



The Perceptual-Conceptual Connection of Symmetry in Sign Language Syntax



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BACKGROUND

- Symmetry is an important aspect in both logic and perception
 - Symmetry is also present in language:
 - Most verbs in English have an asymmetrical meaning
 - (A) If Sam kicks Rick, it does not imply that Rick kicks Sam.
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- Some rare symmetrical verbs: (B) John met Bill, Bill met John
 - **Chestnut & Markman:** by age 4 children can tell the difference between symmetrical and asymmetrical verbs
 - Perceptual symmetry can provide a gateway to understanding linguistic symmetry → language acquisition?
 - **Hafri 2021:** people can rely on the symmetry of a visual event to reveal understand language.
 - **DiStefano, Gomes & Trueswell 2020:** people who do not know sign are able to make a connection between the perception of visual symmetry and linguistic symmetry in ASL.
 - Summer study → verbs in isolation, not natural for child learner
 - Verbs when in context can introduce an asymmetry when syntax imposes asymmetry
 - **Gleitman 1996:** sentence structure can affect the meaning of the sentence
 - **Present study:** what is happening when word order is introduced in ASL?

METHODS

- A native signer was asked to interpret English sentences into American Sign Language (ASL)
- 16 predicates were chosen
 - 8 symmetrical, 8 asymmetrical
 - Each type had both a transitive and intransitive version
- Interpretations were translated into ASL Gloss
- These interpretations were then hand coded for:
 - Transitive vs Intransitive sentence
 - Symmetrical vs Asymmetrical predicate
 - Symmetrical vs Asymmetrical production (sign)

Sentence structure had an effect on how symmetrical predicates were produced visually in ASL.



“Equate” in isolation



Transitive: 1) Jane met Mary.
2) Mary met Jane



Intransitive: 1) Jane and Mary met.
2) Mary and Jane met

RESULTS

- In transitive phrases, symmetrical predicates were produced mainly asymmetrically. The order of the nouns (Mary vs Jane) had no effect on symmetry of signs when the structure was in transitive.
- Some aspect of the word-order in English has an effect on how the signs in ASL are visually produced, even if those predicates were “symmetrical.”

