

SWEDISH ACCENT – DURATION OF POST-VOCALIC CONSONANTS IN NATIVE SWEDES SPEAKING ENGLISH AND GERMAN

Bosse Thorén

Department of Linguistics, University of Stockholm
bosse.thoren@ling.su.se

ABSTRACT

In order to test the persistency of the Swedish complementary durational pattern of VC-sequences in stressed syllables, a number of native Swedish speakers were recorded when pronouncing words in English and German. The words were of a kind that were expected to be perceived by Swedes as having “short vowel”. Swedish speakers pronounced the test words with significantly longer post-vocalic stop consonant /k/ and /t/, than did native English and German speakers, but not when the test word contained a post-vocalic nasal /m/. This asymmetry was not found when native Swedish speakers pronounced Swedish words with the same segments in the VC-sequence.

Keywords: foreign accent, temporal patterns, complementary consonant duration.

1. INTRODUCTION

The concept of foreign accent is well known, and can be described as phonetic properties transferred from the native language to the target language. Prosodic features are claimed to be extra persistent [6]. Temporal features can be prosodic e.g. phonological quantity in Swedish, Norwegian, Finnish, Estonian to mention a few. The temporal parameter of Voice Onset Time (VOT) is not considered prosodic, but is an important acoustic correlate to the voicing contrast. In studies of L2-speech, the attempt to pronounce a second language, can very well result in temporal values somewhere in between those of the L2-speaker’s L1, and those of native speakers of the target language. This has been shown for VOT in native Spanish speakers’ English [5], and for timing of VC-sequences in Swedish speakers’ English and Japanese [9]. According to the feature hypothesis [8], a phonetic property used in a person’s L1 will be easier to learn in a L2 than phonetic properties not utilized by the L1. But what about transfer of properties from L1 that are not needed in the L2?

The present study is part of a survey of Swedish temporal prosody in a L2-learning perspective, and more specifically about lengthening of consonants following phonologically short vowels in stressed syllables.

In addition to differences in duration between /V:/ and /V/, Swedish is known to have a complementary consonant duration in stressed syllables [4] – to less extent in some southern varieties [7] – resulting in long consonant after short vowel /VC:/ or short consonant after long vowel /V:C/. If this complementary temporal pattern is analysed as “compulsory lengthening of stressed syllables”, it can be expected to influence the timing of the VC-sequence in a L2, produced by native Swedish speakers.

English and German have a phonologic distinction corresponding to the Swedish quantity distinction, although English is – depending on which author is consulted – often regarded as having a phonemic and mainly spectral difference between tense and lax vowel, rather than a quantity distinction. The standard varieties of English in UK, USA, Canada and Australia, and German are not known to have a complementary consonant duration after stressed short/lax vowel. Speakers or listeners of the Bavarian dialect, which is reported to have a temporal pattern close to the Swedish [1], did not participate in this study.

It is not obvious which measure is the best gauge of consonant duration. The absolute duration of the post-vocalic consonant would be affected by speaking rate and not a reliable measure, and the V/C-ratio, often used in quantity studies, is affected by durational changes in both V and C, or in either V or C, and does not give information on the separate contribution from V or C duration. Traunmüller & Bigestans [11] and Thorén [10] found that vowel duration related to the duration of the whole utterance – in these cases 6 and 5 words respectively – was the measure that best matched the perceptual boundary between the quantity categories in Swedish (V:C – VC:). This is

consistent with Diehl & Kluender [3], who claim that: “It is generally not the case that relatively localized (e.g. syllable-sized) portions of the acoustic signal contain sufficient information to specify phonetic categories unambiguously.” Segment duration divided by word duration was tested for Swedish [10], but did not correspond well to the categorization made by native Swedish listeners. Segment duration divided by utterance duration will be the main measure of relative consonant duration in the present study.

A native speaker of English or German, who is accustomed to Swedish speech prosody and to English or German spoken by native Swedes, can be expected to perceive a stronger Swedish accent as a consequence of more complementary consonant duration, although other phonetic properties in the L2-speech of Swedes are also expected to contribute to the impression of Swedish accent.

The present study puts forward two hypotheses from the reasoning above:

1. Native Swedish speakers will, in their English and German pronunciation, apply a complementary consonant duration that significantly differs from the post-vocalic consonant duration produced by native speakers of standard English – UK, USA, Canada, Australia – and standard German.
2. Degree of perceived Swedish accent will correlate with relative post-vocalic consonant duration.

