

Focus type effects on focal accents and boundary tones

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Abstract

The paper presents a production experiment on the prosodic realization of focus types in Stockholm Swedish. It is shown that focal accents are realized with higher f₀ and longer duration when signalling narrow or corrective focus, than when signalling all-new focus. In addition, focal accents are more often followed by a L% when signalling narrow or corrective focus, and f₀ falls due to L% are larger.

Introduction

In the literature, different types of focus have sometimes been distinguished and placed on a scale. It has been hypothesized that the higher up on the scale a focus is, the more likely is it that the focus will receive a phonological correlate, and/or the stronger will its correlate be. For example, Féry (to appear), proposes that *all-new information* focus is a weak focus type, *narrow information* focus is stronger, and *corrective* focus is yet stronger (but note that these are not the only focus types on her scale).

Many questions remain to be answered in relation to such focus scales, however. It is unknown how many focus types languages distinguish, and which the primary correlates of focus are in a typological perspective. *Prominence* in terms of e.g. increased f₀ and duration play a very important role in the Germanic languages. In many other languages, *phrasing* has been shown to play a crucial role in focus expression (e.g. Féry, to appear). In the Germanic languages, the role of phrasing in the expression of focus is less well studied than the role of prominence.

In Swedish, the effect of focus types on the realization of the *focal accent* has not been well studied, in spite of the fact that the focal accent has several properties which makes it unique among (at least) Germanic languages (e.g. Myrberg, 2013). Also, in (Stockholm) Swedish, a categorical distinction can be made between focal accents directly followed by a *boundary tone fall*, here analyzed as L%, and focal accents followed by a *high plateau*. Plateaus result from interpolation with a following H, and appear in the absence of a L% (Bruce, 1987; Myrberg, 2013). Because Swedish intonation has these uncommon features,

increased knowledge of the expression of focus types may have interesting typological implications.

This paper presents a production study addressing the question how the three focus types *all-new*, *narrow* and *corrective* focus affect *i*) the maximal f₀ height in focal accents, *ii*) how often there is a *tonal fall* L% directly following a focal accent, as well as the size of such falls, and *iii*) word duration in these three focus types.

Experiment design

Six female Stockholm Swedish speakers read question–answer pairs as in (1).

(1) *Context questions:*

- Q-a. Varför ringer äggklockan ute i köket?
Why is the timer ringing in the kitchen?
- Q-b. Vad har kokat färdigt?
What is done boiling?
- Q-c. Har äggen kokat färdigt?
Are the eggs done boiling?

Target sentences:

- A-a. ¹**Hummern** har kokat färdigt.
The lobster is done boiling.
- A-b. ²**Havren** har kokat färdigt.
The oat is done boiling.

Each target sentence was read with three different context questions, triggering all-new focus (Q-a), narrow focus (Q-b), and corrective focus (Q-c). There were five different target sentences, each of which appeared once with an accent 1 subject (A-a), and once with an accent 2 subject (A-b). Every question–answer pair was repeated three times by each speaker. This procedure resulted in a corpus of 540 sentences (5 were lost due to technical problems).

Syntactically, the target sentences consisted of a one-word subject (disyllabic, initial stress), followed by an intransitive predicate. The predicates belong to the group of intransitives which allow an all-new reading when the strongest prominence of the sentence (a focal accent in Swedish) is located on the subject (e.g. Gussenhoven, 1983; Selkirk, 1984). In contrast to the sentences used here, most sentences can receive an all-new interpretation only when the strongest prominence appears sentence-finally.

It was important that the target word would receive the strongest prominence in all three focus conditions, and that it would appear non-finally in the sentence. Sentence-finally, there is always a L%, and this L% can be expected to reach the lowest f0 of the sentence, simply because it is final. However, in non-final position, the insertion and realization of a L% are independent of finality-effects. Thus, in non-final position, we can observe focus effects on L% insertion and realization.

The intransitives used here made it possible to compare focal accents that express all-new, narrow, and corrective focus, while keeping constant the position of the focal accent in the sentence.

