Limits of Prosody in Turkish[1]

ABSTRACT

This paper claims that certain syntactic structures and information structural content are not always directly encoded in the prosodic representation of Turkish utterances. That syntax is mirrored rather limitedly in prosody is observed in isolated parentheticals which are prosodically realized identically to syntactically integrated constituents such as subjects and objects. That information structure has a limited effect on F0 variation is evidenced in utterances containing multiple foci; they display the same F0 pattern as all-new utterances or utterances with narrow focus. Thus, neither the informative status (topic/focus/neutral) nor the syntactic status (sentential/extra-sentential) of a constituent licenses a pre-specified phonetic correlate for focus and topic in Turkish. To explain the relationship between information structure and prosody in Turkish, one requires an account that appeals to the alignment of relevant items to certain prosodic positions at the level of the Phonological Phrase. In this article, general characteristics of the prosodic units within a Turkish Intonation Phrase are described. An information structure-free inventory of a Turkish Intonation Phrase is developed. This study concludes that what intonation languages such as English and German convey with pitch-accent placement is conveyed through prosodic phrasing strategies and boundary tone placement in Turkish, which is a characteristic of 'phrase languages'.

[1] For valuable comments, I am indebted to Mark de Vries, James Griffiths, Aslı Göksel, Hubert Truckenbrodt, Caroline Féry, and Barış Kabak. Any errors are my own. This work was conducted as part of the research project Incomplete Parenthesis, financially supported by the European Research Council.

Keywords: prosody-syntax mapping, information structure, Turkish, prosodic phrasing

Türkçe'de Bürünsel Yapının Sınırları

ÖZET

Bu makale Türkçe'de tümcenin bilgi yapısı ile belli sözdizim özelliklerinin tümce ezgi yapısında doğrudan temsil edilmediğini öne sürmektedir. Sözdizim özelliklerinin sınırlı temsil edildiği sonucu, sözdizimsel olarak tümceden bağımsız olan parantez yapılarının ezgisel olarak tümcenin diğer ögeleri gibi genel ezgi yapısıyla bütünleşik olduğu gözlemine dayandırılmıştır. Bilgi yapısı özelliklerinin sınırlı temsil edildiği ise, çift odaklı tümcelerin ezgisel yapılanmalarının, tek odaklı tümceler ve tümü odaklı tümcelerden (örnek; 'ne oldu?' sorusuna cevap olacak tümceler) farklı olmadığı gözlemine dayandırılmıştır. Bir başka deyişle, Türkçe'de, konu/odak yapısının tümce ezgisinde, atanmış/önceden belirlenmiş tonların kullanımıyla degil, bürünsel öbekleme ile yansıtıldığı sonucuna varılmıştır. Bu açıdan, ne tümce ögelerinin bilgi durumları (konu belirten nesneler, tek odak belirten nesneler, çift odak belirten nesneler, tümü-yeni tümceler), ne de sözdizimsel özellikleri (tümce içi / tümce dışı) bürün yapılanmasıyla bağdaştırılabilir. Aksine, bürün yapısındaki öbeklemenin bahsedilen özelliklerden bağımsız olduğu görülmüştür. Türkçe'de, bilgi yapısı ve bürün yapısı arasındaki etkileşim, atanmış tonlarla değil, zaten var olan bürünsel öğelerin, bilgi yapısal öbeklerle eşleştirilmesiyle gerçekleşir. Bu çalışmada, tümcenin genel bürün yapısının özellikleri tartışılarak, bilgi yapısından bağımsız incelenebilecek bir bürün yapısı tanımlanmıştır. Sonuç olarak, vurgulu dillerin ezgide tonlama ve vurgulama ile işaretlediklerinin, Türkçe'de bürünsel öbekleme ve sınır

tonlarının düzenlenmesi ile işaretlendiği görülmüştür, ki bu bürünsel ‘öbek dillerinin’ belirgin bir özelligi olarak değerlendirilir.

Anahtar sözcükler: bürün-sözdizim eşlemesi, bilgi yapısı, Türkçe, bürünsel öbekleme

1. Introduction

While the prosodic correlates of syntactic and information-structural input are considered to be the sole basis for the structuring of prosodic events (section 2), to what degree these inputs constrain the prosodic representation has been argued to vary across languages (cf. Ladd 1996, Féry 2010, Selkirk 2009, Elfner 2012, Jun 2005, *i.a.*).

Turkish has been assumed to be among the languages that exhibit a high degree of correlation between syntactic and information structural input and their prosodic patterns in an utterance (İşsever 2003, Göksel and Özsoy 2000, 2003, Özge 2003, Özge and Bozşahin 2010, *i.a.*). Utilizing novel data, this study questions the validity of this assumption.

The observations provided in the current paper show that Turkish prosody mirrors the syntax and information structure to a lower degree of faithfulness than it has been assumed before. The findings of the paper indicate that in addition to syntax and information structure oriented constraints, prosody-oriented constraints should also be taken into account. In fact, it will be argued that prosodic constraints may overweigh the others in the formation and organization of prosodic structures.

The paper is organized as follows: section 2 provides background on the prosodic theory. Section 3 provides a description of the word and sentence level prosody of Turkish. Specifically, section 3.3 illustrates that syntactic isolation does not trigger prosodic isolation. Section 4 provides a novel analysis of focus and topic intonation in Turkish. With further phonetic/phonological

evidence from double focus constructions, the restriction on the prosodic representation of information structure in Turkish is highlighted. Section 5 presents an information structure-free description of intonation pattern of Turkish declaratives. Section 6 concludes.

2. Background

Information structural and syntactic properties of utterances shape the intonational pattern of these utterances (Wagner and Watson 2010, and the references therein).

How prosody mirrors syntax has been the subject of several theories of syntax-prosody mapping, such as the recent Match theory (Selkirk 2009). The Match theory of the syntax-prosodic structure interface requires that a clause, phrase and word in syntactic constituent structure must be matched in phonological representation by a constituent of the corresponding prosodic types; ι, Φ and ω, respectively.

In information structure-neutral environments, mapping ensures that syntactic constituency has a prosodic correlate: namely, prosodic constituency. In particular, the edges of syntactic constituents are matched to the edges of prosodic constituents.

In the Autosegmental-Metrical Model of Intonational Phonology (AM) (cf. Pierrehumbert 1980, Pierrehumbert and Beckman 1988, Pierrehumbert and Hirschberg 1990, *i.a.*), prosodic constituents are identified with reference to certain F0 events, such as the insertion of corresponding boundary tones (e.g. T- for Φ, T% for ι), the use of lexical/post-lexical pitch accents (T*), and/or the presence of down-step on the F0 (!T). Like syntax, prosodic constituency is compositional and hierarchical. As Selkirk (2009) puts it, "the *prosodic hierarchy* is the name for an ordered set of prosodic category types".

(1) Hierarchy of prosodic category types (Selkirk 2009)

Utterance (υ)
|
Intonational Phrase (ι)
|
Phonological Phrase (Φ)
|
Prosodic Word (ω)

For Turkish, among these category types, one level is defined in between ι and ω; the Φ (Kan 2009, Kabak and Revithiodou 2009, Kamali 2011).[2]

In addition to the syntactically motivated F0 variation, information structural units trigger F0 variation (i.e. pitch expansion, tone insertion, etc.) in many languages (Bolinger 1958, Jackendoff 1972, Féry 1993, Selkirk 1995, Büring 1997, Erteschik-Shir 1997, among others). In *intonation languages* such as English and German, F0 events are understood as the phonetic ramification of information structure. Studies on intonation languages state that discourse-new constituents as well as contrastively focused items are accented (Selkirk 1995). The focus accent is aligned with the accented syllable of the focused constituent.[3] Conversely, discourse-old constituents are de-accented (Féry and Samek-Lodovici 2006).

Note that the studies cited above endorse the possibility that the prosodic representation may sometimes **not** exhibit one-to-one correspondence with syntax / information structure-oriented

[2] Note that *Clitic Group* has been argued to exist between the Phonological Phrase and Prosodic Word (Nespor and Vogel 1986, Kabak and Vogel 2001). Yet, this level refers to the representation of compounds, and the prosodic representation of compounds is tangential to the purpose of this article. Therefore, I will not refer to the Clitic Group in the remainder of the paper.

[3] *Accented syllable/pitch accent* refers to the prosodically prominent syllable of a Prosodic Word, which is marked via F0 excursion. *Stress* is referred to as a lexical notion at the level of Prosodic Word, which is marked via cues other than F0; i.e. vowel quality, intensity variation and duration. Accented syllable/pitch accent contributes to the overall make-up of the intonation contour of an utterance, whereas stress is the correlate of the perceived prominence.

constraints. In such cases, the degree of prosodic isomorphism is related to the degree of interaction between the prosody-oriented constraints and the syntax / information structure-oriented ones; e.g. StrongStart, as a prosodic constraint, is preferred over a syntactic constraint, MatchPhrase, in Conamara Irish (Elfner 2012). Additionally, recent research suggests that those languages that rank prosodic constraints over the syntactic and information structural ones should be treated separately. Accordingly, Féry (2010) distinguishes the languages that exhibit prosodic patterns isomorphic to the syntactic structures – and which also reflect the information structural input – from those languages that do not do so. In contrast to the former case, (i.e. intonation languages), the languages that belong to the latter group (i.e. *phrase languages* (ibid.), which are also called *head-edge languages* by Jun 2012) typically shape their Intonation Phrases with the use of phrasal boundary tones and head-non-head distinction within the phonological phrases. Indian languages such as Hindi, Bengali, Tamil and Malayalam (Féry 2010), as well as Korean (Jun 2012), West Greenlandic (Arnhold 2012), Kammu (Karlsson et al. 2012) and Mongolian (Karlsson to appear) are phrase languages.

The melodic properties of Turkish sentences are traditionally assumed to be mediated by information structure, just as in intonation languages. However, this study provides evidence against this assumption.

3. Turkish

3.1. The Prosodic Word in Turkish

Turkish words were traditionally assumed to display "regular" word-final stress, where the lexical stress falls on the final syllable of the word.[4] Under this assumption, lexical stress is equated with the

[4] See Lewis 1967, Sezer 1981, van der Hulst and van de Weijer 1991, Inkelas and Orgun 1998, Kabak and Vogel 2001, Göksel and Kerslake 2005, among others.

perceptually prominent syllable in a word. This assumption is maintained without supporting metrical evidence. (2) illustrates the traditional representation of a perceived stress pattern in a list of words without irregular stress (where stress is marked with ‘ʹ’).

