Prevocalic Boundaries in the Speech of German-English Bilinguals

Nicole Whitworth[†‡]
†University of Leeds, UK, ‡Leeds Metropolitan University, UK
nwhitworth@ntlworld.com

ABSTRACT

In German the juncture between words or syllables is more often than not marked by a glottal articulation when the second word or stem begins with a vowel. English on the other hand tends towards linking successive words or syllables with a supra-glottal articulation. This study investigates prevocalic boundary markers in the speech of German-English late and early bilinguals. The results show that the majority of early bilinguals realize separate patterns for German and English. Those who do not tend to produce insertion rates which are closer to German than English L1 patterns. The late bilinguals fall into two groups. The English native speakers produce German patterns in their L2 speech, whereas the German native speakers do not manage to lower glottal stop insertion to native English levels.

1. BACKGROUND

This study investigates the way bilinguals realize different ways of marking (or not marking) prevocalic boundaries between words and syllables in their two languages. This is an area which has so far received little attention in both monolingual and bilingual acquisition studies.

The following paragraphs outline the way in which prevocalic boundaries are realized in monolingual German and English speech. Then an outline is given of what is known about the acquisition of between-word processes.

German boundaries

The majority of German prevocalic boundaries are signaled. The laryngeal articulations which are used to mark a boundary in German are the simple glottal stop, creaky voicing on the initial vowel, or a combination of both. Kohler [1] investigated the relative occurrence of glottal articulations vs. non-glottal articulations in German. He found that 79% of prevocalic boundaries are marked with some form of laryngeal gesture [1]. The most common realization is laryngealisation, i.e. creaky voicing. This type accounted for 37% of all cases. The two other types were the simple glottal stop accounting for 15% of all instances and the combination of stop and creak in 27% of all occurrences of a prevocalic boundary [1]. In the remaining 21% of incidences no glottal articulation occurs [1].

English boundaries

In contrast to German, English has a greater tendency to link words. Laryngeal articulations are almost exclusively restricted to postpausal vocalic onsets and those vocalic onsets that receive emphatic stress [2]. All three realizations are possible, i.e. laryngeal articulations can take the form of a simple glottal stop, creaky phonation of the initial vowel and a combination of glottal stop and creak [3]. Laryngealization rates reported in the literature for English show a high degree of interspeaker variation ranging from less than 1% to 44% [3].

Acquisition

The difference between the development in the late and early bilinguals is mainly due to the fact that the late bilinguals have already completed or at least largely completed the acquisition of a first language system when a second language is acquired. The early bilinguals on the other hand acquire two languages simultaneously, i.e. from birth.

No investigations of acquisition of juncture realizations in German have been found. There are, however, a number of investigations relating to monolingual acquisition of juncture in English [4, 5, 6]. They show that initially, children mark between-word boundaries. By age three they have acquired adult-like patterns of optional glottal boundary signaling and the corresponding linking types, i.e. resyllabification transitional vocoid insertion and R-liaison. R-liaison is the last process to be acquired, since it is phonological rather than articulatory in nature.

There are no known studies of between-word processes in bilingual speech. It can be hypothesized that bilingual children and adults either use

a) the pattern of one (dominant) language for both languages,

b) some kind of mixed pattern for both languages, or

c) the appropriate pattern for each of the languages.

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2. RESEARCH QUESTIONS

The study investigates how the bilingual children and adults realize prevocalic boundaries in the two languages. It aims to answer the following questions:

a) Do the late and early bilinguals use distinct German and English patterns with regard to the use of boundary signals?

b) What processes govern the acquisition of such junctures in bilingual speech?

3. METHODOLOGY

Subjects

To investigate the above issues a cross-sectional study was carried out using three German-English bilingual families from the West Yorkshire area of England consisting of two adults and two children each. The fathers are all native speakers of English and the mothers native speakers of German. All the adults have acquired their second language after puberty. The children (ranging in age from 5;0 to 13;2) have been exposed to both languages from birth.

Table 1:The families. (The parents' L1 language is given in brackets, as is the children's age at the time of the recordings in the format years;months.)

	Family A	**Family B**	**Family C**
Father	Richard	Mike	Martin
Mother	Sabine	Karin	Gabriele
Child 1	Anneliese (7;6)	Rieke (8;10)	Salome (13;2)
Child 2	Leonore (5;0)	Max (6;2)	Reuben (10;10)

Materials and procedure

The data consist of 15 German and 15 English intonation phrases (IPs) per person. The IPs were elicited by means of a story-telling task using two of the Mercer Mayer "frog story" books. The data were analyzed auditorily and instrumentally. For each intonation phrase the potential sites for boundary phenomena were identified. Each occurrence of a vowel immediately preceded by a boundary was analyzed according to the following criteria:

a) Presence of a laryngeal boundary signal – yes or no

b) Realization of the boundary signal – simple glottal stop or creak

c) Segment preceding the boundary – vowel or consonant

All the occurrences were then counted for each subject and speaker group and then converted into percentages to make them comparable.

