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Horne, Merle; Roll, Mikael

*Published in:*

Fonologi, sociolingvistik og vitenskapsteori

2019

*Document Version:*

Förlagets slutgiltiga version

[Link to publication](#)

*Citation for published version (APA):*

Horne, M., & Roll, M. (2019). Swedish word accents, intonation and L2 English: Aligning tonal, metrical and morphosyntactic structure during L2 processing. I J. K. Hognestad (Red.), *Fonologi, sociolingvistik og vitenskapsteori: Festschrift til Gjert Kristoffersen* (s. 143-159). Novus Forlag.

*Total number of authors:*

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LUND UNIVERSITY

PO Box 117  
221 00 Lund  
+46 46-222 00 00

# Swedish word accents, intonation and L2 English: Aligning tonal, metrical and morphosyntactic structure during L2 processing

Merle Horne & Mikael Roll  
Dept. of Linguistics, Lund University, Sweden

## Abstract

Mastering a new language (L2) implies the need to readjust the associations between different components (phonology, lexicon, grammar) in the native language (L1). L2 speakers have often been observed to apply prosodic patterns from their first language when processing a new language. Swedish speakers have been reported to produce a word melody that resembles accent 1 when speaking foreign languages. The present case study, using data from a speaker of Central Swedish, proposes a possible explanation for this ‘prosodic transfer’ phenomenon in terms of differences in alignment of metrical, tonal, and morphosyntactic patterns in Swedish and English and analyses empirical data from this perspective.

## 1. Introduction<sup>1</sup>

Swedish speakers have been reported to use a word melody that resembles accent 1 when they speak foreign languages (Bruce 1998, 1999)<sup>2</sup>. In a study

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1 We are very grateful to the insightful comments from two reviewers which led to a considerable improvement in the manuscript.

2 This has also been reported to be the case for Norwegian speakers (Ofstedal, 1952).

including speakers from both Central and Southern Swedish dialects compared to American English speakers, Löwgren (2005) observed ‘transfer’ of focal accent 1 in phrase final position in read speech by speakers of both dialects. Since Central and Southern Swedish have word accents<sup>3</sup> whose acoustic realisations are the mirror image of each other (i.e. accent 1 is H\*(L) in Southern Swedish but L\*(H) in Central Swedish and accent 2 is L\*(H) in Southern Swedish but H\*(L) in Central Swedish), it cannot be assumed that it is simply the phonetic form of the tone that constitutes the basis for the transfer of the accent 1 melody.

When the target language is English, this prosodic transfer is perceived as a foreign accent depending on the dialect of the Swedish speaker and the particular discourse context. In Central Swedish, focused words with accent 1 are associated with the contour L\*H, with a low tone early in the stressed vowel (L\*) followed by a rise to a H focal tone. In American English, however, a corresponding contour, represented as L+H\*, is found on words which constitute given (“mutually believed”) information (Pierrehumbert and Hirschberg, 1990). This contour is sometimes called a ‘referring tone’ since it refers back to information previously introduced in the discourse (Brazil, 1997). New discourse information in English is associated with the H\*(L) pitch accent (Pierrehumbert and Hirschberg, 1990).<sup>4</sup> Illustration of these Am. English contours<sup>5</sup> on the word *win* expressing new and given information are given in Figure 1.

Given the fact that a tonal contour corresponding to an English focal pitch accent exists in Swedish (i.e. accent 2), but is not automatically used in the context where H\*L is found in English, it is obvious that factors other than just phonetic resemblance in L1 and L2 determine how tone is aligned with word and sentence structure in L2.

The goal of this contribution is to examine in more detail L2 English intonational prosody as well as problematize and propose an explanation for the transfer of accent 1 in terms of differences in alignment of tonal, segmental and prosodic structure in Swedish and English. The assumption will be that the melodic pattern that is used by Swedish speakers when

3 We are following the tradition in Lund to call these melodies ‘word accents’. They correspond to what Kristoffersen (2000) refers to as ‘tonal accents’.

4 For Southern Swedish speakers, the accent 1 (H\*L) contour would correspond to the English pitch accent used on new information. The contour would thus be expected to be perceived as non-target when associated with words constituting given information.

