

The acquisition of long consonants in Norwegian

Elinor Payne, Brechtje Post, Hanne Simonsen and Nina Garmann

Although geminate consonants are commonly viewed as a relatively unified phonological phenomenon, they are also known to differ cross-linguistically in their distribution, behaviour and phonetic exponents. Furthermore, research has shown that such differences influence the acquisition pathway of geminates. Kunnari et al (2001) report that Finnish children acquire the geminate contrast in production more rapidly than Japanese children, and suggest this is due to differences in the input (the geminate contrast being more frequent and the duration distinction greater in Finnish). Finnish children begin to distinguish between long and short consonants in their productions already by the end of the one-word period (Kunnari et al, 2001) (around the age of 1 year), and by the 50-word stage (between 1 and 2 years), are correctly producing about 78% of geminates (Saaristo-Helin et al, 2006), although the acquisition is still not completely in place even at age 3 years (Aoyama, 2000). In Lebanese Arabic (Khattab & Al-Tamimi, 2013) quantity is present as a suprasegmental feature in early productions (between 1-2 years), but there is evidence for *over-representation* of consonant gemination early on, with children shifting length from the preceding vowel to the consonant. The presence of a word-final geminate contrast in Arabic is also proposed as a reason why coda consonants are more seldom omitted in early stages of Arabic acquisition than, for example, in English or Spanish. In other words, the presence and particularities of the geminate contrast exerts an influence on early phonological templates in general (Vihman and Croft, 2007). So, in Finnish, which has a very salient medial geminate structure, early words are mostly disyllabic with a geminate structure, with frequent omissions of initial Cs (Kunnari, 2000; Savinainen -Makkonen, 2007). A similar pattern has also been observed for Italian (Vihman and Croft 2007).

Given the critical role of cross-linguistic variation, we were interested to deepen our understanding of geminate acquisition by looking at this in Norwegian, a language in which, unlike Finnish or Arabic, consonant quantity is closely tied to that of the preceding vowel, and in which both vowel and consonant duration are closely linked to stress (Rice, 2003). In Norwegian, in closed monosyllabic words and in the initial stressed syllable of disyllabic words, vowel and consonant length are in complementary distribution, e.g. [ha:t] ('hatred') / [hat:] (hat); [he:te] ('heat') / [het:e] ('hood'). While syllable quantity is predictable (if stress is known), the precise instantiation is not, and hence must be marked in the lexicon (Kristoffersen, 2007). In learning to speak Norwegian, infants have to acquire not only knowledge of the possible lexical contrast of quantity, but also of the right instantiation for a particular lexical item, and the phonetic skills for producing the appropriate VC temporal relationship.

Since consonant gemination in Norwegian is intrinsically tied to VC timing, our chief interest was to establish how children acquire and produce this relationship, and thus signal the contrast, in an adult-like way. Hence we moved the investigative lens to a slightly later developmental trajectory than previous studies, namely from 2;6, 4;0 and 6;0 years. We elicited semi-spontaneous productions of monosyllabic words containing target word-final short vs long consonants, for differing voice, place and manner (/s, t, k, g, l, n/) from 12 children (4 per age group) through an interactive naming game played with the children's mothers. In particular we asked: i) is there evidence of a quantity contrast in early productions, and at what age does this become stable?; ii) is there evidence for over-generalisation of consonant (or vowel) length, and if so how and when does this cede to productions that are correctly differentiated lexically?; iii) when do the fine temporal properties of V:C and VC: match adult-targets?; iv) is there evidence that adults modify the timing properties of V:C and VC: productions in their child-directed speech (e.g. to emphasise a long consonant or vowel)? We compare the child speech productions with the benchmark adult productions for the same words (produced as adult-directed speech) in order to establish how their productions compare to the adult target, and also with comparable productions in children acquiring English (a language without quantity contrast), to control for age-appropriate universal phonetic constraints on vowel-consonant timing. We also compare adult productions for both adult-directed and child-directed registers, to investigate the nature of input language more directly.

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