Annotation procedure

The sentences were annotated by the author using Praat (Boersma & Weenink, 2013). In each accent 1 subject, a L*H focal accent contour was annotated, and in each accent 2 subject a H*LH focal accent contour was annotated. This annotation is based on standard assumptions of the tonal structure in Stockholm Swedish (e.g. Bruce, 1977, 1998; Heldner, 2001; Myrberg, 2013). Henceforth, the right-most H-tones in the focal accent tonal sequences L*H and H*LH will be referred to as the *focal H tone*. The focal H tones are structurally equal in words with accent 1 and accent 2, and correlate with information structural focus in Stockholm Swedish (Bruce, 1977).

In addition to the focal accent contours, the lowest f0 point following the focal H tone inside the subject was annotated. This low point corresponds to a potential L% following the focal accent. Furthermore, the author made a (subjective) judgment with respect to whether or not a L% followed the focal accent on the subject, and with respect to whether or not the predicate contained a focal accent in addition to the one on the subject.

Results and discussion

Four basic tonal patterns could be distinguished in the target sentences, as shown in Table 1 (for sentences with an accent 1 target word) and Table 2 (for sentences with an accent 2 target word). The patterns differ *i*) in terms of a focal accent in the verb phrase, and *ii*) in terms of a boundary tone (L%) immediately following the focal accent in the subject. The focal accent on the verb is present in a and b, and the boundary tone in the subject is present in a and c.

Table 1. Distribution of phrasing patterns of sentences in (1). Accent 1 target word. 100%=267

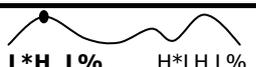
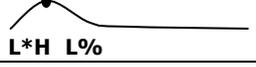
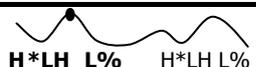
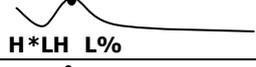
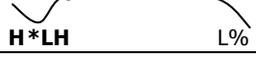
¹ Hummern... .. ² färdigt	all-new (1) Q-a	narrow (1) Q-b	correct. (1) Q-c
a.  L*H L% H*LH L%	17.6% (47)	-	-
b.  L*H H*LH L%	1.5% (4)	-	-
c.  L*H L%	13.9% (37)	33.7% (90)	33.3% (89)
d.  L*H L%	-	-	-

Table 2. Distribution of phrasing patterns of sentences in (1). Accent 2 target word. 100%=268

² Havren... .. ² färdigt	all-new (1) Q-a	narrow (1) Q-b	correct. (1) Q-c
a.  H*LH L% H*LH L%	6.3% (17)	0.3% (1)	-
b.  H*LH H*LH L%	10.1% (27)	-	-
c.  H*LH L%	3.7% (10)	16.8% (45)	17.5% (47)
d.  H*LH L%	12.7% (34)	16.4% (44)	16.0% (43)

The right sides of Tables 1 and 2 show the number of occurrences in the three focus types for each pattern. As for the focal accent on the verb (a and b), it should be noted that this pattern appears only in the all-new condition.

As for the occurrence of boundary tones in the subject, there is an effect of focus type for the accent 2 words, but not for the accent 1 words. L% following the subject is as good as obligatory for accent 1 words in all focus types (hence patterns b and d are virtually unattested). However, in the accent 2 words, speakers insert a L% more restrictively. This restrictiveness allows the observation that L% insertion is more common with narrow and corrective focus than with all-new focus. This observation is made by comparing the number of occurrences of patterns a and c (with L%), to the number of occurrences of patterns b and d (without L%), in the three focus types. A Chi-square test shows a significant effect of focus type in relation to the presence of a L% (χ^2 -squared = 10.5484, df = 2, $p = 0.005122$).

Much remains to be understood when it comes to the distribution of L% boundary tones directly following focal accents, but the fact that accent 2 (which contains 3 tonal targets) have such tones much less often than accent 1 (which contains 2 tonal targets) suggest that in

addition to focus type, space inside the target word is a major factor in determining whether a focal accent is followed by a L%.

It can be hypothetically concluded that when there is ample space, as in the accent 1 words, speakers insert a L% following focal accents, independent of context. However, even when there is some shortage of space, insertion of a L% is sometimes forced, as in the accent 2 words. It is in these cases, where L% is not always present, that we can observe the higher pressure for a L% to be inserted with narrow and corrective focus than with all-new focus.