5 Examples extracted from an extemporaneous speech material obtained from the web.

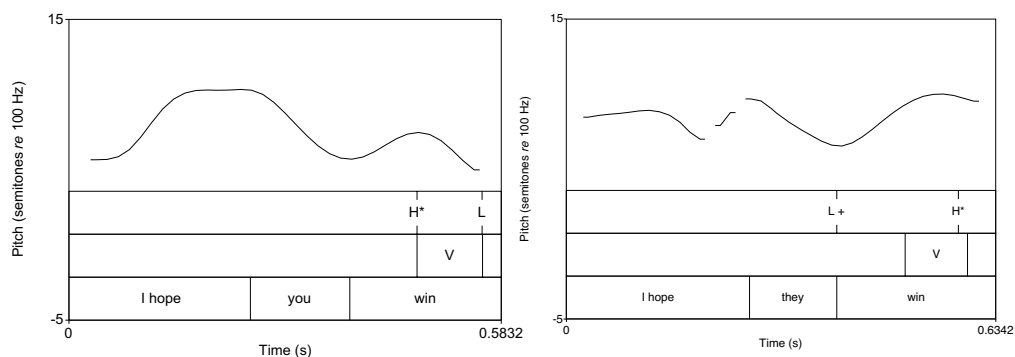


Figure 1. Am. English pitch accents  $H^*L$  (left) and  $L + H^*$  (right) on the word win. In the first case, win constitutes new information whereas in the second, it constitutes contextually given information.  $V$  = vowel.

pronouncing English is partly a result of differences in the way tonal prominence is assigned to words and utterances in Swedish and English and partly a result of differences in the metrical/rhythmical stress patterns of English and Swedish.

## 2. Prosodic transfer: Word-level tonal and metrical patterning in English and Swedish

In a neurocognitive and information processing approach to language acquisition, it is assumed that, at least when it comes to language production, the native language structure “creates a filter through which new languages are processed and organized” (Byers and Yavas, 2017; Baddeley (2003))<sup>6</sup>. For instance, it is a common observation that learners of a second language (L2) often transfer prosodic patterns from their first language (L1) to the target language (L2) (Jilka, 2000; Jun and Oh, 2000; Trouvain and Gut, 2008; Major, 2008). Moreover, since there is usually a strong connection between prosodic patterns (e.g. word tones) with segmental and higher-level phono-

6 According to Baddeley’s (2003) ‘phonological loop’ model, articulation in L2 should be facilitated by the loop, provided that the L2 sounds “can be represented using existing output processes”.

logical structure (e.g. syllables), mastering a new language can imply learning new connections between tones and segmental structure (Gosselke Berthelsen et al., 2018). As noted above, Swedish and English both have tonal contours that can be described as L(H) and H(L). However, the association with segmental structure and higher-level prosodic structure is quite different in the two languages. In Swedish, L\* and H\* represent word accents (accent 1 and accent 2 in Central Swedish) that are associated with the stressed syllable. In English or German, languages without word tones, L(H) and H(L) are instantiated as different intonationally related pitch accents that are used in discourse to distinguish pragmatic interpretations, e.g. ‘given’ and ‘new’ information, respectively (Pierrehumbert and Hirschberg, 1990; Gussenhoven, 1984).

Since the tonal patterns are phonetically very similar in Swedish and English but used in different linguistic contexts, the task for a learner is thus to “disassociate” them from the linguistic structures where they are used in the L1 and map them onto new structures in the L2. Neurolinguistic studies on acquisition of Swedish prosody have indicated that the brain’s recognition of the difference in tonal association between Swedish, a language with word-level tones, and a language like German, with phrase-level pitch accents (Féry, 1993), can occur very quickly (Gosselke Berthelsen et al., 2018, Schremm et al., 2016). However, mastery of the details involved in the (re)association of tone with word-level structure in both perception and production can be a considerable challenge.

Not only does learning a new language involve the possible need to make mapping adjustments between the tonal level and other components of the L2, but also the necessity to make changes within the phonological component as regards the segmental and syllabic structure and their connections to metrical patterns associated with stress, syllable strength, etc. For example, in the case of Swedish and English, both languages have a similar metrical/rhythmic structure (stress-timing). They differ, nevertheless, quite radically in that, whereas Swedish has a low degree of reduction in unstressed syllables (Nord, 1986), English has a rather high degree of vowel reduction in unstressed syllables. Thus the potential for unstressed syllables to bear tones in English can be assumed to be relatively weak in comparison with Swedish.

