Acquiring Linguistic Structure

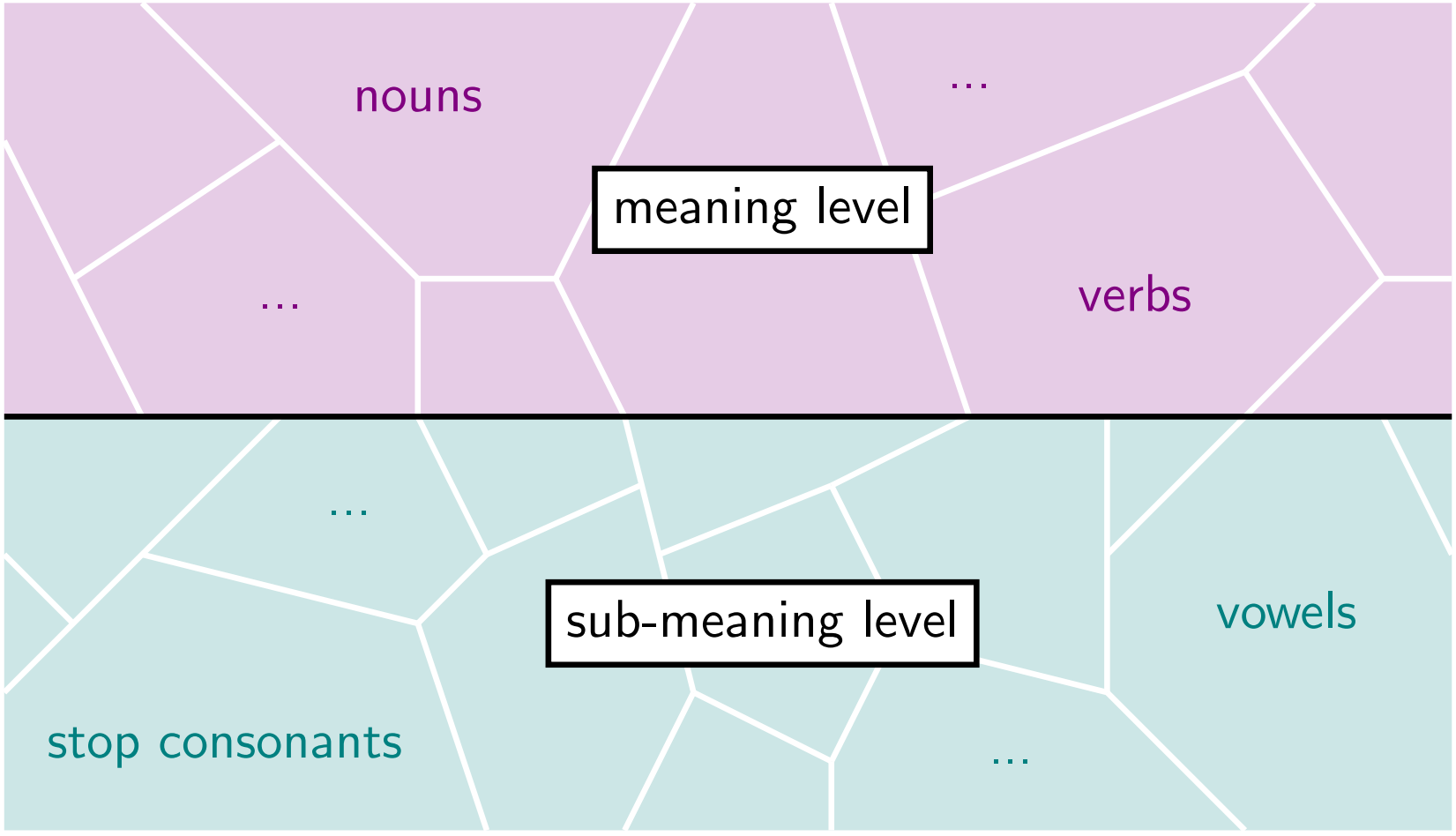
LouAnn Gerken (2008)

presented by: Anina Klaus

May 2, 2024

“This chapter is an overview of what scientists currently know about human sensitivity to linguistic form during infancy.”

