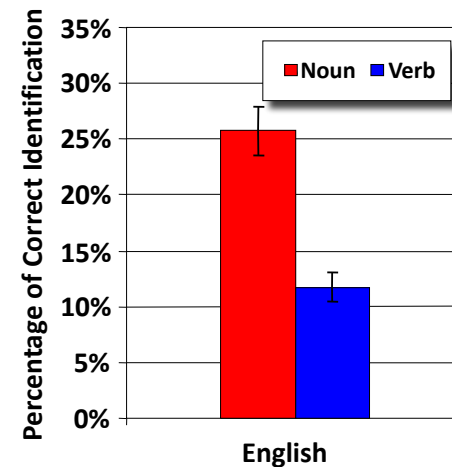


Getting a sense of noun information in scenes [Extra]

<https://itunes.apple.com/us/app/whats-the-word-hd/id594488190?mt=8>



Percent correct identification in English Snedeker, Gleitman, and Brent (1999)



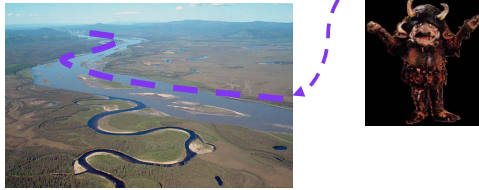
Nouns seem
to be easier...
why might
that be?

Verb meaning: Linguistic variation

Example of linguistic variation in verb meaning:

English:

The goblin fell into the river and then floated down it.



Spanish equivalent:

The goblin fell into the river and then left floating.

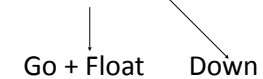
El duende cayó en el río y después salió flotando

Verb meaning: Linguistic variation

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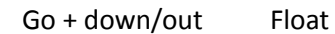
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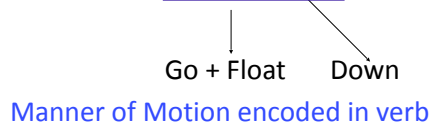
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Verb meaning: Linguistic variation

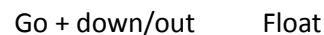
Example of linguistic variation in verb meaning:

English:

The goblin fell into the river and then floated down it.



Direction of Motion encoded in verb



Spanish equivalent:

The goblin fell into the river and then left floating.

El duende cayó en el río y después salió flotando

Becoming aware of language-specific preferences for verb meaning

Maguire et al. 2010

English and Spanish 2-year-olds seem to show a default preference for encoding **direction of motion** in a verb (perhaps because path information is more salient).

English and Spanish 5-year-olds seem to show a preference for encoding **manner of motion** in a verb.

By adulthood, English speakers maintain their preference for encoding the **manner of motion** in a verb while Spanish speakers recover their initial preference for encoding **direction of motion**.

Also...

There is some cross-linguistic variation in the preference for nouns over verbs in the early lexicon.

Korean (Kim, McGregor, & Thompson 2000), **Japanese, and Mandarin children show less of a noun bias (though there still is something of a noun bias)**. These languages have several ways of making verb information more salient to learners: verbs appearing sentence-final (very prominent for children), nouns optionally omitted



How might verbs be learned?

Proposal for vocabulary development (Snedeker & Gleitman 2002):

1. Learn from Scenes

- Child relies on situational context alone
- Can learn only very concrete words: object labels

How might verbs be learned?

Proposal for vocabulary development (Snedeker & Gleitman 2002):

1. Learn from Scenes

2. Learn from Nouns

- Object labels provide richer representation of linguistic context
- Utterance = set of known nouns
- Child can learn concrete relational words like spatial prepositions (ex: “near”) and many verbs

How might verbs be learned?