The present study focuses on obtaining a better understanding of the underlying factors which can explain transfer of melodic characteristics of

Swedish to English. Before looking closer at the phenomenon, we will present a brief summary of Swedish word accents. We will then illustrate the prosodic transfer phenomenon using data from the spontaneous speech of a male speaker of Central Swedish born in the late 1940s who speaks fluent English, but whose intonation is sometimes perceived as non-target.

### 3. Swedish word prosody

Word accents in Swedish (and Norwegian) are assumed to have arisen as a result of a number of changes in the phonological and morphosyntactic structure of words (Kristoffersen, 2000; Riad, 1998, 2005). Changes in the metrical structure constitute one factor. Changes in the strength of the final syllable of many words is assumed to be an important factor in leading to the development of the accent 1 – accent 2 contrast in cases such as [[*'and*]<sub>1-en</sub>] ‘duck (sing.def.)’, [[*'ande*]<sub>2-n</sub>] ‘spirit (sing.def.)’, where posttonic syllables in accent 1 words often contain vowels resulting from enclisis of grammatical morphemes and are relatively weak, whereas accent 2 forms have a posttonic syllable that regularly corresponds to a heavy syllable in Proto-Norse (Riad, 2005). Further traces of earlier metrically heavy posttonic syllables can still be seen in the prosodic behaviour of a group of suffixes and inflections that project accent 2 onto word stems and that are heavy enough to bear focal tones, e.g. *-ning*, (*ritning* ‘drawing’), *-or* (*blommor* ‘flowers’) (Riad, 2012). This sensitivity to strength relations between syllables and word accent assignment can perhaps even be expected to find expression when Swedish speakers process other languages, leading them to tend to associate tonal patterns to words in a manner similar to the way in which word accents are associated with words in Swedish, i.e. partly on the basis of their metrical structure.

In Swedish, all words are associated with one of the two word accents (Bruce, 1977, 1998). According to Bruce (1977), the phonetic difference between accent 1 and accent 2 involves a difference in the timing of the same basic tonal contour (HLH) with respect to the segmental string.<sup>7</sup>

In the default case of disyllabic words with initial stress, the timing of the accent 1 contour is seen as being earlier than the accent 2 contour. The

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<sup>7</sup> This *timing* analysis has also been proposed for Norwegian (Haugen and Joos (1952); Kristoffersen (2006)).

result of this difference in timing is that the first peak in accent 1 is associated with the pretonic syllable, whereas the first peak of accent 2 is aligned with the beginning of the stressed syllable. Following the word accent, an F0 rise to a focal H<sup>+</sup> tone (termed “sentence accent rise” (Bruce, 1977))<sup>8</sup> can occur, resulting in a H<sup>+</sup> in the stressed syllable in accent 1 words and a peak later in the posttonic syllable in accent 2 words.

Unlike accent 2, the realization of accent 1 can vary depending on the position of the stressed syllable within the word. Phrase-final focused accent 1 words with stress on the final syllable are often characterized by tonal crowding, so that a truncated/compressed<sup>9</sup> accent 1 with a focal H<sup>+</sup> relatively early in the stressed syllable is not uncommon (Bruce 1998). Even a number of suffixed words are sometimes seen to behave like monosyllables and appear with this early H<sup>+</sup> (e.g. *fan 'tastisk* ‘fantastic’). This is accounted for by assuming that there is a prosodic word (PW) boundary before the suffix *-isk* (cf. Riad, 2012) which leads to stress being placed on the rightmost syllable of the stem.<sup>10</sup> Figure 2 presents an example of an accent 1 monosyllabic word and a suffixed word in phrase-final focused position.

The association of word accents with the segmental structure is also assumed to take place in different ways. Whereas accent 2 is assumed to be in many cases assigned in the lexicon, accent 1 is assumed to be associated with words postlexically (Riad, 2012). Moreover, focal prominence related to pragmatic factors constitutes a higher-level prosodic phenomenon, associated with the intonational phrase (Myrberg and Riad, 2015). Words which constitute new information, as opposed to words expressing given information, are associated with prominent phrase final tones.

