Wug[z], wup[s], and wuz[ɨz]: disambiguating stem and allomorph effects in speeded nonword inflection.

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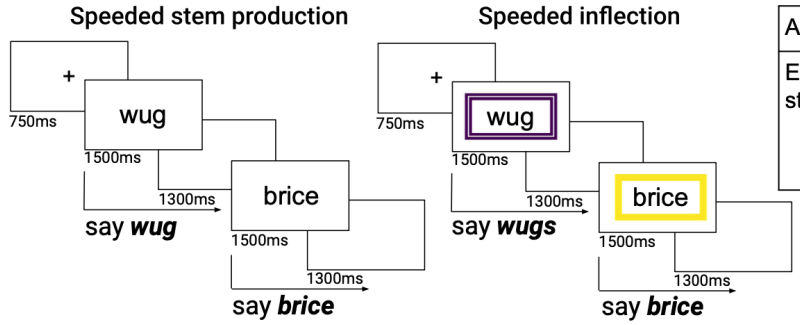
The phonological representation of inflectional morphemes has been widely studied in theoretical phonology, acquisition, and perception[1-4], but less is known about the processes involved in the production planning of inflected forms[5]. In a previous speeded inflection study, Li et al. (2023)[6] reported an effect of English regular plural allomorph ([z], [s], or [ɨz]) on response onset latencies when participants inflected visually presented real-word stems (e.g., *leash* → *leah*[ɨz]). However, any putative allomorph effect was potentially confounded with independent differences among stems, as finding sets of lexical stems matched on all relevant dimensions is challenging. The present work attempts to disambiguate stem and allomorph effects by utilizing minimal triples of nonwords that differ only in the stem-final consonant and investigating the main effects of stem consonant, singular/bare form vs. plural inflection, and their interaction.

Speeded production experiments. We selected 156 minimal nonword stem triplets (468 total stems) that differed only in a simple coda (e.g., /wʌg/, /wʌp/, /wʌz/). Within a triplet, the three stems conditioned different plural allomorphs, and we carefully controlled other stem properties such as length, orthographic consistency[7], and rime frequency. In the speeded **stem production** experiment (*n* = 24), participants were asked to produce visually presented wug stems as quickly and accurately as possible. In the **speeded inflection** experiment (*n* = 24), participants were presented with the same stems and asked to produce either the bare/singular form (e.g., /wʌg/) or the plural inflected form (/wʌgz/) according to a simple, simultaneously presented visual cue. The dependent variable was onset latency (RT) in milliseconds: the difference between onset of stimulus presentation and the acoustic onset of the response.

Hypotheses. If it is the case that the conditioning context – the stem-final segment – imposes difficulty on phonological planning, we expect an effect of allomorph grouping (i.e., sets of stems that condition the same allomorph) on RTs in the stem production experiment. If this effect exists, we want to further know whether (i) stem difficulty fully explains any RT differences in plural production or (ii) there is an effect of allomorph over and above the conditioning stem context. Trials from the stem production experiment and the plural productions of the inflection experiment were entered into a Bayesian mixed-effects model where the interaction effect between experiment and allomorph was estimated alongside other nuisance variables. If the planning of an allomorph induces difficulty above and beyond stem difficulty, we expect an interaction effect.

Results. The stem production experiment elicited an effect of the final consonant: production of stems that condition the [z] plural allomorph was fastest, and production of stems that condition [ɨz] was slowest (i.e., [z] < [s] < [ɨz] by stem set). The RTs of speeded plural productions in the second experiment mirrored this pattern. The observed ordering follows the inverse frequency of the stem-final consonants in a lexicon of monomorphemic monosyllables[9] ([z]-taking: 1027 stems > [s]: 619 > [ɨz]: 537), suggesting that it is phonotactic in origin. The mixed-effects model did not yield any significant interactions. This suggests that any production difficulty uniquely due to allomorph planning was not detectable, in spite of the fact that the allomorph [ɨz] adds an additional syllable to the inflected form and previous work was reported a (syllable) length effect in monomorphemic word production[10].

Methodological notes. Nonword (wug) inflection has been widely employed in psycholinguistics and morphology since the 1950s[1]. To our knowledge, this is the first study that uses nonwords in the speeded inflection context. This study demonstrates the utility of using nonwords to disambiguate the many confounds that exist in real word inflection, which by design, have to be between-items due to conditioning context. Designs with nonword stems are subject to less constraints of the lexicon and allow for an easier search for matching items. We find this particularly useful for studies of inflection, and recommend it for future studies of morpho-phonological production planning.