(2)	[*év*]	house	‘house’
	[*ev-lér*]	house-PL	‘houses’
	[*ev-ler-ín*]	house-PL-2ND.SG.POSS	‘your houses’

There is also a class of words that bear non-final stress; this class is considered to be “irregularly-stressed”. In irregularly-stressed words, stress is assigned according to the presence of lexically stressed/pre-stressing syllables or due to the use of a lexically stressed root, such as in those words known as *Sezer’s roots*.[5] The instrumental studies that compare the metrical properties of the “final” and “non-final” stress in Turkish agree that F0 variation is the primary correlate of lexical prominence in Turkish (Konrot 1981, Fukumori 2004, Levi 2005). These studies also note the difference between the realization of final and non-final prominence. Konrot (1981) observes that, while the F0 peak attaches to the stressed syllable, it does so only in the cases of non-final prominence. In addition to F0, Levi (2005) observes that duration and intensity are also correlates of stressed syllables. However, she also points out that these cues are not robust as correlates of final stress. Contra to Levi (2005), Öztürk (2005) observes that the mean vowel and syllable duration of lexically *stressed* and *un-stressed* syllables show no significant variation. In summary, metrical analyses of the correlates of final and non-final stress in Turkish confirm that (i) the acoustic correlates of final stress are different from those of non-final stress, and (ii) only non-final stress triggers an F0 peak. Considering that F0 is suggested to be the correlate of *stress* in Turkish, Konrot (1981) advances a distinction

[5] Lewis 1967, Sezer 1981, *i.a.* Notice that in the works cited so far, the notion of *stress* is not used in the sense that it is used in the remainder of the current paper. These works refer to stress as the perceptually prominent syllable of a word, without distinguishing it from *pitch accent.*

between (i) *pitch accent* and (ii) *stress accent* in Turkish. Accordingly, a final syllable has *stress accent* but not *pitch accent*. Therefore, the F0 in finally stressed words is realized as a plateau in the pitch contour. In cases of non-final stress, the stressed syllable takes a coexisting pitch accent, which creates a rise-fall pattern in the F0. The observation that stress does not have F0 as its primary correlate, whereas accent does, has previously been postulated (cf. Van Der Hulst 2001, among many others). Following from these studies and Konrot's postulation, I refer to the words that bear an F0 peak on their stressed syllables as lexically *accented* words (notated by a binary tone, i.e. H*L), and those that do not bear an F0 excursion on the syllables that are perceived as bearing final-stress as *accentless* words.[6] The pitch plots presented in figure 1 illustrate the case of an *accented* and *accentless* word in Turkish.

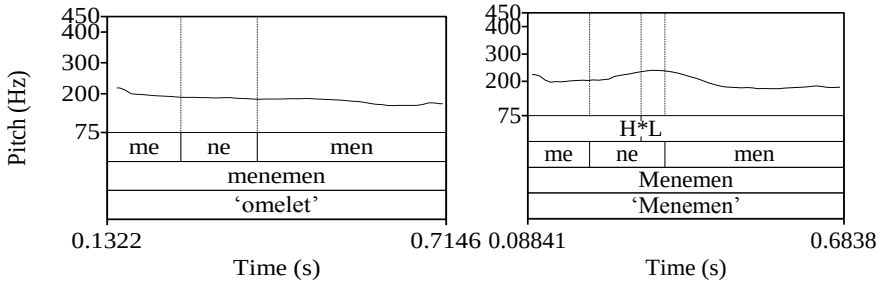


Figure 1. Pitch contour of an accentless (left) and an accented (right) word

[6] An anonymous reviewer points out that duration and intensity should not be completely dismissed in the discussion of lexical stress. I agree with this comment: for languages such as Dutch and English, duration, glottal parameters, and vowel quality are the primary correlates of *stress*, and F0 variation is a cue to mark *accent*. However, if the so-called "stress" that falls on final and non-final syllables in Turkish is of the same type, and if duration and intensity, as well as F0, is the primary correlate to mark *stress* in Turkish (and not *accent*), then each of these cues should have been consistently observed as correlates of Turkish "stress" in the studies cited in the main text. Bearing in mind the designated distribution of F0 peaks (i.e. only in the cases of non-final stress) in Turkish, I consider F0 as the primary correlate of the *lexically accented syllable* and **not** stress. Therefore, stress is not discussed further in the current study.

Both of the recordings of the plots presented in the figure were elicited in isolation, i.e. not as part of a sentence or a fragment answer. The accentless word (left) was read aloud after the following prompt was introduced: "Please say out loud the *food name* that is written here." The accented word (right) was read out after the following prompt was introduced: "Please say out loud the *town name* that is written here." Since place names bear lexical accent (cf. Sezer's roots), the non-final stress disambiguates the word as a proper name, and it is accompanied by a coexisting pitch accent that falls on the non-finally stressed syllable.

Similar to the distinction posed here, Kamali (2011), argues that the finally-stressed words are *accentless*; and it is the irregularly-stressed words that bear the only lexical accent. However, she refers to pitch accent as the overall marker of word level prominence, and does not discuss the existence of stress in cases of accentlessness.

I adopt the view that there are accentless words in Turkish. My analysis diverges from Kamali's account, in that I assume (i) all words bear stress (final or non-final), (ii) pitch accent is an intonational cue that may or may not co-exist with the stressed syllable, and (iii) final stress marks the right edge boundary of ωs.[7]

3.2. The Phonological Phrase in Turkish

In the AM Model, there are two kinds of edge marking tones that represent the intonation pattern of utterances above the level of ω; (i) Φ-level *phrase accent* (T-) (hereafter *edge tone*), and (ii) ι-level *boundary tone* (T%) (hereafter *ι-level boundary tone*). In contrast to lexical pitch accents, which attach to stressed syllables, Φ-level edge tones and ι-level boundary tones do not necessarily fall onto the stressed syllable.

[7] Another property of Turkish ωs is that they can exhibit recursivity. See Kabak and Revithiadou (2009) for a discussion of recursive Phonological Words (i.e. $[[X^0]_\omega\ [X^0]_\omega]_\omega$) in cases of noun-incorporation and compounds.

Φ is a domain that is envisaged for Turkish (Kabak and Vogel 2001, Kabak and Revithiodou 2009, Kan 2009, Kamali 2011). Kabak and Vogel (2001), the first study that depicts a level higher than ω in terms of Prosodic Structure Theory (cf. Selkirk 1986, *et seq*., Nespor and Vogel 1986, *i.a.*), portray the Φ-level as embodying phrase level stress (in my terms, *head prominence*). Kabak and Vogel (ibid.) observe that head prominence falls on the leftmost ω of a Φ.[8] The directionality of head prominence, being specific to Φ-level constituent formation, is considered as a diagnostic for the Φ in Turkish. In the consequent studies, additionally Φs are observed to bear phrase accents/edge tones that delimit one Φ from another (Özge and Bozşahin 2010, Kamali 2011). Özge and Bozşahin (2010) postulate H-, and L- as right edge tones – H- falling on Φs in pre-focal area, and L- falling on Φs in the area immediately before the right edge of the ι-level boundary tone (L-L%). Kamali (2011), on the other hand, postulates L- for the left edges of Φs (in all Φs) and H- for the right edges of Φs (only in pre-nuclear Φs) in Turkish.

In terms of the alignment of edge tones with lexically stressed and/or accented syllables, Özge and Bozşahin (2010) refer only to the cases of H- edge tones and, remaining ambivalent, state that it is not clear whether H- is part of the pitch accent or an independent boundary event. Kamali (2011) considers a right edge H- as a property of pre-nuclear Φs, and states that "in the pre-nuclear position, finally stressed words do not realize word accent in wide focus sentences" (Kamali 2011:85). She supports her argument, drawing attention to those cases in which the final rise and the lexical stress do not overlap; i.e. cases of non-finally accented words occurring in the pre-nuclear Φ position. Consider the figure below:

[8] Note that they associate the head prominence with only the finally stressed syllable of the leftmost ω. By instrumental analysis, Kamali (2011) observes that the overall pitch level of head ω is relatively higher than the overall pitch level of the non-head ω (this is called *relative leveling of pitch register*). The high-leveled pitch register aligned with the heads of Φs is observed in my data as well.

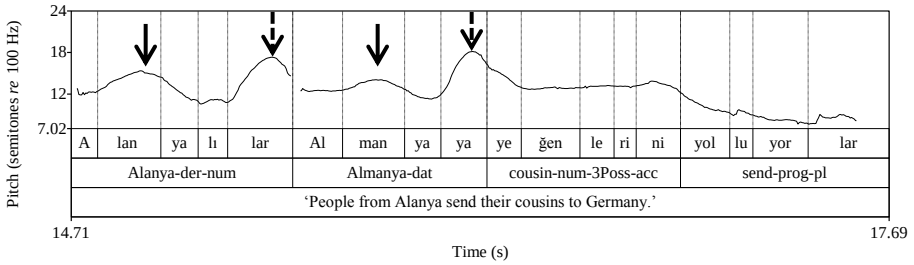


Figure 2. Pitch contour of an utterance with accented words in pre-nuclear area

The utterance plotted in figure 2 illustrates a case of lexically accented words occurring in the pre-focal/nuclear area. The utterance was elicited as an answer to "who do the people from Alanya send to Germany?", in which case the direct object is the focus (hence, the nucleus) and the subject and indirect object are the constituents that precede the focus. The solid arrows point to the non-final lexical accents and the dashed arrows point to the Φ-edge pre-nuclear rise.

Compare figure 2 to the figure 3 below, where the two pre-nuclear Φs are words that bear final stress, yet no lexical accent:[9]

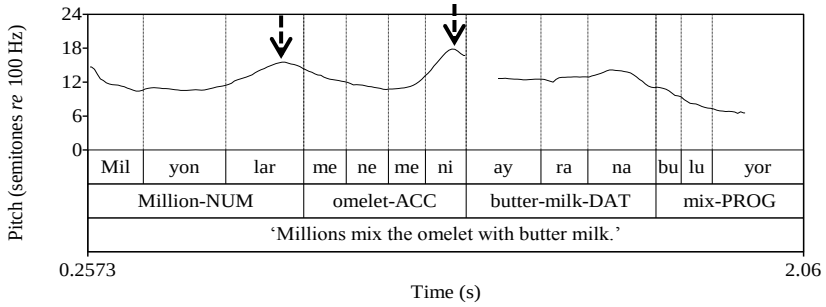


Figure 3. Pitch contour of an utterance in indirect object-new context, with accentless words in pre-nuclear area

[9] Both of the utterances that are plotted in figures 2 and 3 were elicited for another experiment.

The utterance plotted in figure 3 illustrates a case of finally stressed yet accentless words occurring in the pre-nuclear area. The utterance is elicited as an answer to "what do the millions (of people) mix the omelet with?", in which case the indirect object is the focus (hence the nucleus) and the subject and the direct object are the constituents that linearly precede the focus. The arrows point to the Φ-edge pre-nuclear rise.

Whether or not they contain non-finally stressed (and accented) or finally stressed ωs, all single-worded Φs exhibit a rising F0 on the right edge in the pre-nuclear area. Therefore, I consider this pattern as a boundary marking phenomenon and refer to it as an *edge tone* (a phrase accent that does not necessarily fall onto the stressed syllable), 'H-'. In the case of final stress, the edge tone will co-exist with the finally stressed syllable, and in the case of non-final stress, the edge tone will be realized independent of the stressed syllable.

