Phonological Alternation Learning is Facilitated by Relative Frequency Cues

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Many phonological alternations involve exceptions. This is well-exemplified by English stress shift, which predicts primary stress shifts rightward in a stem when a suffix is added (e.g. párent → parént-al, nárrate → narrát-ion); however, many suffixes do not trigger the expected shift (e.g. párent → párent-hood, nárrate → nárrat-ive). Prominent analyses of these patterns have relied on *a priori* categorization of suffixes, with speakers associating each category with either rule-application or non-application [1, 2]. However, alternative accounts opposing pre-categorization have recently found that lexical decomposition, a parsing process occurring during lexical access, can explain the association of different phonological outcomes with different suffixes [3–5]. They show that stems and affixes which are decomposed during lexical access are also likely to be exceptions in phonological alternations (i.e. not undergo stress shift), suggesting speakers utilize perceptual cues from lexical decomposition when learning exception-filled alternations. However, behavioral evidence is needed to rule out the possibility that this correlation is due to diachronic coincidence of the English lexicon, rather than correspondence between decomposition and phonological exceptions.

An artificial language learning (ALL) task was used to test the hypothesis that lexical decomposition (indicated by token relative frequency) is actively used to enhance the learning of a phonological alternations involving exceptional suffixes. In the learning phase, nonce stems (e.g. [porap]) and suffixes ([-ifa/-iso]) were involved in a stem-final voicing alternation applying inconsistently across stem-suffix boundaries. Participants saw a pattern in which one nonce suffix triggered the alternation (1), and the other nonce suffix did not (2). The task also contained an artificial relative frequency distribution which encouraged decomposition for one suffix over another by manipulating stem and suffixed form frequencies. Suffix type and decomposition were crossed to generate 3 different conditions found in Figure 2. After the learning phase, a subsequent test phase evaluated how accurately participants generalized the alternation to new words. If participants are reliant on a correspondence between cues to 'separateness' in lexical decomposition and phonological patterning, accuracy is predicted to be highest in the congruent condition, and lowest in the incongruent condition.

Preliminary analyses were performed on 26 pilot participants (full task will have 60 participants). Figure 1 shows the proportion of accurate test phase responses, and a mixed effects logistic regression predicting participant accuracy using condition (with random intercepts of participant and word) showed that the incongruent condition has numerically lower accuracy compared to the congruent condition but did not reach significance (β = -0.73, p = 0.07). This shows some limited support for the hypothesis: The congruent condition has numerically higher accuracy compared to the incongruent condition. Figure 2 breaks down participant accuracy between rule-application and non-application suffixes, showing improved accuracy on non-application suffixes in the congruent condition.

The results of this study show limited support for facilitated learning of non-application (i.e. exceptional) suffixes when a correlation in non-application suffixes and high decomposability is present. This suggests a correspondence between lexical parsing and phonological derivations, providing a crucial piece of evidence supporting reference to psycholinguistic factors when considering theoretical approaches to phonological exceptionality.

References

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Figures and Tables

(1) Rule-application:	**(stem-final voice)**
a. porap	→ porabifa
b. talik	→ taligifa
(2) Non-application:	**(no stem-final voice)**
a. porap	→ porapiso
b. talik	→ talikiso

Figure 1: Examples rule-application (1) and non-application (i.e. exceptional) (2) stimuli in the ALL task.

Condition	Suffix correlation
Congruent	Non-app. = decomp., Rule-app. = whole-word
Incongruent	Non-app. = whole-word, Rule-app. = decomp.
Baseline	Neutral decomposability

Figure 2: Conditions of the ALL task. The congruent condition contains a correspondence in 'separateness' cues from lexical decomposition and phonological non-application predicted to facilitate learning.

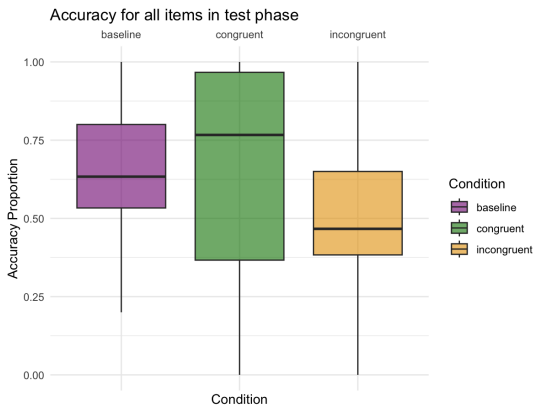

Figure 3: Participant accuracy across all conditions.

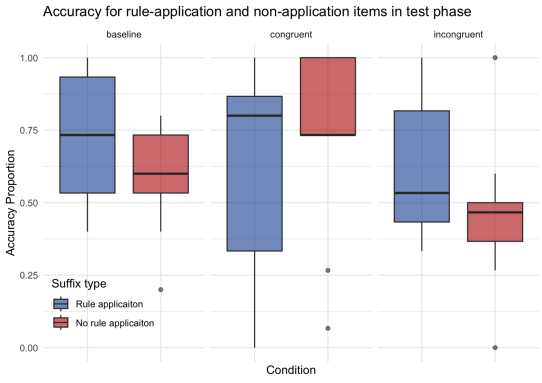

Figure 4: Participant accuracy for rule-application and non-application suffixes across all conditions.