Sound symbolism triggered by consonants and vowels across age groups

Diana Hahn & Bettina Braun
(University of Konstanz)

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Despite the arbitrary relationship between sound and meaning (de Saussure, 1916), humans often make a connection (Bergen, 2004; Köhler, 1967; Maurer et al., 2006; Westbury, 2005), in particular between vowel rounding and round shapes, known as the *bouba-kiki* effect. Maurer et al., (2006) tested the developmental aspect and found that adults relied more on vowel rounding as a cue than 2.5 year old children; however in Maurer et al., (2006), vowel rounding was confounded with consonantal place-of-articulation. Subsequent adult studies, which orthogonally varied consonantal and vocalic properties, reported individual effects of phonetic cues, such as vowel rounding/backness, consonant voicing or manner of articulation, but no interactions (D'Onofrio, 2014; Peiffer-Smadja & Cohen, 2019)

We take up the developmental aspect in three age groups (fifteen 2:0–2:8-year-olds, seventeen 3:0–3:4-year-olds, twenty adults) and cross place-of-articulation (PoA: velar/labial) with vowel rounding in German nonce words: [ˈmoːbu, ˈmeːbi, ˈkoːku, ˈkeːki] (note that [b] and [m] received similar roundness ratings in McCormick et al., (note that [b] and [m] received similar roundness ratings in McCormick et al., 2015). Four pairs of three-dimensional objects were created, matched for size, colours and materials; one round, one angular. Four additional familiar word-object trials with a distractor served as fillers. Participants were instructed verbally to pick an object and received positive feedback. Results were analysed with logistic mixed-effects models with age-group, PoA and vowel-rounding as fixed factors and crossed random effects for participant and items (Baayen, 2008). Results showed a significant three-way-interaction ($p=0.05$). Separate analyses across age groups showed an interaction between PoA and vowel-rounding for the younger children ($p<0.05$): vowel rounding had a larger effect in bilabial consonants (93.3% vs. 26.7%) than in velar ones (73.3% vs. 53.3%). For the older children and adults, there was only a main effect of vowel rounding: round vowels were more often associated with round objects (70% vs. 23%, $p<0.001$ for older children, 77.5% vs. 47.%, $p<0.01$ for adults), see Fig1.

Vowel rounding affected all age groups (supporting D'Onofrio, 2014; Köhler, 1967; Maurer et al., 2006; Peiffer-Smadja & Cohen, 2019), but the effect decreased with increasing age (contra Maurer et al., 2006). Only the youngest age group (< 3 years of age) showed a mediating effect of consonantal place-of-articulation: the effect of vowel rounding was present only for labial consonants. We suggest that the labial consonants enhanced/prolonged the rounding gesture, to which younger children were more sensitive than older age groups.

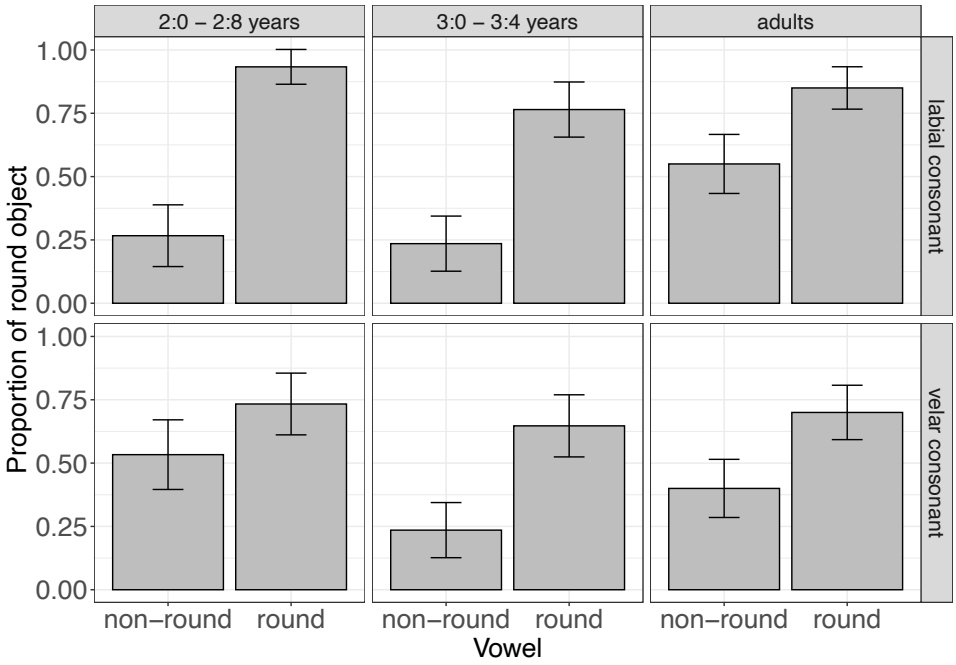

Figure 1: Average proportion of selection of the round object across age groups, vowel rounding and consonantal place of articulation

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