2. METHOD

22 native Swedish speakers were recorded when pronouncing the English words *chicken* [tʃɪkən] and *woman* [wʊmən] in the carrier phrase *I said again*. 10 native speakers of standard English (1 Australia, 2 Canada, 3 UK and 4 USA) produced the same utterances. The corresponding procedure was carried out in German, with 18 native Swedes and 10 native speakers of standard German. The words *Mutter* [mutɐ] ‘mother’ and *kommen* [kʊmən] ‘to come’, were pronounced in the carrier phrase *Ich habe gesagt* ‘I said’ As a control, 12 native Swedes were recorded pronouncing Swedish words with same or similar VC-sequences as the English and German test words. The Swedish words were: *spiken* [spi:kən] ‘the nail’, *blicken* [blik:ən] ‘the look’, *boten* [bu:tən] ‘the remedy’, *Otto* [ʊt:ʊ] proper name, *omen* [u:mən] ‘omen’, *lommen* [lʊm:ən] ‘the diver/loon’, *pråmen* [pro:mən] ‘the barge’, *kommer*

[kʊm:ər] ‘is coming’. These words contain the sequences [i:k ɪk:] to be compared with *chicken*, [u:t ʊt:] with *Mutter*, [u:m ʊm:] with *woman*, and [o:m ɔm:] with *kommen*. These Swedish words were pronounced in the carrier phrase *Jag sade till dig*. ‘I said to you’. The initial sequence *Jag sade* is mostly pronounced as disyllabic [jasa]. None of the native Swedish speakers had a south Swedish (Skåne-) dialect. The recordings were done in sound treated rooms in private homes as well as in the Physiology studio in the University of Stockholm. The recordings were transferred to computer and analyzed in Praat [2]. Durations of utterances, first vowel in test words as well as post-vocalic consonant was measured. Segmentation of utterances was carried out by means of visual study of waveform and spectrogram, as well as listening. Stops were measured both including and excluding bursts. If not otherwise explicitly indicated, stop durations in the results refer to occlusion only.

A native speaker of American English and a native speaker of standard German, who had both lived in Sweden for several years, rated the utterances by the Swedish speakers for degree of global Swedish accent, on a scale from 1 “no Swedish accent, or hardly detectable” through 10 “strongest Swedish accent in this sample”. The judges had linguistic education but were not informed of the purpose of the study. The correlation between perceived degree of Swedish accent and consonant duration was tested.

