Prosody of contrastive focus in Estonian

Heete Sahkai, Mari-Liis Kalvik, Meelis Mihkla

Institute of the Estonian Language, Tallinn, Estonia

`Heete@eki.ee, Mariliis@eki.ee, Meelis@eki.ee`

Abstract

The study contributes to the cross-linguistic discussion on the prosodic correlates and categorial status of contrastive focus. It brings in data from Estonian, a flexible word order language where the prosodic expression of Information Structure has been very little studied. The study compares narrow contrastive focus with narrow and broad information focus in semi-spontaneous production data, examining word order, pitch accent types and distribution, word duration changes, and F0 values. Interestingly, neither contrastive nor information focus induces the expected word order changes. The examined phonological features, i.e. accent types and distribution, show some correlation with contrastive focus, but the strongest determinant of accent type is the position of focus (final vs. non-final). An interesting finding is that in parallel constructions with symmetric foci, the two foci tend to bear different accents. Duration changes distinguish between all three focus categories; interestingly, a three-way distinction between categories is obtained by way of different distributions of binary durational distinctions. F0 differences between conditions are significant only within certain informants and distinguish between contrastive and information focus only in non-final position; clause-finally, F0 distinguishes between broad and narrow information focus.

Index Terms: Estonian, contrastive focus, pitch accents, word durations, fundamental frequency, word order

1. Introduction

The paper aims at contributing to the study of the prosodic correlates of Information Structure (IS) in Estonian as well as to the cross-linguistic study of the expression and status of contrastive focus. By contrastive focus we understand focus in contexts involving explicit alternatives to the focused constituent. The study will concentrate on narrow contrastive focus in comparison with narrow and broad information focus in semi-spontaneous production data.

Cross-linguistically, contrastive focus has been found to have both phonetic correlates, like stronger prominence (e.g. increased pitch range and duration) or distinctive pitch accent alignment, and phonological correlates, like a distinctive pitch accent type, accent distribution or prosodic phrasing. Often, a combination of these properties is reported to signal contrastive focus in a language, see e.g. [1], [2] for German, [3] for Spanish, [4] for Dutch. Contrastive focus has also been argued to have distinctive syntactic properties [5].

A theoretical question related to contrastive focus is whether it is categorically or gradually distinct from information focus. A categorical distinction would be supported by evidence of phonological or syntactic marking of contrastive focus, but possibly also by consistent and perceptually recognisable phonetic marking (for an overview of the discussion see e.g. [6]).

Estonian, a Finno-Ugric language closely related to Finnish, is considered to express IS primarily with word order [7, 8]. Prosodic correlates of IS in Estonian have so far been very little studied and the present study is part of an attempt to initiate a systematic study of this area. It continues our previous study [9] that checked for correlations of four focus structures in simple SVO sentences (subject focus, object focus, predicate focus and sentence focus) with word order, accentuation patterns, pitch accent types, degree of prominence (as reflected in word duration changes) and prosodic phrasing. The present paper will extend this study to sentences with contrastive subject and object focus. Both studies are based on data elicited with the same production task. The study will concentrate on the following questions, assuming that positive answers to these questions will support a categorical distinction between contrastive and information focus:

1. Does contrastive focus induce the inverted OVS order, instead of the neutral SVO order of Estonian main clauses? Surprisingly, [9] found that information focus on subject was overwhelmingly expressed with the SVO order and the strongest prominence on subject, although subject-focus sentences had been expected to follow the word order principle whereby foci tend to be final and topics initial [7]. The present study will examine whether contrastive focus induces inversion more frequently. Inversion may in principle occur either in subject-focus sentences, due to a stronger preference for focus-final order, or in object-focus sentences, since contrastive foci may be fronted [7]. In other words, contrastive focus could differ from information focus either in a stronger tendency to occur clause-finally, or in a different (clause-initial) syntactic position.

2. Do sentences with contrastive focus exhibit more deaccentuation than sentences with narrow information focus, which were found to exhibit accentuation both pre- and post-focally?

3. Is contrastive focus signalled by a particular pitch accent type? Estonian has two main nuclear accent types, H*L and HL*, both of which are also possible in pre-nuclear position [10]. Of the two accents, HL* is more restricted in several respects [10, 11]: (i) the default intonation pattern of Estonian is a series of H*L accents; (ii) prenuclear HL*, unlike H*L, is possible only if the subsequent accents are of the same type; (iii) HL* does not occur in questions. [9] checked whether the accent types correlate with focus size. They found that accent type does not distinguish between final narrow and broad information focus: both occurred in more or less equal proportion with the two accent types. Furthermore, early focus was restricted to H*L, so that narrow focus was not expressed uniformly in clause-final and non-final position (unlike e.g. in Portuguese, cf. [12]). The present study will examine whether contrastive focus can be associated with a distinctive accent type, either uniformly or separately in final and non-final position. Secondly, it will be verified whether early contrastive focus confirms the restriction of early focus to H*L.

