Vowel context and frequency effects in dorsal and coronal acquisition in Drehu and French

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BACKGROUND—Age typical misarticulations in phonological development that are attested in any given language might be explained by universal “markedness constraints” or by language-specific “phonotactic constraints”.

• Markedness constraints: This term refers to universal tendencies that originate from the child’s immature motor system (Davis et al., 2002). It has been claimed that marked phonemes are acquired later. For instance, dorsals such as [k] (marked [+posterior]) are claimed to be acquired later than coronals such as [t] (Locke, 1983; Jakobson, 1941; Yamaguchi, 2008; Brandão de Carvalho et al., 2010).

• Phonotactic constraints: Other researchers have suggested that language-specific frequencies can modulate markedness constraints. For example, recent cross-sectional developmental studies on Greek (Nicolasis et al., 2003), Japanese (Beckman et al., 2003) and Drehu and French (Monnin & Loevenbruck, 2010) suggest that the tendency to produce coronals more accurately than dorsals is modulated by language-specific frequencies.

RESEARCH QUESTION—Is this language-specific modulation due to consonant frequency per se or to the language-specific frequencies of “fronted frames” vs “backed frames” (Davis et al., 2002)?

RESULTS—

Production of [k] and [t] in different vowel contexts [a, i, u]
Elicited word initially in a picture-prompted word-repetition task
4 groups of about 40 French-acquiring children, aged 2 through 5 years
3 groups of about 16 Drehu-acquiring children (Austronesian language from New Caledonia), aged 3 through 5 years

Figure 1. Elicitation of French [k] in the context before [a] in carotte “carrot”

Figure 2. Growth in accuracy of [k] and [t] productions in the context of [a, i, u] for Drehu-speaking children (left) and for French-speaking children (right).

• In both languages: both stops are mastered early, [k] is somewhat more accurate for the youngest children.
• For Drehu, [t] is less accurate before [u] than [k], in keeping with the “backed frame” hypothesis.
• For French, [t] is less accurate before [i] than [k], unexpected in a universal account.

The difference in accuracy is modulated by vowel context.

Figure 3. Mean accuracy of the initial [k] or [t] plotted against its context-specific frequency for the youngest age groups for each language.

Evaluation of the frequency effect
Type frequencies for [k] and for [t] in the [a, i, u] contexts in French and Drehu were estimated using two corpora of child-directed speech (Monnin & Loevenbruck, 2008).

• In both languages: very low frequency of the [ti] sequence
• For the youngest children, the lower frequency of [ti] relative to [tu] might explain the lower accuracy of [t] in a front-vowel context (relative to a back-vowel context).

The difference in accuracy is modulated by CV frequency in the ambient language.

CONCLUSION AND FUTURE RESEARCH—

The relative accuracy of [t] and [k] in development reflects the markedness of particular combinations of lingual stop and coarticulated vowel, as modulated by language-specific phonotactics. Future analyses will examine stop burst spectra and vowel formants to evaluate whether there are cross-language phonetic differences in the consonant and vowel targets which might also contribute to the accuracy differences.

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