3. RESULTS

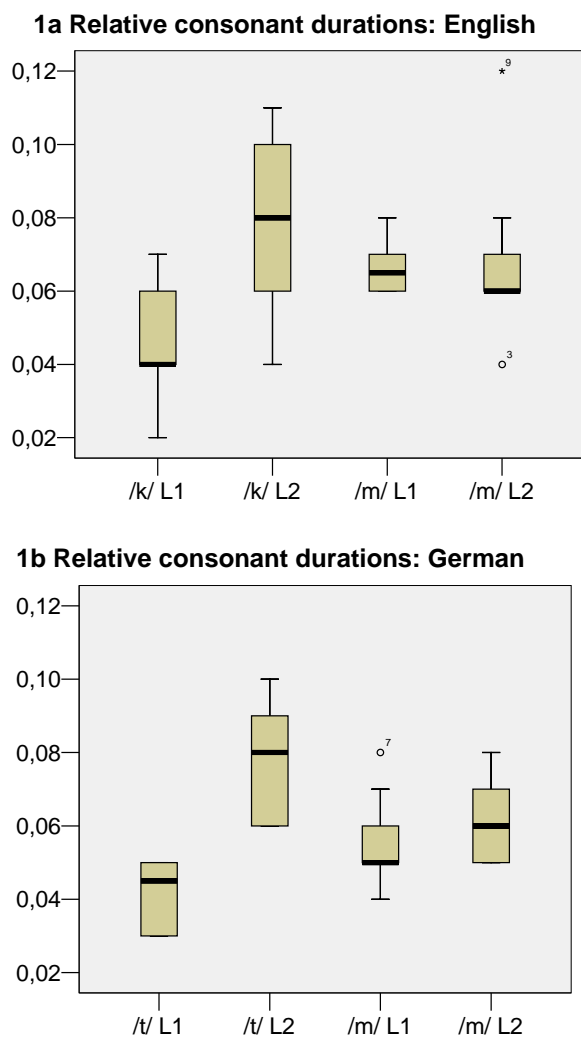
3.1. Durations

The native Swedish speakers as a group differed significantly from the native English and German speakers with respect to absolute and relative duration of post-vocalic stops in *chicken* and *Mutter*. For post-vocalic /m/ in *woman* and *kommen*, however, the differences between the speaker groups were smaller, which means that the Swedish speakers lengthened post-vocalic stops more than they did nasals. Total utterance durations were significantly longer for the Swedish L2-speakers than for L1-speakers, and the utterances in German had longer average durations than the English utterances, which is consistent with the fact that German utterances had one more syllable; 7 compared to 6 for the English utterances. As a group, the native Swedish speakers had longer duration for both V and C in the measured sequences, which is consistent with their longer average utterance durations, which in

turn reflects a slower speaking rate that can be considered natural when speaking a second language.

Figure 1a and 1b illustrate consonant durations divided by utterance durations for the three speaker groups. It shows that speaker groups differ more with respect to stop durations for both English and German (left in panels), than they do with respect to nasal durations (right in the panels). The shorter stop durations compared to nasal durations produ-

Figure 1 a and b: Consonant durations divided by utterance durations for /k/, /t/ and /m/ for native English speakers (panel a L1), native Swedes speaking English (panel a L2), native German speakers (panel b L1) and native Swedes speaking German (panel b L2).



ced by L1 speakers are due to exclusion of bursts in the stop duration measure.

In figure 2, vowel and consonant durations for L1 and L2 productions of the test words are shown, and it is clear that the native Swedish speakers

pronounce the English and German test words with shorter vowel as well as consonant durations compared to Swedish /VC:/-words (*blicken, Otto, lommen, kommer*), and it also shows that the Swedish speakers apply substantial complementary consonant lengthening in the Swedish words.

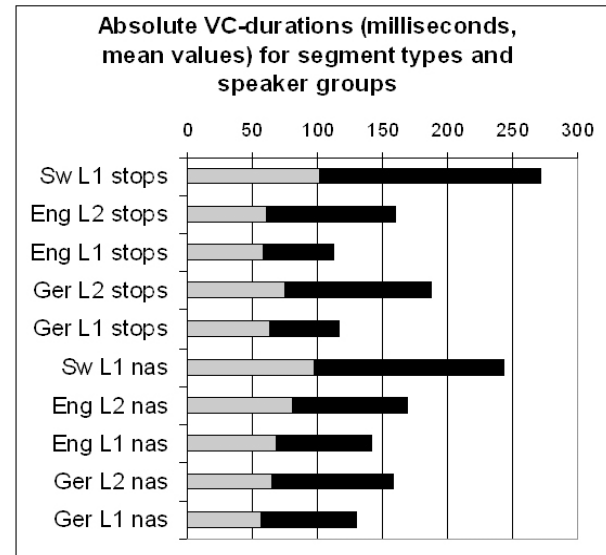


Figure 2: Vowel and consonant durations for test words containing stops and nasals after short vowel. Gray portions (left) show vowel durations and black portions (right) show consonant durations.

3.2. Correlations

The correlation between “degree of global Swedish accent” rating, and relative consonant duration, defined as occlusion/utterance duration for /k/ and /t/, and total duration of /m/ divided by utterance duration, are rather low, and significant in only one case. Quite unexpectedly the highest correlations between accent-rating and consonant duration was found for absolute consonant durations. Correlations and p-values are shown in table 1.

Table 1: Correlation coefficients between absolute and relative durations for post-vocalic consonants, and ratings of global Swedish accent. Dur = duration, nas = nasals, u = utterance.