4. Is narrow contrastive focus distinguished from narrow information focus by stronger prominence on the focal

constituent, as reflected in longer duration, increased F0 range, higher F0 maximum or lower F0 minimum, and by weaker prominence on the non-focal constituent, as reflected in shorter duration? [9] found that word duration changes significantly distinguished final narrow information focus from broad focus. The difference consisted both in the lengthening of the focal noun and shortening of the pre-focal noun. The difference was also confirmed by a perception test. The present study will verify whether the two are also distinguished by F0 values.

Earlier production studies of phonetic correlates of broad, narrow and contrastive focus suggest that they tend to make binary distinctions, cf. e.g. [4]. Similarly, perception studies suggest that prominence strength tends to be interpreted categorically in a binary way, although it is perceived gradually, cf. e.g. [13]. We predict therefore that prominence strength may distinguish early contrastive focus from early information focus, but that it will not distinguish between final narrow contrastive and information focus (given that it already distinguishes between final narrow and broad focus).

[9] also examined the correlation of focus structures with prosodic phrasing, and found evidence of separate phrasing of the early focus constituent, but not of narrow focus in general. However, the identification of phrase breaks was problematic because boundary cues and the prosodic hierarchy above the prosodic word have not been systematically studied in Estonian. Prosodic phrasing will therefore not be examined in the present study. Another topic that will be left for future research is the influence of focus types on accent alignment.

Contrastive focus is exemplified in the study by corrective focus, but we also examine sentences with selective object focus, in order to test for possible differences between different types of contrastive focus. In addition, we will examine parallel coordinate clauses with symmetric object and subject foci, in particular because they involve contrastive topics, which may tend to be fronted and thereby induce inverted word order, cf. [14].

2. Data and method

The study is based on data elicited using the design and materials of the "Who does what" production task of the "Questionnaire on Information Structure" [15] (with some modifications). The task consists in answering questions about pictures, which represent either a single event or, for the elicitation of contrastive foci, two events. The pictures are chosen so as to elicit simple transitive clauses with a subject, verb, and object, each consisting of a single word, e.g. *Mees joob kokat (ja naine joob veini)* 'The man is drinking coke (and the woman is drinking wine)', *Mees sööb banaani (ja naine sööb õuna)* 'The man is eating a banana (and the woman is eating an apple)'. Each picture is shown several times with different questions, in order to elicit identical sentences with different IS. The questions were pre-recorded and presented to the informants together with the pictures in the form of a PowerPoint slide show. The subjects were alone in the recording studio and answered the questions on their own pace. For the present study we used sentences elicited with 8 questions, each of which was applied to 8 pictures; the task was performed by 9 subjects, 4 women and 5 men. Altogether, the data consisted of 576 sentences. The examined focus categories are presented in table 1 (together with the respective abbreviations that will be used in the rest of the paper) and illustrated with the translations of the questions that were used

to elicit the sentence *Mees joob kokat (ja naine joob veini)* 'The man is drinking coke (and the woman is drinking wine)'. The early focus category includes contrastive, non-contrastive and parallel subject-focus sentences produced with SVO order, and the late focus category includes broad-focus sentences and object-focus sentences with information focus, corrective focus, selective focus and parallel foci.

Table 1. *Focus conditions and elicitation questions.*

	Late focus		Early focus
	Broad focus	Narrow focus	
Information focus	BF What is happening?	LNIF What is the man drinking?	ENIF Who is drinking coke?
Corrective focus	-	LCF Is the man drinking <u>wine</u>?	ECF Is the <u>woman</u> drinking coke?
Selective focus	-	LSF Is the man drinking wine or coke?	-
Parallel foci	-	LPF What is the man drinking and what is the woman drinking?	EPF Who is drinking coke and who is drinking wine?

One informant's data was used only in the examination of parallel sentences since he produced negative sentences instead of corrective focus. One subject tended to use creaky voice; his data was therefore often difficult to analyse. Also, some sentences with disfluencies were left out of analysis.

The sentences were analysed with Praat [16], segmented into words and sounds and labelled for pitch accent placements and accent types. A pre- or post-focal noun was labelled as deaccented when its F0 and intensity were not higher than those of the (non-accented) verb.

To measure word duration changes, we first equalised the durations of the 6 single-focus versions of each sentence for each informant and then calculated the mean duration of each word across the versions. We then calculated the relative difference of the normalised duration of each word from the mean duration and compared the mean differences in the six focus categories. The significance of the differences between the mean values was determined by ANOVA.