4. RESULTS

In the following only the results relating to a) and b) above are presented, i.e. the realization of a glottal articulation as creak or a simple glottal stop is not discussed here. For a detailed outline of these matters see [7].

Figure 1 shows the percentage of glottal articulations in all prevocalic boundary contexts for the parents (top graph) and children (bottom graph) in both languages. It can be seen that the two native speakers of English – Richard and Mike – produce the separate patterns for English and German. Glottal articulations in a prevocalic boundary context are appropriately frequent (75% and above) in German and comparatively low in English (under 15%). In contrast, the German mothers do not produce a similarly distinct pattern. The usage rates for both languages are above 60%.

In German, the four youngest children produce laryngeal articulation rates above 75%, whereas the two oldest children realize rates between 50% and 75 %. The children's rates in English are below 30% with two exceptions: Salome and Anneliese produce laryngeal articulations in around 60% of possible occurrences. These data show that some of the children clearly produce separate patterns for their two languages, whereas others do not. Anneliese appears to favor a more German-like pattern using more laryngeal articulations than linking, whereas Reuben produces a more English-like pattern. Salome on the other hand uses some kind of mixed pattern for both languages with intermediate laryngeal articulation percentages.

Figure 2 shows the above glottal articulation rates separated by preboundary context, i.e. taking into account whether the sound preceding the boundary is a vowel (V#V) or a consonant (C#V). It reveals that Sabine's and Gabriele's glottal articulation rates in C#V context are actually separate for German and English. In V#V context the patterns have not been separated. The same applies to Anneliese. Reuben shows a greater degree of separation between the German and English patterns if viewed by context, although his German productions display far fewer tokens of laryngeal marking than would be expected in native speaker productions. Salome also exhibits separate patterns for German and English. In both contexts her English glottal articulation rates are quite high around the 50% mark. In German, prevocalic boundaries are realised differently depending on the class of the preboundary sound. If the sound preceding the boundary is a consonant Salome does not use a laryngeal gesture, if it is a vowel she always uses one.

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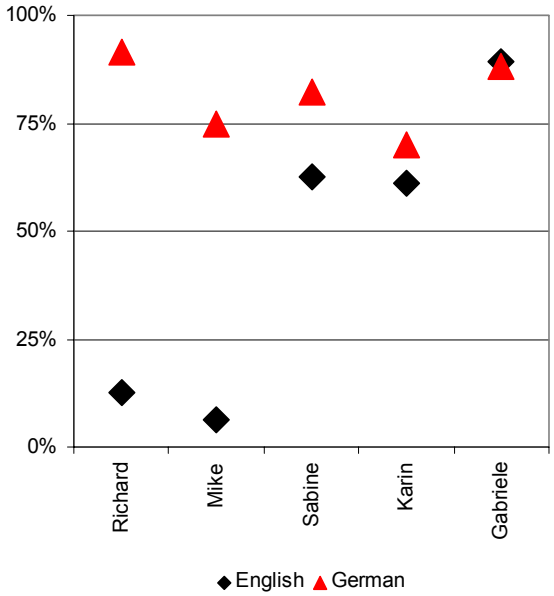


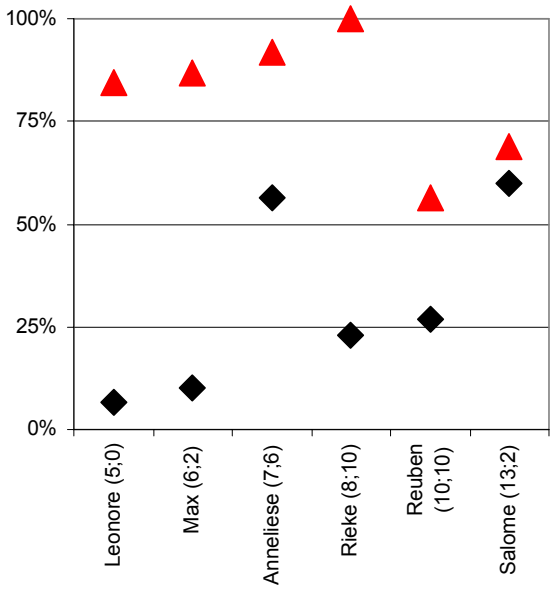
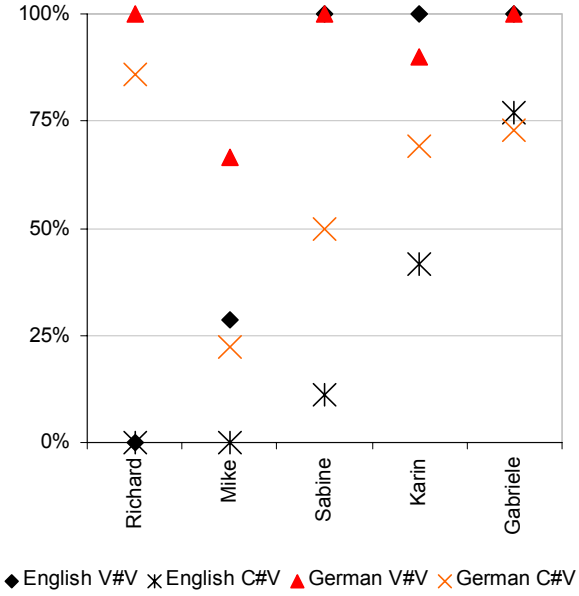


Figure 1: Occurrence of glottal boundary realizations in percent of possible occurrences (%) in the English and German speech of the children and adults.