Allomorph	[z]	[s]	[ɨz]
Example stems	swame clud zov twide	swake clup zoth twipe	swace cluss zozz twize

Table 1 ↑. Example stimuli.
Figure 1 ←. Experimental tasks.

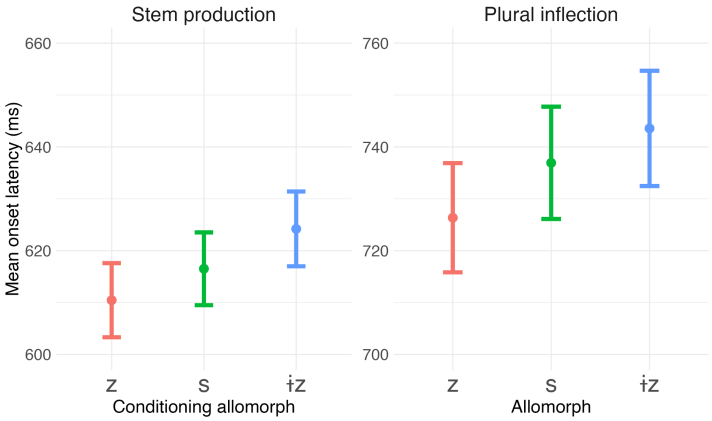


Figure 2. Mean onset latency (with 95% CI of the mean) for stem and plural production. Analysis of singular trials in the plural production experiment are omitted here but exhibited parallel effects of stem consonant / allomorph grouping. We note that this ordering is different from that of [6] (which elicited a weak effect of [s] < [z]) and subject to future investigation.

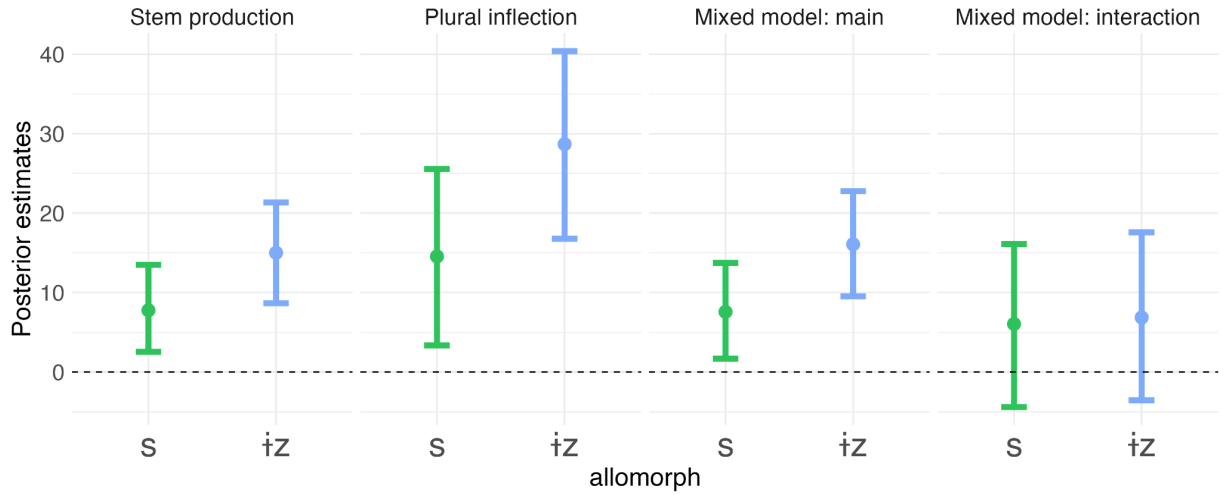


Figure 3. Posterior estimates from Bayesian mixed-effect models fitted over onset latencies (ms) with an ex-Gaussian distribution on production onset latency (RT). Results are qualitatively equivalent when a normal distribution on RTs is assumed.

[1] Berko, J. (1958). *Word*. **[2]** Zwicky, A. M. (1975). *Testing linguistic hypotheses*. **[3]** Mealings, K. T., Cox, F., & Demuth, K. (2013). *JSLHR*. **[4]** Goodwin Davies, A., & Embick, D. (2020). Language, Cognition and Neuroscience. **[5]** Meyer, A. S., & Belke, E. (2007). *Oxford handbook of psycholinguistics*. **[6]** Li, J., Rest, S., & Wilson, C. (2023). HSP2023. **[7]** Jared, D., McRae, K., & Seidenberg, M. S. (1990). *JML*. **[9]** Kessler, B., & Treiman, R. (2001). *JML*. **[10]** Bachoud-Lévi, A. C., Dupoux, E., Cohen, L., & Mehler, J. (1998). *JML*.