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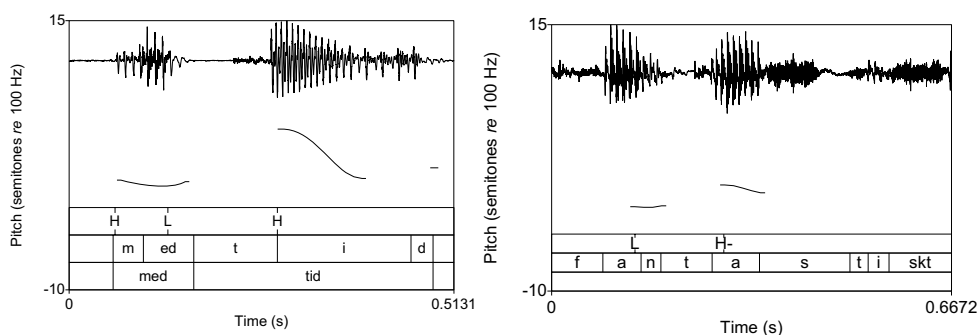
8 This is referred to as a nuclear ‘big accent’ in more recent analyses where it is associated with the intonation phrase (Myrberg and Riad, 2015).

9 The term ‘truncated’ (Grabe et al. (2000)) refers to the fact that the pretonic H is sometimes absent in this environment. The term ‘compressed’ refers to the fact that the focal H<sup>+</sup> is earlier in PW final position than in the case where there is a posttonic syllable.

10 Kristoffersen (2000:174) refers to corresponding suffixes in Norwegian as “prestressing” suffixes, i.e. morphemes which lead to stress being placed on the syllable preceding the suffix.

#### 4. Present study: goals, method, hypotheses, findings

In her study using read speech, Löwgren (2005) examined the tonal patterns on disyllabic focused test words in phrase-final position. It is in this prominent position and on polysyllabic words with non-final stress that the accent 1 tonal contour HL\*H- is particularly salient as a ‘foreign accent’ in



*Figure 2: Illustration of tonal crowding in the monosyllabic accent 1 word tid ‘time’ and the suffixed word fantastiskt ‘fantastic’ in phrase-final position. The focal H is realized early in the stressed vowel.*

L2 speakers of Central Swedish. However, PWs with stress on the final syllable with the truncated/compressed focal accent 1 would not be expected to be perceived as non-target, nor would words with a HL\*H- contour that refer to information that is given in the discourse.

In order to investigate the tonal patterns on PWs with both non-final and final stress, we examined English and Swedish extemporaneous speech from an adult male Central Swedish speaker (born 1948), downloaded from the internet.<sup>11</sup> The material consisted of a number of short interviews and a talk/presentation dealing with soccer. English utterances with prominent phrase final words were extracted by a native speaker of English for analysis using Praat. As in Löwgren’s study, the investigation concentrated on words at the right edge of intonational phrases. The expectation was that, as in previous findings, intonational contours with final prominences resembling accent 1 would occur. It was further expected that if it is accent 1 that

<sup>11</sup> Readers interested in getting access to the material are invited to contact the authors.



is transferred, then suffixed words with stress on the final syllable of the PW would be associated with a contour similar to a truncated/compressed accent 1 (as in Fig. 2). It was also expected that there would be instances of the HL\*H contour that would not be perceived as non-target due to the fact that they occur in a discourse context where a ‘referring’ tone would be appropriate in English. Problematising the transfer issue further, it was hypothesized that it is perhaps not just an unrestricted mapping of an accent 1 phrase final contour onto words in the target language that accounts for the transfer phenomenon, but that in addition, even fundamental metrical phonological constraints in the L1 might also determine to some degree what tonal pattern gets mapped onto English utterances. If this is true, then we should also expect to find cases of tonal patterns resembling accent 2 in cases where English words have a metrical structure that could be perceived as having two stressed syllables.

#### 4.1. Swedish (L1) and English (L2) data

##### 4.1.1. Focused accent 1 words in Swedish as L1

In order to obtain a basis for comparison of L1 and L2, an initial analysis of the Central Swedish speaker’s accent 1 was made. Figure 3 an example of an F0 contour for a prominent Swedish accent 1 word (*länder* ‘countries’) is presented. The tonal pattern is characterized by a fall in the pretonic syllable to a L\* around the beginning of the stressed syllable and a focal rise (H<sup>-</sup>) in the stressed syllable.

