Cross-linguistic transfer of word order
A computational study of case-marking comprehension

Background

- Transitive sentences in languages such as Russian or German may have both SVO and OVS word order. Example from Yoshimura and MacWhinney (2010):

The dog chases the bear.

(1) Der Hund jagt den Bär

(2) Den Bär jagt der Hund

- L2 learners of these languages (as well as children) often misinterpret OVS sentences, such as (2), as SVO; in this case: The bear chases the dog.

- Two theories explain this type of error:
  1. First-Noun Principle (e.g., VanPatten, 2015): learners universally assign the agent role to the first noun or pronoun. Cross-linguistic influence (CLI) plays no role.
  2. Competition Model (e.g., Morrett & MacWhinney, 2013): L2 learners use the interpretation strategy standard in their L1. CLI is the key factor.

The observance of CLI could be seen as evidence for the Competition Model.

Computational model

- Learns argument structure constructions from bilingual input (Alishahi & Stevenson, 2008; Matusevych et al., 2015, 2016).
- Groups instances probabilistically into clusters, based on (1) similarity between instances and clusters; and (2) existing cluster size.
- Instances are annotated with argument structure information: head verb, arguments, word order, semantics, event-based properties, case-marking, etc. In this study: child-directed speech in CHILDES.
- Model is tested on the simulated picture-choice task, using the original test instances. Each instance "activates" some clusters more than others. Measuring amount of CLI given an instance: how "blended" the activated clusters are.

Simulations: Testing the model

Janssen et al. (2015)

1. All groups perform high in the converging condition (grey bars).
2. Monolinguals in the conflicting condition perform above chance, but lower than in the converging condition (the two pairs of bars on the left).
3. Bilinguals perform at/below chance in the conflicting condition (two white bars on the right).

Kempe & MacWhinney (1998)

1. Converging: learners choose first noun as agent (four bar pairs on the left).
2. Conflicting: Russians choose second noun more frequently than Germans (three bar pairs on the right).

The experimental patterns observed in the computational model are similar to those reported in the human studies.

Simulations: CLI analysis

Janssen et al. (2015)

- Similar result; but for OVS sentences (circles) there is no difference in the amount of CLI for Russian vs. German learners.

Kempe & MacWhinney (1998)

- Like above, but an additional group of German natives is simulated: German allows for OVS.

References


Conclusions

- Our probabilistic computational model performed in the target task similar to human learners: early bilinguals in the experiment of Janssen et al. (2015) and L2 learners in the experiment of Kempe and MacWhinney (1998).
- Our results suggest that CLI is an important factor that affects this kind of comprehension. This explicitly contradicts VanPatten’s First-Noun Principle, but is compatible with MacWhinney’s Competition Model.
- There is also VanPatten’s L1 Transfer Principle, which our results do not necessarily challenge. Moreover, lexical similarity and intonational cues may be at play, which our study did not account for.