3.2. Intonational Phrase in Turkish declaratives

The current study uses boundary tone placement and head prominence as diagnoses for the identification of the prosodic category types of the different levels in the prosodic hierarchy, as these cues are consistent and therefore reliable phonological cues for the identification of ιs and Φs.[10]

For annotation, the boundary tones suggested by Kamali (2011) are adopted here with some modifications. Specifically, she proposes a L- associated with the left edges of all Φ-level constituents in addition to a H- tone for the right edges of what she calls *pre-nuclear Φs* (Kamali, 2011:82) (i.e. Φs that precede the nucleus). Following Kamali (2011), I consider H- as an edge tone which marks the right edges of Φ-level in the non-final-Φ area, since H- is observed on the right edges of all constituents in the non-final-Φ area. Unlike

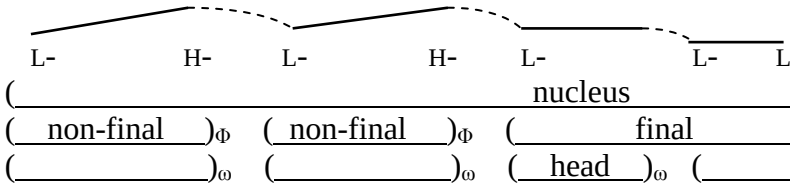
[10] Kan (2009) suggests four cues that identify the difference between ιs and Φs: (i) language-specific boundary tones, (ii) linguistic pauses (iii), head prominence, and (iv) final lengthening.

Kamali, I consider L- as a ω-level left edge tone since it is observed on the left edges of all ωs in the final and non-final-Φ areas.[11]

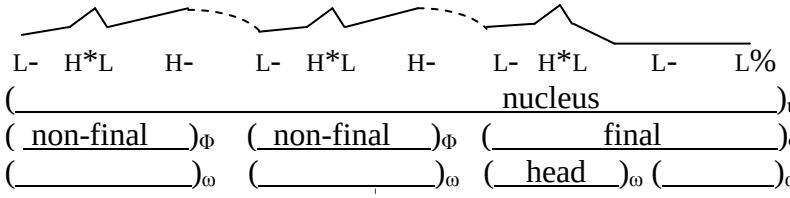
As noted, the H- is the boundary tone reserved for non-final-Φs. Final-Φ is the area that contains the nucleus. I define the nucleus as the perceptibly prominent part of the ι of a declarative clause, since all ιs must bear a marked unit that is more prominent than the rest (cf. Ladd 1996, among others). Within the final-Φ, nucleus is always parsed as the head. Any ω within a final-Φ does not bear a H- and is marked only by a left edge ω-level tone, which is L-.

The intonational structure of Turkish declarative root clauses with accented (4) and accentless (3) ωs are illustrated below.

(3) The ι of Turkish declarative root clauses with accentless ωs:



(4) The ι of Turkish declarative root clauses with accented ωs:



[11] Notice that unlike in Kamali (2011), the final-Φ is not recursive in my analysis. It is composed of one ω or a combination of more ωs, the head of which is the leftmost ω. Within the Φs that contain more than one ω, the head/non-head distinction is conveyed through the relative pitch register difference; i.e. the leftmost ω, being the head, bears a high level pitch register, whereas the remainder, comprising the non-head, always exhibits a low pitch register. The Φ that contains two ωs in my notation resembles the Phonological Phrase described in Kabak and Revithiodou (2009).

As (3) and (4) show, the tonal variation of constituents is highly dependent upon their position. Namely, a nucleus (the prominent part of a root clause) is a reference point by which the rest is defined. Any constituent that occurs to the left of the nucleus (pre-nucleus) bears a rising terminal (with an optional lexical accent) and any constituent that occurs to the right of the nucleus (post-nucleus) shows a leveled pitch contour.[12] Note that the nucleus in Turkish does not bear a designated pitch accent, i.e. H*. Furthermore, while in cases of lexically accent words the nucleus bears an F0 peak (4), in cases of accentless words there is no F0 expansion on the nucleus (3). This shows that the F0 peak of the nucleus in (4) is due to the lexical pitch accent, H*L, and should not be considered as a post-lexical F0 event that is due to the marking of sentence prominence or focal prominence. Kamali (2011) observes that the nucleus in Turkish exhibits a plateau contour which is higher than the following post-focal area (in my terms, higher than the non-head part of the final-Φ). A similar pattern is also observed by İpek (2011).[13] Hereafter, I refer to the Φ that contains the nucleus as the *final-Φ* and all the Φs that linearly precede the nucleus as *non-final-Φs*. The only difference between non-final-Φs and final-Φs is that final-Φs do not bear H- on their right edge. The head of an ι is aligned with the rightmost Φ in Turkish (Kan 2009). Therefore, the winning candidate for the nucleus of the ι is the head in the final-Φ.

Figure 4 provides an exemplary declarative root clause that was uttered in an all-new context with SOV order.

(5) *Nevriye yeğen -i -ne yağmurluğ-u -nu ver-iyor.*
N. cousin-3SG.POSS-DAT raincoat-3SG.POSS-ACC give- PROG
'Nevriye is giving her raincoat to her cousin.'

[12] To my knowledge, Kamali (2011) is the first study to document this positional dichotomy in the tonal properties of prosodic constituents.

[13] The arguments in Kamali (2011) are based on canonically ordered (SOV) root clauses in all-new context. However, İpek (2011) observes the same kind of representation (although not stated explicitly) in root clauses with different information structural conditions.

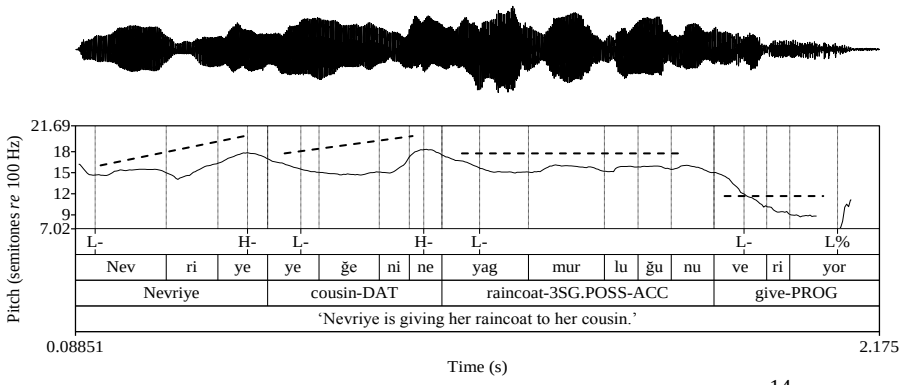


Figure 4. Pitch contour of an all-new declarative root clause[14]

In figure 4, all the words in the utterance are accentless. The sentence-initial subject *Nevriye* and the indirect object *yeğenine* 'to her cousin' are parsed as non-final-Φs. The final-Φ ends the sentence and is composed of the direct object and the verb. The non-final-Φs bear rising intonation that comprises a low left boundary (L-) and a high right edge boundary (H-). The pitch register remains the same in the transmission from the non-final-Φ to the final-Φ (the pitch interval is between 240-300 Hz.). The final-Φ begins with a low left boundary tone (L-). The pitch level remains constant until the end of the first ω within the final-Φ. The second ω of the final-Φ (the verb *veriyor* 'is giving') begins with a low left boundary (L-), the level of which is scaled relatively lower than the first ω in the final-Φ. The plateau in the final-Φ is the nucleus. Moreover, figure 4 shows that an ι of an all-new utterance in Turkish has a nucleus.[15] Note that there is no F0 expansion aligned with the object, and the only tone that is visible on the object is a left boundary tone.

In the remainder of this paper, clauses with accentless words are described. Therefore the template presented in (3) is adopted.

[14] The utterance in figure 4 was elicited in an identical manner as the ones in figures 2 and 3.

[15] This is discussed in section 5.

4. The limits of intonation in Turkish

In what follows, a detailed exposition of the limited prosodic representation of information structure and syntactic constituency in Turkish utterances will be provided. Section 4.1 examines the limited effect of syntax on the structure of the ι-level. Section 4.2 shows that information structure is not reflected in sentence-level Turkish prosody in the same manner as in intonation languages.

4.1. Syntax-prosody mapping

In contrast to the syntax-prosody mapping theories, not all languages seem to employ the mapping mechanism as faithfully as the intonation languages do. Féry (2010) argues that the mapping observed in intonation languages is very limited in the phrase languages. I claim that Turkish displays limited syntax-prosody mapping transparency. This claim is based on the observation that some parenthetical clauses, which are typically analyzed as isolated forms, are not prosodically isolated in Turkish.

4.1.1. Prosody of some parentheticals

Parenthetical insertions do not belong to the syntactic core of a sentence, yet they are perceived as a part of that sentence (cf. Potts 2005). (6) lists some parenthetical structures (cf. De Vries, 2007):

(6) Non-restrictive relative clauses, nominal appositions, comment clauses, interjections, tag questions, vocatives, and dislocated phrases.

According to theories of syntax-prosody mapping, parentheticals such as those listed in (6) are parsed as ιs. They are mapped as ιs for two reasons: (i) parentheticals which are syntactic clauses are parsed as ιs since clauses are matched as ιs, and (ii) parentheticals are extra-sentential insertions, and syntactically isolated structures are parsed

as ɪs (cf. Selkirk 1986, Nespor and Vogel 1986, Bolinger 1989, Truckenbrodt 1995, among others).[16] The presence of any ɪ-level cues aligned with a parenthetical (or with its edges and the contour surrounding it) indicates its *prosodic isolation* (ɪ-level parsing). Conversely, the absence of any ɪ-level cues or the existence of any non-ɪ-level cues (i.e. Φ-level cues) aligned with a parenthetical's edges indicates its *prosodic integration*. The cues which help identify whether the prosodic contour of a parenthetical constitutes an ɪ or not fall into two groups: (i) general cues for ɪ-hood (i.e. bearing a nucleus, pre-boundary lengthening, language-specific ɪ-boundary tones, pitch reset after the ɪ) and (ii) cues that are observed only in cases of parentheticals (i.e. lowered pitch level, compressed pitch span, diminished loudness, faster speech rate).[17]

Güneş (2012) investigates whether parentheticals displayed prosodic integration or isolation. If they exhibited prosodic isolation, the conclusion would be that Turkish prosody transparently reflects syntax-prosody mapping. If they did not exhibit isolation, then there must be certain non-syntactic constraints govern prosodic domain-formation.

The experiment was conducted with 7 native speakers of standard Turkish. The phonetic and phonological features of a clausal parenthetical (*yanılmıyorsam* 'if I am not mistaken') and a mitigative adverbial parenthetical (*bence* 'for me' or 'I think', henceforth 'I think') were examined in three positions: sentence-initial (pre-nuclear) (7), sentence-medial (pre-nuclear or post-

[16] In addition to their syntactic isolation, parentheticals may also be pragmatically isolated (cf. Dehé and Kavalova 2007). For instance, vocatives are more pragmatically isolated than comment clauses, since the former does not refer to the propositional content of the host clause, whereas the latter provides a speaker's comment about the utterance denoted by the host clause. Interjections (e.g. "Some birds – *why don't you take a seat* – migrate to warmer areas.") are the most isolated of the parenthetical structure listed above, since they bear no relation to the semantic/pragmatic content of the clause that hosts them. The parentheticals that are analyzed in the current paper are those that are pragmatically related to their hosts. Prosodic integration/isolation of pragmatically isolated parentheticals is an interesting topic, but one that requires future investigation.

[17] Cf. Dehé and Kavalova (2007) for the cues of isolation.

nuclear) (8), and sentence-final and post-nuclear (9). Furthermore, different word-order and informational structural configurations were tested.[18]

(7) *(sentence-initial)*
Yanıl-m-ıyor-sa-m /Ben-ce Yumak mama-yı ye-di.
mistake-NEG-PROG-COND-1SG/1SG-ADV Y. food-ACC eat-PAST
'If I am not wrong/I think, Yumak ate the food.'