The following sections describe in turn how focus type affects *i*) the f0 height of the focal H tone in the subject, marked by a dot in Tables 1 and 2, *ii*) the realization of the L% fall following the focal accent in the subject, as in patterns a and c, and *iii*) the duration of focally accented words.

Height of the focal H tone in the subject

The boxplots in *Figures 1 and 2* illustrate how the f0 of the focal H varies between the focus types.

A Wilcoxon test reveals that the focal H tone is significantly lower in the all-new condition than in the narrow condition. This is true for accent 1 ($W = 2840$, $p = 0.001617$) as well as accent 2 ($W = 2641$, $p = 0.000125$). The all-new condition is also significantly lower than the corrective condition, in accent 1 ($W = 3009$, $p = 0.01075$) and in accent 2 ($W = 2396$, $p < 0.0001$). Between the corrective and the narrow condition, however, there is no significant difference, for accent 1 ($W = 4357$, $p = 0.3106$) or 2 ($W = 3841$, $p = 0.5508$).

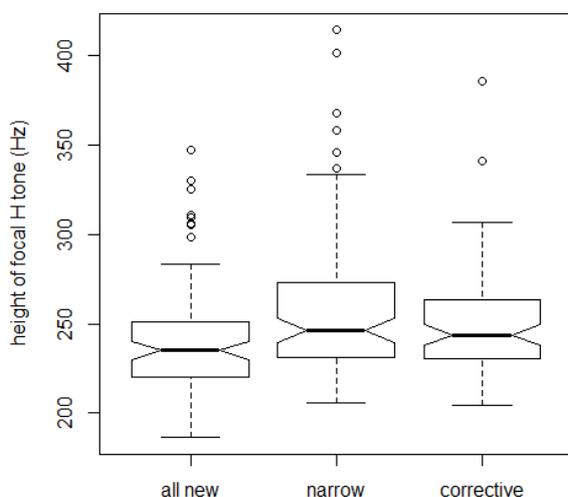


Figure 1. Height of focal H tone. Accent 1.

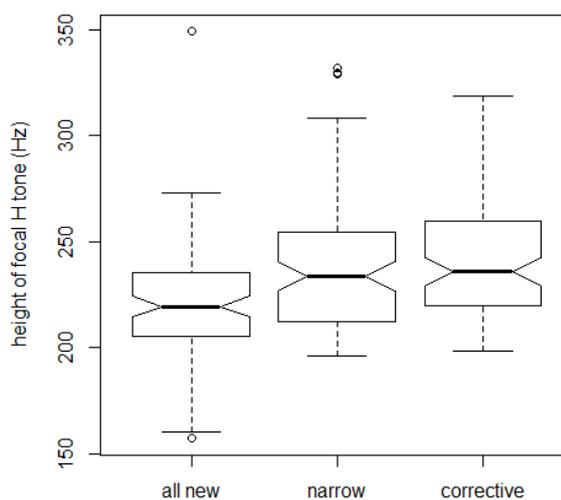


Figure 2. Height of focal H tone. Accent 2.

Size of the L% boundary fall

The size of the falls from the focal H tone to the L% in patterns a and c from *Tables 1 and 2* were measured, to see whether these falls were affected by focus type.

The fall size reported here amounts to the difference between the focal H tone (as reported in the previous section), and the lowest f0 point following the focal tone *within* the target word. Only sentences realized with a L% (i.e. patterns a and c from *Tables 1 and 2*) were included in the reported measures (it can be noted, however, that similar results were obtained when including sentences realized with patterns b and d).

The size of the fall in the three focus conditions is illustrated in *Figure 3* (for accent 1 subjects) and *Figure 4* (for accent 2 subjects).

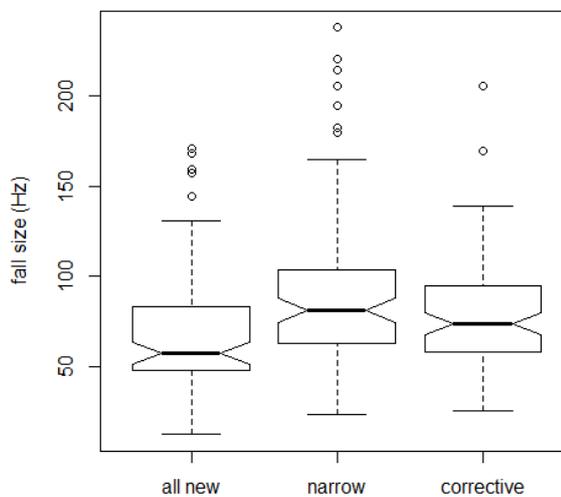


Figure 3. Fall size from the focal H to L%, in sentences with patterns a and c from Table 1. Accent 1.

