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THE MARKED STATUS OF ACCENT 2 IN CENTRAL SWEDISH

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ABSTRACT

Based on results from psycholinguistic and neuro-linguistic research on the perception of word accents in Central Swedish, we argue that Accent 2 could be seen as “marked,” as opposed to the unmarked Accent 1. The markedness of Accent 2 is assumed to be both phonetic, due to its relatively more complex high tone, and cognitive, due to the fact that the Accent 2 tone activates more word forms and thus increases processing load.

Keywords: markedness, Swedish, word accent, reaction time, ERP

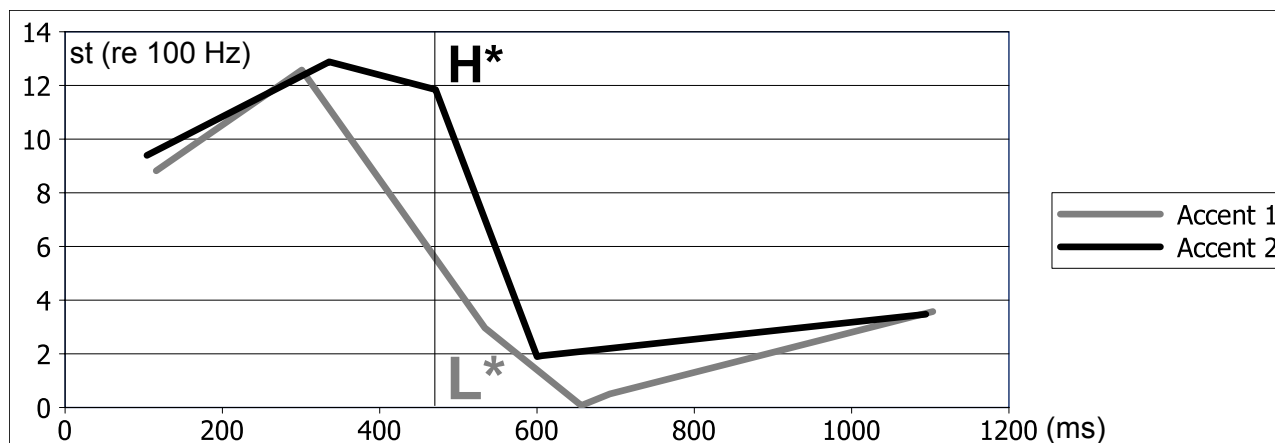
INTRODUCTION

The aim of this article is to relate recent findings on the neurocognitive processing of the two word accent patterns in Central Swedish to the notion of ‘markedness.’ It will be argued that one of the patterns, namely high Accent 2, can be seen as “marked” due to the particular (acoustic) phonetic and lexical properties it is associated with. We will first discuss the basic properties of the two word accent patterns before moving on to present recent empirical research results and relate them to different notions of markedness.

SWEDISH WORD ACCENT PATTERNS

Word accents are used in most varieties of Swedish. One of the main functions of the accents is that they enable speakers to differentiate between the meanings of words that only differ tonally. A common example is the word pair *anden*₁ and *anden*₂ (the subscript number meaning the accent type, Accent 1 or 2). The first word means ‘the duck’ (*and+en* ‘duck+DEF’) and the second means ‘the spirit’ (*ande+n* ‘spirit+DEF’). Although Swedish word accents can be used to distinguish word meanings, they differ, however, from tones in e.g. Chinese or Thai, in that they are not associated with whole word forms, but rather associated with stressed syllables on the basis of morphological and phonological criteria [1,13]. This can be illustrated in words where present or past tense suffixes are connected to the same verb stem, e.g. *läk-* ‘heal.’ Attaching a present tense suffix *-er* gives the Accent 1 word *läker*₁, ‘heals’ while the past tense suffix *-te* results in the Accent 2 word *läkte*₂, ‘healed,’ showing that the tonal pattern associated with the word is clearly related to which suffix is attached to the stem.

Figure 1: Average F0 contours for unfocused Accent 1 (grey) and Accent 2 (black) from 40 Central Swedish pronoun+verb utterances. The vertical line marks the beginning of the stressed vowel.



Word accent characteristics

Both word accent patterns are associated with a HL tonal pattern. The important difference between the accents lies in the timing of the word accent fall in relation to the stressed syllable [1]. In Accent 1 (HL*), the gesture rises to a high tone in the pre-tonic syllable and falls to a low tone (L*), which is associated with the beginning of the stressed syllable. In Accent 2 (H*L), there is a high tone (H*) associated with the beginning of the stressed vowel, which falls through the vowel to a low tone (see Fig. 1).