(8) *(sentence-medial)*
Yumak yanıl-m-ıyor-sa-m / ben-ce mama-yı ye-di
Y. mistake-NEG-PROG-COND-1SG/1SG-ADV food-ACC eat-PAST
'Yumak, if I am not wrong/I think, ate the food.'

(9) *(sentence-final)*
Yumak mama-yı ye-di yanıl-m-ıyor-sa-m. /ben-ce.
Y. food-ACC eat-PAST mistake-NEG-PROG-COND-1SG /1SG-ADV
'Yumak ate the food, if I am not wrong/I think.'

Figure 5 illustrates a sentence-initial clausal parenthetical.

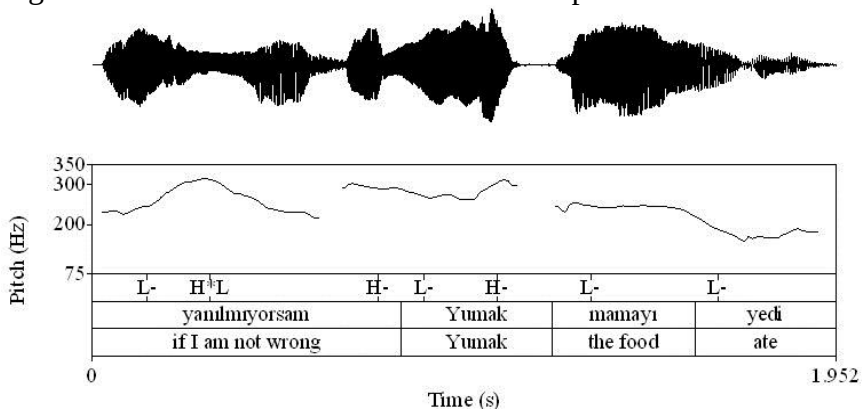


Figure 5. Pitch contour of the clausal parenthetical in pre-nuclear position in all-new context

[18] Utterances in all-new, S-new and O-new contexts: 44 sentences x 7 speakers = 308

Figure 5 illustrates a pitch track of a parenthetical within a SOV sentence in an all-new context. The object, *mamayı* 'the food' in the immediately preverbal position is the nucleus. The subject, *Yumak*, precedes the nucleus and bears pre-nuclear rise (a left boundary 'L-' followed by a right edge boundary 'H-'). The verb, *yedi* 'ate', exhibits a low-leveled ω-boundary tone on its left edge (L-), which fits the description of a post-nuclear leveling. Figure 5 shows that a sentence-initial parenthetical exhibits a rise that begins with a L- tone and proceeds to a H- terminal. This rise is interrupted by a lexical accent (H*L) that is triggered by the lexically pre-accenting negation morpheme *–mA*. Note that the post-lexical rise aligned with the parenthetical is the same F0 event that is observed on the pre-nuclear subject. The tonal inventory indicates that there are three Φs in this sentence: two pre-nuclei non-final-Φs (the parenthetical and the subject), and a final-Φ composed of the nucleus and a post-nuclear item. These three Φs are also evidenced by the relative scaling of the observed pitch registers. Specifically, the level of the two pre-nuclei Φs and the nucleus are scaled to the same level of pitch interval. Moreover, the post-nuclear verb bears a lowered level left boundary tone, which is typical for post-nuclear constituents (Ladd 1996, Truckenbrodt 1995, Göksel and Özsoy 2003, and Özge and Bozşahin 2010).

ι-level properties and/or other prosodic cues that are only employed in cases of parenthetical isolation were also examined. Given that every ι obligatorily bears a nucleus, and a Turkish nucleus (just as any other ω) is marked by a left boundary tone L-, one may consider the sentence-initial parenthetical as a nucleus which is isolated from the rest of the host clause. Yet, close examination reveals that, just as with any nucleus in Turkish, pre-nuclear items – in fact all ωs – display a L- boundary tone to their left. What differentiates a nucleus from a pre-nuclear item is the boundary tone on the right-end of the Φ: H-. As seen in figure 5, the sentence-initial parenthetical bears a pre-nuclear rise on its right-edge rather than a

high leveled nuclear plateau. In this respect, the initial parenthetical does not display the hallmarks of a root-clause ι; instead, it bears the hallmarks of a sub-constituent of the root-clause ι.

Faster speech rate, compressed pitch range, and lower pitch level are parenthetical-specific cues of ι-domain formation. In figure 5, the rate of the parenthetical (5.9syll/sec) is slightly higher than the rate of the following item, which is the pre-nuclear subject (5.6syll/sec). Following previous studies (such as Dehé 2009 and Döring 2007, among others), one might conclude that the parenthetical's faster rate of articulation is evidence of isolation. However, examining the articulation rate of the other items in the sentence, the rate of articulation of the parenthetical doesn't appear to be dissimilar enough to mark them as isolated. Specifically, the nuclear object is the fastest word in the sentence (8.1syll/sec) and the rate of the post-nuclear verb has the same speech rate (5.9syll/sec) as the parenthetical. Moreover, the articulation rate of the host clause excluding the parenthetical is faster than the parenthetical (6.5syll/sec).[19]

Figure 6 demonstrates a pitch track of a sentence-medial parenthetical within a SOV sentence uttered in an all-new context.

[19] A comparison of speech rate means (Güneş 2012):

(i)	All positions	Parentheticals	6.10 syll/sec
		Arguments	7.38 syll/sec
	Pre-nuclear positions	Subject	6.08 syll/sec
		Object	7.91 syll/sec
		Long-Par.	6.67 syll/sec
		Short-Par.	5.50 syll/sec

The Object bears the highest speech rate. Second fastest is the longer parenthetical, while the Subject is the third fastest. The short parenthetical bears the lowest rate. In sum, the results do not provide sufficient evidence generalize about the rate variation in the parentheticals and the arguments.

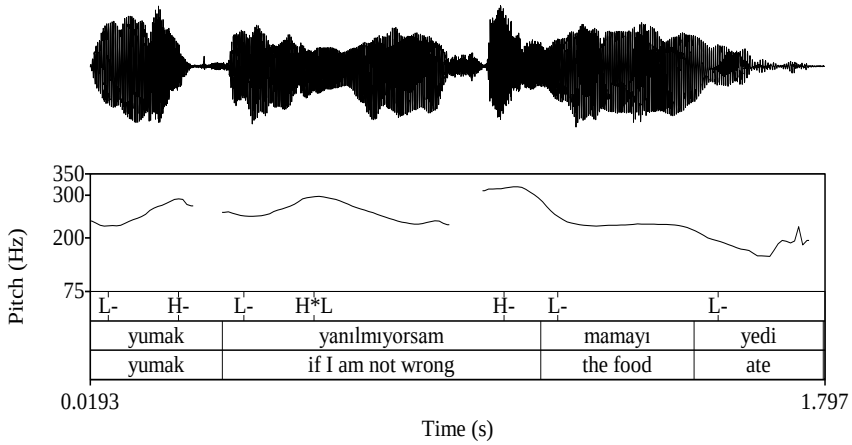


Figure 6. Pitch contour of a clausal parenthetical in sentence-medial, pre-nuclear position in all-new context

The parenthetical, in this case, is inserted between the nuclear object and the pre-nuclear subject. The same tonal patterns described for figure 6 hold for this sentence. The medial parenthetical bears a lexical accent as well as boundary tones (L- for the left edge and H- for the right edge).

With respect to cues of isolation unique to parenthetical insertions, the sentence-medial parenthetical in figure 6 is faster (6.3syll/sec) than the preceding host clause subject (5.5syll/sec). Yet, it is slower than any of the following host clause items (the object (9.5syll/sec), and the verb (6.9syll/sec)). It is also slower than the host clause excluding the parenthetical (7.2syll/sec). Thus, the speech rate analysis indicates that the parentheticals in (8) do not create an independent ι.

As for the pitch range, the sentence-medial parenthetical presents a range of 3.9 semitones. When this is compared to the other pre-nuclear item in the sentence (subject, *Yumak*), the range is almost identical (4st). A similar situation to figure 6 is observed in figure 5, where, this time, the first pre-nuclear item – the

parenthetical – has a larger range. I argue that this distinction is not due to the content of the Φ (host clause item vs. parenthetical as the pre-nucleus) but because of the presence of lexical accents in both of the parentheticals. This claim is supported by the results of non-parametric tests (Wilcoxson's non-parametric test in R), which show that the pre-nuclear parentheticals tested in this experiment, against the traditional assumptions, bear significantly larger pitch range than pre-nuclear arguments (p= 0.028). Figure 6 also shows that the pitch level of the sentence-medial parenthetical is the same as the previous pre-nuclear item and the nucleus.[20] Thus, according to the pitch range data discussed above, Turkish parentheticals do not create an independent ι. These results indicate that the parenthetical insertions analyzed in Güneş (2012) bear prosodic boundary tones aligned with their edges; however, these tones are not ι-boundary tones, but Φ-boundary tones (figure 7). The prosodic behavior of parentheticals is also observed in the host clause constituents that occur in the corresponding prosodic positions.

[20] Notice that the final rise of the parenthetical in figure 6 is slightly higher than the final rise of the preceding Φ, which might be another reason why the pitch range is so high on this particular example. This, I believe, is a distributional phenomenon. It appears that the final rise of the Φ that is left-adjacent to the nucleus is always higher than the final rise of any other non-final-Φs (compare the final rise of the parenthetical in figure 6 with the final rise of the root clause arguments in figures 2, 3, 4 and 5). Although this variation has been documented in other studies (Kamali 2011, İpek 2011), it is clear that the phenomenon requires future acoustic investigation.