Proposal for vocabulary development (Snedeker & Gleitman 2002):

1. Learn from Scenes

2. Learn from Nouns

3. Learn from Syntactic Frames

- Learning relational words allows the child to learn the basic grammar of her language
- Utterance is represented as a syntactic structure + known words
- This representation allows the child to learn more abstract words

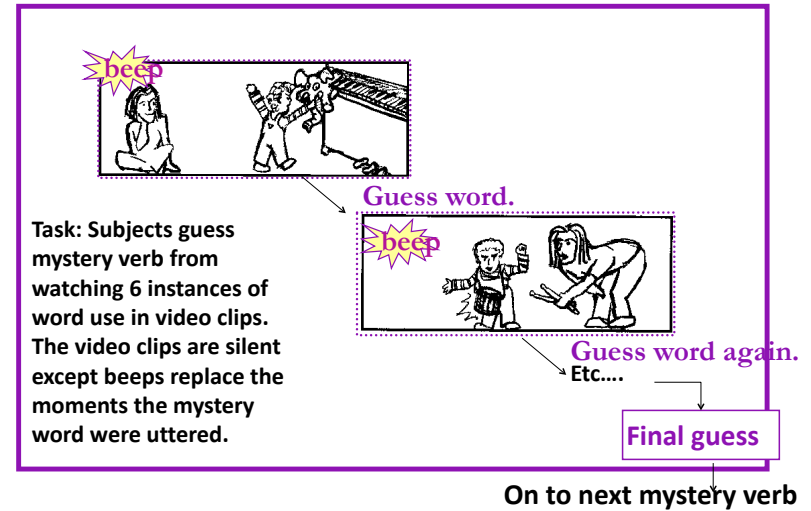
Snedeker & Gleitman (2002)

- **Targets**
 - Videotaped interactions of 4 mother-child pairs
 - 24 most common **verbs** chosen as targets
 - for each target, 6 instances randomly selected
- **Subjects participated in one of 7 Information Conditions**
 - Scenes
 - Nouns
 - Frames
 - Scenes + Nouns
 - Scenes + Frames
 - Nouns + Frames
 - Scenes + Nouns + Frames



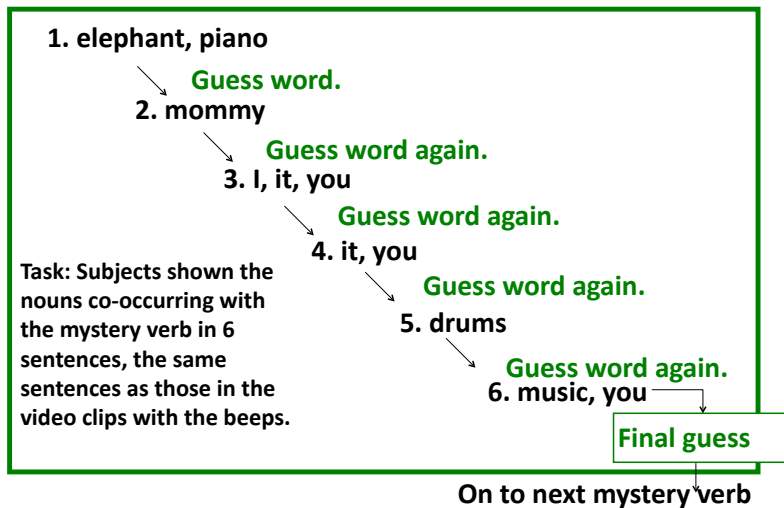
Scenes condition

Example “mystery verb”: “play”