F0 maxima and minima of focal accents were measured in the following way: for H*L, the maximum was measured in the vowel of the stressed syllable and the minimum in the vowel of the next syllable, and for HL*, the minimum was measured in the vowel of the stressed syllable and the maximum in the vowel of the preceding syllable. F0 ranges were obtained by subtracting the minimum from the maximum. We compared separately the values of the objects in the 4 late focus versions of each sentence, and the values of the subjects in the 2 early focus versions. F0 ranges were compared both across and within informants; F0 maxima and minima were compared within informants. The significance of the differences between the values was determined by ANOVA. Comparisons between the late focus conditions were somewhat problematic because the data were divided between

two accent types. For the same reason, we gave up sentence-internal comparisons.

Parallel sentences were examined only for word order and pitch accent types.

3. Results and discussion

Word order. No difference in word order between contrastive and non-contrastive sentences was found, not even in the parallel subject-focus sentences, where the objects are contrastive topics: only one informant used the OVS order, and she did so in all subject-focus sentences. In other words, contrastive foci were not produced in a uniform and distinctive syntactic position, nor did they show a stronger tendency to occur clause-finally. Similarly, contrastive topics were not more frequently fronted than non-contrastive topics. These results raise the question of the functions and distribution of the OVS order, and, more generally, of the role of syntax vs. prosody in the expression of IS in Estonian. It may be the case that SVO is the preferred order in spoken language, as suggested by the findings of [8].

Accent distribution (in single-focus sentences). Like in sentences with late narrow information focus, pre-focal nouns in contrastive-focus sentences were accented. Post-focal nouns, on the other hand, were more often labelled as being deaccented in contrastive early focus sentences (in 45% of cases) than in the non-contrastive ones (in less than 10% of cases). However, the two conditions did not differ significantly with respect to the shortening of the post-focal noun (see below). More study is needed in order to permit a more principled interpretation of post-focal sequences in Estonian.

Accent types. The study confirmed that early focus, including contrastive focus, is confined to the H*L accent, although a small percentage of low accents occurred in the single contrastive focus condition (15%) and in the second conjunct of the parallel subject-focus sentences (15%). The parallel sentences further suggest that HL* may also be excluded from non-final IPs, since it never occurs in the first conjunct; this hypothesis needs to be verified in future research. The study also confirms that narrow contrastive focus, like narrow information focus, is not expressed uniformly in final and non-final position: whereas early contrastive focus is marked with H*L, late contrastive focus occurs both with H*L and HL*, with a certain prevalence of HL*, especially in selective-focus sentences and in the second conjunct of parallel object-focus sentences (respectively 74% and 67%, as opposed to 48% in narrow information focus and 59% in broad information focus condition). However, the correlation of late contrastive focus with HL* is not as strong as the correlation of early focus with H*L – whereas the latter is close to an absolute constraint, the former is a tendency.

An interesting result is that in 67% of the parallel object-focus sentences, the two contrasted foci are produced with different accent types, suggesting that accent types may be used to iconically express contrast. This is surprising since previous findings and hypotheses suggest that symmetric foci in parallel constructions are produced with parallel prosody, cf. [14, 17]. A separate study is needed to verify whether this phenomenon is specific to contrastive coordinate clauses or is perhaps a general property of coordinate clauses in Estonian.

We also examined the proportions of upstepped H*L accents in the different late focus categories, but these did not distinguish consistently between contrastive and non-contrastive foci. Table 2 summarises the nuclear accent types in the late focus sentences; it includes the data of predicate-focus sentences from [9], in order to show the considerable variation that is present within the broad focus and information focus categories.

Table 2. *Nuclear accent types in late focus conditions (percentage of upstepped accents in parentheses).*

	BF	VP focus	LNIF	LCF	LSF	LPF, 1st clause	LPF, 2nd clause
H*L	41% (25%)	56% (57%)	52% (**75%**)	40% (64%)	26% (41%)	**100%** (**84%**)	33% (5%)
HL*	59%	44%	48%	60%	**74%**	0	**67%**

Duration patterns (in single-focus sentences). Early contrastive focus differs significantly from early information focus in the lengthening of the focal noun, as was predicted, but not in the shortening of the post-focal noun. Figure 1 shows the relative duration changes of the contrastive and non-contrastive early focus constituent (respectively 14.1% and 8.6%).
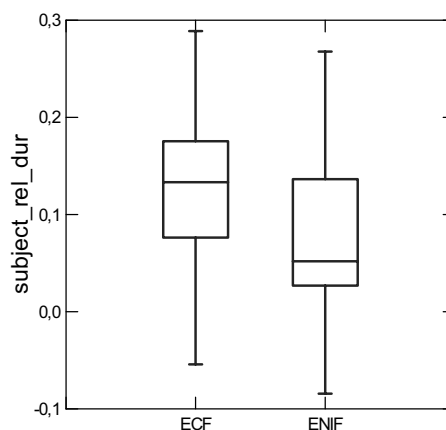

