

# Aspects of Prosodic Phrasing in Turkish

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## Abstract

This pilot study investigates the prosodic marking of contrastive in-situ focus in monolingual Turkish. The results of the production study are based on a phonological and phonetic analysis of information structure modified target sentences. The prosodic analyses reveal (i) feature that derive properties of prosodic phrasing which are inherent to phrase languages [5]. It is shown that Turkish is a radical splitting language since each prosodic word ( $\omega$ ) [14] forms its own phonological phrase ( $\varphi$ ) [14] indicated by a high phrase tone (H-) aligned to  $\omega$ - final syllables. The language's preference for radical splitting of simple SOV sentences is maintained in information structure modified targets by one speakers group, but modified by another group in favor of wrapping adjacent given constituents into one  $\varphi$ . The analyses reveal (ii) that prosodic cues are not crucial to mark in-situ focus in Turkish, but they may be used to contextualize information structure. If focused constituents are marked at all by prosodic means they do not show an increased pitch like most Germanic languages, but focused constituents are aligned to prosodic boundaries. The data motivate the claim that prosodic alignment is an adequate way to describe the prosodic realization of focus in Turkish.

**Index Terms:** Turkish, focus, alignment

## 1. Introduction

Turkish is claimed to have two distinct focus marking strategies: syntactic movement and prosodic focus marking in-situ [2, 6, 9], i.e. when the focused constituent remains in the default word order. Previous studies on prosodic focus marking in Turkish describe focus in the original meaning of prominence as an increase of acoustic parameters and the modulation of pitch accents [10]. Correspondingly, different tunes are described for different information structural parts: e.g. H\*L- for focused and L\*H- for given constituents [15]. H-boundary tones are assumed for pre-nuclear phrases, and an H\* nuclear pitch accent is designated to align to the immediately pre-verbal position in syntactically un-marked sentences [11], as demonstrated in Figure 1.

Figure 1. *Broad focus intonation contour in SOV*

H-	H*	L- L%
(subject)xp	(object	verb)vp

All tones are usually aligned to the last syllable of a  $\omega$ , since Turkish word stress is final [12]. However, a recent acoustic analysis [8] reveals that Turkish shows no straightforward pitch accent modification of the focused constituent for in-situ focus. Despite the lack of pitch range expansion a change in

the f0 contour is observed for final and initial focus: A focused verb in SOV declaratives shows an *immediately pre-focal rise* on the preceding constituent and post-focal compression (PFC) is observed after initial focus.

Concerning the cross-linguistic realization of focus prominence, typological studies [1, 3] show that focus is not necessarily marked by an increase of acoustic parameters such as f0, duration and intensity, as in most Germanic languages. Focus can also be captured by means of prosodic alignment understood as the correspondence between the edge of a syntactic and/or phonological constituent and the focused part of a sentence [13, 15]. On the basis of mapping theory [16], [17] proposes WRAP which offers at least three strategies for mapping: (a) radical splitting where each syntactical phrase (xp) forms its own ( $\varphi$ ), (b) moderate wrapping where each xp forms its own  $\varphi$  and non-phrasal elements are wrapped with the closest phrase, and (c) radical wrapping where every element of the biggest xp gets wrapped into one  $\varphi$ . In the prominence theory of focus [17] focus needs to be maximally prominent which can be achieved by a modification of the phrasing structure, either by swapping of pitch accents or by the introduction and/or deletion of prosodic phrase boundaries. In focus as alignment theory [3] focus alignment may be obtained even in the absence of prominence.

This paper presents data that support the classification of Turkish as a phrase language [7] showing that high tones aligned to  $\omega$ - final syllables represent phrase boundaries. Furthermore, the optionality of prosodic marking of in-situ focus is demonstrated. A change in phrasing according to information structure states prosodic alignment as optional tool to mark focus in Turkish.