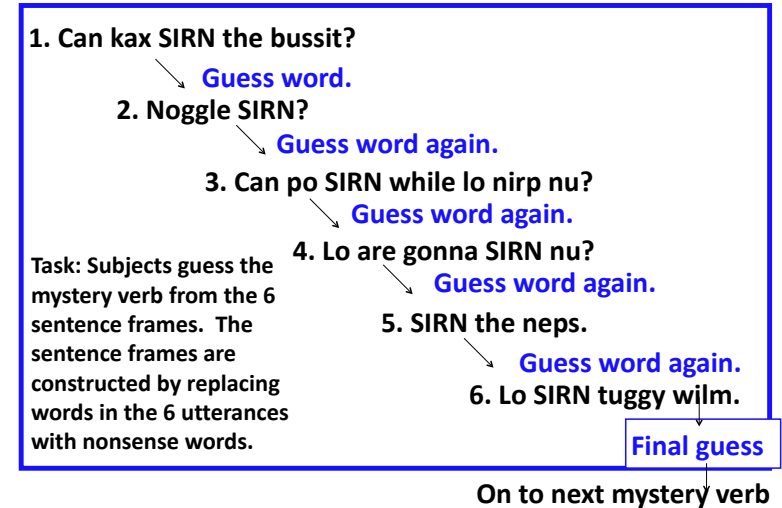
Nouns condition

Example “mystery verb”: “play”

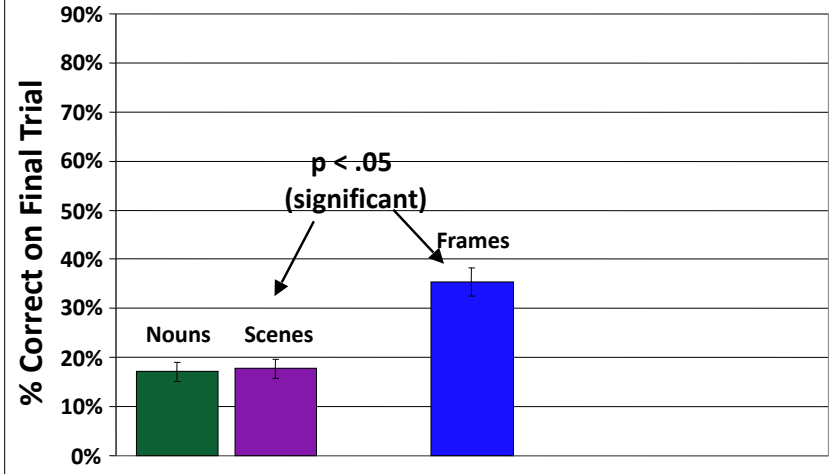


Frames condition

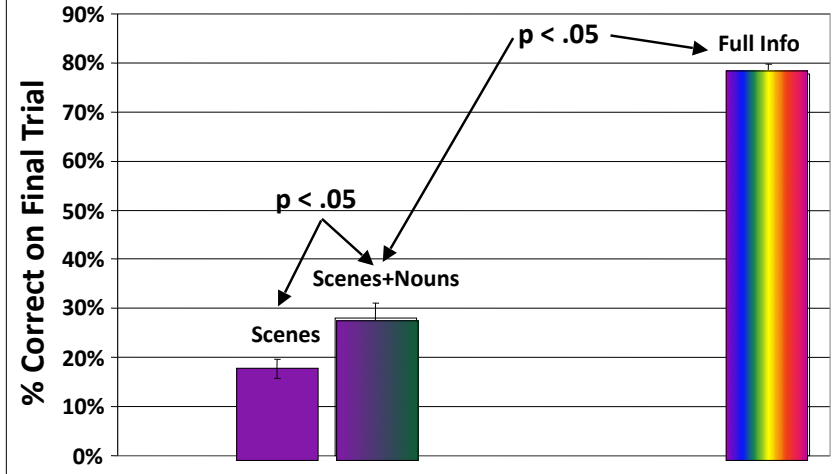
Example “mystery verb”: “play”



