

Gradient homophony avoidance in the learning of neutralizing alternations

Sora Heng Yin¹, Kathleen McCarthy¹, and Adam Chong¹

¹*Department of Linguistics, Queen Mary University of London (United Kingdom)*

Previous research on the typology and historical development of neutralization has shown that neutralizing alternations are more likely to be phonologized if they introduce less homophony into the lexicon, a correlation attested by case studies on homophony avoidance patterns, e.g., in Korean [1, 2] and Dutch [3], as well as by large-scale statistical analysis of diverse languages [4]. Results from artificial grammar learning studies support this hypothesis, and have found an effect of homophony avoidance: adults were worse at learning neutralizing alternations that created homophony than those that did not [5, 6]. In this study, we examine if homophony avoidance is categorical or gradient, i.e., if neutralizing alternations that create more homophones in the lexicon are harder to learn.

Method: Native English speakers were exposed to five artificial languages (20 per exposure condition; 100 in total). During exposure, participants heard pairs of singular-plural nonce words, e.g. [tusut]~[tusutʃi]. For alternating stems, the final C of the singular alternated when followed by the plural suffix *-i*. 16 trials involved neutralizing alternations [t, k]~[tʃ] and [d, g]~[dʒ], whereas 8 involved non-neutralizing alternations [s]~[ʃ] and [z]~[ʒ]. There were also 24 non-alternating stems ending in [p, b, f, v, m, n]. In total, the exposure consisted of 48 trials. We also manipulated the rate of homophony: in the 100% Homophony condition, neutralizing alternations always created homophones, as all neutralizing items formed minimal pair, e.g., [tusut]/[tusuk]~[tusutʃi] (8 pairs in total), whereas in the 0% condition neutralizing alternations never created homophones. There were also 3 conditions with intermediate homophony rates (75%, 50%, 25%). In the test phases, participants completed a forced-choice task consisting of a mix of trained and novel items. After hearing the singular (e.g. [tusut]), participants were given two plural options, one alternating ([tusutʃi]) and one non-alternating ([tusuti]), and asked to choose the correct one. Accuracy on Alternating trials was analyzed using mixed-effects logistic regression with Homophony Level (0%, 25%, 50%, 75%, 100%) and Alternation Type (Neutralizing vs. Non-neutralizing) and their interaction as predictors.

Results and discussion: There was a significant interaction between Homophony Level and Alternation Type ($z=-3.39$, $p<.001$; Fig 1) for participants' accuracy on novel items. Participants had lower accuracy for Neutralizing alternations compared to Non-neutralizing alternations, as Homophony Level increased. Pairwise comparisons show this difference in accuracy (Neutralizing vs. Non-neutralizing) only became significant in the 50%, 75%, and 100% conditions. Our results add to the evidence of a learning bias against homophony-inducing alternations, suggesting the highly integrated nature of phonological and lexical learning. This gradient bias may play a role in shaping language change, as the typological data shows parallel gradience: neutralizing alternations occur less frequently if they create more homophony (e.g., [4]).

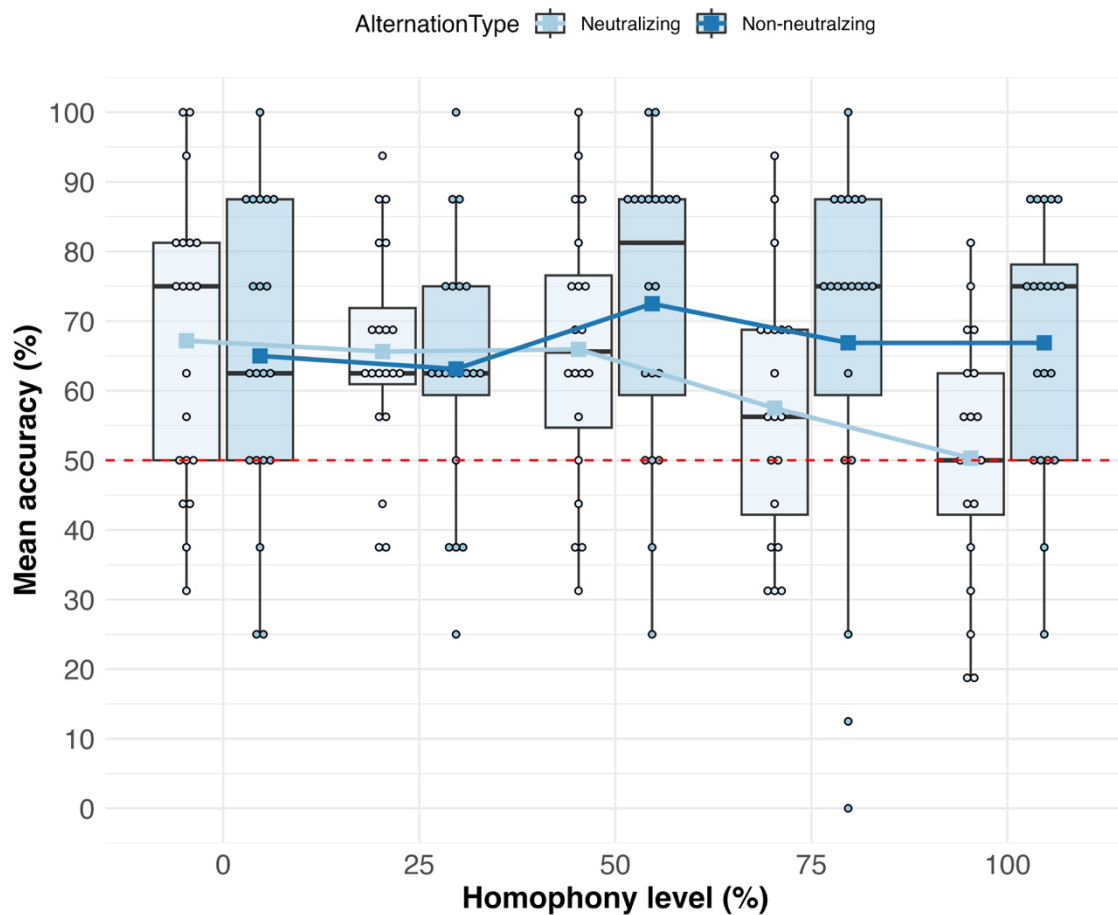


Fig. 1. Percentage of novel test trials in which participants correctly chose the alternating plural form by Homophony Level and Alternation Type. Individual results (dots) and overall means (boxes and squares connected by lines) are provided. The dashed line indicates chance performance at 50%.

References

[1] Silverman, D. (2010). Neutralization and anti-homophony in Korean. *Journal of Linguistics*, 46(2), 453–482.
 [2] Kaplan, A. (2011). How much homophony is normal? *Journal of Linguistics*, 47(3), 631–671.
 [3] Smet, I. D., & Rosseel, L. (2023). Who’s afraid of homophones? A multimethodological approach to homophony avoidance. *Language and Cognition*, 1–24.
 [4] Wedel, A., Kaplan, A., & Jackson, S. (2013). High functional load inhibits phonological contrast loss: A corpus study. *Cognition*, 128(2), 179–186.
 [5] Yin, S. H., & White, J. (2018). Neutralization and homophony avoidance in phonological learning. *Cognition*, 179, 89–101.
 [6] Song, H., & White, J. (2022). Interaction of phonological biases and frequency in learning a probabilistic language pattern. *Cognition*, 226, 105170.