## 2. Hypotheses

With regard to previous acoustic measurements [8] which did not succeed in identifying pitch increase as a focus marker, but revealed a modification of f0 by means of PFC and *pre-focal pitch increase* two assumptions are examined in the pilot production study:

- High tones on word final syllables do not represent typical pitch accents aligned to word stressed syllables but are phrase delimiting boundary tones.
- In-situ focus is prosodically marked by a modification of the phrasing structure, i.e. focus is aligned to prosodic boundaries by means of boundary insertion/deletion.

In practice, the high tone (H\*) on nuclear constituents described by [11] was expected to be a further boundary tone in accordance to the pre-focal high tones (H-) observed by [11]. Since [8] describes a rise on (H\*) in the immediately pre-focal position it was expected to be the result of the introduction of a boundary tone and not an increased pitch accent aligned to a  $\omega$  stressed syllable. The previously

observed *immediately pre-focal rise* and PFC [8] were expected to be the results of boundary insertion and/or deletion to satisfy focus alignment.

### 3. Method

This production experiment is a modified replication of [8]. Both studies adopt the methodology of [18] to elicit in-situ focus on different constituents.

#### 3.1. Stimuli

Five target sentences with a simple SOV structure including an accusative object were designed. Each target contained the same number of comparable segments: a three syllabic subject, a four syllabic object, and a three syllabic verb. To elicit the introduction of boundary tones and the status of (H\*) vs (H-), only subjects and objects with non-final lexical word stress were considered to avoid that pitch accents and boundary tones would fall on the same segment. Each sentence was elicited as a contrastive focus condition, i.e. when the interpretation of a linguistic expression is limited to a set of contrasting alternatives. Targets were preceded by a question eliciting contrastive focus on either the subject, the object, or the verb. As a baseline, a broad focus condition was elicited for all targets. The contrastive constituent of the targets was always presented as the first alternative in the preceding questions. The elicitation of contrastive in-situ focus was furthermore supported by the focus sensitive question particle -mi attaching to the contrastively focused alternatives in the preceding questions. The morphological marker should help to avoid the triggering of a default reading prosody in the following answer and reduce errors concerning the focused constituent. Additionally, the focused items were presented with underlining to avoid prosodic pattern repetitions since the question-answer pairs were presented without fillers. In (1) a list of the target sentences is provided. In (2) the question-answer pairs are exemplarily provided for target sentence (a).

(1) *Target sentences.*

- (a) **Fahire Naci'sını seviyor.**  
Fahire Naci-POSS-ACC love-PRS(3SG)  
Fahire loves her Naci.
- (b) **Nasrettin babasını üzüyor.**  
Nasrettin father-POSS-ACC sadden-PRS(3SG)  
Nasrettin saddens his father.
- (c) **Macide kardeşini çiziyor.**  
Macide sibling-POSS-ACC draw-PRS(3SG)  
Macide draws her sibling.
- (d) **Nadide ablasını özlüyor.**  
Nadide sister-POSS-ACC miss-PRS(3SG)  
Nadide misses her sister.
- (e) **Yasemin aynacıyı dinliyor.**  
Yasemin mirror dealer-ACC listen-PRS(3SG)  
Yasemin listens to the mirror dealer.

(2) *Contrastive focus questions preceding target (a).*

- (broad) **Ne oluyor ?**  
What be-PRS(3SG)  
What happens?
- (subject) **Fahire mi Naci'sini seviyor, Meral mı?**  
Fahire Q Naci-POSS-ACC love-PRS(3SG) Meral Q  
Does Fahire love Naci or Meral?
- (object) **Fahire Naci'sini mi seviyor, polisi mi?**  
Fahire Naci-POSS-ACC Q love-PRS(3SG) police man Q  
Does Fahire love Naci or the police man?

- (verb) **Fahire Naci'sini seviyor mu, üzüyor mu?**  
Fahire Naci-POSS-ACC love-PRS(3SG) Q sadden-PRS(3SG) Q  
Does Naci love or sadden Naci?

Each pair of target sentence and preceding question was presented subsequently in its four focus conditions. No repetitions were made. 140 utterances were recorded: 7 speakers x 5 sentences x 4 foci.