Word accent markedness

The notion that certain linguistic features could be seen as ‘marked’ as opposed to ‘unmarked’ has been widely discussed, at the very least since the time of the Prague School linguists Roman Jakobson and Nikolay Sergeyevich Trubetzkoy. In analyzing certain phonological “oppositions,” Trubetzkoy [16] suggested that the unmarked member of an opposition (involving a phonetic obstruction in his particular example) should be the one that deviates the least from normal breathing. The marked member should be the one that does the “opposite.” Relating this idea to the realm of general online linguistic processing, a word accent pattern that “deviates” more from normal breathing and is more difficult to process could be viewed as being ‘marked.’ Based on this reasoning, research results presented below indicate that Accent 2 is phonetically marked, as compared to Accent 1. This idea has been proposed earlier for both Swedish [2,3] and Norwegian [8,5,9]. It has further been discussed in the context of basic Biological Codes related to the function of prosodic parameters in speech processing. According to Gussenhoven’s ‘Effort Code’ [7], high tones are likely to convey more information due to the amount of energy involved in their production. In contrast to low tones, high tones such as those related to Accent 2 in Central Swedish involve a faster movement of the vocal folds, and thus a wider excursion of pitch movement in contrast to low tones. High Accent 2 tones can therefore be said to be phonetically marked in relation to the low Accent 1 tones.

In addition to its *phonetic* markedness, Accent 2 can also be said to be marked as regards its *cognitive* complexity, i.e. in terms of the “mental effort or processing time” [6] associated with its use in language processing. Cognitive complexity can e.g. be discussed in relation to word accents’ dis-

tribution in different kinds of words. Thus, a salient characteristic of Accent 2 in Central Swedish is that it is the word accent that is associated with all compound words. Bruce discussed this aspect of Accent 2 in terms of its ‘connective’ role signaling that different kinds of upcoming linguistic information are somehow connected to the H* syllable in Accent 2 words [2]. Thus – only taking the past tense suffix *-te* and compound words into account – syllables with Accent 2 activate far more word forms than syllables with Accent 1: the syllable *läk*₋₁ with a L* Accent 1 tone only activates the present tense verb *läker*₁ ‘heals’ and the bare stem imperative *läk*, ‘heal’), while the same syllable with a high H* tone (*läk*₋₂) associated with it activates any number of compound words, e.g. *läkemedel*₂ ‘medicine’, *läkarkonferens*₂ ‘medical conference’ etc., along with the past tense form *läkte*₂ ‘healed’ and the noun *läkare*₂ ‘doctor.’ Thus high Accent 2 is marked regarding its cognitive psycholinguistic function in word access processing in the sense that it is associated with many more word forms than Accent 1 due to its connective function.

A third sense of markedness with respect to word accents is based on degree of predictability in theoretical modeling of the word accent distinction. This modeling must take into consideration decisions as to which accent is most difficult to derive/predict on the basis of phonological and morphological information. The ‘marked’ word accent is therefore the one assumed to be lexically marked due to its relative linguistic *unpredictability*. As regards Central Swedish, different theoretical models of the word accents have been proposed. On the one hand, Riad [11,12] assumes, following Rischel [13], that Accent 2 is marked in the lexicon on certain suffixes and that Accent 1 is the ‘default’ accent associated with words postlexically. Additional support for this post-lexical status of Accent 1 comes from observations that Central Swedish speakers generalize Accent 1 onto words when speaking foreign languages and that unanalyzed loan words receive Accent 1 [2]. On the other hand, a competing analysis by Lahiri et al. [10] claims that a simpler account for both Swedish and Norwegian can be obtained if Accent 1 instead is regarded as marked in the lexicon and that Accent 2 is associated with words by default.

These three senses of markedness of course do not necessarily imply each other. For instance, it is not necessarily the case that the phonetically marked accent should be considered to be the

marked accent in a theoretical model of Swedish phonology. In addition, different dialects of Swedish realize the word accents differently. Thus, what is a high Accent 2 in Central Swedish is realized as a low in southern Swedish. However, the phonological contrast between two word accents is nevertheless a reality for all Swedish speakers except Finland Swedes. Indeed, the marked status of Accent 2 regarding its cognitive load in Central Swedish word accessing cannot be expected to be relevant for all varieties of Swedish, e.g. northern varieties of Swedish and even southern Swedish where compounds can also be associated with Accent 1.

EVIDENCE FOR MARKEDNESS OF ACCENT 2 IN CENTRAL SWEDISH

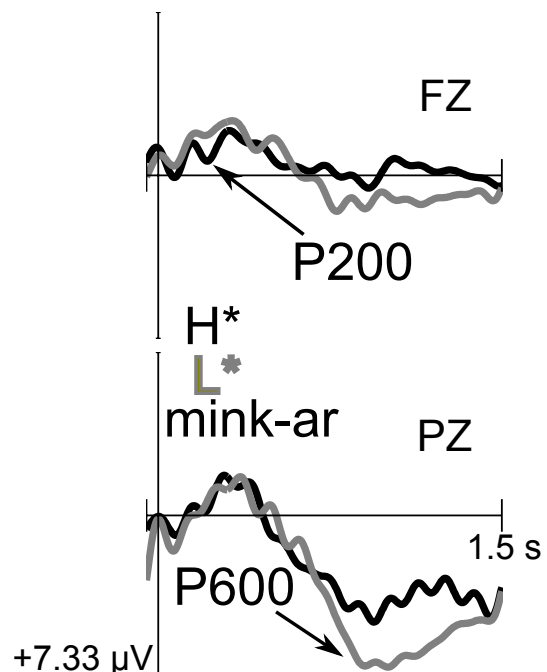
Recent psycholinguistic and neurolinguistic research has lent support to the idea that Accent 2 is marked in Central Swedish.