F0 values (measured in semitones (st) with 0 st = 100 Hz) taken from 10 focused polysyllabic phrase final expressions extracted from the Central

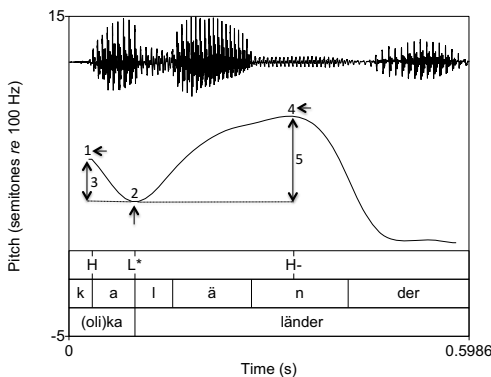


Figure 3. A phrase-final focused accent 1 contour on the Swedish word *länder* ‘countries’ in the phrase *tre olika länder* ‘...three different countries’. Numbers refer to the points where measurements were made. See text for specification.

Swedish extemporaneous speech material were analysed using Praat (Boersma and Weenink, 2012). Five F0 values were measured: 1. peak of the H in the pretonic syllable, 2. lowest point of the L\*, 3. range of the F0 fall in the pretonic syllable relative to the L\*, 4. peak of the H<sup>-</sup> in the stressed syllable, and 5. range of the rise in the stressed syllable relative to L\* (see Figure 3). In addition to the F0 measurements, we indicate whether or not the pretonic vowel was perceived as being reduced. Results from the measurements are presented in Table 1.

Table 1. HL\*H<sup>-</sup> contours on phrase final Swedish accent 1 focused words with non-final stress.

L1 Swedish		H (st <sub>100</sub> )	L* (st <sub>100</sub> )	H <sup>-</sup> (st <sub>100</sub> )	HL* range (st)	L*H <sup>-</sup> range (st)		Pre- tonic V reduced	Post- tonic V reduced
på <b>Island</b> 'on Iceland'		12.8	8.5	13.3	4.3	4.8		No	No
<b>definiera</b> 'define'		7.6	4.7	8.8	2.9	4.1		No	No
genom <b>åren</b> 'through the years'		2.5	1.2	5.5	1.2	4.3		No	No
<b>politisk</b> 'political'		5.5	4.5	11.5	1.2	7.0		No	No
(oli)ka <b>länder</b> '(diffe)rent countries'		5.0	2.8	8.9	2.2	6.1		No	Yes
till <b>Spanien</b> 'to Spain'		6.3	4.1	7.8	2.2	3.7		No	No
en <b>video</b> 'a video'		7.6	5.4	10.6	2.2	5.2		No	No
<b>förväntningar</b> 'expectations'		8.6	5.8	9.5	2.8	3.7		Yes	Yes
som <b>gäller</b> 'that is valid'		1.7	0.3	3.4	1.4	3.1		No	Yes
en <b>regel</b> 'a rule'		7.5	3.4	11.3	4.1	7.9		No	No
	Mean	6.5	4.1	9.1	2.5	5.0	Consistency	10%	30%
	SD	3.2	2.3	2.9	1.1	1.6			

#### 4.1.2. Words in L2 English with non-target and target intonation

In the following three sections, we present results from analysis of L2 English where the prominent accent 1 contour HL\*H<sup>-</sup> is perceived as non-target when it is associated with new information, as well as cases where its realization corresponds to an English 'referring' tone. Also presented are instances where the truncated and/or compressed variant (H)L\*H<sup>-</sup> corresponds to a target focal pitch accent.

4.1.2.1. *Focused words with non-target tonal contours*

Corresponding measurements of ten prominent polysyllabic phrase final English utterances perceived to have non-target focal contours were made. In Figure 4, an example of such a contour on the word *developed* in the L2 English material is presented. A summary of the results from the F0 measurements are presented in Table 2 along with information as regards perceived reduction of the pretonic and posttonic vowels.