Overview: Linguistic Structure



Acquisition of linguistic competence

Main questions:

- What is being acquired?
- How?
- When?

What is being acquired, and how?

Which role does input play in language acquisition?

- the nativist point to view:
  - Any set of data can potentially give rise to an infinite number of generalizations.
  - Therefore, learners must be born strongly constrained with with a restricted set of possible generalizations.
- in contrast: recent research suggests that even on the basis of just general purpose learning mechanism making the right generalizations can be possible

The third question: When?

- This chapter provides an overview over which sensitivity to structure can be attested at various points during infancy.
- Structure: two sections
  1. Sensitivity to Phonological Form
  2. Sensitivity to Syntactic Form

Experimental Methods

The experimental subjects are 6-18 month-old infants. How can we test their linguistic competence?

- measure attention to different auditory stimuli
- measurable differences in attention: children can discriminate based on the structural difference being tested

Sensitivity to Phonological Form

1. sensitivity to phonetic features
2. sensitivity to segment sequences
3. sensitivity to stress assignment

Sensitivity to Phonetic Features

Question: How do children determine which acoustic differences are relevant?

Sensitivity to Phonetic Features

Background: Children can be shown to be sensitive to all sorts of differences in early infancy, but later lose the ability to discriminate sounds that are not phonemic in their mothertongue.

Sensitivity to Phonetic Features

Hypothesis 1: Children lose the ability to distinguish non-phonemic sound pairs once they learn to associate the sounds with words and therefore meanings.

Hypothesis: Association to meaning shapes perception

Evidence in favor:

- Children show a decline in the ability to discriminate non-native consonants around the time they start to recognize and produce the first words.

Hypothesis: Association to meaning shapes perception

But:

- Decline in ability to discriminate non-native vowel sounds already at 6 months old - when word learning is "not obviously underway".
- Children show difficulty to discriminate minimal pairs (*bear* vs. *pear*) in early stages of word learning, but are able to discriminitate the relevant phonemes.

Sensitivity to Phonetic Features

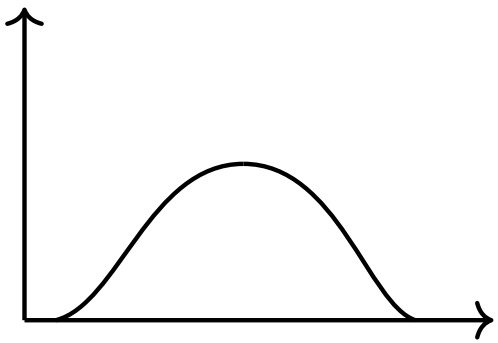
Hypothesis 2: Infants are sensitive to statistical properties in the input and can deduct information about the relevance of specific features this way.

Hypothesis: Distributional information shapes perception

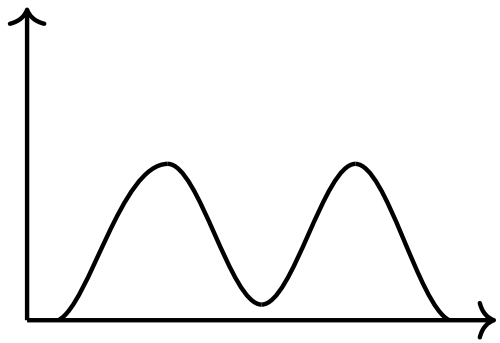
Evidence in favor:

- Infants show different responses when primed with bimodel as opposed to unimodal distributions along a feature spectrum.

Unimodal distribution:



Bimodal distribution:



Hypothesis: Distributional information shapes perception

Follow-up question: Does this learning process work on a by-pair basis or do children deduct more general, abstract rules?

- by-pair: /ba/ vs. /pa/, /da/ vs. /ta/ etc. are learned individually
- abstract, general: "voicedness" as a feature is learned

Hypothesis: Distributional information shapes perception

Evidence in favor of the latter (general abstract features):

- 8-month old children familiarized with a bimodal distribution in one continuum (e.g [d] - [t]) were able to discriminate on a different continuum of the same feature ([g] - [k])
- familiarized with an unimodal distribution were not

Sensitivity to Segment Sequences and Stress Assignment Patterns

Sensitivity to Segment Sequences

Observation: a number of studies show that infants are sensitive to sequence patterns

- non-native patterns are more interesting
- can learn new patterns in brief exposure in lab experiments
- seem to learn abstract feature patterns

Sensitivity to Stress Assignment Patterns

- recognize usage of a non-native stressing pattern

$\longrightarrow$ Do they learn abstract principles?