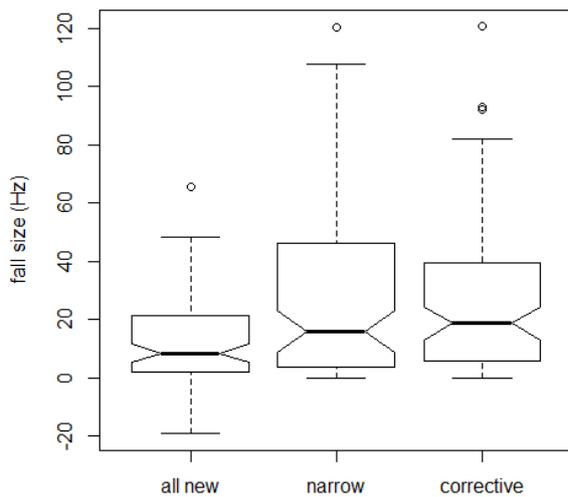


Figure 4. Fall size from the focal H to L%, in sentences with patterns a and c from Table 2. Accent 2.

A Wilcoxon test shows that the fall is smaller in the all-new condition than in the narrow condition, for accent 1 ($W = 2377, p < 0.0001$) as well as accent 2 ($W = 2849, p = 0.001234$). The all-new condition is also significantly different from the corrective condition, both for accent 1 ($W = 2689, p = 0.0009858$) and accent 2 ($W = 2648, p = 0.0001358$). However, the narrow and the corrective conditions are not significantly different (accent 1: $W = 4501, p = 0.1158$; accent 2: $W = 3931, p = 0.7346$).

Word duration

The duration of the target words, too, reflects the different focus conditions. The duration of the target words is illustrated in Figure 5.

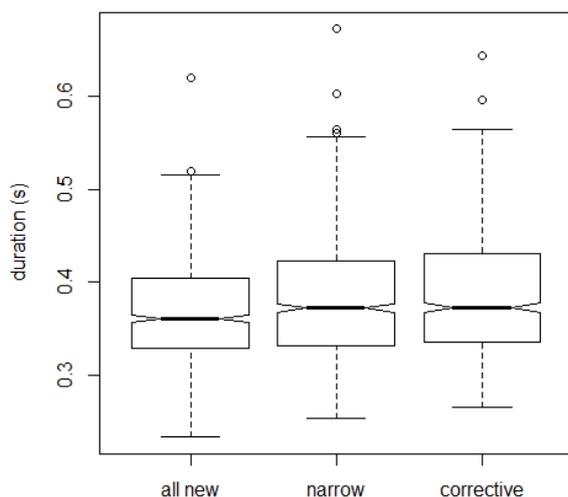


Figure 5. Duration of the target words in the three focus conditions. Accent 1 and 2.

The Wilcoxon test shows that words in the all-new condition are significantly shorter than words in the narrow condition ($W = 288730, p = 0.0005403$), as well as words in the corrective condition ($W = 285258, p = 0.0002355$).

However, words in the narrow and the corrective conditions are not significantly different ($W = 323350, p = 0.7427$).

Conclusion

The results of the experiment reveal that all-new focus is distinguished from narrow focus and corrective focus in Stockholm Swedish. However, they also indicate that no distinction is made between narrow and corrective focus.

All-new focus is distinguished from narrow and corrective focus in terms of the f0 height of the focal H, in terms of the size of a L% tone fall inside a focally accented word, and in terms of word duration. The first two effects are interpreted here as effects on the phonetic realization of the tonal targets involved in expressing focus.

The results also show a higher pressure to insert a L% boundary tone after narrow and corrective focus than after all-new focus. This is interpreted as indicating that, alongside the obligatory focus prominence, there is a pressure to align focus with a prosodic edge in Swedish, along the lines of focus alignment as proposed by Féry (to appear).

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