Speech production may serve a variety of functions, such as allowing for the creation of articulatory representations or the generation of auditory and sensori-motor feedback (Hickok, 2014). Speech production has been examined from different perspectives in adult language processing (e.g., MacLeod et al., 2010), and from the view of child language development (e.g., Vihman et al., 2014). However, few studies have systematically controlled for the effect of speech production on word learning. In previous work with adults, we explored the impact of production on the recognition of newly learned non-words (Zamuner et al., in press). Adults were trained on non-words with visual referents. During training, half of the non-words were produced and the other half were heard-only. Using a visual world paradigm, results indicated that adults’ had faster recognition of non-words that were produced compared with heard-only during training. In the current research, we tested whether similar effects are found with children. Early in development, there is an advantage in children’s learning of words that contain sounds in the child’s production repertoire (e.g., Schwartz & Leonard, 1982). Children are also better able to recall the plurality of non-words that contain sounds within their production repertoire (Ettlinger et al., 2014). It has been suggested that production experience facilitates word learning by supporting the memory of those words, as they require less processing resources to link words and their referents (Vihman et al., 2014). Based on previous research, it was predicted that children would show similar effects as shown with adults.

Experiment 1. Participants were children aged 4-5 years (n=12). The study used a within-subjects design, with a training phase of non-words and their visual referents, followed by a test phase. During training, half of the non-words were produced and half of the non-words were heard-only. At test, children saw two trained images on a screen and were asked to look at a target. The proportion of looking to the target (vs. the distractor) in 100 ms time bins after the target onset was analyzed using a growth curve analysis (Mirman et al., 2008), to assess differences in looking and in the steepness of the looking curve over time. For children, the slope of Heard targets was more steep than that for Produced targets (Estimate = -2.73, SE = 0.98, p < .01), indicating that there was increasingly more looks to Heard targets compared to Produced targets over time (Figure 1).

![Figure 1: Exp. 1 model predictions for produced and heard training conditions.](image)

Experiment 2. The rationale for Experiment 2 was to determine whether different results would be found using a less complex task. Participants were children aged 5-6 years (n=14). The study also used a within-subjects design, however, there were separate blocks for Heard and Produced trials. In Block 1, non-words were Heard, followed by the test phase. In Block 2, non-words were Produced, followed by the test...
phase. The order of the blocks was counterbalanced. Analyses were based on proportion of looking to the target in 100 ms time bins after the target onset. The slope of Heard targets was more steep than that for Produced targets (Estimate = -1.55, SE = 0.58, p < .01), indicating that there was increasingly more looks to Heard targets compared to Produced targets over time (Figure 2).

![Model Predictions (line) for Condition](image)

In our previous work with adults, participants were faster at recognizing new words that were produced compared to heard during training. This is consistent with the hypotheses that production strengthens newly formed lexical representations. The opposite pattern was found in children, who were better at recognizing non-words that were heard-only rather than produced during training. Although unexpected, the results with children are in-line with previous work with adults that has found that production does not always show beneficial or improved learning effects, and this depends on the linguistic characteristics of the stimuli (Kaushanskaya & Yoo, 2011). The results from children demonstrate that the effect of production may also depend on the developmental stage of the learner and the difficulty of the task, as seen in other domains of language development modelled in PRIMIR (Processing Rich Information from Multi-dimensional Interactive Representations; Curtin et al., 2011).

**References**