#### 3.2. Subjects

Seven native Turkish speakers, four females and three males, from Ege Universitesi in Izmir participated in the experiment. At recording time they were aged between 20 and 27, had no previous specific linguistic knowledge and no speaking or hearing disabilities. All of them were monolingual speakers; most of them had some basic foreign language skills in a second language.

#### 3.3. Recording process

The data were recorded in a translation laboratory. The target sentences and preceding questions were presented on a power point slide. The subjects were asked to read out aloud first the question and subsequently the answer. The interviewer was a native Turkish speaker who was schooled to ask the participant to repeat the question-answer pairs in cases of discrepancies concerning the understanding of the task.

## 4. Analyses and results

#### 4.1. Phonologic analysis

A phonological annotation of 135 target sentences was done by the author and double checked by a native Turkish speaker. Five utterances had to be excluded from the analyses due to creaky voice, slip of the tongue or hesitation. The phonological annotation of the *f0* contour among the different focus conditions of the whole ip was done for each target sentence and speaker. All target sentences were manually segmented in Praat on the syllable level. Supra-segmental labeling basically follows [11], but is adapted and modified with respect to the features observed in the data using general ToBi labeling advices, since Turkish lacks a conventionalized annotation system. Special attention was paid to boundary tone insertion/ deletion under the changing foci.

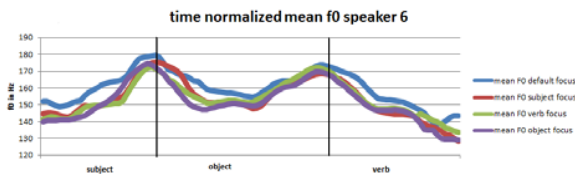
The descriptive phonological analysis revealed that all speakers of the production experiment implemented a high tone (H-) on the ultimate syllable of the subject and a further high tone (H-) on the following object in all broad focus and object focus sentences. In addition to the high tones on the last syllable of each non-final  $\omega$ , some speakers arbitrarily implemented pitch accents on the word stressed syllables of the lexically accented words. A low final boundary tone (L%) was aligned with the  $\omega$ -phrase final verb. Figure 2 demonstrates the broad focus intonation contour and phrasing of Turkish SOV declaratives for all speakers as observed in the data.

Figure 2. *Broad focus intonation contour in SOV*

(H*) H-	(H*) H-	L%
(subject) $\phi$	(object) $\phi$	(verb) $\phi$

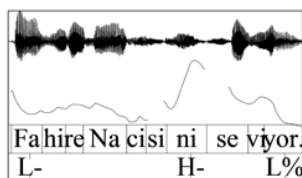
Concerning the tonal modification corresponding to different focus conditions, two groups were identified. For group A (speakers 1, 2, 3, 5, 6) the observed tonal implementation as shown in Figure 2 was not modified by information structure. Neither a categorical modification of the described high tones, nor the insertion or deletion of tonal boundaries was observed in the different focus conditions. Figure 3 displays the time normalized f0 of the realization of the four focus conditions of one male speaker averaged across all target sentences.

Figure 3. Mean f0 contour in four focus conditions.

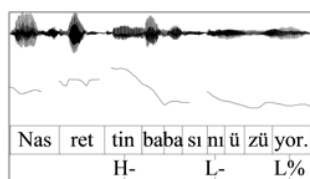


For group B (speakers 4 and 7) f0 modification was observed in different focus conditions. Like the remaining speakers they implemented a high tone (H-) on the rightmost syllable of each non-final *w*. For subject focus both speakers continued implementing H- on the subject, but deleted the following H- of the object. De-accentuation continued until the *t*-phrase final low boundary tone (L%). Speaker 7 used de-accentuation only in four of the five subject focus conditions. For verb focus they deleted or compressed the high tone on the subject, but implemented (H-) on the object. The verb was always aligned with (L%). Examples 1 and 2 show the modified f0 contour in verb and subject focus of group B.

Example 1. F0 of verb focus in target sentence (1).



