Does sentence structure boost word learning? Evidence from an artificial language learning study

Research Master Traineeship
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Language learning: words and structure
Language learning: words and structure

- **Word** learning
  - Cross-situational word learning: perceptual cues
Language learning: words and structure

- **Word** learning
  - Cross-situational word learning: perceptual cues
  - Syntactic bootstrapping: **structural** (linguistic) cues
Language learning: words and structure

- **Word** learning
  - Cross-situational word learning: perceptual cues
  - Syntactic bootstrapping: **structural** (linguistic) cues

- **Structure** learning
  - Perceptual cues
  - **Word** knowledge as a cue
Word and structure learning interact

- Knowledge of **words** helps learning **structure**
  - Word knowledge:
    - *Hazi* - Boy
    - *Zasu* - Ball
    - *Waba* – Kick
Word and structure learning interact

- Knowledge of **words** helps learning **structure**
  - Word knowledge:
    - *Hazi* - Boy
    - *Zasu* - Ball
    - *Waba* – Kick
    - “*Waba hazi zasu.*”
Word and structure learning interact

- Knowledge of **words** helps learning **structure**
  - Word knowledge:
    - *Hazi* - Boy
    - *Zasu* - Ball
    - *Waba* – Kick
    - *Waba hazi zasu*
  - | Verb | Subject | Object
Word and structure learning interact

- Knowledge of **words** helps learning **structure**
  - Waba hazi zasu
  - Verb  | Subject  | Object

- Knowledge of **structure** helps learning new **words**
  - Verb  | Subject  | Object
  - “Foga rada lowi.”
Research Question

How do word learning and structure learning interact?
Word and structure learning

- Previous studies: Word learning OR structure learning
Previous studies: Word learning OR structure learning

Word learning studies *ignore* structure

Smith, Smith, & Blythe, 2011
Word and structure learning

- Previous studies: Word learning OR structure learning
  - Word learning studies *ignore* structure
  - Syntactic bootstrapping studies *assume* structure knowledge
Previous studies: Word learning OR structure learning
- Word learning studies *ignore* structure
- Syntactic bootstrapping studies *assume* structure knowledge
- Structure learning studies *assume* word knowledge
Word and structure learning

- Previous studies: Word learning OR structure learning

- Our project: simultaneous word AND structure learning
1. Linguistic knowledge improves over time
Hypotheses

1. Linguistic knowledge improves over time

2. Structure knowledge affects word learning only in later stages
   - First learning stages: no effect of structure
   - Later learning stages: structure knowledge boosts word learning
Methodology

- Artificial language
- 50 participants
- 16 words:
  - CVCV
  - 12 nouns, 4 verbs
- Observation of scene and sentence…

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Sentence Test Trial
Design

- 2 blocks:
  - training – word test – sentence test
  - training – word test – sentence test
- 2 conditions:
  - structured (VSO)
  - unstructured (random)
- dependent measures:
  - number of correct answers
  - reaction times
Results
Number of learned words and sentences

Condition
- ○ no structure
- ○ structure

Words Test 2 vs. Sentences Test 2
Number of learned words and sentences

Condition
- no structure
- structure

Words Test 2 vs. Sentences Test 2 graph.
Number of learned words and sentences

Condition
- ○ no structure
- ○ structure
Number of correct words

![Graph showing the number of words correct with two conditions: no structure and structure. The graph includes data points for test block 1 and 2.]
Number of correct words | reaction times

Number of words correct

Reaction Time (ms)
Conclusions

- Significant improvement of linguistic knowledge over time (H1)
- No effect of structure in first learning block (H2a)
- Non-significant effect of structure in second learning block (H2b)
  - Structure learning was too difficult
  - Follow-up…
Follow-up

• 4 (smaller) blocks of training – word test – sentence test
• Facilitate structure learning
  • From 16 to 12 words (8 nouns, 4 verbs)
  • 3 conditions: random order, VSO, SVO
• Manipulation check: sentence production task
Future Work

- Different frequency distributions in the language input
- The effects of morphological markers on words
- Differences in the learning trajectory of different populations
- .....
Thank you!