Phonological learning is asymmetrical between prefixes and suffixes

Darby Grachek (grachek@usc.edu) and Elsi Kaiser
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Background

Prefix-suffix asymmetry

- Prefixes fail to undergo phonological processes that the stem and suffix undergo regularly
- Russian word internal process of palatalization applies to suffixes as expected, but fails to apply to prefixes (where word external velarization applies instead)

Russian Palatalization vs velarization (Gribanova, 2008):

a. Word internal palatalization
/obid + e/ → [obʲidʲe] 'offense.DAT'
b. Word external velarization
/ugol ɨvana/ → [uglʸɨvana] 'Ivan's corner' *[uglʲɨvana]
c. prefixes trigger velarization
/ot + iskatʲ/ → [otʸiskatʲ] 'find.INF' *[otʲiskatʲ]

- Hawkins and Cutler (1988) argue that stems must be recognized first before an affixal modification can be made
- Requires more cognitive resources to hold a prefix in working memory to apply its modification (doesn't apply to suffixes)
- Right to left learning asymmetry (Hupp et al. 2009)
- Extend this to explain why phonological processes are more frequently exceptional in prefix position

Hypothesis: Due to their position relative to the stem, phonological processes are easier to learn and implement in suffix position than in prefix position

Methods

Participants and Stimuli

- 41 native English-speaking participants recruited via Prolific (Palanlab and Schitter, 2018)
- Nonsense word stems (CVCV) and affixes (CV)
- Stem controlled backness harmony pattern
- Affixes had front and back form (prefixes =ʃe/ʃo, suffixes = mi/mu)
  bibi + mu = bibi-mi
  ʃe + bubu = ʃo-bubu
- All stimuli associated with meanings (stem = objects and animals; affix = 'above' or 'below')
- Controlled for stress location by recording each syllable as a separate monosyllabic word and splicing each syllable together (Boersma and Weenink, 2016)
- 144 targets (half exposure/half test); 36 fillers = 180 total trials

Methods (continued)

Procedure

Exposure phase: stimuli associated with meanings via picture and audio presentation (after White et al, 2018)

- Stem image appears on left portion of screen followed by stem audio
- Affix image appears on right portion of screen (blue orb above or below), followed by affix audio
- Meaning and harmony always correct in exposure phase

Test phase: asked whether the form participants heard for affixed stimuli fits into exposure pattern
Prompt: *"Does the second word you heard match the picture on the right side of the screen?"*

- Binary y/n response (F/J button press)
- Not all harmony and meaning patterns are correct
- Participants have to discern which ones follow the pattern
- 24 trials in each exposure phase (repeated 3 times)
- 24 test trials, 12 fillers in each test

Prediction: The suffix condition should have more correct responses for harmony pattern than prefix