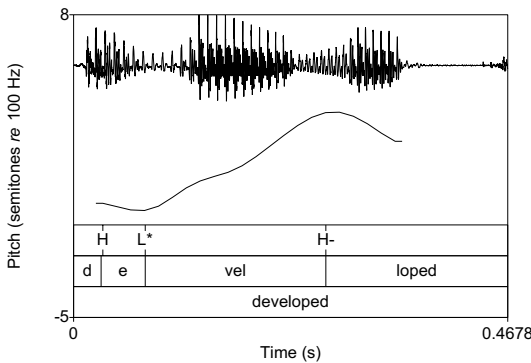


Figure 4: L2 focal accent on development in the utterance *The technical skills have developed a lot. The phrase-final contour resembles that of a focal accent. 1.*

Table 2. Non-target realisations of HL\*H contours on English ‘discourse new’ words.<sup>12</sup>

L2 English		H (st <sub>100</sub> )	L* (st <sub>100</sub> )	H- (st <sub>100</sub> )	HL* range (st)	L*H- range (st)		Pretonic V reduced	Posttonic V reduced
the <b>winter</b>		0.2	-1.1	2.1	1.3	3.2		Yes	Yes
hard <b>working</b>		1.4	-0.4	4.1	1.8	4.5		No	Yes
with <b>physics</b>		0.5	-1.6	3.6	2.1	5.2		No	Yes
(skill)ful <b>players</b>		1.9	-0.5	5.3	2.4	5.8		No	Yes
(coun)try <b>going</b>		6.7	4.9	10.5	1.8	5.6		No	Yes
<b>developed</b>		1.1	-0.7	4.0	1.8	4.7		Yes	Yes
<b>develop</b>		0.3	-1.3	2.4	1.6	3.7		Yes	Yes
the <b>country</b>		3.7	1.9	7.6	1.8	5.7		Yes	Yes
(coach)ing <b>Sweden</b>		3.4	1.0	6.7	2.4	5.7		No	Yes
are <b>educated</b>		-1.0	-1.1	4.2	0.1	5.3		No	Yes
	Mean	1.8	0.1	5.1	1.7	4.9	Consistency	40%	100%
	SD	2.2	2.0	2.6	0.7	0.9			

12 We will use the same notation for the tones in the English (L2) contours, i.e. H, L\*, H- (instead of H, L+H\*) in order to make the comparison with the Swedish data more straightforward.

4.1.2.1.1. Comparison of Swedish and L2 English test words with non-target intonation

A repeated-measures ANOVA with factor tone (H, L\*, H<sup>-</sup>), and language (Swedish, English) as between-items factor showed a significant difference in F0 between tones,  $F(2, 36) = 170.4, p < 0.001$ , but no tone  $\times$  language interaction,  $F(2, 36) = 1.1, p = 0.32$ . Posthoc t tests with Bonferroni-correction indicated that the pretonic H,  $M = 4.2$  st, was higher than L\*,  $M = 2.1$  st,  $p < 0.001$ , but lower than H<sup>-</sup>,  $M = 7.1$  st,  $p < 0.001$ . Swedish H and L tones (F0 register) were on average 4.2 st higher than the English register, producing a main effect of language,  $F(1, 18) = 14.49, p = 0.001$ . Moreover, all of the L2 English words (N=10) had reduced posttonic vowels, compared to only 3 in Swedish,  $p = 0.003$ .

4.1.2.2. Contextually appropriate HL\*H<sup>-</sup> contours

Unlike the examples in Table 2, a number of cases of the phrase-final accent 1 contour were perceived as having more or less target contours. These occurred in discourse contexts where the prominent words could be considered as referring back to already mentioned information in the discourse where a HL\*H<sup>-</sup> accent is possible in English. The results of the analysis of these cases are presented in Table 3. There it can be seen that the L\*H<sup>-</sup> range is much narrower than in the cases where the phrase final words are interpreted as new information. Thus, an ANOVA with factor context and posthoc t tests with Bonferroni correction,  $F(2, 23) = 4.69, p = 0.020$ , showed a difference between ‘referring’ English L\*H<sup>-</sup> contours and L\*H<sup>-</sup> contours on new information, in both English,  $p = 0.037$ , and Swedish,  $p =$

Table 3. Target realisations of HL\*H<sup>-</sup> contours as ‘referring’ tones in L2 English

L2 English	H (st <sub>100</sub> )	L* (st <sub>100</sub> )	H <sup>-</sup> (st <sub>100</sub> )	HL* range (st)	L*H <sup>-</sup> range (st)		Pretonic V reduced	Posttonic V reduced
and <b>attitude</b>	-0.4	-0.4	2.8	0.0	3.2		Yes	No
with <b>other</b>	2.7	1.0	4.6	1.7	3.6		No	Yes
<b>professional</b>	0.5	-1.0	2.2	1.5	3.2		Yes	Yes
<b>remember</b>	4.1	1.6	4.0	2.5	2.4		Yes	Yes
the <b>language</b>	-1.1	-1.1	2.4	0.0	3.5		Yes	Yes
the <b>football</b>	6.6	5.3	9.3	1.3	4.0		Yes	Yes
Mean	2.1	0.9	4.2	1.2	3.3	Consis -tency	83%	83%
SD	3.0	2.4	2.7	1.0	0.5			