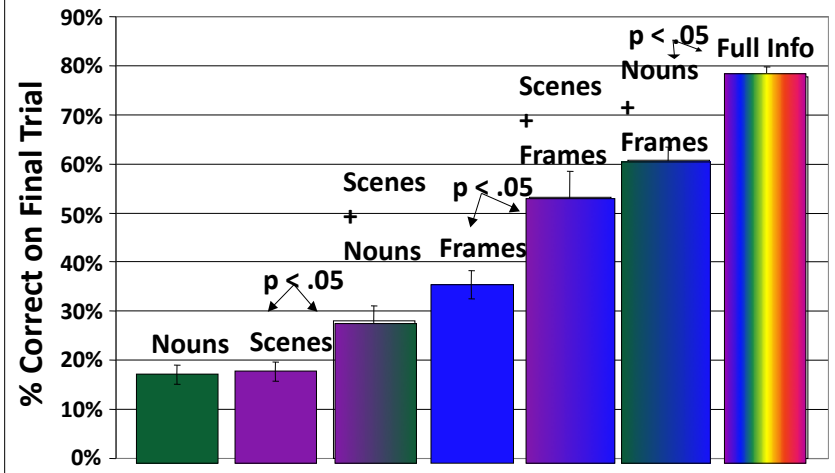
Correct identification varies with information condition



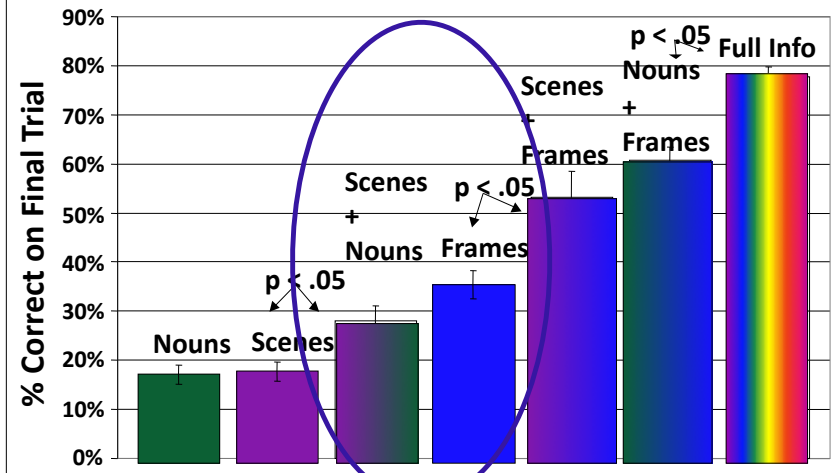
Correct identification varies with information condition



Correct identification varies with information condition

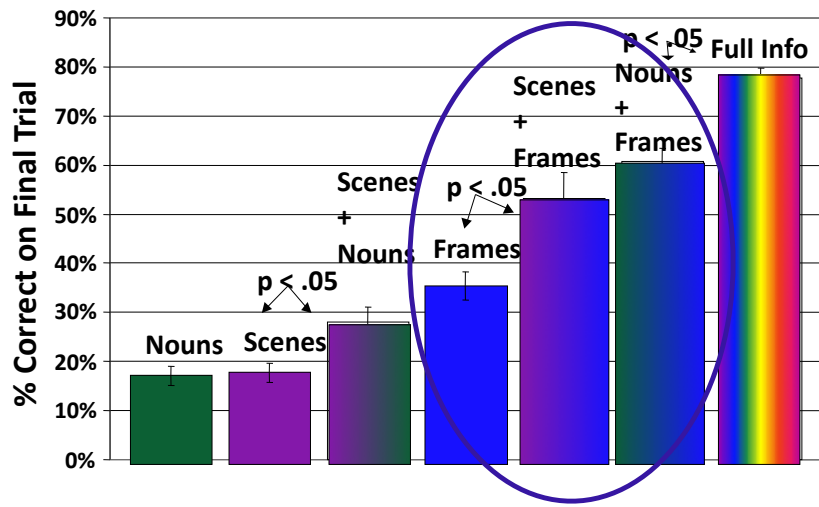


Utility of syntactic frame knowledge:
Scenes + Nouns equivalent to Syntactic Frames only