	Stop dur	Nas dur	Stop/u	Nas/u	All C	All C/u
English	0.65 p<0.01	0.51 p<0.05	0.48 p<0.05	0.09 p=0.7	0.60 p<0.01	0.33 p<0.05
German	0.37 p=0.14	0.48 p<0.05	0.22 p=0.39	0.27 p=0.28	0.47 p<0.01	0.32 p<0.05

4. DISCUSSION

The result gives some support to the hypothesis that native Swedish speakers would produce complementary longer consonants after perceived short vowel in English and German, than native English and German speakers. The Swedish complementary pattern was obvious for *chicken* and *mutter*, but vague for *kommen* and non-existent for *woman*. A possible explanation to this asymmetry could be a general tendency for nasals to have shorter durations than stops. Elert [4] claims that: "Nasals, such as /m n rŋ/, seem to be shorter when compared with homorganic voiced plosives". However, the Swedish words produced by the native Swedish speakers does not support this explanation, since relative nasal duration after short vowel was well on a par with relative stop durations in the same position. Another explanation to the inconsistent L2-productions by the native Swedish speakers in this study could be that the Swedish speakers perceived the English and German words containing /m/ as having long vowel quantity, and hence would pronounce them without the post-vocalic long consonant. If the Swedish speakers had perceived the words *woman* and *kommen* as carrying phonologically long (or tense) vowel, they would be expected to pronounce the vowel with durations near those of Swedish words with phonologically long vowel, but again, the native Swedes pronounced the vowels in *woman* and *kommen* slightly longer than did native speakers of English and German, but significantly shorter than the phonologically short vowels in the corresponding Swedish words. This indicates that *woman* and *kommen* are indeed perceived by the native Swedish speakers as having phonologically short vowel. It can be assumed that most Swedes are more exposed to native spoken English compared to German, and this state of things could possibly explain more native-like English productions by the Swedish speakers, but it would nevertheless be expected to have the same influence on stops as on nasals. An extended study including fricatives could shed some more light on these issues.

With regard to correlations between absolute and relative consonant duration and perceived degree of Swedish accent, it is obvious that more factors than post-vocalic consonant duration influences degree of perceived accent, but the correlations indicate that the Swedish accent rating

is not totally independent of the parameter of interest. The result of the ratings also shows that the Swedish speakers who received the lowest ratings for degree of Swedish accent (most native-like), never had relative stop durations exceeding those of the native English and German speakers. Although long consonant duration automatically prevented low scores on perceived Swedish accent, the opposite is not true, since many different phonetic factors may contribute to a strong foreign accent. The conclusion is that the Swedish temporal pattern of long consonant after phonologically short vowel is transferred to L2-productions, but not in a uniform way. More consonant phonemes should be studied with respect to this phenomenon.

5. REFERENCES

- [1] Bannert, R. 1976. Mittelbairische Phonologie auf akustischer und perzeptorischer Grundlage. *Dissertation*. Lund University. Travaux de l'Institut de Linguistique de Lund X. 74-121.
- [2] Boersma, P., Weenink, D. 2001. Praat – a system for doing phonetics by computer. <http://www.fon.hum.uva.nl/praat/>
- [3] Diehl, R., Kluender, K. 1987. On the categorization of speech sounds. In *Categorical Perception: The Groundwork of Cognition*, edited by Steven Harnad. Cambridge. Cambridge University Press. 226-253.
- [4] Elert, C-C. 1964. *Phonologic Studies of Quantity in Swedish*. Uppsala: Almqvist & Wiksell.
- [5] Flege, J., Eefting, W. 1986. The production and perception of English stops by Spanish speakers of English. *Journal of Phonetics* 15. 67-83.
- [6] Gårding, Eva. 1974. Den efterhängsna prosodin. In: Teleman & Hultman (eds.) *Språket I bruk*. Liber, Lund.
- [7] Gårding, E., Bannert, R., Bredvad-Jensen, A-C., Bruce, G., Naucler, K. 1974. Talar skåningarna svenska? *Svenskans beskrivning* 8. Lund. 107-117.
- [8] McAllister, R., Flege, J., Piske, T. 2002. The influence of L1 on the acquisition of Swedish quantity by native speakers of Spanish. English and Estonian. *Journal of Phonetics* 30. 229-258.
- [9] McAllister, R., Inoue, M., Dahl, S. 2006. L1 Residue in L2 Use: A Preliminary Study of Quantity and Tense-lax. *Proceedings from Fonetik 2006* Lund. 93-96.
- [10] Thorén, B. 2006. Andraspråkstalares realisering av svenskans kvantitetsdistinktion. *Svenskans beskrivning* 28. Örebro universitet. 369-378.
- [11] Traunmüller, H., Bigestans, A. 1988. Perception of the quantity distinction in Swedish /VC/-sequences. *Papers from the Second Swedish Phonetics Conference held at Lund*. May 5-6 1988 114-127