Recognition of reduced word forms in second language lexical learning

Motoki Saito[1], *Esther Ruigendijk*[1]

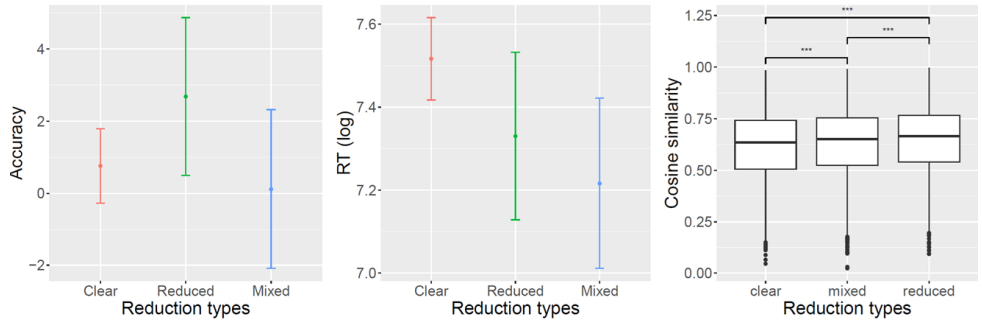
[1] *Institute of Dutch Studies, Universität Oldenburg, Germany*

Background: Word recognition has been assumed to involve identification of canonical word forms [1, 2], pre- dicting that clear forms should always be easier to process than *reduced* forms, which are much more common than widely assumed [3, 4]. However, there are studies that suggest that learning only reduced forms improves their recognition, without necessarily helping recognition of canonical forms [5]. Positing representations of reduced forms is not very realistic, though, as most reduced forms are encountered only once or twice given the continuous nature of acoustic realizations. The Discriminative Lexicon Model [DLM; 6] sidesteps this problem by mapping acoustic inputs directly onto semantics without word-level representations. In DLM, words are learned as they are, whether clear or reduced, predicting that learning reduced forms is helpful for recognizing reduced forms, regardless of the type of reduction. The current study tests these competing hypotheses.

Method: 30 German native speakers participated in a word-learning experiment with 10 Dutch target word-pairs (i.e., 20 words) that were semantically similar but phonologically distinct. Reduced pronunciations were elicited from a Dutch native speaker in spontaneous conversation. Clear versions were recorded from the same speaker in isolation. Participants heard Dutch words in clear or reduced pronunciations and chose the German translation from two options on screen. They were assigned to one of three learning conditions (clear-only, reduced-only, or mixed) crossed with two learning amounts, including each of the 20 words either 2 times or 4 times, which resulted in a 3×2 design. Subsequently, participants were tested on reduced forms (320 trials). In addition, three DLM models paralleling the experimental conditions were trained to predict meanings of German words from syllable-based phonological representations, approximating German native speakers. These models were subsequently trained with trisyllabic Dutch words in their clear forms, reduced forms, or both. Reduced forms were simulated by reducing saliency of the second syllable. Recognition performance by these models was assessed via cosine similarity between predicted and correct meanings for reduced forms.

Results: Accuracy and reaction times (log) collected in the experiment were modelled separately using GAMMs, with reduction type, learning amount, and covariates as predictors and target word as a random effect. Preliminary results for 5 participants per condition (recruitment and testing will be finished by May 2026) show better accuracy for reduced-only compared to the other two conditions, with no difference between clear-only and mixed training. RTs were shortest for mixed training, intermediate for reduced-only, and slowest for clear-only training (Figure 1). The trained clear-only, mixed, and reduced-only DLM models showed worst, intermediate, and best performance respectively (all pairwise differences significant, $p < 0.001$).

Discussion: Both experiment and modeling results indicate that learning only clear forms is the least helpful, while learning reduced forms most effectively improves their recognition, consistent with prior work [6, 7]. Learning clear forms alongside reduced forms also benefits reduced-form recognition, consistent with DLM predictions. These findings suggest that a model without explicit word representations can account for the observed learning effects.



(a) Recognition accuracy (experiment) (b) Reaction time (experiment) (c) Modeling performance

Figure 1: Estimated effects of the reduction types in the word-learning experiment (left and center) and recognition accuracy of the trained DLM models (right).

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