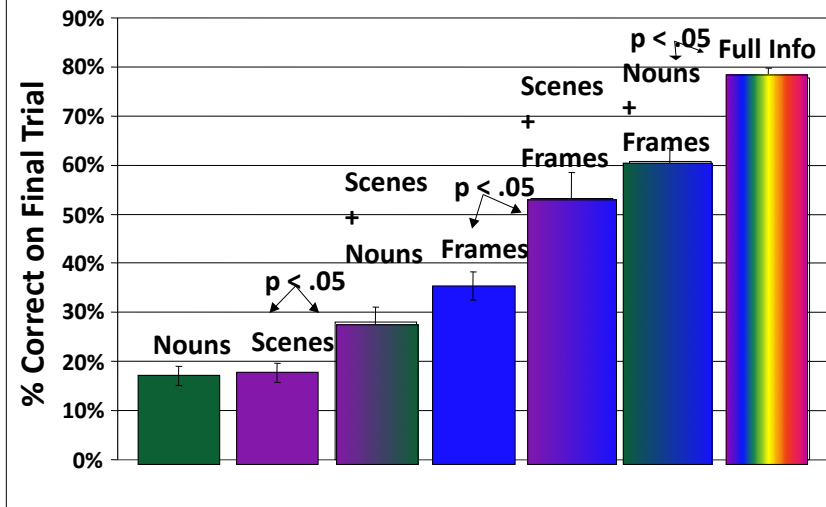
Utility of additional knowledge with Frames:

Scenes + Frames equivalent to Nouns + Frames which is better than Frames alone



Superiority of using all the available information:

Scenes + Nouns + Frames is better than all other information type combinations



So Snedeker & Gleitman (2002) have shown that maybe learning verbs isn't so bad once you have some linguistic background (like knowing some nouns and some syntactic frames) and informative situational context (scenes)...

Now, back to learning nouns (a first step)...

Common mistakes children make with meaning

Once children figure out that words are referential, they have to figure out what range of concepts words apply to. This isn't so easy.

Underextension: using words in a narrower range.

Ex: Only siamese and Persian cats are cats.

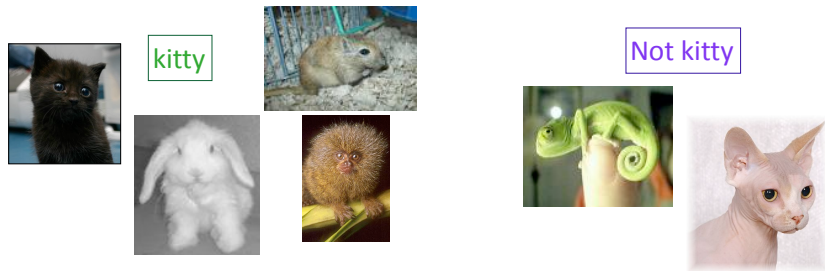


Common mistakes children make with meaning

Once children figure out that words are referential, they have to figure out **what range of concepts** words apply to. This isn't so easy.

Overextension: using words in a wider range. (more common)

Ex: All fuzzy creatures are cats.



Causes of extension errors

Underextension: perhaps the child is conservatively extending the hypothesis about what word refers to; correctable from experience with word's usage by adults.

Overextension: Likely to simply be because the child doesn't know appropriate word and uses one that's known. Overextensions tend to have some aspect of meaning in common, though. Corrected as children learn appropriate words for meanings they want to express.

Overextension errors often have semantic features in common



Thanks to Sierra Broussard for finding this.

Some more overextension examples

Ball = ball, balloon, marble, apple, egg, wool pom-pom, spherical water tank

common feature = "round-ish shape"



Cat = cat, cat's usual location on top of tv when absent

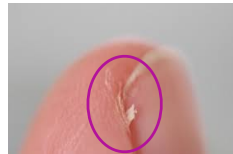
common feature = "associated with kitty"



Some more overextension examples

Moon = moon, half-moon-shaped lemon slice, circular chrome dial on dishwasher, ball of spinach, wall hanging with pink and purple circles, half a Cheerio, **hangnail**

common feature = “crescent or round-ish shape” + a memory retrieval error?



A little later lexical development



The difference after 50 words

Up to 50 words: about 8-11 words added every month, adding words is a slow process

After 50 words: about 22-37 words added every month, words often added after a single exposure

Called the “word spurt”, “word explosion”, “naming explosion”.