0.030. Further, there is little or no fall on the pretonic syllable which is seen to be reduced in all cases except one. Fisher’s exact test showed that pretonic,  $p = 0.008$ , but not posttonic,  $p = 0.119$ , syllables were significantly more reduced than in Swedish.

4.1.2.3. *Truncated and compressed accent 1 focal contours*

In addition to the above examples of HL\*H contours, a number of examples which perhaps testify to the result of generalizing the PW final contour as the focus contour in L2 English were also found. These words were perceived to have tonal contours that conformed in all respects to the target English H\*(L) pitch accent. Table 4 summarizes the measurements for these words. In contrast to all the other cases analysed, these words did not exhibit a rise in the stressed syllable, but rather the tone was high already at the beginning of the rhyme. Indeed, in two of the cases, there was a fall in the rhyme. Moreover, both the pretonic and posttonic vowels were reduced, producing a target English rhythm as well.

Table 4. Target realisations of compressed focal accent 1 on PW final English words.

L2 English	H (st <sub>100</sub> )	L* (st <sub>100</sub> )	H <sup>-</sup> (st <sub>100</sub> )	HL* range (st)	L*H <sup>-</sup> range (st)		Rise in rhyme	Pre- tonic V Re- duced	Post- tonic V Re- duced
to socialise	2.4	1.0	4.9	1.4	3.9		No <sup>(level)</sup>	Yes	Yes
behaviours	5.4	4.5	6.0	0.9	1.5		No <sup>(level)</sup>	No	Yes
assistent	1.3	1.0	3.7	0.3	2.7		No <sup>(level)</sup>	Yes	Yes
position	0.5	-0.6	6.6	1.1	7.2		No <sup>(level)</sup>	Yes	Yes
professional	1.5	1.0	3.4	0.5	2.4		No <sup>(level)</sup>	Yes	Yes
fantastic	2.2	-0.5	3.1	2.7	3.6		No (fall 2.1 ST)	No	No
a favorite	-0.6	-0.9	2.0	0.3	2.9		No (fall 1.7 ST)	Yes	Yes
Mean	1.8	0.8	4.2	1.0	3.5	Consis- tency	100%	71%	86%
SD	1.9	1.8	1.6	0.8	1.8				

5. Discussion

The extemporaneous speech data presented here provides further support

for previous results from read speech that Central Swedish speakers tend to produce intonation contours with right-edge prominences that in all respects correspond to those which are associated with accent 1 (Bruce 1998, 1999). Results show that focused L2 English words with non-final stress are interpreted as having non-target intonation when they are associated with a contour resembling Swedish focal accent 1 (HL\*H). The L2 focal accent was realized with a lower F0 register than in Swedish. When words with non-final stress associated with given information were produced with a HL\*H contour corresponding the English ‘referring tone’, they were not, however, perceived as having non-target prosody. Moreover, words with PW final stress and associated with a contour that resembled the truncated/compressed variant of focal accent 1, were also perceived as having a tonal melody which was in all respects identical to the target L2 focal contour (H\*).

A number of factors can be proposed to account for the L2 intonation. One is that it could be assumed that in L2 production, just as in Swedish, there would be no word-level assignment of tonal prosody, but rather all tonal patterns would be assigned postlexically. Thus, the appearance of accent 1 would be expected, since it is claimed to be assigned postlexically in Swedish (Riad, 2012), as is assignment of focus accent (Riad, 2014) and thus the prominent accent 1 focal contours observed in the L2 English material can be seen to conform to this mapping of tonal structure. The fact that the pretonic fall to the accent 1 L\* is sometimes associated with a syllable in a preceding word (e.g. <sup>H</sup>en <sub>L\*</sub>regel ‘a rule’, English <sup>H</sup>the <sub>L\*</sub>winter) supports a postlexical association of the accent 1 tones with the phonological structure.

