

# On distinguishing stress and accent in Finnish

Kari Suomi, Juhani Toivanen, Riikka Ylitalo

Dept. of Finnish, Saami and Logopedics, Oulu University  
kari.suomi@oulu.fi

## Abstract

*The paper summarises the results of an investigation of the phonetic correlates of stress and accent in Finnish, to be reported in more detail elsewhere. Mere stress was not signalled tonally, while accents were signalled mainly tonally. The time course of the tonal realisation of accents followed a moraic rather than syllabic pattern.*

## 1 Introduction

To our knowledge, this study is the first attempt to dissociate the realisation of (word) stress from (sentence) accent in Finnish. It is suggested in recent prosodic models of some languages, e.g. Swedish (Bruce 1998), that the phonetic correlates of stress are complex but non-tonal, while accents in turn are primarily signalled by tonal cues. But the situation in Finnish need not be similar, for at least two reasons. First, Finnish has fixed word-initial stress, against the moving stress in the Germanic languages. Second, Finnish is a full-fledged quantity language with a quantity opposition in both consonants and vowels, and the oppositions are available irrespective of stress (and not only in stressed syllables, as in many languages). It is therefore not *a priori* impossible that in a language in which relative segment durations serve the purpose of distinguishing words to such a high extent, duration cannot signal prosodic distinctions as freely as in languages in which segmental quantity is less pervasive.

Finnish appears to be typologically rare in its specific combination of stress (or rhythmic) system and quantity system; the following account is based on Hayes (1995). Finnish exhibits a bounded stress system: in such systems stresses fall within a particular distance of a boundary or another stress. Finnish is also a syllabic trochee language: in such languages feet consist of two syllables, where the first syllable is metrically strong irrespective of its weight (and hence, of the number of moras it contains). In 'pure' syllabic trochee languages there are neither syllable quantity distinctions nor segmental quantity distinctions. But if a syllabic trochee language does have a segmental (especially vowel) quantity distinction, it should also exhibit a sensitivity to syllable weight in its assignment of stress (namely by avoiding stresses on light syllables). Finnish is exceptional among the syllable trochee languages in having a quantity distinction, and in that syllable weight nevertheless plays no part in the assignment of (primary) stress.

## 2 Experimental procedures

Three types of target words were used, viz. CVCV, CVCVV, and CVVCV (in all of which a syllable boundary precedes the intervocalic consonant). The first two types had a monomoraic first syllable, the third a bimoraic one. The target words, numbering 11 of type CVCV, 8 of type CVCVV and 8 of type CVVCV, were all common nouns. For each target word a triplet of short sentences was constructed. In the first sentence type, e.g.

"Sanoin että kato PAHENTAA tilannetta, en sanonut että kato PARANTAA sitä" ('I said that dearth WORSENS the situation, I didn't say that dearth IMPROVES it'), a contrastive accent was indicated on the verb following the target (*kato* 'dearth'), and the target was mentioned twice. It was always the second occurrence of the target that was measured, in order to obtain as deaccented a version as possible. Below, this condition will be referred to as Word Stress. In the second sentence type, e.g. "Sanoin että kato pitää tilanteen edelleen KIREÄNÄ" ('I said that dearth continues to keep the situation TENSE'), the target occurred early in the sentence, and an emphatic word followed at the end of the sentence. This condition will be referred to as Moderate Accent below. In the third sentence type, e.g. "Sanoin että KATO pelotti, en sanonut että KATTO pelotti" ('I said that DEARTH frightened (me), I didn't say that the CEILING frightened (me)'), the target itself carried a contrastive accent, and below this condition will be referred to as Strong Accent. The target word was always preceded by the conjunction *että* ('that') and, in a given triplet, followed by the same plosive. The sentences were spoken by 10 female speakers of Finnish. Measurements were made of word/segment durations and F0 at the beginning and end of the syllable preceding the target; at the beginning, middle and end of the voiced portion of both syllables of the target words, and the corresponding three locations of the syllable following the target. Additional two F0 measurements were made for the phonetically long syllables; these latter measurement points were located halfway between the beginning and middle, and middle and end, respectively. One of the authors audibly evaluated the prominence levels of all word tokens using a three-way scaling: not accented, moderately accented, and strongly accented. 2.6 % of the spoken tokens were rejected, mainly because of a discrepancy between the intended and the evaluated degree of prominence.

