Mastering VC timing: When do prosodic-phonetic biases emerge in acquisition?

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When learning to speak, infants’ exposure to the particular distributional frequencies (in e.g. contrastive consonant length, syllable structure, etc.) of the ambient language can subtly influence the developmental path followed (Vihman & Velleman, 2000; Prieto et al, 2006) despite common neuro-physical constraints, as the infant capitalizes on that language’s statistical properties to learn its structures (Saffran et al, 2003). However, languages also exhibit interesting micro-variation in their implementation of phonological structure, patterns we refer to as ‘prosodic-phonetic biases’ (PPBs). For example, the temporal relationship in a VC sequence in English is in part determined by the phonological voicing status of that consonant – an important cue to voicing in English (known as ‘pre-fortis clipping’) which young children eventually also have to master in their own productions. The VC temporal relationship is also ‘linguistically’ determined in Norwegian, but in a different way: in stressed syllables there is a complementary relationship between V and C (resulting in either [V:C] or [VC:]). which, as Kristoffersen (2000) argues, must be flagged at the lexical level. Young children acquiring either English or Norwegian are thus exposed to VC sequences which are segmentally similar but with different statistical distributions of timing relationships. At the same time, children are faced, cross-linguistically, with the same initial articulatory constraints associated with an immature vocal tract and articulatory skills that are still developing. Of particular relevance here, it has been shown for several languages (Payne et al, 2012) that young children’s vocalic productions are more equal in duration when compared with those of adults, while their consonant productions are more variable (illustrating an imperfect mastery of the greater articulatory skill required for consonants on the one hand, and an imperfect mastery of ‘meaningful’ variation of vocalic duration). Thus it is of interest how and when children exposed to English and Norwegian negotiate the acquisition of the VC sequence, and at what point the ‘shared’ developmental pressures yield to language-specific patterns (the ‘correct’ PPBs of the language they are learning).

To investigate the influence of PPBs on the developmental pathway, we established an adult benchmark for VC temporal relationships in Urban East Norwegian and Standard British English, and then examined the productions of words containing tautosyllabic VC sequences in the speech of English- and Norwegian-learning children (aged 2;5, 4 and 6 years). Semi-spontaneous productions were elicited through a naming-game based on stories in each language which were carefully devised to contain words of interest. Preliminary findings in English show that while vocalic durations are more evenly timed and consonants more variable than in the adult target (as we would predict), language-specific influences in timing are already detectable, with an indication albeit weak, of a differentiated relationship with the following consonant. We are now conducting our analysis of the Norwegian data to see if Norwegian timing patterns are also already emerging by this age.

This study provides further evidence for the importance of examining the role fine, systematic phonetic detail in the acquisition process, and more widely in considering more precisely what constitutes ‘phonological knowledge’.