Occurs for most (but not all) children around 18 months.

Leveraging known words [Extra]

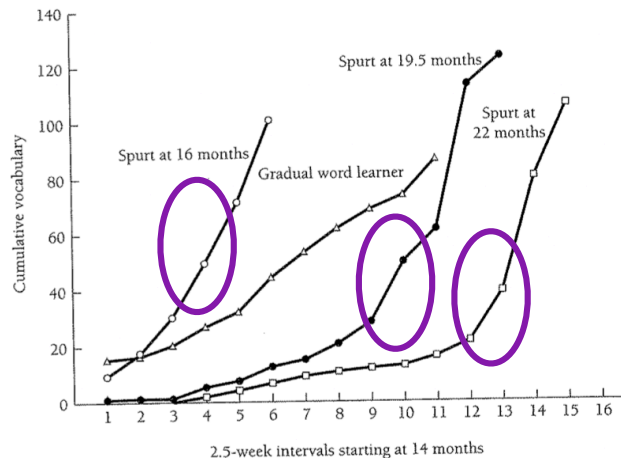
On Borovsky, Ellis, Evans, & Elman 2015:

“Children leverage their early world knowledge to help them unlock their language skills. **Knowing a few related words helps children recognize links between new word meanings**, and this could be a very useful strategy for helping children learn vocabulary early in life. This might be part of the explanation for why children begin to start 'talking up a storm' between the ages of 18-24 months.”
— Arielle Borovsky



<https://www.sciencedaily.com/releases/2015/10/151012132455.htm>

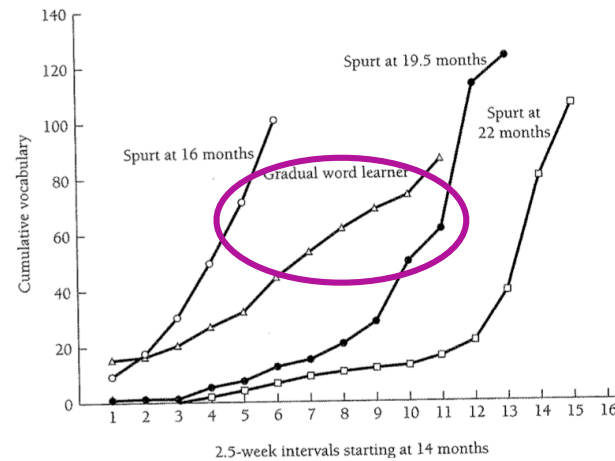
Does every child have a word spurt?



Some seem to
(13 of 18)

Goldfield & Reznick 1990

Does every child have a word spurt?



Others don't
(5 of 18)

Goldfield & Reznick (1990)

Word comprehension

The word spurt refers to words children actually produce. However, another way to test children's developing lexicons is via their comprehension of words.

Production usually lags behind comprehension.

Ex: At 16 months, children typically produce less than 50 words, but parents report they comprehend between 92 and 321 words.

Production vocabularies are different from comprehension vocabularies. (This may be because communication works just fine with a minimal verb vocabulary. Ex: *go* is very versatile. *Go + night-night, go + car, go + park*, etc.)

How learning works:

Links between phonology and word learning [Extra]

phonological memory = ability to remember a sequence of unfamiliar sounds

Children's phonological memory has been linked to their vocabulary size from 22 months up to 9 years old. (This makes sense since the ability to remember the forms of newly encountered words would be vital if a child wants to learn the mapping between sound and meaning.)



How learning works: Links between labeling and word learning [Extra]

Ferguson, Havy, & Waxman (2015) found that 12-month-olds who recognize that different labels indicate different categories have a larger vocabulary at 18 months.



What this means: Recognizing that **words (labels) denote specific concepts**.

<https://www.sciencedaily.com/releases/2015/08/150831135841.htm>

How learning works: Links between motherese and word learning

Ma, Golinkoff, Houston, & Hirsh-Pasek (2011) found that 21-month-olds learn better from child-directed speech (as compared to regular adult-directed speech).