## 3 Results

### 3.1 Durations

The durations of all segments in the target words were always reliably longer in Strong Accent than in at least one of the other degrees of prominence, while there was no systematic difference between Moderate Accent and Word Stress. The durational relations within and across the three word structures obtaining in unaccented words were preserved even in Strong Accent. Moderate accentuation was not realised durationally.

### 3.2 Fundamental frequencies

The target words were always preceded by the conjunction *että*, but the carrier sentences differed in length, and in particular the Word Stress version of each target occurred later in its carrier sentence than did the other versions in theirs. Since the purpose was not to investigate sentence intonation but local F0 effects of prominence, absolute F0 values were normalised relative to the immediately preceding, syntactically and lexically identical context. Consequently, the F0 values presented below are, for each degree of prominence, values relative to the F0 at the end of the preceding *että* for that degree of prominence. The effects of prominence on the course of F0 in the CVCV and CVVCV words are shown graphically in Figures 1 and 2 (CVCVV words behaved essentially as CVCV words).

It can be seen that F0 in the Word Stress versions was essentially flat during the first syllable, and then fell during the second syllable (presumably due to sentence intonation); a control experiment with 5 speakers showed that the 20 Hz step-up from the end of the preceding conjunction *että* disappeared when a content word preceded the targets.

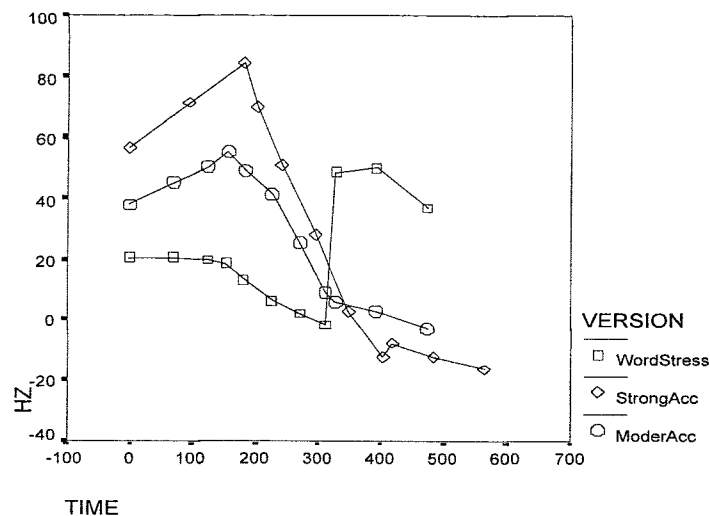


Figure 1. Mean F0 values of the CVCV type words in the three degrees of prominence. The syllable boundary is located between the third and the fourth measurement point. The last three measurement points refer to the initial syllable of the word following the target.