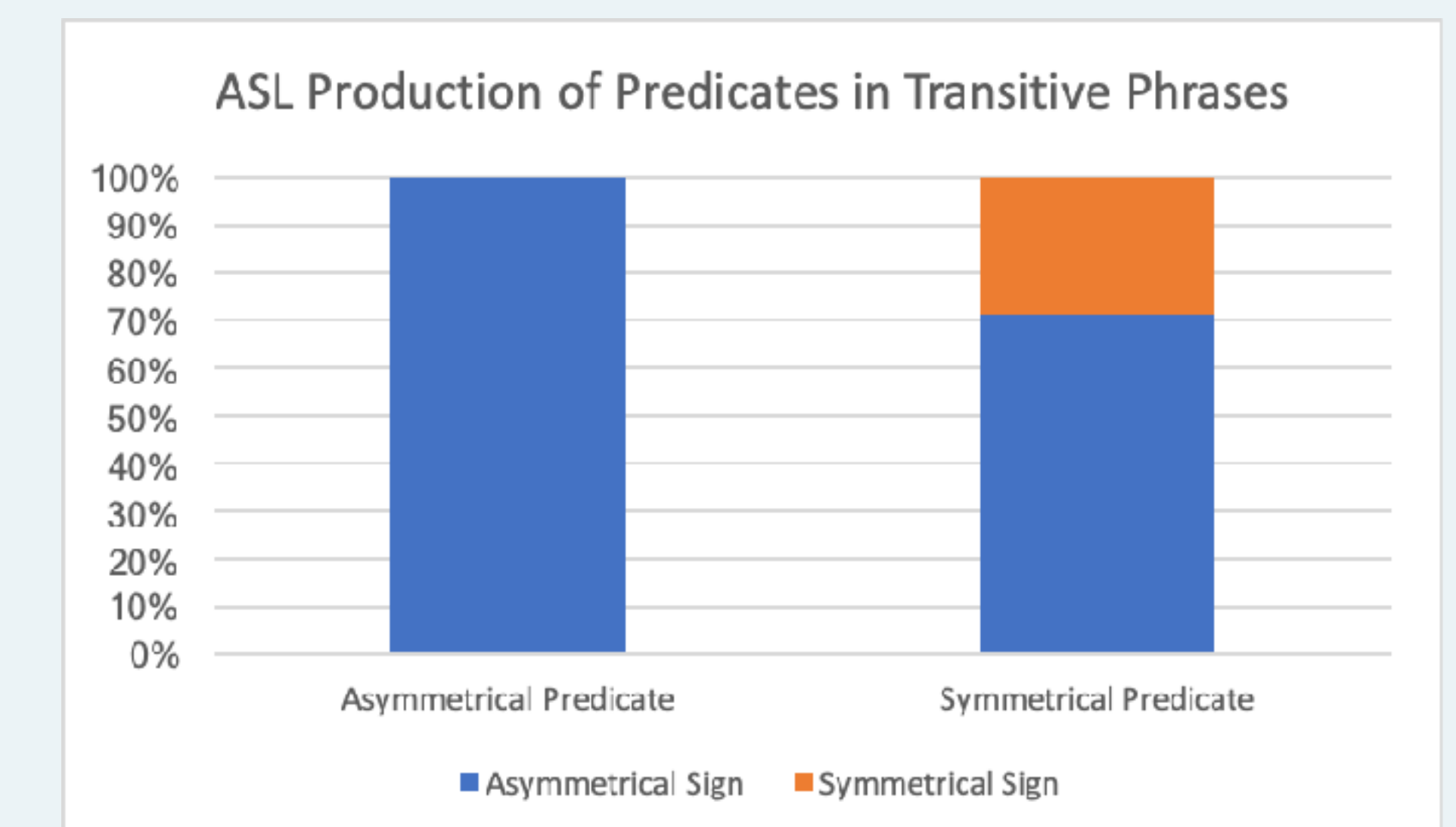


Figure 1: ASL Production of Predicates in Transitive Phrases

P-value: 0.031618789

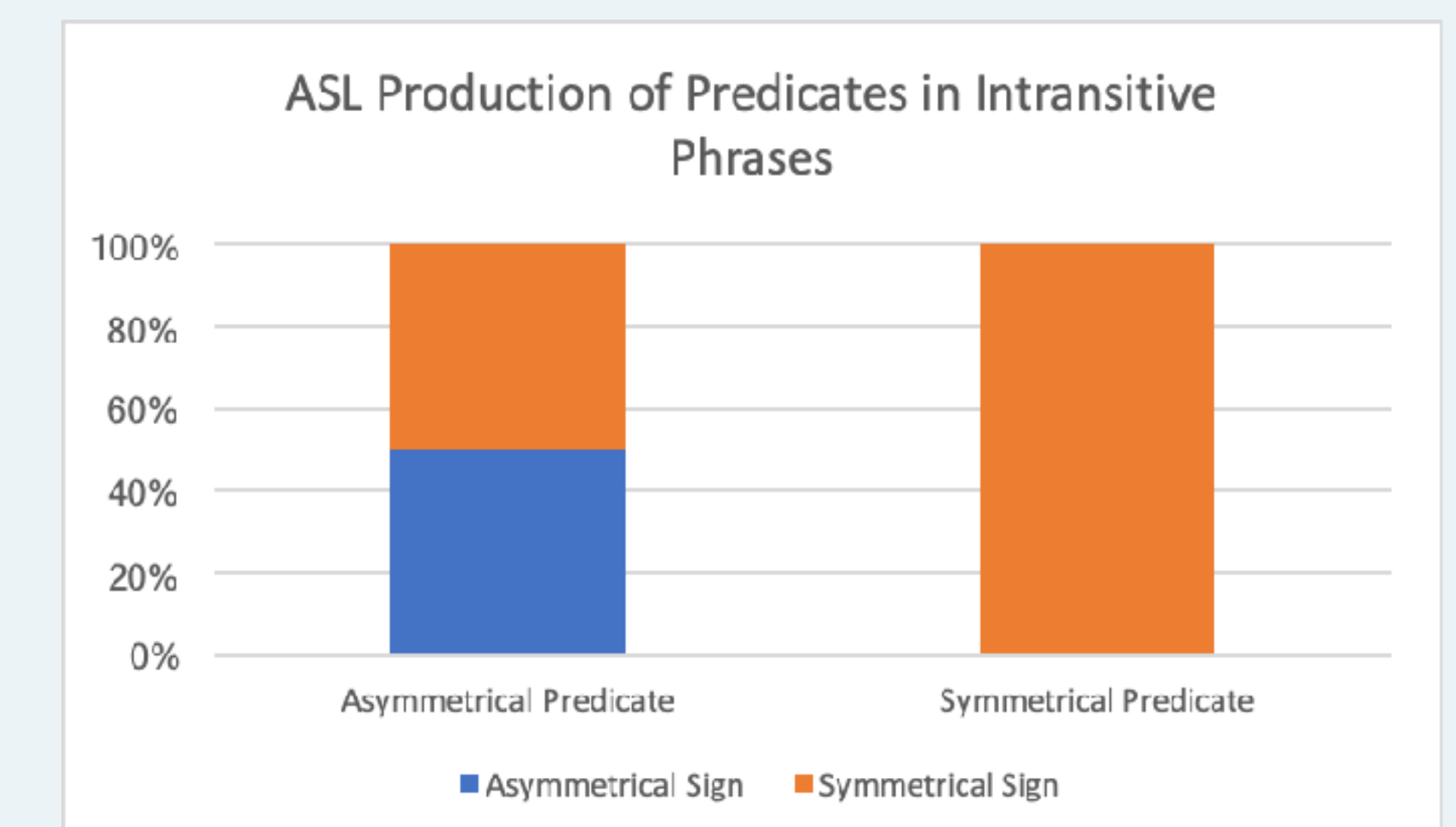


Figure 2: ASL Production of Predicates in Intransitive Phrases

P-value: 0.000944494

DISCUSSION & FURTHER DIRECTIONS

- **Do ASL signers see these signs as meaningfully different?** An experimental study would include participants who are native signers, making judgements about how similar the ASL phrases in different nominal orders are to each other.
- **Prediction:** participants would have different interpretations of the meanings based on the nominal ordering of both English and ASL phrases.

REFERENCES

- Chestnut, E. K., & Markman, E. M. (2018). “Girls are as good as boys at math” implies that boys are probably better: A study of expressions of gender equality. *Cognitive science*, 42(7), 2229-2249.
- Gleitman, L.R., Gleitman, H., Miller, C., & Ostrin, R. (1996). Similar, and similar concepts. *Cognition*, 58(3), 321-376.
- Hafri, A., Gleitman, L.R., Landau, B., & Trueswell, J.C. (2021). When word and world meet: Intuitive correspondence between visual and linguistic symmetry. In Proceedings of the 43rd Annual Conference of the Cognitive Science Society. *res of similarity. Psychological Review*, 84(4), 327-350.