What this means: Remember that **motherese has exaggerated prosody**, and when learning novel words early on in lexical development, children rely more on prosodic cues. Also, the exaggerated prosody may get children's attention more.

How learning works: Links between motherese and word learning

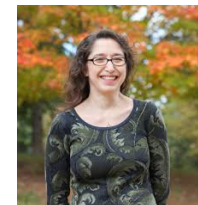
Taumoepeau (2016) found that mothers who **expanded more of the utterances** directed at children between the ages of 24 and 33 months really gave those children a boost when learning words.



What this means: Remember that **motherese tends to have more expansions and repetitions**, and this seems to be helpful (most likely for remembering word forms and determining their referents).

How learning works: Links between motherese and word learning

On Newman, Rowe, & Bernstein Ratner (2015):
"Parents who **repeat words more often** to their infants have children with better language skills a year and a half later...A lot of recent focus has been on simply talking more to your child -- but how you talk to your child matters. It isn't just about the number of words." - Rochelle Newman



<https://www.sciencedaily.com/releases/2015/09/150921103539.htm>

How learning works: Links between motherese and word learning

Rowe (2012):

The **quantity** of speech is the strongest predictor of **vocabulary growth in the second year of life**. **Diversity of vocabulary** used by parents predicts **vocabulary growth in the third year of life**, and the **complexities associated with narratives and decontextualized speech** predict **vocabulary growth in the fourth year of life**.



Decontextualized speech: Things that aren't about the "here" and "now" of the current context.

How learning works: Links between quantity of motherese and word learning

<http://www.economist.com/news/science-and-technology/21596923-how-babbling-babies-can-boost-their-brains-beginning-was-word#>

(video: up through about 1:14)

Issues of input disparity

"It is also now clear from Dr Fernald's work that words spoken directly to a child, rather than those simply heard in the home, are what builds vocabulary...Telling parents is the first step: many who volunteered themselves and their children for study did not know they could help their babies do well simply by speaking to them."

How learning works: Links between quantity of motherese and word learning

Schwab & Lew-Williams 2016:

Differences by socio-economic status (SES)

"On average, children from lower-SES families show slower vocabulary growth relative to their higher-SES peers, and these differences persist into the school years. From where do these differences arise? Research suggests that **variation in parents' speech to children—as a function of SES—relates to children's language development**.

How learning works: Links between quantity of motherese and word learning

Schwab & Lew-Williams 2016:

Differences by socio-economic status (SES)

"For example, Hart and Risley revealed dramatic differences in the amount that parents talk to their young children as a function of SES. Their estimations suggest that by age 4, children from professional families hear a total of 45 million words on average, while children living in poverty hear 13 million words on average. This finding is often described as the '**30 million word gap**.' Importantly, **quantitative differences in parents' language input have been shown to uniquely predict aspects of children's language development**, such as vocabulary growth and speed in processing familiar words."

How learning works: Links between quality of motherese and word learning

Schwab & Lew-Williams 2016:

Differences by socio-economic status (SES)

“Rowe found that SES was related to both quantity and **quality measures**, with more highly educated parents using more **word tokens and word types**, as well as more **rare words** and more of some types of **decontextualized utterances...**”

How learning works: Links between quality of motherese and word learning

Schwab & Lew-Williams 2016:

Differences by socio-economic status (SES)

“By 18 months, group-level differences in vocabulary knowledge and language processing efficiency (i.e., comprehension of language in real time) between lower-SES and higher-SES toddlers are already apparent. By 24 months, there is a 6-month gap between SES groups in language processing efficiency, which has been shown to forecast later language learning. Thus, infants hearing **more rich language from their caregivers early in life develop stronger language processing skills**, which can affect their ability to learn new words more quickly, and this in turn seems to influence their ability to process future sentences containing those words.”