Example 2. F0 of subject focus in target sentence (2).



### 4.2. Phonetic analysis

Due to the group dependent results of the phonological description, the analysis was amplified by a phonetic analysis. Maximum f0 of (H-) and break introduction were measured for each speaker and focus condition. Since group A showed no phonological modification of the f0 contour, it was tested, if the modification was phonetic in terms of a gradient

modification. The test concerned the question whether break introduction and/ or a gradient modification of (H-) indicate a change in phrasing by establishing prosodic boundaries to align focused constituents, as stated in the hypothesis. The phonetic analysis was done time-normalized by the introduction of 10 measure points per syllable using a general purpose PRAAT script Prosody Pro [19]. The script enables comparison across all target sentences, focus conditions, and speakers. Each sentence was corrected manually with respect to spurious pitch values.

In a first step, the maximum f0 values were averaged across the five target sentences and four focus conditions for each speaker. The mean maximum f0 values on the high tones of the subject and the object of each focus condition and sentence were compared with each speaker to test if the downstep relation refers to focus alignment in the sense of a change in phrasing indicated by a reset. A reset by means of tonal upstep was considered in the case that the high tone of the second constituent was higher than the high tone of the preceding constituent. The maximum f0 analysis showed speaker-dependent variation. Downstep on the second high tone was not implemented in 34 sentences. A correlation between focus and upstep was only found for the speakers of group A. For verb focus, the maximum f0 on the objects excelled the maximum f0 of the preceding subject in all target sentences for both speakers corresponding to the tonal deletion/ compression observed in the phonological analyses. Nonetheless, upstep was also observed in other focus conditions for both speakers. For the remaining speakers, no clear relation between upstepped high tones and focus conditions was found and the tonal values of subsequent constituents were rather arbitrarily implemented and not obligatorily following downstep. Table (1) summarizes the upsteps implemented by all speakers.

Table 1. Upsteps per speaker and focus condition.

Upsteps according to focus condition								
speaker	1	2	3	4	5	6	7	total
amount	7(18)	7(19)	0(20)	6(20)	3(19)	2(19)	9(20)	34 (135)
default	1	2	0	1	0	1	2	5
subject focus	2	2	0	0	0	0	1	4
object focus	0	1	0	0	1	1	1	3
verb focus	4	2	0	5	2	0	5	18

In a second step, all target sentences were tested concerning break implementation. The test concerned the question whether prosodic breaks may serve as an indicator for focus prominence and focus induced change in phrasing in the sense of pre-focal break introduction like in French [4]. Break introduction showed speaker dependent variation. Only speaker 4 used considerable breaks of around 0,05s. The other speakers rather showed a tendency to final lengthening. Speaker 3, 5, and 6 used none to one break. The breaks implemented by speakers 1, 2 and 7 were mainly used after the subject, mapping syntactical phrasing. Sometimes speaker 1 and 2 used additional breaks after the object. There was no straightforward implementation of the breaks after the subject and/ or object and no correlation to focus for speaker 1, 2 and 7. Speaker 4 implemented a break after the subject in all target sentences, unless in verb focus. In verb focus she used a pre-

focal break after the object and deleted the preceding break after the subject. Figure 4 shows how prosodic breaks assisted syntactic or prosodic phrasing in the data of this study.

Figure 4. *Prosodic break implementation*

Syntactic phrasing: (S)[break] (OV)  
 Prosodic phrasing: (S) [break] (O) [break] (V)

## 5. Discussion and conclusion

The phonological description and the phonetic analysis of information structurally modified target sentences only partly fulfill the initial hypotheses.