In an ERP (Event-Related Potential) experiment, Roll et al. [14], found a dissociation of processing between the two accents at the neural level. Brain responses related to the processing of noun stems combined with Accent 1 and Accent 2 suffixes were compared. Singular suffixes, e.g. *-en* in Accent 1 words like *mink-en* ‘the mink’ were compared to plural suffixes, e.g. *-ar* in Accent 2 words like *mink-ar* ‘minks.’ The accents were both matched and mismatched with the word stems in order to compare the brain response. The test words were embedded in sentences. The task was to judge sentence acceptability. Results showed that the high tone of Accent 2 increased a particular ERP component – the P200 – as compared to the low tone of Accent 1. Since this effect was found for the high Accent 2 tone, it might reflect perception of the relative auditory saliency of the high tone. The P200 could also involve higher level processing of auditory stimuli that are perceived as relevant due to their potential link to different kinds of information in later stages of linguistic processing.

Another finding in [14] was a P600 effect related to the neurocognitive difficulty of processing Accent 2 words whose stems had been wrongly associated with an Accent 1 pattern, e.g. *mink-ar* ‘minks.’ This difficulty, involving reprocessing the word form, was not observed for Accent 1 words wrongly associated with Accent 2. This result suggests that a stem associated with the low Accent 1 tone does not activate a plural suffix and that rea-

analysis of the word form takes place after hearing a plural suffix. Stems associated with Accent 2 however, do appear to activate a singular suffix in addition to a plural suffix. In other words, it seems like the stem alone is enough to activate Accent 1 suffixes, whereas the high stem tone is needed in addition for Accent 2 suffixes to become activated.

Figure 2: Event-related brain potentials (ERPs) for on-line processing of words like *minkar* ‘minks’ associated with Accent 1 (L*) or Accent 2 (H*) at an anterior (FZ) and a posterior (PZ) electrode. The H* stem tone yielded an anterior positive deflection (P200), whereas the plural Accent 2 suffix *-ar* produced a posterior positivity (P600) in the absence of its associated H*. Data from [14].



Although Roll et al. [14] showed that there was a strong association between Accent 2 and suffixes, they did not specifically answer the question as to whether listeners use word accents to predict upcoming suffixes in word interpretation. In order to look closer at the effect stem tone has on the semantic interpretation of suffixes, Söderström et al. [16] devised a response time experiment. Rather than judging sentence acceptability, participants were asked to judge as quickly as possible whether test stimuli were in the present or the past tense. Verbs with the present tense suffix *-er* (e.g. *HAN läker* ‘HE heals’) and with the past tense suffix *-te* (e.g. *HAN läkte* ‘HE healed’) were associated with correct and mismatching word accents. Narrow

focus was placed on the pronoun so as to avoid the focal rise on the verb. Half of the stimuli had a stem tone/suffix mismatch. As was expected on the basis of findings in [14], the Accent 2-inducing suffix (past tense *-te*) preceded by a low Accent 1 tone on the stem elicited the longest response times, suggesting that these were the most difficult to process. This was in line with previous results, indicating that a mismatching Accent 1 on a word stem leads to reanalysis of a word with an Accent 2-inducing suffix like past tense *-te*. In addition, contrary to earlier findings, the high Accent 2 tone impeded the processing of the present tense suffix *-er*. In other words, it took longer to process a present tense form when it was associated with Accent 2. This follows from the assumed markedness of the high Accent 2, which would be expected to activate more forms and thus more response options than Accent 1. Adding to this interpretation is that fact that correct non-mismatched past tense utterances (Accent 2) were also significantly more difficult to process than correct present tense utterances (Accent 1). Faster processing of correct Accent 1 compared to Accent 2 was also found – albeit during different circumstances – in nouns in another study by Felder et al. [4].

CONCLUSIONS

The reviewed results point to an assumed marked status of Accent 2 in Central Swedish regarding its auditory phonetic and neurocognitive characteristics. The fact that high Accent 2 leads to enhanced neural activation as compared to low Accent 1 (P200), the fact that there is a strong neurocognitive association between high Accent 2 and Accent 2-inducing suffixes (P600), as well as the fact that high Accent 2 takes longer to process than Accent 1 support an interpretation of Accent 2 as the marked word accent, both phonetically, neurocognitively, and perhaps even phonologically.

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