How learning works: Links between quantity & quality of motherese and word learning

Schwab & Lew-Williams 2016:

Differences by socio-economic status (SES)

“Specifically, children at the lower end of the SES spectrum tend to **receive significantly less high-quantity and high-quality language experience**, which affects their development of vocabulary, grammar, and language processing.”



How learning works: Links between quality of motherese and word learning

Schwab & Lew-Williams 2016:

Differences *within* socio-economic status (SES)

“...within this low-SES sample, **measures of the quality of mother-child communication more strongly predicted children’s expressive language abilities** one year later than did the total number of words spoken by mothers...”

“...children from low-SES families whose **mothers spoke to them using more complex language** at 18 months were **significantly faster** in a real-time comprehension task at 24 months.”

How learning works:
Links between quality of motherese
and word learning

<http://www.sciencedaily.com/releases/2014/09/140917141431.htm>

Brady & Goodman 2014: Investigating 18- to 36-month-olds

- children learn better when a variety of cues are available (like the scenes+nouns+frames condition in Snedeker & Gleitman 2002)



How learning works:
Links between cognitive development
and word learning
[Extra]

<http://www.sciencedaily.com/releases/2014/09/140917141431.htm>

Brady & Goodman 2014: Investigating 18- to 36-month-olds

- children's ability to figure out a word using linguistic context (like the frames condition in Snedeker & Gleitman 2002) improved with age
- children's memories are still limited — the first 3 words they learn the previous day stick with them better
- by 36 months, children relied less on social cues like eye gaze

How learning works:
Links between social cues and word learning
[Extra]

Brooks & Meltzoff 2008: 10- and 11-month-old infants who follow the gaze of their caretakers and pointed themselves when learning new words had faster vocabulary growth.



Bergelson & Swingley 2013: 10-month-old ability to follow pointing of caretaker correlates with current non-noun (verb, adjective, etc.) vocabulary.

How learning works:
Links between social cues and word learning
[Extra]

Wu & Gros-Luis 2015: 16-month-olds learned the labels for new objects the best when the labels were provided contingently after the child's own pointing gesture.



What this means: Very early word learning may be greatly facilitated by these kind of social cues in a communicative context.

How learning works: Links between social cues and word learning [Extra]

Scott, Sakkalou, Ellis-Davies, Hilbrink, Hahn, & Gattis 2013: 14-month-old tendency to look at objects after being encouraged to do so (called **infant follow-in**) is strongly related to productive vocabulary size and growth.



What this means: Very early word learning may be greatly facilitated by these kind of social cues in a communicative context.

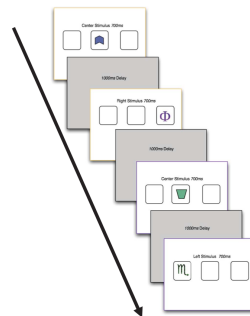
How learning works: Links between social cues and word learning [Extra]

<http://sites.sinauer.com/languageinmind/wa05.03.html>
Joint attention “in the wild”



How learning works: Links between sequential pattern sensitivity and word learning [Extra]

Ellis, Robledo Gonzales, & Deák 2013:
6-month-old capacity to respond to **novel but predictable events** robustly predicted both receptive and productive vocabulary at 22 months.



What this means: This domain-general ability to track probabilities matters for early word learning.

Recap: Children’s lexical development

Children must figure out the lexicon of their language, including the correspondence between sounds and meaning.

Children typically acquire their first 50 words over a series of months, and then increase their rate of lexical acquisition suddenly (word spurt)

Learning word meanings isn’t easy:

Some kinds of words may be more difficult to learn than others (nouns vs. verbs)

Recap: Children's lexical development

Often, children make mistakes by either assigning a narrower or wider meaning to a word than adults do. Eventually, through experience with the language, they home in on the correct meaning.

The quantity and quality of language experiences (especially as transmitted by motherese) impacts lexical development.

There are significant differences in motherese both across SES classes and within SES classes.

Questions?



You should be able to do up through question 12 on HW4, and up through question 20 on the lexical development review questions.