The analyses of broad focus sentences offer a new contribution for the general description of the tonal structure in Turkish. The data revealed that each non-final  $\omega$  in simple SOV sentences bears a high tone on the ultimate syllable. This high tone cannot be interpreted by means of general pitch accent implementation as in previous tonal descriptions, since it is not aligned to metrically strong syllables. The word stressed syllables were only additionally and arbitrarily aligned to less prominent pitch accents indicating that the prosodic structure in Turkish is primarily based on prosodic phrasing and less on the notion of pitch accents. From the present data the high tone on the last syllables of non-final constituents is interpreted as a high phrase tone (H-) aligned to the right boundary of each non-final  $\omega$ . Consequently, Turkish is interpreted as a phrase language. Its prosodic structure is characterized by radical splitting, where each constituent forms its own  $\varphi$  and the function of H- is interpreted as delimiting  $\varphi$  on a supposed  $\varphi$  level. The concept of phrase language established by [5] is extended here to the inclusion of pitch accents aligned to word stressed syllables (Figure 2).

The analyses of information structure modified sentences revealed two groups in the prosodic realization of focus in Turkish. The phonological annotation and the acoustic measurements of maximum  $f_0$  and break implementation showed that group A did not change the tonal implementation and prosodic phrasing structure as observed for broad focus. For group B the study revealed that speakers change the prosodic structure according to focus. Whereas in the broad focus condition the same  $f_0$  contour was observed as for group A, group B implemented (H-) on the subject for subject focus and deleted the following high phrase tone to its right, approving the observation of PFC by [8]. For verb focus, the pre-focal (H-) on the subject was deleted or compressed and only the high tone on the object was implemented. The observed tonal deletion/ compression shows a change in phrasing according which is interpreted as an indicator for the prosodic alignment of focus. In subject and verb focus the broad focus phrasing structure as observed in the study and characterized by radical splitting changes. The focused constituent is separately wrapped into its own  $\varphi$  whereas the remaining given constituents are radically wrapped into a one further  $\varphi$  as long as they are adjacent. For object focus radical splitting was also maintained for subject and verb by group B, since the given elements were not adjacent and the focused

constituent is claimed to be separately wrapped into an independent  $\varphi$ .

The variation of break implementation in the data show that prosodic breaks can be used for the individual organization of utterances on a supra-segmental level reflecting segmental and supra-segmental properties of the language. Hence, break implementation can assist phrasing, but has to be accompanied by tonal features to assist focus alignment and does not indicate focus on its own.

The acoustic analysis of maximum  $f_0$  on focused and un-focused subjects and objects revealed that a register change by means of upstep indicating a reset to establish a new  $\varphi$  is not related to information structure. Furthermore, the speaker-dependent variation in the data motivate the assumption that downstep is not systematic in Turkish.

Based on the group specific observations in the prosodic realization of contrastive in-situ focus in the present study it is assumed that prosodic focus marking in Turkish is optional. Turkish does not require a prosodic focus marking per se, but focused constituents are optionally aligned with prosodic boundaries. It is assumed that a preceding context which already sufficiently identifies the focused constituent overrides the need for a prosodic focus marking. Nonetheless, a prosodic representation of information structure was observed in the pilot, which can successfully be described by prosodic alignment. I thus interpret the results suggesting that Turkish can be classified as a boundary language in the framework of focus typology, and as a phrase language such as Hindi or French [4, 5] in the notions of general language classification. Figure 5 summarizes the general phrasing structure in Turkish as observed in the data and its modification according to the contrastive focus condition.

Figure 5. *Prosodic alignment in Turkish.*

Broad/object focus phrasing: (S) $\varphi$  (O<sub>(F)</sub>) $\varphi$  (V) $\varphi$ .  
 Subject focus phrasing: (S<sub>(F)</sub>) $\varphi$ (OV) $\varphi$ .  
 Verb focus phrasing: (SO) $\varphi$ (V<sub>(F)</sub>) $\varphi$ .

Concluding, certain limitations concerning the data interpretation have to be made: (i) the alignment approach is based on the observations of a small data set and needs to be confirmed on the bases of more data. (ii) The observed phrasing structure is based on an analysis of simple SOV declaratives. Further research on more complex syntactic representations has to be done to confirm the implementation of the supposed phrase delimiting high tones. (iii) In order to access the reliability of the production data and the resulting claim of focus alignment, a perception test is necessary.

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