Another factor that can be suggested to further explain the predominance of accent 1 in L2 English is that English words rarely have the rhythmical structure necessary for being associated with Swedish accent 2. Accent 2 requires that the associated word have at least two syllables. In disyllabic words, both these syllables must furthermore contain unreduced vowels. This kind of foot structure is very uncommon in English. Although English, like Swedish, has trochaic feet, the weak syllable of English metrical feet is as a rule highly reduced (Delattre, 1969), which is not the case in Swedish (Elert, 1964; Nord, 1986). Thus, if it is the basic rhythmic structure of the L2 that at least partially influences transfer processes, then it would be expected that the rhythmic structure of English would favour

the transfer of accent 1 since it would be assumed that Swedish speakers would perceive English unstressed syllables as too weak to bear a focal prominence. Indeed, the data showed that the L2 English speaker reduced posttonic vowels, thus indicating that a focal accent 2 could not have been associated with these weak syllables (see Table 2).

Despite the predominance of accent 1 in L2 English, transfer of accent 2 could nevertheless be expected in cases where post-tonic syllables are perceived to be strong enough to bear a tone. In the speech material examined here, the only case of a focal accent corresponding to accent 2 was observed on the word *extra*. Since *extra* is sometimes pronounced/perceived with an unreduced posttonic vowel in Am. English, this would potentially constitute an environment that is conducive to accent 2, i.e. two unreduced syllables. Thus, it could be argued that even accent 2 could be transferred to English, given the optimal metrical structure.<sup>13</sup> Since *extra* has a cognate in Swedish, however, with accent 2, it could be argued that what is involved here is a case of direct lexical transfer.

The data also indicate that some morphological conditioning of PW structure is perhaps carried over to L2; in particular, the suffixed word *fantastic* was seen to have a stress and a compressed accent 1 pattern with the H<sup>-</sup> peak at the beginning of the stressed vowel. This seems to indicate a likely PW boundary before the suffix (see the corresponding word in Swedish (*fantastiskt*) in Figure 2). The fact that the posttonic vowel was not perceived as reduced would strengthen this possibility (see Figure 5).

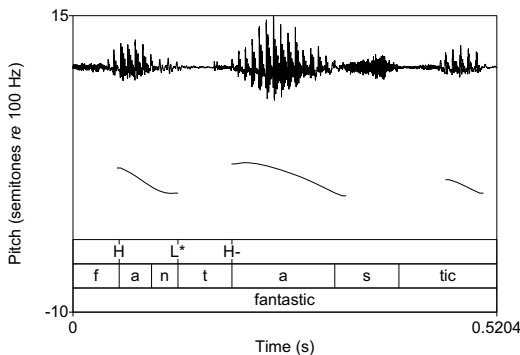


Figure 5. A target (compressed) accent 1 F0 contour on the phrase final focused word *fantastic* in the utterance *It's absolutely fantastic*.

13 *Extra* is usually transcribed in dictionaries with a final schwa (<https://dictionary.cambridge.org/pronunciation/english/extra>).

The details regarding just how the process of acquiring the target phrase-final contour occurs is difficult to speculate on, but it could be thought that the truncated and compressed H<sub>r</sub> accent 1 realisation could eventually be generalised to all focused words in phrase-final focal position, while the HL\*H contour would be disassociated from focus environments and restricted to pragmatic contexts where it is used to refer to information that is given in the discourse. One could also expect that this process would be connected with increased reduction of unstressed vowels, leading to pre-tonic syllables then being too weak to bear tones.

## 6. Conclusion

The present study provides further evidence for the observation that Swedish L2 speakers of English have a tendency to transfer a tonal pattern that corresponds to accent 1. This transfer is, however, only perceived as non-target when it occurs on PWs with non-final stress in phrase-final (focused) position. Reference to both basic rhythmical and prosody-grammar mapping constraints in Swedish and English are proposed to account for the phenomenon. The data indicates, that, just as in Swedish, the realization of the phrase-final intonation varies depending on the phonological, morphological, and pragmatic context. Moreover, it can be assumed that it is perhaps not just accent 1 that is transferred and that, given the appropriate prosodic environment, even tonal patterns corresponding to accent 2 can occur. Further study and more data is needed, however, in order to arrive at a more complete understanding of how the tone-grammar mapping in L2 is attained. In particular, it would be interesting to investigate the relation between stress and tonal association in more detail.

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