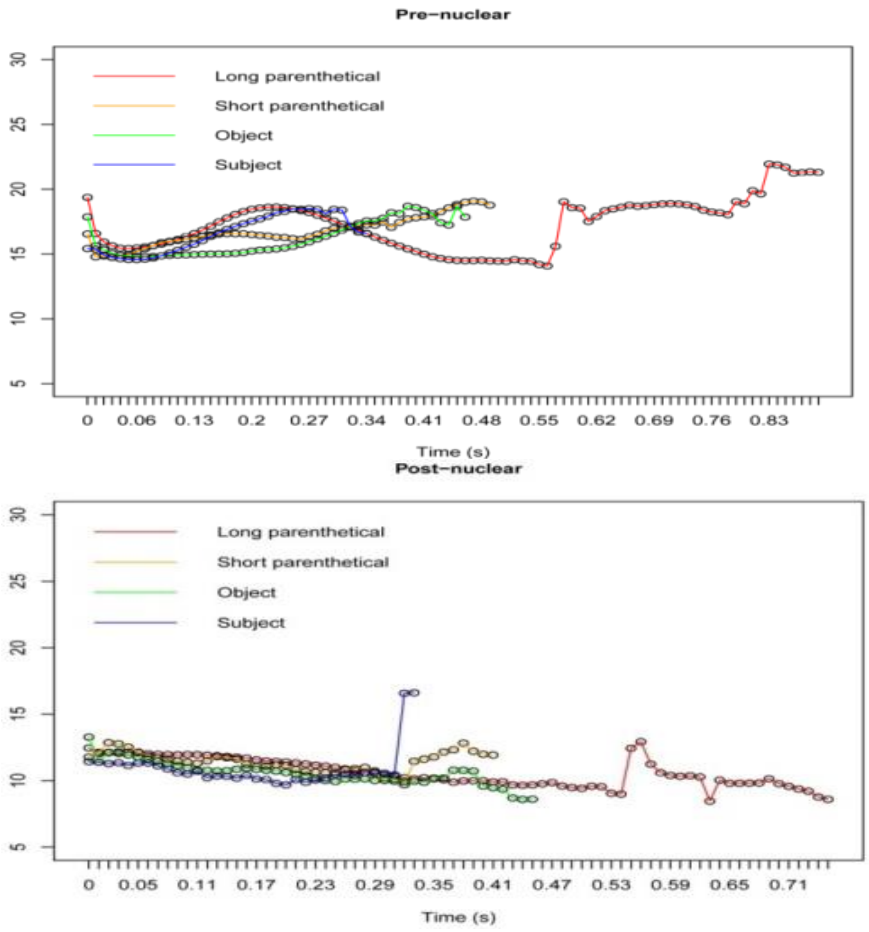


Figure 7. Means of the actual pitch (st) of parentheticals and arguments in non-final-Φs (*top*) and final-Φs (*bottom*)

Figure 7 illustrates that the pre-nuclear / post-nuclear asymmetry in the prosodic realization of host clause constituents extends to the prosodic realization of parenthetical insertions. There are no

prosodic isolation cues available for ι-formation.[21] Consequently, parentheticals are not parsed at the ι-level but at the Φ-level. (10a-c) represent the phrasing and boundary tone alignment of the clausal parenthetical *yanılmıyorsam* in the three positions tested: (10a) and (10b) where the parenthetical occupies a pre-nuclear position and (10c) where the parenthetical occupies a post-nuclear position (the object being the nucleus in an all-new context).[22]

(10) a. *sentence-initial*
L- H*L H- L- H- L- L-
[(*Yanıl-m-ıyor-sam*)$_{\Phi}$ (*Yumak)*$_{\Phi}$ (*mama-yı$_{N}$ ye-di*)$_{\Phi}$]ι
mistake-NEG-PROG-COND-1SG Y.food-ACC eat-PAST
'If I am not wrong, Yumak ate the food.'

b. *sentence-medial*
L- H- L- H*L H- L- L-
[(*Yumak*)$_{\Phi}$ (*yanıl-m-ıyor-sam*)$_{\Phi}$ (*mama-yı$_{N}$ ye-di*)$_{\Phi}$]ι
Y. mistake-NEG-PROG-COND-1SG food-ACC eat-PAST
'Yumak, if I am not wrong, ate the food.'

c. *sentence-final*
L- H- L- L-
[(*Yumak*)$_{\Phi}$ (*mama-yı$_{N}$ ye-di yanıl-m-ıyor-sam*)$_{\Phi}$]ι
Y. food-ACC eat-PAST mistake-NEG-PROG-COND-1SG
'Yumak ate the food, if I am not wrong.'

The results of Güneş (2012) suggest that the syntactic isolation of parentheticals is not realized in the prosody. Thus, syntactic isolation does not result in prosodic isolation in Turkish. This mismatch in

[21] See Güneş (2012) for a more detailed discussion of the findings.

[22] Notice that the phrasing pattern remains the same even when the word-order of the host-clause constituents is altered. Due to space limitations, illustrations, pitch contours of sentences with different word-orders and a sample plot of the sentence-final parenthetical have been left out.

syntax-prosody mapping is expected if Turkish strictly adheres to the prosodic representation advanced in (3) and (4).[23]

The data show that ι-formation in Turkish is not a direct realization of syntactic clausehood. Further questions remain to be investigated regarding the trigger behind Φ-formation within an ι and the correlation between syntactic constituency and prosodic constituency. Any possible correlation between syntactic constituency and prosodic constituency at the Φ-level will not be in conflict with the claims of this paper since the argument advanced here discusses ι-formation strategies rather than Φ-formation.[24]

4.2. Information structure - prosody relations

The effect of information structure variation on the F0 pattern has been well studied in intonation languages (see Jackendoff 1972, Pierrehumbert 1980, Büring 1997, Steedman 2000, Selkirk 2005, among many others). The consensus is that, in intonation languages, elements are shipped to the prosodic component pre-specified as e.g. foci or topics. This pre-specification occurs either in the narrow syntax – where elements are assigned focus or topic 'features' – or at some post-syntactic level of the grammar. The implication of this pre-specification is that the prosodic component does not employ its own internal mechanisms to reflect information structure; rather the prosodic representation of an utterance is organized around the pitch accents that are inherently assigned to foci or topics.

In 4.2.1, I discuss whether Turkish exhibits designated prosodic events to mark foci and topics.

[23] See Kan (2009) for similar observations supporting the lack of syntax-prosody mapping in Turkish.

[24] In fact, I support the assumption that the prosodic parsing mechanism that operates within the ι of declarative root clauses (constraints operating upon Φ-formation in an ι) is syntax-driven to a large degree.

4.2.1. Focus and topics in the Turkish ι

While many researchers working on intonation languages claim that information structural effects are reflected in the intonation pattern of an utterance (Jackendoff 1972, Büring 1997, Féry 1993, among others), others maintain that the presence of an F0 event (usually a pitch accent) does not necessarily indicate focus, but rather, prosodic headedness (Ladd 1996). According to the latter view, the position of a nucleus in an ι is determined by the organization of prosodic constituents, rather than focus structure. I will call the former approach the *Focus/Topic intonation approach* (henceforth the *FTI approach*) and the latter the *non-FTI approach*. Previous studies on Turkish intonation claim that information structure is reflected in the intonation pattern of Turkish as in intonation languages (Erguvanlı 1979, Demircan 1996, Göksel 1998, İşsever 2003, Göksel and Özsoy 2000, 2003, Özge 2003, Kılıçaslan 2004, Özge and Bozşahin 2010, among others). Although all of these works show variation in the details of their argumentation, in general terms, they all argue for an FTI approach.

Göksel and Özsoy (2000, 2003) claim that there is no canonical position for focus in Turkish and *stress* is the sole indicator of focus. Focus is located in a 'focus field' defined as an area between the item that bears primary stress and the domain that includes the matrix verb (ibid.). While their analysis is *a priori* plausible, their empirical analysis fails to provide an acoustic correlate for what they call 'stress'. What they refer to as 'stressed' is what is perceived as prominent, which is not necessarily intonationally marked in the F0 contour.

Based on Steedman's (2000) tune-based account, Özge (2003) and Özge and Bozşahin (2010) claim that "Turkish makes use of accent placement and phonological phrasing in the encoding of information structure, (i) stress, (ii) intonational contour, or tune, comprising of pitch accents and boundary tones, and (iii)

intonational phrasing" (Özge and Bozşahin 2010:140). Accordingly, each information structural unit is associated with a particular melodic pattern in the F0 contour. Regardless of the positioning, the F0 curve of the rheme is identified as a H* accompanied by a L- . Contrastive topics are marked by a L*H- tone and post-focal constituents bear compressed pitch leveling (or *flooring* in their terms). Unlike Göksel and Özsoy (2000, 2003), who delimit the area of deaccentuation with respect to the verb (i.e. pre-verbal accentuation vs. post-verbal deaccentuation, also see Erguvanlı 1984), Özge and Bozşahin (2010) define the locus of deaccentuation with respect to focus; i.e. pre-focal rise vs. post-focal deaccentuation. Although Özge and Bozşahin (2010) point out the importance of boundary tone placement in the interaction of syntax and prosody, they propose designated tunes as correlates of topic and focus. In this sense, neither Göksel and Özsoy's (2000) approach nor Özge and Bozşahin's (2003) approach resemble the inventory presented in (3) and (4), where the intonation patterns are defined neither via syntactic notions (i.e. positioning with respect to the verb), nor via information structural notions (i.e. designated F0 patterns for focus and topic). (3) and (4) depict an inventory solely defined in terms of prosody (i.e. organization of final-Φ and non-final-Φs).

This section demonstrates that Turkish does not exhibit pre-specified F0 contours/tunes such as those suggested by FTI approach. This does not entail that the prosodic constituency and the Match mechanism of Selkirk (2009) are free of syntactic and information structural input. Indeed, the conclusions of this paper are intended to **support** the view that Turkish bears informational structural effects on the organization of prosodic units. However, these effects apply in a more limited fashion and not via designated F0 events.

The inventory presented in (3) and (4) is insensitive to the focus/ topic/ background information contained within an utterance.[25] Considering that all-new sentences are devoid of topics and foci, it is misleading to define a nucleus solely in information structural terms.

4.2.2. Prosody of the nuclei in Turkish declaratives

In an experimental study on Turkish prosody, İpek (2011) presents an acoustic analysis of different kinds of foci in different linear positions. According to the results of the production experiment "…speakers do not expand on-focus pitch range in any of the focus conditions, but duration and intensity changed as a function of focus" (İpek 2011:140).[26] This illustrates that focus in Turkish does not have a designated tone (i.e. H) which is identified by F0 expansion. Additionally, İpek (2011) observes that there is no significant difference between the F0 height of the area that is aligned with the nucleus in an all-new condition (object in SOV order) and the area aligned with the focused constituent (with narrow focus on the object in SOV order). This indicates that what is perceived as prominent in Turkish (narrow focused or default prominence) is metrically identical, and is not set by F0 expansion. İpek (ibid.) notes that the post-focal area bears a lowered pitch level when the sentence-initial item is focused. Furthermore, a constituent is most easily recognized as the focus if it occupies the sentence-initial position. According to her, "…this shows the importance of post-focus compression in correct identification of focus" (İpek 2011:140). In sum, what İpek (2011) observes is that Turkish does

[25] Again, this declaration should not be equated to the assertion that Turkish does not display any information structural effects in its sentential intonation. On the contrary, we will see that the matching of the nucleus to a particular prosodic constituent is highly dependent on the information structural content of an utterance (section 4.2.3).

[26] The findings of İpek (2011) accord with the findings of Ivoseviç (2011), in which the acoustic properties of broad focus and narrow focus are found not different.

not employ F0-change in the same manner as intonation languages; instead employs other mechanisms, such as prosodic phrasing.

The findings of İpek (2011) are also supported by Güneş (2012). The results of a production experiment in Güneş (2012) demonstrate that in narrow and broad focus conditions all focal arguments in all word orders bear a high plateau (but not a pitch expansion) of the same pitch level as pre-nuclear Φs. Figure 8 represents the flat contour of narrowly focused subject and object nuclei in all-new utterances in all possible word orders (i.e. for S focus; SVO, for O focus; OVS, and for both; SOV, OSV).

