Language Development

Before the first word
- speech perception
- speech production

Single word utterances
- first words
- characteristics
- lexical development
Variations in Voice Onset Time

Prevoiced - 65 ms

Voiced /di/ - 13 ms

Voiceless /ti/ - 54 ms
Identification of stimuli varying on voice onset time as \(ba\) or \(pa\)
Discrimination of ba-pa stimuli

VOT for discrimination pair
Can Infants Perceive Speech?

VOT = 20  VOT = 40  VOT = 60  VOT = 80  No change

Mean number of sucking responses

Time (min)
Speech perception - Categorical perception

Lasky et al.
1- and 4-month old Guatemalan infants born into Spanish-speaking homes

Found that:
Babies can perceive two distinctions between the phonemes that are not part of their language but not the one that is in their language.

Speech perception system is tuned into the native language.
Speech production

1. Babbling
   reduplicated- “dadadada”
   variegated- “bidadu bidadu”
   practice of muscles control
   influence of the target language

2. Idiomorphs
   e.g., caca → milk
   creative
   consistent
Average age of consonant production
Phonological errors in early speech production

Bloom & Lahey (1978)

<table>
<thead>
<tr>
<th>Type</th>
<th>Example</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduction</td>
<td>tore for store</td>
</tr>
<tr>
<td>Coalescence</td>
<td>paf for pacifier</td>
</tr>
<tr>
<td>Assimilation</td>
<td>nance for dance</td>
</tr>
<tr>
<td>Reduplication</td>
<td>kiki for kitty</td>
</tr>
</tbody>
</table>
## Single word utterances

First 10 words - 12 months
context-bounded vs. referential

<table>
<thead>
<tr>
<th>Word type</th>
<th>James</th>
<th>Jacqui</th>
<th>Jenny</th>
<th>Madeleine</th>
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</thead>
<tbody>
<tr>
<td>Context-bound</td>
<td>mummy</td>
<td>wee</td>
<td>choo-choo</td>
<td>there</td>
</tr>
<tr>
<td></td>
<td>go</td>
<td>hello</td>
<td>bye-bye</td>
<td>hello</td>
</tr>
<tr>
<td></td>
<td>quack</td>
<td>mummy</td>
<td>there</td>
<td>here</td>
</tr>
<tr>
<td></td>
<td>there</td>
<td>here</td>
<td></td>
<td>bye-bye</td>
</tr>
<tr>
<td></td>
<td>buzz</td>
<td>no</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>moo</td>
<td>down</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>boo</td>
<td>more</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>go</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nominal</td>
<td>teddy</td>
<td>Jacqui</td>
<td>teddy</td>
<td>teddy</td>
</tr>
<tr>
<td></td>
<td>ball</td>
<td>beeh</td>
<td>doggy</td>
<td>shoes</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>moo</td>
<td>brum</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>shoe</td>
<td>woof</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>more</td>
<td>mummy</td>
<td>yes</td>
<td></td>
</tr>
<tr>
<td>Nonnominal</td>
<td></td>
<td></td>
<td>no</td>
<td></td>
</tr>
</tbody>
</table>
First 50 words- 18 months

Noun bias?
- N vs. V
- linguistic difference
- cultural difference
Individual differences

![Graph showing individual differences in vocabulary production between referential and expressive children. The x-axis represents different types of words: nominals, action words, modifiers, personal/social words, and function words. The y-axis represents the percentage of a 30-word vocabulary. The graph indicates that referential children have a higher percentage of nominals compared to expressive children.](image-url)
Sources of the difference

- Environment: input from the mother
- Birth order: referential children are more likely to be the first-born
- Children’s temperament/hypothesis

Consequences of the difference

- Referential children have more rapid vocabulary development?
- Expressive children have more rapid development of syntax
Overextensions

e.g., Use “dog” to refer to all four-leg animals

Underextensions

e.g., Use “dog” to refer to a specific dog Lucky
Are overextensions a reflection of underlying semantic system?

Probably not, because:

1) not that often
2) not consistently used
3) sometimes but not always consistent with comprehension
4) decline when vocabulary increases
How are new words learned?

What is a “word”?
the segmentation problem

Saffran et al. suggested that babies can learn the sequence of phonemes

Jusczyk et al. suggested that babies can learn the prosodic pattern

What does the word mean?
the mapping problem
Statistical Learning by 8-Month-Old Infants
Saffran, Aslin, Newport (1996)

Infants heard 2 min of continuous speech -
4 three-syllable nonsense “words” - e.g. “bidaku” “padoti”
Randomly ordered

“bidakupadotigolabubidaku.....”
“bidaku padotigolabubidaku…..”

Transitional probabilities:

Within “word” (daku) - 1.00
Between “word” (tigol) - .33
Infant listening times:

“Words”       6.8  sec
Other          7.6  sec
From 18 months to 6 years:

Children learn an average of 9 new words a day

Fast mapping-

20-month olds can do this at one exposure

Can I have the ball?  Can I have the zib?

But how?
What does the word RABBIT mean?
1. Internal constrains

whole-object assumption

taxonomic assumption

No word: Find another one that is the same as this.
Word:   This is a sud. Find another sud that is the same as this sud.

mutual exclusivity assumption
2. Input and sociopragmatic cues

Child-directed speech
here and now
unambiguous utterances

Nonlinguistic context
the focus of gaze
cross-situational information
others’ behaviors and responses

E.g., “Let’s go twang it!” + accidental/intentional movement
24-month olds thought twang only refers to the intentional action
3. General learning processes

E.g., an orange is called a ball because of the shape

- common nouns refer to similarly-shaped things
- can account for overextensions
- after acquire a certain amount of vocabulary

However, children make inference about categorical membership, even it is in conflict with perceptual similarity.
Gelman & Markman (1986) tested 4 year-olds

This bird’s legs get cold at night.

This bat’s legs stay warm at night.

See this bird [bat]?
Do its legs get cold at night like this bird or stay warm like this bat?
Children preferred to use the category information:

<table>
<thead>
<tr>
<th>Percentage of category choices</th>
<th>Experimental condition</th>
<th>No conflict control</th>
<th>Attributes control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>68</td>
<td>88</td>
<td>54</td>
</tr>
</tbody>
</table>

- This pattern is true even when synonyms (e.g., rock and stone) rather than identical labels are used
- When the attributes are more perceptually based (e.g., size), children did not rely more on the category information
4. Syntax

e.g., Gelman and Markman (1985) tested 4-year olds

Find the fep one. → (b)

Find the fep. → (c)

Syntactic bootstrapping hypothesis