- Experimental results indicate that they can abstract to general principles by the age of 9 months.
- But they probably need exposure to different variants of a items to do so.

do-TON-re-MI-fa, do-RE-mi-TON-fa

Sensitivity to Syntactic Form

- often researched via meaning

$\longrightarrow$ therefore hard to research in infants!

- one option: familiarization studies

Sensitivity to Syntactic Form

1. sensitivity to the order of word-like units
2. sensitivity to syntactic categories

Sensitivity to the order of word-like units

Sensitivity to the order of word-like units

Question: What can be observed in studies using actual words from the childrens mother tongue?

- infants (10.5 months old) notice deviations from canonical word orders
- *Det N* $\rightarrow$ *N Det*

Sensitivity to the order of word-like units

- children respond differently to stimuli where functional morphemes were randomly replaced by nonsense syllables as opposed to stimuli were the replaced items were content words
  a. *There was once a little kitten who was born in a dark, cozy closet.*
  b. *There [ki] once [gu] little kitten who [ki] born in [gu] dark, cozy closet.*
  c. *There was once a little [mafIt] who was [tek] in a dark, cozy closet.*

Sensitivity to the order of word-like units

- 18-month old (but not 15-month old) children were able to notice dependency violations - if distance is not too far
- *is sing-ing* vs. *can sing-ing*

Sensitivity to the order of word-like units

Question: What can be observed in studies using familiarization studies?

- children familiarized with a Finite State grammar afterwards preferred items produced by "their" grammar over items produced by another grammar
- similar results in other types of "repetition pattern" studies

VOT-PEL-PEL-JIC

PEL-RUD-JIC-VOT-RUD

JED-FIM-FIM-TUP

Sensitivity to the order of word-like units

Question: What can be said about generalization?

- generalization, once again, seems to rely on the presentation with a variety of stimuli

$\longrightarrow$ tendency to apply more narrow generalizations over broader ones

- possible explanation: processing ressource minimization

Sensitivity to Syntactic Categories

Sensitivity to Syntactic Categories

Question: What can be observed in studies using natural language?

- 17-months old children notice misfit of word and gendered suffix (tested in Russian)
- 12-months old did not!
- only able to discriminate when there were additional cues in the word hinting at its grammatical gender

Sensitivity to syntactic categories

Question: What can be observed in studies using familiarization?

- 14 to 16 month old children familiarized with nonsense words in either noun or verb context (German)
- preference for words familiarized as nouns presented in verb contexts at test time

$\longrightarrow$ children keep track of morphological context

$\longrightarrow$ possibly beginning formation of syntactic categories for the novel words

Summary

Summary: Sensitivity to phonological patterns

- sensitivity to phonetic segment inventory, patterns of combination and stress at around **9 months old**
- sensitivity to differences in realization of **vowels earlier**
- patterns presented in brief familiarization experiments are quickly picked up

Summary: Sensitivity to phonological patterns

- seem to use **distributional information** as a cue for the formation of categories on a spectrum (e.g. +v/-v)
- **generalization** beyond the stimuli presented (when presented with **enough variety**)
- but: still unclear what exactly is required to "trigger" generalization
- open question: Are children biologically prepared to entertain certain categories or can any readily perceivable acoustic dimension serve as the basis for a category?

Summary: Sensitivity to syntactic patterns

- children show sensitiviy to patterns of abstract features/categories
- **7 months - middle of the second year**
- generalize beyond stimuli of the experimental input in familiarization studies
- ...when provided with sufficient evidence of variety
- but: most of the experiments on word order utilize reduplication, which is not exactly central to human syntax

Conclusion

- children have a remarkable ability to keep track of the specifics of the input
- generalize to new forms given sufficient evidence

"Language development is a process in which learners must use their pattern detection and categorization skills to discern the patterns and categories of human language."