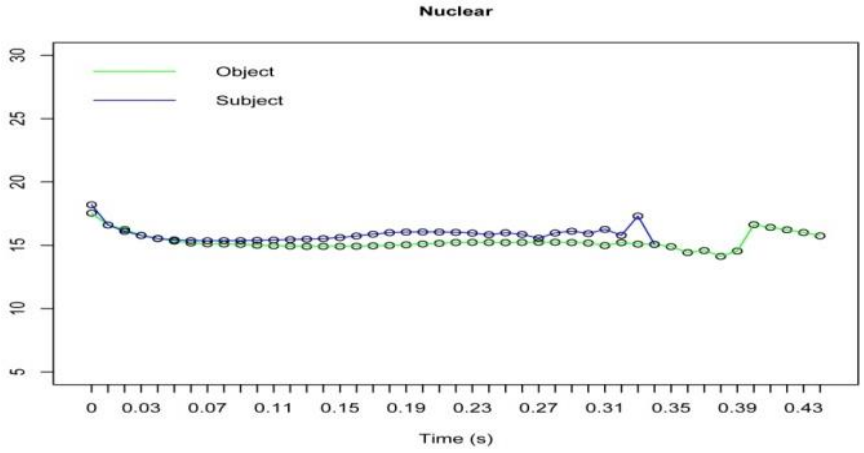


Figure 8. Means of the actual pitch points (st) of subject and object nuclei over time

The flat contour in figure 8 provides convincing evidence against the idea that there exists a rise in the area understood as the nucleus or the area that is aligned with focus.[27] The pitch level is the same (between 15-20 semitones) as the level of non-final-Φs (see figure 7

[27] Note that the actual pitch contours exhibit subtle variations. Therefore, the individual analysis of the F0 contours may be misleading in comparison to the statistical means. Also note that the barely visible rise at the end of the object cases is not due to the a rise on the F0 but due to the standard deviation which results from the speaker variation in the duration change of the words that are plotted.

for the plots of non-final-Φs). However, the F0 contour is different. Unlike the non-final-Φs that exhibit a rising contour towards the end of the Φ (a right edge boundary tone, H-), the nuclear area in the final-Φ does not bear such a rise.[28]

In conclusion, Turkish does not employ F0 expansion or tonal marking for perceptually prominent constituents. Instead, I claim, Turkish shows a very similar pattern to *phrase languages* (see Féry 2010), where prominence is not marked by F0.

The properties of the inventories in (3) and (4) predict that the only prosodic unit that survives in fragment answers is the final-Φ, since it contains the only obligatory item, the nucleus. If a fragment answer is composed of more than one ω, then post-focal lowering starts from the second ω on. If the fragment answer consists of a single ω, then the inventories in (3) and (4) predict that one should observe the prosodic properties of a nucleus (a flat contour as high as a nucleus). (11) provides an example of a fragment answer, and figure 9 presents the F0 of this answer.[29]

(11) A: Whose bicycle is this?
B: [(*Emre-ler-in*)$_{\Phi}$]$_{\iota}$
Emre-PL-GEN
'(It is) Emre's'

[28] The short lowering that is observed at the left end of the plot is due to a transmission from the H- boundary tone that is introduced for the last non-final-Φ.

[29] The data was elicited as part of the experiment that is described in section 4.1.1.

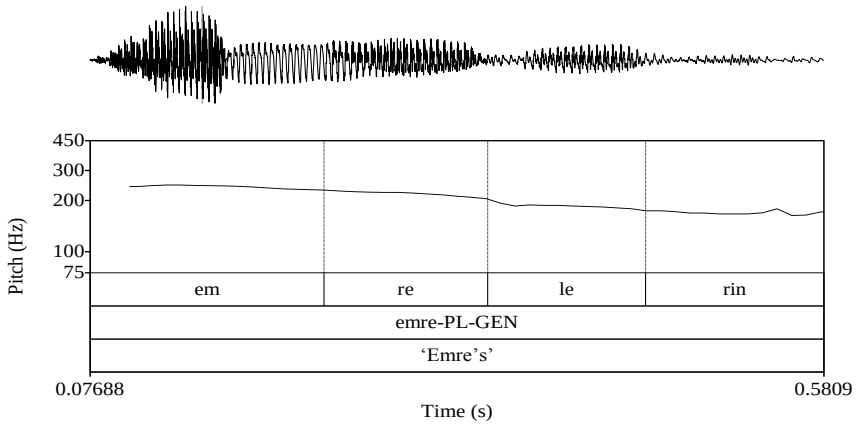


Figure 9. The pitch contour of a fragment answer

As figure 9 illustrates, the fragment answer is uttered within the same pitch range as the nuclei in figure (8) (between 12-19 semitones).[30] Moreover, the fragment answer bears a flat F0 that is typical for the nuclear area.[31] Given that the nucleus is the only obligatory item in an ι, a fragment answer must be the nucleus of its ι. Thus, ιs composed of a single ω contain a single Φ, and are *single-phrased ιs* in the sense of Féry (2008).

This section discussed the prosodic properties of the nuclear area in Turkish ιs. Nucleus does not bear F0 expansion. Instead, what appears to prosodically delimit the focused item is *prosodic phrasing*; i.e. post-nuclear leveling and the difference in edge tone properties between the final-Φs and non-final-Φs.

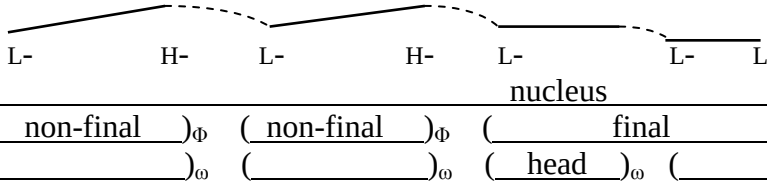
4.2.3. The prosody of all-new sentences in Turkish

Let us recall the prosodic structure of Turkish declaratives – repeated in (12).

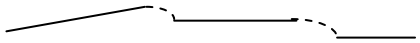
[30] Note that the mean pitch interval may vary across male and female speakers.

[31] The hardly noticeable lowering that is aligned with the last two syllables of the fragment answer in figure 9 may be an effect of the right ι-boundary tone 'L%'.

(12) The Turkish ι in declarative clauses with accentless ωs:



In cases of all-new contexts, the item that is perceptually prominent in an utterance is defined syntactically. For instance, when an utterance that displays the canonical SOV word-order is uttered in an all-new context, the object is in the nucleus (Üntak-Tarhan 2006). When an adverb intervenes between O and V (i.e. S-O-ADVERB-V) then the adverb occupies the nucleus (ibid.). In cases of narrow focus, the left-edge of the nucleus is aligned with the left edge of the narrowly focused ω. For example, in the canonical SOV order, if the focus is the subject, then the subject is the nucleus and the rest of the utterance bears a low and flat F0. In such a case, the ι is composed of a single Φ, the head of which matches with the subject (i.e. $[(S_N OV)_{F\text{-}\Phi}]_\iota$). The same holds for the case of V-focus in SOV order, where the ι is composed of three Φs, and where the final-Φ matches with the verb ($[(S)_{NF\text{-}\Phi}(O)_{NF\text{-}\Phi}(V_N)_{F\text{-}\Phi}]_\iota$). The constituents that precede the nucleus bear a pre-nuclear rise and are parsed as a separate Φs. (13) illustrates the F0 pattern[32] and phrasing of such an utterance:[33]



(13) [(SUBJECT)$_\Phi$ (OBJECT$_N$ VERB)$_\Phi$]$_\iota$

For (13), the FTI approach interprets the rise observed on the non-final-Φ that is aligned with the subject as a *topic contour* (cf. Özge

[32] See figures 2 and 3 for samples of an actual F0 plot of a SOV sentence in all-new context.

[33] The alignment of the object with the nucleus in the environment described in the main text (i.e. SOV, all-new context) is not obligatory. The verb or subject may also be aligned with the nucleus in all-new sentences. Also see Özge (2012).

and Bozşahin 2010), and interprets the object that is aligned with the nucleus as the *focus*. Under the FTI approach, the levelling on the verb is interpreted as post-focal levelling, and is typically identified as a *tail* or a *backgrounded* item.

In accounting for the prosodic properties of (13) which is produced in an all-new context, we realize that the FTI approach runs into problems since we must assume that the all-new context is, in fact, not all-new.[34] If this is correct then in an all-new context, the utterance must be structured according to a supposed common ground, and the item that is not a part of this common ground must bear the nucleus (as the nucleus is assumed to hosts a focus). Of course, this cannot be true, as it is logically incongruent to appeal to the existence of a common ground to explain the prosody of utterances which are uttered before the common ground is established.

Furthermore, if the constituent aligned with the nucleus is the focus as the FTI approach maintains, then the FTI approach fails to explain why only the immediately pre-verbal constituent may be marked as the 'focus'. The same problems arise regarding the purported 'topic' (subject) and 'background item' (the verb) in (13). The FTI approach fails to explain why the verb in all-new SOV utterances like (13) cannot receive the 'topic intonation pattern'[35] observed on the subject, or why the subject cannot receive the 'background intonation pattern' observed on the verb, as both are suitable candidates for both information structural roles.

Thus, it appears that ascribing the information structural role of 'focus' to the nucleus in all-new utterances is problematic for the FTI approach, for the simple reason that all-new sentences do not, by definition, contain a narrow-focused constituent. In the following

[34] This issue has been discussed for intonation languages. Pointing out the existence of sententially prominent elements in all-new context, Ladd (1996) posits that the nucleus is parsed as a result of *prosodic constituency*, rather than information structure, which is known as *stress first* approach.

[35] See Özge (2003) and Özge and Bozşahin (2010) for the *topic tune* in Turkish.

subsection I employ novel data to show that the FTI approach not only insufficiently explains the F0 pattern of all-new utterances; it also makes incorrect predictions for the F0 pattern of double focus constructions.

4.2.4. Double focus

The phonetic/phonological properties of utterances containing double foci remain uninvestigated in Turkish. However, double foci have been investigated in other languages. Rump and Collier (1996) and Selkirk (2005) among others observe that, in intonation languages such as English and Dutch, all occurrences of focus within a single ι receive a focus-accent. These studies accord with the FTI approach, as they provide support for the idea that all [F]-marked elements within an ι receive focus-related accent placement. By contrast, Kabagema-Bilan et al. (2011) observe that, in Chinese, only one occurrence of focus within a single ι receives focus-related prominence. Such studies conflict with the FTI approach, as they provide counterevidence for the idea that all [F]-marked elements within an ι receive focus-related prominence.

Returning to the Turkish data, if the FTI approach is correct, one expects to observe the following F0 events in Turkish utterances that contain two adjacent foci:

Prediction 1 (P1)

a. Multiple nuclear plateaus in one single ι (where the adjacent foci create a single long plateau);
   i.e. $[(\text{Subject})_{\Phi}\ (\text{D.Object}_{N/F}\ \text{ID.Object}_{N/F}\ \text{Verb})_{\Phi}]_{\iota}$
   or
b. Two single nuclear plateaus in two separate ιs (where each nucleus heads its own ι);
   i.e. $[(\text{Subject})_{\Phi}\ (\text{D.Object}_{N/F})_{\Phi}]_{\iota 1}\ [(\text{ID.Object}_{N/F}\ \text{Verb})_{\Phi}]_{\iota 2}$

If the FTI approach is incorrect and Turkish patterns like Chinese insofar as only one focus within an ι receives prominence, then one expects to observe the following F0 events in such utterances:

Prediction 2 (P2)

a. A single nucleus in a single ι (where the leftmost focus is aligned with the nucleus and the rightmost focus is aligned with the compressed post-nuclear area);
   i.e. $[(\text{Subject})_{\Phi}\ (\text{D.Object}_{\text{N/F}}\ \text{ID.Object}_{\text{N/F}}\ \text{Verb})_{\Phi}]_{\iota}$
   or
b. A single nucleus in a single ι (where the leftmost focus is aligned with a non-final Φ and the rightmost focus is aligned with the nucleus);
   i.e. $[(\text{Subject})_{\Phi}\ (\text{D.Object}_{\text{N/F}})_{\Phi}\ (\text{ID.Object}_{\text{N/F}}\ \text{Verb})_{\Phi}]_{\iota}$

(P1a) predicts the existence of a long plateau that is employed to mark both of the focused items as prosodically prominent. This entails that the plateau that is the head of the final-Φ will stretch over at least two phonological words, as diagrammed in (14).

