

Temporal indicators of language dominance in bilingual children

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In the field of bilingualism it is of particular interest to establish which, if any, of a speaker's languages is dominant. Earlier research has shown that immigrants who acquire a new language tend to use elements of the timing patterns of the new language in their native language. It is shown here that measurements of timing in the two languages spoken by bilingual children can give information about the relative dominance of the languages for the individual speaker.

1. Introduction

The current study is in preparation for a larger study of the language proficiency of students in English-medium schooling, which investigates, among other things, students' loss and gain in Swedish and English. The focus of this study is the realization of phonological length in the Swedish and English of three bilingual children. This study is of a preparatory nature, intended to find a useful method for establishing parts of the language dominance profile of young Swedish-English bilinguals. It is expected that such a profile would include lexical factors, syntactic structure and usage patterns as well as pronunciation and foreign accent aspects which are the focus here.

1.1. Bilinguals as native speakers

Bilingualism studies have not traditionally been devoted to the investigation of the speakers' pronunciation (c.f. Moyer 1999). There has been an assumption that if speakers began speaking both their languages before the end of the critical period (e.g. Scovel 1988), then they will be native-like in their pronunciation. However, Flege, Frieda & Nozawa (1997) found that a group of early Italian-English bilinguals who used Italian more than another group with a comparable early age of arrival had a stronger foreign accent in English.

The notion of the native speaker has often been taken as fairly unproblematic in phonetic research. However, there is evidence to suggest that native speakers of a language can lose their native speaker status. Major (1990), for example, studied the speech of American women living in Brazil. Comparing measurements of their VOT in English and Portuguese with the VOTs of native Brazilians and Americans living in the US, he found that the women all to a greater or lesser extent became more Portuguese-like in their VOT in English.

1.2. Duration in Swedish and English

There are many studies which show that Swedish and English function differently as regards the relative duration of vowels and post vocalic stops. In English, the distinction between vowel pairs such as /i:/ and /ɪ/ is primarily a qualitative difference, although studies have shown that there is a difference in vowel length and that native speakers of English do perceive this difference (Mermelstein, 1978; Whalen, 1989). In Swedish, on the other hand, Elert (1988) has described short vowels as having an average of 65% of the duration of long vowels. In addition, in stressed syllables in Swedish a long vowel is followed by a short consonant and a short vowel by a long consonant. The short vowel is on average 85% of the length of the long consonant (Elert 1988). No such consonant lengthening is found in English.

The relationship between vowel and post-vocalic stop closure duration has been the focus of many studies of foreign accent, both with reference to the voicing contrast (e.g. Mitleb 1984, Cunningham Andersson 1987) and phonological length e.g. McAllister, Flege & Piske (2002) who used the relationship between vowel and post-vocalic stop duration in words with phonologically long and short vowels to establish among other things whether native speakers of English are better able to learn Swedish quantity distinctions than native speakers of Spanish.

2. Method

Three siblings were studied, a boy aged 16, a boy aged 14 and a girl aged 9. They have been raised according to the one-person one-language method (Romaine 1995) from birth, speaking Swedish with their father and English with their mother. All three are active speakers of both languages and fairly consistent in their use of the appropriate language to the appropriate parent. The 16-year-old has always attended Swedish school, the 14-year-old attended Swedish school up to grade 5 and an English-medium international class in grades 6-8, and the nine-year-old has spent grades 1-2 in a bilingual (Swedish-English) class where about 60% of the teacher time is dedicated to English with native speakers. The siblings speak Swedish together. The 16-year-old himself judges Swedish to be his stronger language, while the two younger children feel their two languages to be equally strong.

The children were recorded in a sound-insulated environment using high-quality equipment. They were asked to say first the English words *bit* and *beat*, and then later, after a pause, the Swedish words *vitt* and *vit*, both embedded in carrier phrases and in isolation. The children were asked to repeat the phrases until a number of fluent tokens had been obtained, giving 10-20 repetitions of each word.

The material spoken by each subject was digitized using the program Wave Surfer (KTH, Stockholm) and measurements of duration were made visually and auditorily using digital spectrograms and oscillograms. Vowel durations were measured from the vowel onset, i.e. the point of release of constriction of the /b/ in *bit* and *beat* and the point of rapidly increasing activity in F₂ for *vit* and *vitt*. The vowel offset was taken to be when the closure for the final /t/ was made. One of the children (the girl) had a voiceless fricative or aspiration at the end of her Swedish /i:/. This was included as part of the vowel duration. The stop closure was measured from the point of closure to the release of the stop.