Figure 1: Example of exposure trial

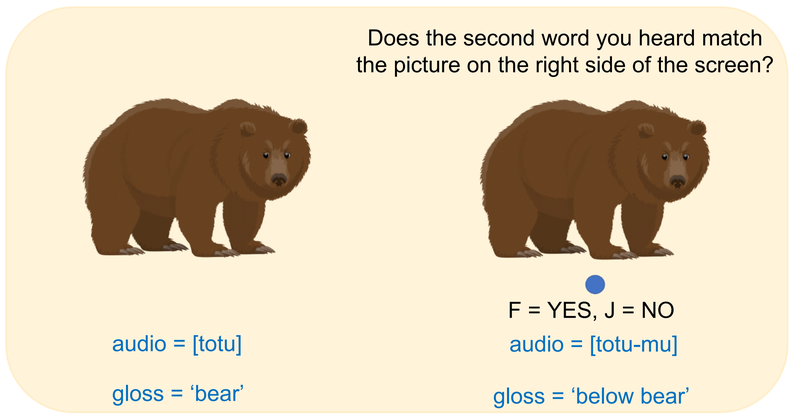

Figure 2: Example of test trial

Data, Results, and Analysis

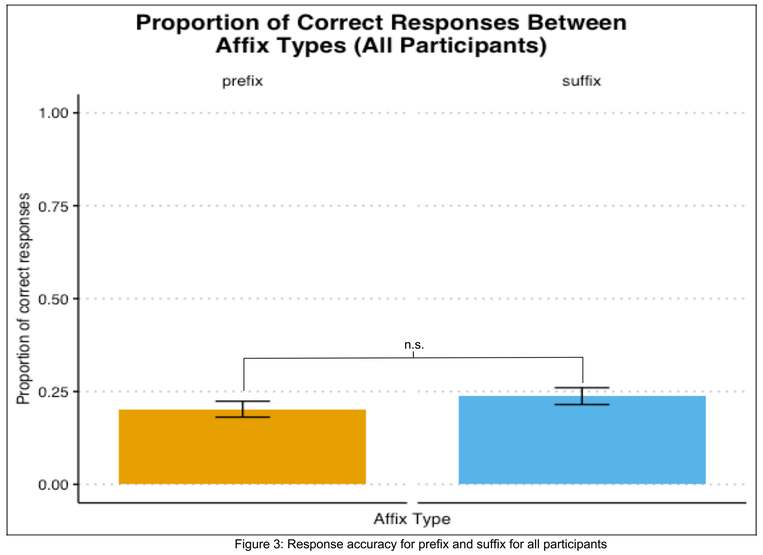

Figure 3: Response accuracy for prefix and suffix for all participants

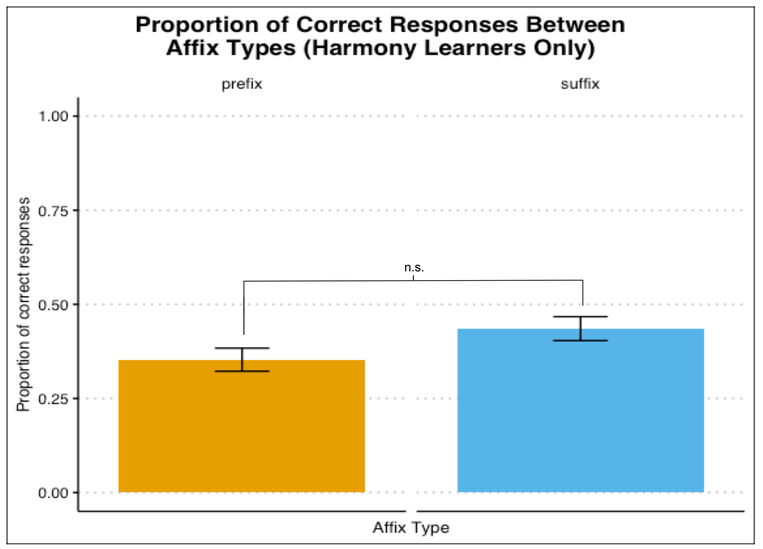

Figure 4: Response accuracy for prefix and suffix for all participants that learned harmony pattern

- Results for all participants don't have large difference in accuracy – many failed to learn the harmony pattern (although in direction by hypothesis) ($\hat{\beta}$ = -.47, p = 0.15)
- When looking only at participants showing evidence of learning harmony pattern, predicted effect is more visible: participants were more accurate in characterizing harmony pattern using suffixed stimuli than for prefixed stimuli ($\hat{\beta}$ = -0.77, p = 0.08)

Conclusion

- Results provide limited support for hypothesis that phonological learning facilitated in suffix position as opposed to prefix position (esp. clear in harmony learners)
- Difference in ability to learn accurately between affix types may contribute to tendency for prefixes to not undergo phonological processes as regularly is suffixes
- Alternative explanations also worth investigating include:
- Directionality – Affix asymmetry possibly an effect of progressive patterns being more common than regressive ones
- Structural – prefixes have been claimed to be less morphologically related to the stem than suffixes (although that alone is not an explanation)

References and Acknowledgments

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