Figure 1: *Lengthening of the early contrastive focus constituent (ECF) and of the early information focus constituent (ENIF).*

Table 3 presents the significances of the relative duration differences in the late focus categories. Late contrastive focus does not induce significantly more lengthening of the focal noun than narrow information focus, as was predicted, given that lengthening already operates a distinction between broad and narrow information focus. Similarly, the pre-focal noun does not shorten more in the contrastive-focus sentences than in the narrow information focus sentences, again as predicted, given that the shortening of the pre-focal noun distinguishes between narrow and broad information focus. Interestingly, however, the three conditions still differ in terms of duration: namely, contrastive-focus sentences differ from narrow information focus sentences in that their subject is significantly longer (and does not differ significantly from the subject of broad-focus sentences); but contrastive sentences also differ from broad-focus sentences in the lengthening of the object; in addition, the late contrastive focus sentences are set apart from all the other categories by the shortening of the

verb. In other words, the three conditions differ in the overall distribution of prominence strengths in the utterance, although each word only displays a binary durational distinction, as was predicted. The two types of late contrastive focus do not differ significantly from each other with respect to duration.

F0 (in single-focus sentences). F0 differences between conditions were found to be significant only within particular informants. The most consistent distinguishing factor was the F0 range of the focal word, which was varied either by raising the F0 maximum or lowering the minimum. Overall, the differences between focus conditions in terms of the F0 range of the focal word were not significant (p-values between 0.63 and 0.97). Early contrastive focus was produced with a significantly larger excursion than early information focus in the data of 3 informants out of 7. In the late focus condition, the F0 range distinguished between broad and narrow information focus in 5 informants out of 8. Late contrastive foci however did not pattern consistently neither with respect to each other nor with respect to broad and narrow information focus.

4. Conclusions

The study checked for syntactic, phonological and phonetic correlates of narrow contrastive focus in Estonian.

Syntactically, narrow contrastive focus was not different from narrow information focus. Furthermore, neither of the two focus types induced the expected word order changes, suggesting the need to study the role of the prosodic vs. syntactic strategies of the expression of IS in Estonian.

No absolute correlation between contrastive focus and a phonological category was found either. 45% of early contrastive focus sentences exhibited post-focal deaccenting, which was nearly absent from information-focus sentences. However, the identification of post-focal (de)accentuation is not straightforward and more study is needed in order to establish the properties of post-focal sequences in Estonian. No differences between contrastive and information focus were found in pre-focal accentuation. With respect to accent type, contrastive focus was not expressed uniformly in clause-final and non-final position, just like narrow information focus: early focus is restricted to H*L, whereas late focus occurs in all conditions both with H*L and HL*. Contrastive-focus sentences exhibit a larger proportion of HL* than

information-focus sentences, but to a somewhat different extent in the different types of contrastive focus. An interesting finding is that in 67% of parallel object-focus sentences, the contrasted foci bear different accent types. Whether this is related to the expression of contrast or is a general property of Estonian coordinate clauses requires further study.

The study confirmed that the primary determinant of pitch accent type is the final vs. non-final position of focus: whereas the correlation of contrastive focus with the examined phonological categories is statistical, the correlation of early focus with H*L is absolute. The study further suggests the hypothesis that HL* may also be excluded from non-final IPs.

Phonetically, both early and late contrastive focus were distinguished from information focus by word duration changes: the former by a greater lengthening of the focal word, the latter by different overall distributions of binary durational distinctions in the sentence. F0 range distinguished between early contrastive and information focus, and between late broad and narrow information focus, but not in all informants; late contrastive foci did not pattern consistently in terms of the examined F0 values.

The study also compared two types of late contrastive focus, corrective and selective focus. These patterned similarly with respect to duration changes, but not in terms of pitch accent types and F0 values.

In conclusion, the study did discover some differences between contrastive and information focus, primarily of phonetic nature, but also some tendencies involving deaccentuation and pitch accent types. However, a perception study is needed in order to test whether these differences are perceptually recognisable. Further topics for future research are the effects of contrastive focus on prosodic phrasing and accent alignment.

5. Acknowledgements

Table 3. *P-values of relative duration differences in late focus categories (statistically significant differences p<.05 in bold)*

Focus type / Constituent		BF			LNIF			LCF		
		S	V	O	S	V	O	S	V	O
LNIF	S	**<.0005**								
	V		0.273							
	O			**0.002**						
LCF	S	0.302			**0.033**					
	V		**<.0005**			**0.019**				
	O			**0.003**			0.843			
LSF	S	0.144			**0.028**			0.828		
	V		**<.0005**			**0.012**			0.949	
	O			**<.0005**			0.930			0.951

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