(14) $[(\text{Subject})_{\Phi}\ \ (\text{D.Object}_{\text{N/F}}\ \text{ID.Object}_{\text{N/F}}\ \text{Verb})_{\Phi}]_{\iota}$

(P1b), on the other hand, predicts that each candidate for focus will head its own ι, and hence, there will be no requirement for stretching the plateau in the final-Φ over a number of ωs. Thus, from an FTI perspective, if there is more than one focus in a single clause then the prediction in (P1b) should be possible, since the information structural mediation is assumed to be stronger than prosodic constraints in ι formation. A diagrammatic representation of the contour predicted in (P1b) is given in (15).

(15) $[(\text{Subject})_{\Phi}\ \ (\text{D.Object}_{\text{N/F}})_{\Phi}]_{\iota 1}\qquad [(\text{ID.Object}_{\text{N/F}}\ \text{Verb})_{\Phi}]_{\iota 2}$

In (15), ι_1 is composed of pre-nuclear/pre-focal non-final-Φ that contains the subject and a final-Φ that contains the leftmost focus of the utterance. ι_2, on the other hand, contains a solitary non-final-Φ composed of the rightmost focus of the utterance (the nucleus) and the verb (the post-nucleus).

(P2a) predicts the existence of a single ι in which the leftmost focus is aligned with the only nuclear plateau in the ι and the rightmost focus is lowered because it occupies the post-nuclear area. (16) provides a diagrammatic representation of the contour that will be observed if (P2a) is borne out.

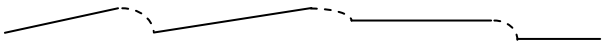
(16) $[(\text{Subject})_{\Phi}\ (\text{D.Object}_{\text{N/F}}\ \overline{\text{ID.Object}_{\text{N/F}}\ \text{Verb}})_{\Phi}]_{\iota}$

In (16), the final-Φ begins with the direct object. The plateau that contains the direct object is followed by post-nuclear lowering that is on the indirect object and the verb. The subject that precedes the leftmost focused item is parsed as an independent Φ and is expected to bear the trademark 'non-final-Φ' rise.

Like (P2a), (P2b) predicts that the whole utterance is parsed as a single ι. The difference between (P2a) and (P2b) lies in the prosodic positioning of the focused elements. Unlike (P2a), (P2b) predicts that the leftmost focus will be aligned with a non-final-Φ. In this case, the rightmost focus will be the head of the final-Φ and thus the nucleus. This is predicted by a non-FTI approach since such a representation does not constitute a change in the 'default' phrasing pattern. It may be preferred over the representation in (P2a), since, in the case of (P2b), the focused item that cannot match with the nucleus is at least in an area that is prosodically *active*.[36] Also, there is a cross-linguistic tendency to primarily match the rightmost focus with the sententially prominent area. This prediction accords with

[36] See Göksel and Özsoy (2003) for a different understanding of *prosodically active* areas in the positioning of single focus.

the observation that the post-nuclear area hosts *discourse given* constituents (Özge 2003, Özge and Bozşahin 2010, Erguvanlı 1984, Göksel and Özsoy 2003, among others). (17) provides a diagrammatic representation of the contour that will be observed if (P2b) is borne out.



(17) $[(\text{Subject})_{\Phi}\ (\text{D.Object}_{\text{N/F}})_{\Phi}\ (\text{ID.Object}_{\text{N/F}}\ \text{Verb})_{\Phi}]_{\iota}$

In (17) the subject is aligned with a non-final-Φ as in (16). However, in (17) the leftmost focused item, the direct object, is also matched with a non-final-Φ. The sentence-initial subject is parsed as a non-final-Φ; the direct object immediately following the subject is in another non-final-Φ. The indirect object is in the nucleus of the ι, and is followed by a low leveled F0 in the post-nuclear area where the verb is positioned.

Now, let us examine a sample F0 pattern of Turkish utterances containing double foci. Figure 10 presents the F0 contour of an S-DO-IO-V ordered utterance that contains multiple foci in which both of the objects are focused.[37]

(18) A: To whom did Emre give what?
B: Emre elma-lar-ı$_{\text{F-1}}$ yeğen-ler-i-ne$_{\text{F-2}}$ ver-miş.
E. apple-PL-ACC cousin-PL-POSS-DAT give-EVD
'Emre gave the apples$_{\text{F}}$ to his cousins$_{\text{F}}$.'

[37] The utterance in (18) was also elicited as part of the experiment described in section 4.1.1.

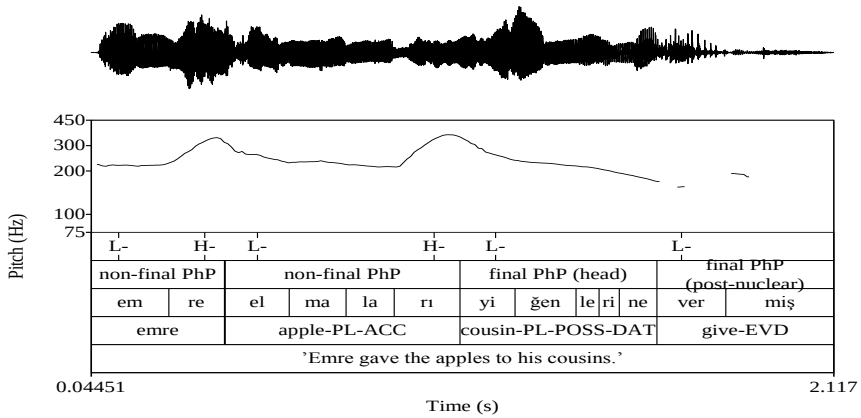
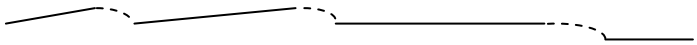


Figure 10. F0 of a declarative root clause with double foci

The utterance in figure 10 is an answer elicited from a multiple wh-question question and thus bears two focused items: a direct object (*elmaları* 'apples') as an answer to 'what', and an indirect object (*yeğenlerine* 'to (his) cousins') as an answer to 'to whom'. The sentence-initial subject bears a rising pattern that is typical to non-final-Φs. That the subject displays this pattern is predicted by (P1b), (P2a), and (P2b). When we examine the sentence-final item, uncontrolled octave jumps are observed due to the presence of a very low F0 that results in 'creaky voice', a phenomenon that is commonly observed in the post-nuclear area. From this observation, it is evident that the verb in figure 10 matches with a post-nuclear levelling; this is also predicted by (P1b), (P2a), and (P2b). The item that immediately precedes the post-nuclear verb is the indirect object. It bears a flat contour that is higher than the level of the F0 aligned with the verb and is as high as the F0-level of the subject. This pattern shows that the F0 observed on the indirect object is a nuclear plateau. Therefore, the data show that (P2a) is not borne out, as (P2a) predicts that the leftmost focus is realised as a post-nuclear item. At this point, we are left with three options; either the predications that accord with the FTI approach (i.e. (P1a) and (P1b))

are correct or the 'single ɪ' account in (P2b) is correct. The deciding factor is the prosodic realization of the direct object. As figure 10 shows, the direct object is uttered at a pitch level that is as high as both the non-final-Φ that precedes it and the nuclear indirect object that follows it. This shows that the indirect object is either a non-final-Φ or a nucleus of its own ɪ. The only F0 event that distinguishes a non-final-Φ from a nucleus contained within a final-Φ is the right boundary marker. While a non-final-Φ bears a rising terminal on the Φ-level, the nucleus does not. In figure 10, the F0 of the final syllable of the indirect object (the leftmost focus) bears a rising pattern. In light of this observation, I conclude that the data rule out the FTI approach and hence the predictions in (P1a) and (P1b). Thus, (P2b) provides the correct description of a Turkish utterance containing double foci. (19) presents a diagrammatic representation of the pitch pattern observed in figure 10.



(19) [(Emre)$_{Φ}$ (elma-lar-ɪ$_{F-1}$)$_{Φ}$ (yeğen-ler-i-ne$_{N/F-2}$ ver-miş)$_{Φ}$]$_{ɪ}$
E. apple-PL-ACC cousin-PL-POSS-DAT give-EVD
'Emre gave the apples$_{F}$ to his cousins$_{F.}$'

In short, utterances containing double foci are composed of a single ɪ that contains a single nucleus that hosts the rightmost focus. The leftmost focus is not parsed as the nucleus of a separate ɪ but is parsed as a non-final-Φ.

The data discussed then illustrate that there is no designated topic/focus intonation in Turkish. Utterances containing double foci, where the non-rightmost focus bears an alleged topic accent (rising F0), pose problems for the approaches that assume a pre-specified topic or focus accent in Turkish. ɪs of double focus are identical to the ɪs of all-new, and narrow-focus. Thus, it appears that neither the informative status (topic/focus/neutral) nor the syntactic status (sentential/extra-sentential) of the item licenses a phonetic correlate

for focus and topic in Turkish. To explain the relationship between information structure and prosody in Turkish, one requires an account that appeals to prosody-internal positioning preferences of the Turkish ɪ. I, thus, conclude that any prosodically-defined topic or focus analysis will lack descriptive adequacy: one may observe a rise when there is no topic (leftmost focus in double focus cases, neutral items in all-new utterance), and, conversely, one may observe a topic when there is no rise, i.e. post-nuclear topics (Göksel 1998, İşsever, 2003, *i.a.*).

Abandoning the assumption that the tones/tunes of an utterance are mediated by the information structure enables one to create more accurate predictions for the above mentioned cases**.** If one assumes that sentence prosody is independent of information structure then one can account for the '*blind*' parsing of prosodic constituents. The information structure-prosody interaction can now be easily captured; it is not the insertion of pre-specified tones/tunes reserved for certain of information structural units that determine the sentential intonation patterns, but the matching of already existing prosodic constituents (i.e. phrases) with certain information structure units (i.e. the matching focus with the nucleus).[38]

5. Dissociating focus from nucleus

The evidence presented in section 4.2 illustrated that information-structurally [F]-marked constituents must be dissociated from prosodically-defined nuclei. If I am correct to dissociate information

[38] Further evidence of the 'blind' parsing of prosodic constituents, comes from *non-local doubling* (Göksel, Kabak, and Revitihadou 2013). In (i), doubling occurs only if the antecedent for doubling is (a) a non-final-Φ; (i), or (b) the head of a Φ; (ii), (iii). Neither informational structural nor syntactic units provide the targets for doubling; rather it is prosodic constituents.

(i) (Mavi vazoya)$_{NF\text{-}\Phi}$ (çiçekleri)$_{NF\text{-}\Phi}$ (Ali$_{N}$ koydu çiçekleri)$_{NF\text{-}\Phi}$
blue in-vase flowers A. put flowers
'Ali put the flowers in a blue vase.'