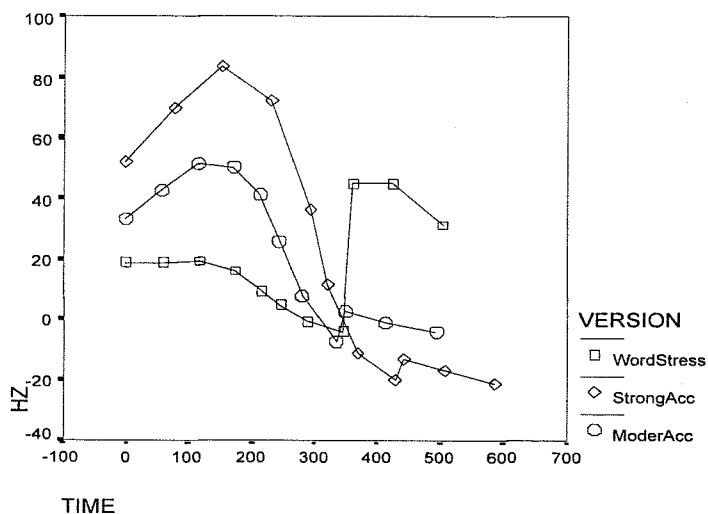


Figure 2. Mean F0 values of the CVVCV type words in the three degrees of prominence. The syllable boundary is located between the fifth and the sixth measurement point. The last three measurement points refer to the initial syllable of the word following the target.

The accents involved an F0 rise followed by a fall. The peak F0 value in Strong Accent always occurred at the third measurement point, in Moderate Accent somewhat later. For CVCV words this point corresponds to the end of the first syllable V, for CVVCV words the middle of the first syllable VV. In other words, the peak always occurred near the end of the word's first mora. Also in real time, the timing of the F0 movements was highly uniform across the three word structures, but in syllabic terms the rise and the peak occurred on the first syllable and the fall on the second one in CVCV(V) words, whereas in CVVCV words the rise, the peak and much of the fall occurred on the first syllable.

#### 4 Conclusions

Stress in Finnish is not realised tonally, while accents are signalled at least tonally. In this respect, Finnish does not seem to differ much from other, genetically distinct and more thoroughly investigated languages. The mora is important in explaining the course of F0 movement in Finnish accentuation. In syllabic terms, two distinct, structure-dependent patterns of accentuation were discovered, whereas in moraic terms, accentuation was uniform across the word structures: rise during the first mora, fall during the second one. Assuming that the post-peak fall is an essential part of accentuation, the distinction drawn by Ladd (e.g., 1996, p. 55) between *association* and *alignment* comes in handy: normal accents in Finnish are unquestionably associated with the initial, stressed syllables, but their *alignment* with the segmental material follows the moraic pattern just summarised ("normal" accentuation excludes instances in which an accent falls on a non-initial syllable).

Extending the term stress, as used by Hayes, to encompass accentuation as well, it can be stated that Finnish indeed seems to be exceptional in the sense intended by Hayes (see above) as far as the association of accentuation is concerned, but the exceptionality is attenuated when the phonetic alignment is considered. Thus when the first syllable is light (as in CVCV words), the phonetic realisation of accent is extended to the second syllable (which realises the fall portion of the accent); in a sense, then, a light initial syllable alone cannot bear an accent, and thus syllable weight does play a part, namely in the alignment of stress/accent with the segmental material.

We are inclined to view the observed F0 movements as interpolations between level tonal targets, not least because of the constancy that was observed in the extents of rises and falls in the two degrees of accentuation. In line with the framework of the bitonal (or autosegmental-metrical) approach to intonational phonology, originating in the work of e.g. Bruce (1977) and Pierrehumbert (1980), we very tentatively propose that accents in Finnish be analysed as H\*+L, with the H\* being associated with the word-initial syllable, and with rules of alignment specifying that the H\* is reached at the end of the first mora of the accented word (strong accentuation) or beginning of the second mora (moderate accentuation), and the L at the end of the last mora in the accented word.

#### References

- Bruce, Gösta. 1977. *Swedish Word Accents in Sentence Perspective*. Lund: Gleerup.  
 Bruce, Gösta. 1998. *Allmän och svensk prosodi*. Praktisk lingvistik 16. Institutionen för lingvistik, Lunds universitet.  
 Hayes, Bruce. 1995. *Metrical Stress Theory*. Chicago: The University of Chicago Press.  
 Ladd, Robert. 1996. *Intonational phonology*. Cambridge: Cambridge University Press.  
 Pierrehumbert, Janet. 1980. *The phonetics and phonology of English intonation*. Dissertation, Massachusetts Institute of Technology.