3. Results and conclusions

Figure 1 shows the average durations of the vowels and stops in the two English and two Swedish words produced by the three children. As can be seen, the children all make longer vowels in *vit* than in *vitt* and in *beat* than in *bit*, as expected. T-tests showed these differences to be highly significant for all three speakers. The two boys make longer stops in *bit* than in *beat*, although the girl has longer stops in *beat* than in *bit*. These differences are not significant for any of the children, which is also in line with what would be expected from native speakers. The surprising thing here is that although all the children all have longer stops in *vitt* than in *vit* the difference is not significant for any of them.

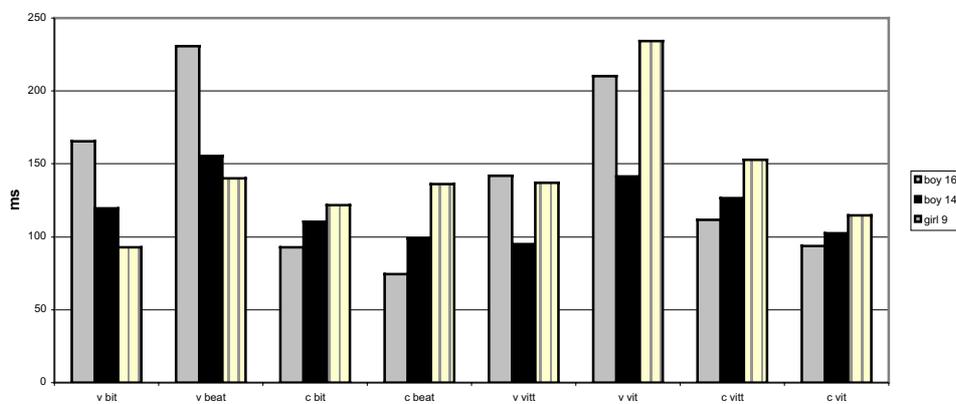


Figure 1 Mean vowel and post-vocalic stop closure duration in English and Swedish words

From this data it would seem that the children were pronouncing Swedish and English words according to the English model where vowel duration together with vowel quality but not consonant duration are used to distinguish between word pairs such as those being studied here. Yet this does not seem to be the whole story, as evidenced by the differences in consonant duration that do exist. McAllister, et al (2002) used the ratio between vowel length and stop duration as a measure of nativeness in similar contexts. Because of the complementary nature of the durations of vowels and consonants in Swedish, the ratio between vowel length and stop duration can be useful in this study too. The fact that a long vowel is followed by a short stop and vice versa in Swedish means that native speakers have a relatively large difference between V:C and V/CC ratios. In McAllister et al, native speakers had an average V:/C ratio of 2.1, and an average V/CC ratio of 0.9. The difference between ratios (i.e. V:/C – V/CC) in these kinds of word pairs was then used in McAllister et al's study to compare the Swedish spoken by native speakers with that from e.g. English speakers where the difference between V:/C and V/CC ratios was around 1.3 for high vowels for native speakers of Swedish and around 0.9 for English speakers speaking Swedish.

The differences between the V:/C and V/C(C) were found to be significant for the Swedish words for all three children, but the girl and the older boy did not have a significant ($p(t) < 0.01$) difference between V:/C and V/C in the English words.

Table 1. Average V:/C – V/C(C) ratios for the Swedish words *vit-vitt* and the corresponding English words *beat-bit*.

		V:/C – V/C(C)
Boy 16	English	1.49
	Swedish	1.08
Boy 14	English	0.58
	Swedish	0.66
Girl 9	English	0.38
	Swedish	1.24

The results shown in Table 1 suggest that there is in fact a difference between the children in the way their timing works in the two languages. The older boy appears in this respect to treat both Swedish and English as Swedish. He does in fact have a slight Swedish accent in his English. The younger boy, on the other hand, seems to treat both Swedish and English as English in this respect. This may be due to his going to an English-medium school and using more English than Swedish. He does not appear to have a noticeable non-native accent in either language, but his Swedish timing does, nonetheless seem to have been affected by his English. The girl appears to speak both languages in a native-like way. She does not appear to have a foreign accent in either language and her Swedish and English timing appear to operate according to different rules.

It is tempting to explain the differences between the children's timing in their two languages by their different schooling experiences, but the amount of data examined in this study is too small for any far-reaching conclusions to be made.

4. References

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