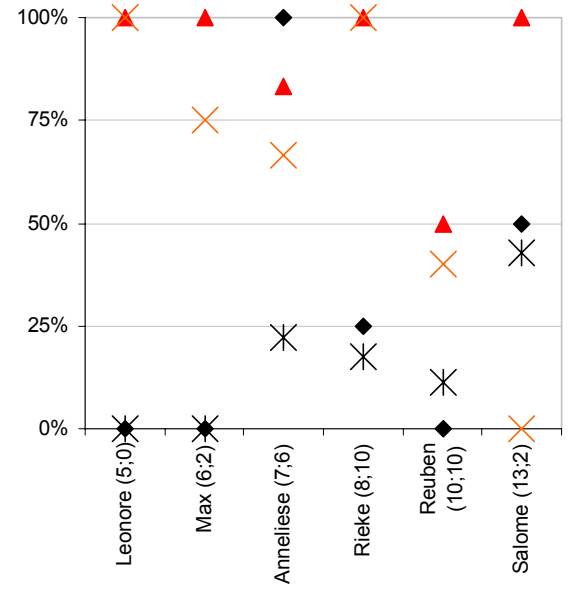


Figure 2: Percentage of the occurrence of glottal realizations in V#V and C#V context in the speech of the children and adults.

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5. DISCUSSION

Late bilinguals

Native English speakers of German appear to be able to increase their rate of boundary signal use to achieve native like numbers. German native speakers of English on the other hand do not display a corresponding decrease in marked boundaries. They lower the number of insertions slightly when speaking English, however, not to native English values. How can this result be explained?

When viewing the performance of the German L1 speakers on their own an explanation of language transfer appears to be the obvious answer. However, this explanation is definitely not appropriate for the German productions of the English L1 speakers. Since it can be assumed that the same acquisition process will influence the linguistic behavior of both groups where the same linguistic structure is concerned, an alternative explanation has to be found. It is here suggested that the use of laryngeal articulations is actually a less marked feature than the linking type patterns found in English speech. This would explain why the fathers can realize accurate German and English patterns, whereas the mothers can only produce German-like patterns in both languages. This hypothesis is further strengthened by the fact that the German women use more laryngeal gestures when the boundary is preceded by a vowel. Linking in this position (V#V) is acquired late by monolingual English infants [4, 5] and thus seems to be a more marked structure.

However, sociophonetic factors might provide an alternative explanation. A previous study by Redi & Shattuck-Hufnagel [3] found that English monolingual females use proportionally more glottal boundary realizations than corresponding English males. One professional female speaker in fact used glottalisation in 88% of prevocalic boundaries, a rate which is similar to L1 German values. Since all the women in the studies are professionals who are (as teachers) used to public speaking, they might have emulated a similar pattern as the professional women reported in [3].

Early bilinguals

The early bilinguals' have German marking rates which are adult-like, whereas in English their rates are higher than the adult L1 speakers' in this study. Applying the findings of previous research [4, 5] it could be supposed that the children move from a high occurrence of laryngeals to the appropriate language-specific pattern. That is why their English values are not as low as those of the native speakers in this study. However, it also has to be noted that Redi & Shattuck-Hufnagel [3] report highly variable patterns ranging up to 44% in the use of glottalisation in English. In the light of these findings all the bilingual children are still within the L1 English adult range.

6. CONCLUSION

When taking into account phonetic and sociophonetic factors [3], it becomes apparent that all of the early bilinguals develop separate patterns for German and English. The English late bilinguals also realize separate patterns in English and German. However, the German late bilinguals apply German-like patterns to English. They are only able to link successive words to a limited degree, and find this particularly difficult where there is a vocalic preboundary context. This pattern can be explained by the fact that the English linking pattern is more marked than the German boundary marker pattern.

The study provides some support for a markedness hierarchy, i.e. a progression from the insertion of glottal stops to linking phenomena in L1 and L2 development. However, whether the higher rates of laryngeal articulations of the German women are due to developmental and/or markedness processes or rather the result of sociophonetic differences in male and female speech is unclear. Both in German and English glottal articulations are more frequent in immature speech than in the corresponding mature productions. There is thus a tendency to use a glottal stop – rather than linking – in those cases where a boundary is immediately followed by a vowel. In the case of the German mothers' L2 speech where both developmental/markedness phenomena and language transfer processes work towards high glottal marker rates this is particularly obvious.

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