Strütjen, Kim; Ruben van de Vijver; Dinah Baer-Henney

Asymmetries in learning vowel nasalization

Recent research has corroborated the hypothesis that substantively based phonological rules are learnt more easily than rules that are not (Baer-Henney et al., 2014; van de Vijver & Baer-Henney, 2014) or less so (Finley, 2012; Wilson, 2006). Substantively based rules facilitate either production or perception. The present study investigates whether such a bias influences the acquisition of vowel nasalization in relation to vowel height. Nasalized vowels are common across the world's languages but not part of our learners' language.
In the case of vowel nasalization at different heights there are different predictions for the effect of a substantive bias on perception and the effect of a substantive bias on production. In perception, high nasalized vowels are easily distinguished from high oral vowels (Bond, 1976; House & Stevens, 1956; Ohala, 1975) while in production, low nasalized vowels are easier to produce than non-low nasalized vowels (Bell-Berti, 1993; Zsiga, 2013). Typologically, both patterns occur. There are languages in which only high vowels are nasalized as well as languages in which only low vowels are nasalized (Hajek, 1997).

To investigate a possible bias, 60 native German adults took part in an artificial language learning experiment and learnt that vowels are nasalized before nasals while they are not nasalized in other contexts. In three different experimental groups subjects were trained with items containing either high, mid or low vowels. In a subsequent forced-choice task subjects were forced to make grammaticality judgments about oral and nasalized vowels in contexts that are conform to the trained context for nasalization or not. All subjects were tested on items containing all three vowel heights.
Our results show a learning advantage for a nasalization rule for the high and mid vowels over the low vowel: high and mid learners acquire the pattern in the trained height more readily than low learners (figure 1). The advantage for high and mid vowels is also present in the generalization behavior: Nasalization is generalized more often to untrained high conditions than to the untrained low condition. Low learners do not make a difference between high and mid vowels (figure 2). Findings are explained by means of the substantive bias favoring perceptual ease.
Investigating the pattern of vowel nasalization this study shows that [-low] vowels are favored in comparison to [+low] vowels. Thus, we provide evidence for an active substantive bias during learning which favors patterns that facilitate perception rather than articulation.

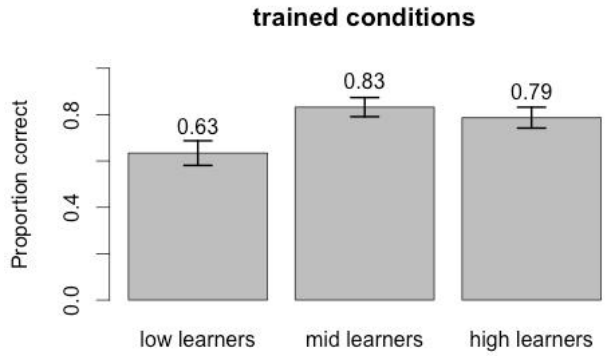

Figure 1. Results in trained conditions: Proportion correct with ±1.96 SE.

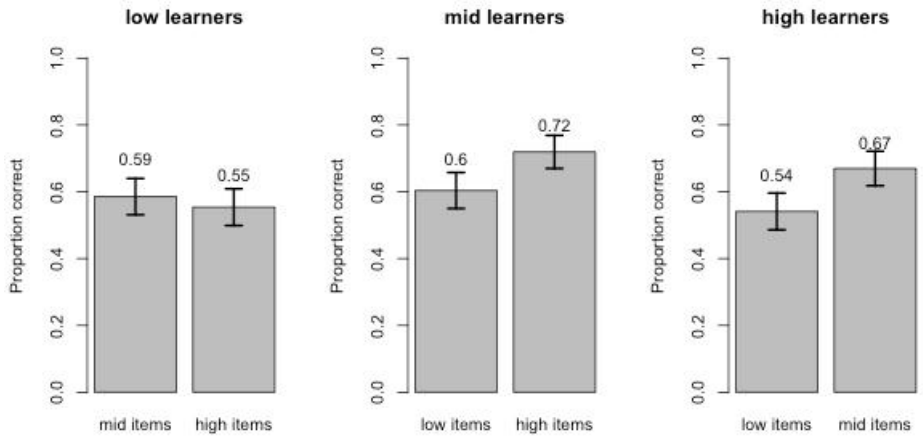

Figure 2. Results in untrained conditions: Proportion correct with ±1.96 SE.

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