(ii) (Mavi$_{HEAD}$ vazoya)$_{NF\text{-}\Phi}$ (çiçekleri)$_{NF\text{-}\Phi}$ (Ali$_{N}$ koydu mavi)$_{NF\text{-}\Phi}$

(iii) * (Mavi$_{HEAD}$ vazoya)$_{NF\text{-}\Phi}$ (çiçekleri)$_{NF\text{-}\Phi}$ (Ali$_{N}$ koydu vazoya)$_{NF\text{-}\Phi}$

structural [F]-marking and the prosodic nucleus, then in an SOV utterance in which the object is aligned with the nucleus, the object should be ambiguous between a narrow focus and no-focused (i.e. all-new) reading. This ambiguity should arise because, in the default SOV order in all-new utterances, the object is typically aligned with the nucleus. As (20) shows, the predicted ambiguity is observed.[39] (Göksel and Özsoy 2000:5, where small caps = nuclear prominence)

(20) *EV-E* *git-ti-m.*
home-DAT go-PAST-1
'I went HOME/home.'

Thus, the following generalization can now be advanced:

(21) The nucleus is information-structurally neutral and is set via prosodic phrasing.

The issue of how to describe the distribution of the nucleus in Turkish ɪs remains to be answered. I claim that this distribution can be described by appealing to the following general phrasing properties of Turkish.

(22) a) All ɪs in Turkish display a nucleus.
b) There is only one nucleus in an ɪ (the head of the final-Φ).

The phrasing rules interact with the preference principles outlined in (23), ordered from 'most preferred' to 'least preferred'.

(23) a) Align the nucleus with the rightmost focus.
b) Align the nucleus with the item left-adjacent to the verb.
c) Align the nucleus with the verb.[40]

[39] See Göksel and Özsoy (2000) for a similar observation which concludes that nucleus is an information structure-free notion that is set via positioning *vis-à-vis* the matrix verb. Also, note that in my account the only constraint on delimiting nucleus is prosodic phrasing.

[40] See Güneş (2013) for a detailed discussion on the limited prosodic distribution of the verb in Turkish.

Let us examine what these rules and preference principles predict. (23a) predicts that, if an utterance contains multiply-focused constituents, the nucleus will align with the rightmost focused constituent; if an utterance contains **one** focused constituent, the nucleus will align with it. If there is no focused constituent (as in all-new utterances), nucleus is the constituent that is immediately left-adjacent to the verb, as stated in (23b). In certain environments, (23b) is ignored for the sake of nucleus-assignment,[41] and instead the nucleus is aligned with the verb (23c).

The application of the properties in (22) and the preference principles in (23) provides the correct description of the distribution of the nucleus within an ι, and requires no recourse to information structural notions such as [F]-marking. Thus, unlike in intonation languages, the existence of the Turkish nucleus is not dependent upon the presence of an information-structurally marked item.

In sum, ι-internal prosodic patterns in Turkish show limited effects of the variation in the information structural conditions. With this respect, Turkish exhibits the characteristics of a phrase language.

6. Conclusion

In this study, I claimed that Turkish (i) lacks syntactic effects on ι-formation, and (ii) does not display prosodic correlates of information structural units in the way that intonation languages do. Syntactically isolated parentheticals are prosodically realized identically to syntactically integrated constituents such as subjects and objects. In this sense, Turkish treats the parentheticals analyzed in this study as host-clause arguments and parses them as separate Φs (rather than isolated ιs). Acoustic and tonal properties of the nuclear area in Turkish ιs were also discussed. Results of an experiment showed that the nuclei of ιs in different information structural conditions (i.e. narrow focus, all new focus) bear identical

[41] In certain intransitives, when the verb displays particular semantics, see Özge (2012).

F0 properties: a flat contour. This observation was further evidenced by the prosodic properties of fragment answers. In particular, the flat plateau that is observed on the nucleus in a multi-Φ utterance is also observed in fragment answers which bear single-Φ Intonation Phrases. The flat contour of the fragment answer, as a focused item, provided further support for the argument that there is no F0 expansion that is aligned with the prosodic contour of the foci. Thus, ascribing the information structural role of 'focus' to the nucleus in all-new utterances was concluded to be problematic, for the simple reason that all-new sentences do not, by definition, contain any narrow-focused constituents. Furthermore, novel data presented showed that the approaches arguing for information structural units to have phonological correlates were insufficient in explaining the F0 pattern of all-new utterances and of those containing multiple foci. Utterances containing double foci in which the non-rightmost focus bears an alleged topic accent (rising F0) pose problems for approaches that assume a pre-specified topic and focus accent in Turkish. ıs that host double foci were argued to be identical to ıs that host all-new constituents, and narrow-focused constituents. Thus, it appears that neither the informative status (topic/focus/neutral) nor the syntactic status (sentential/extra-sentential) of the item licenses a phonetic correlate for focus and topic in Turkish. Thus, given the sentence melodic classification of languages in Féry (2010), Turkish was shown to resemble *a phrase language* (or *a head-edge prominence language* in terms of Jun 2012).

References

Arnhold, A. (2012). Prosodic structure and focus realization in West Greenlandic. In S.-A. Jun (eds.) Prosodic Typology II: The New Development in the Phonology of Intonation and Phrasing (tentative title), Oxford, OUP.

Bolinger, D. L. (1958). A theory of pitch accent in English. In Word 14, 109-149.

Bolinger, D. L. (1989). Intonation and its uses: Melody in grammar and discourse. Stanford: Uni. Press.

Büring, D. (1997). The meaning of topic and focus: The 59th Street bridge accent. London: Routledge.

De Vries, M. (2007). Invisible constituents? Parentheses as B-merged adverbial phrases. In Parentheticals, Dehé, N. & Kavalova, Y. eds. 203-234. Amsterdam/ Philadelphia: John Benjamins.

Döring, S. (2007). Quieter, faster, lower, and set off by pauses? Reflections on prosodic aspects of parenthetical constructions in modern German. In Parentheticals, Dehé N. & Kavalova Y. eds. 285-307. Amsterdam/ Philadelphia: John Benjamins.

Dehé, N. (2009). Clausal parentheticals, intonational phrasing, and prosodic theory. In Journal of Linguistics, 45, 569-615.

Dehé, N. and Kavalova, Y. (2007). Parentheticals: An introduction. In Parentheticals, Dehé, N. & Kavalova, Y. eds. Amsterdam/ Philadelphia: John Benjamins. 1-22.

Demircan, Ö. (1996). Türkçe'nin sesdizimi [The phonology of Turkish]. Istanbul: Der Yayın.

Elfner, E. (2012). Syntax-Prosody Interactions in Irish. University of Massachusetts, Amherst, Doctoral dissertation.

Erguvanlı, E. (1979). The function of word order in Turkish grammar. Ph.D. Thesis. UCLA.

Erguvanlı Taylan, E. (1984). The function of word order in Turkish grammar. Berkeley, CA: University of California Press.

Erteschik-Shir, N. (1997). The Dynamics of Focus Structure. Cambridge: University Press.

Féry, C. (1993). German intonational patterns. In Linguistische Arbeiten 285. Tübingen: Niemeyer.

Féry, C. (2008). Syntax, Information Structure, Embedded Prosodic Phrasing and the Relational Scaling of Pitch Accents, ms.

Féry, C. (2010). The intonation of Indian languages: An areal phenomenon. In Imtiaz Hasnain and Shreesh Chaudhury (eds.), Festschrift in honour of Ramakant Agnihotri.

Féry, C. and Samek-Lodovici, V. (2006). Focus Projection and Prosodic Prominence in Nested Foci. Language 82(1):131–150.

Fukumori, T. (2004). An Experimental Phonetics Study of Vowel Harmony in Turkish, Ph.D. Thesis published by Bensei Shuppan, University of Tsukuba.

Göksel, A. (1998). Linearity, focus and the postverbal position in Turkish. In: Lars Johanson (eds.), The Mainz Meeting Proceedings of the Seventh International Conference on Turkish Linguistics. Harrassowitz Verlag, Wiesbaden, pp. 85–106.

Göksel, A., Kabak, B. and Revithiadou, A. (2013). Prosodically constrained non-local doubling. *The Linguistic Review*, Vol 30

Göksel, A. and Özsoy, S. (2000). Is there a focus position in Turkish? In Aslı Göksel, and Celia Kerslake (eds.), Studies on Turkish and Turkic Languages; Proceedings of the Ninth International Conference on Turkish Linguistics. Harrassowitz, Wiesbaden, pp. 219–228.

Göksel, A. and Özsoy, S. (2003). dA as a focus/topic associated clitic in Turkish. In Lingua, Special edition on Focus in Turkish, Sumru Özsoy and Aslı Göksel (eds.) 1143-1167.

Göksel, A. and C. Kerslake. (2005). Turkish, A Comprehensive Grammar. London: Routledge.

Güneş, G. (2012). Prosodic parentheticals and prosodic integration: A case study in Turkish. Ms. University of Groningen.

Güneş, G. (2013). On the Role of Prosodic Constituency in Turkish. In the Proceedings of WAFL8 MIT Working Papers in Linguistics Cambridge, MA.

Hulst, H. van der. (2002). Stress and accent. In Encyclopedia of cognitive science, vol. 4, ed. by Lynn Nadel, 246–254. London: Nature Publishing Group.

Hulst, H. van der, and Weijer, J. van de. (1991). Topics in Turkish phonology. In Hendrik Boeschoten and Ludo Verhoeven (eds.) Turkish linguistics today. Leiden: Brill. 11–59

Inkelas, S. and Orgun, C. O. (1998). Level (non)ordering in recursive morphology: evidence from Turkish. In S. G. Lapointe, D. K. Brentari and P. M. Farrell (eds.) Morphology and its relation to phonology and syntax. Stanford: CSLI. 360-410.

İpek, C. (2011). Phonetic Realization of Focus with no On-Focus Pitch Range Expansion in Turkish. In Proceedings of the 17th International Congress of Phonetic Sciences.

İşsever, S. (2003). Information Structure in Turkish: the word order-prosody interface. In Lingua 113(11), 1025-1053.

İvoseviç, S. (2011). Bürün, Bilgi Yapısı ve Sözcük Dizilişi Etkileşimi: Türkçe-Sırpça Örneği. Ankara Üniversitesi, Sosyal Bilimler Ensitüsü. Unpublished dissertation.

Jackendoff, R. (1972). Semantics in Generative Grammar. Cambridge, MA: MIT Press.

Jun, S.-A. (2005). Prosodic Typology: The Phonology of Intonation and Phrasing. Oxford University Press .

Jun, S.-A. (2012). Prosodic Typology Revisited: Adding Macro-rhythm. In the Proceedings of Speech Prosody, 6th international conference, Shanghai, China.

Kabagema-Bilan, E., LÛpez-JimÈnez, B., Truckenbrodt, H. (2011). Multiple focus in Mandarin Chinese. In Lingua 121(13), 1890-1905

Kabak, B. and Vogel, I. (2001). The phonological word and stress assignment in Turkish. In Phonology 18, 315-360.

Kabak, B. and Revithiadou. A. (2009). An interface approach to prosodic word recursion. In: J. Grijzenhout & B. Kabak (Eds.) *Phonological Domains: Universals and Deviations*. Berlin/ New York: Mouton de Gruyter.

Kamali, B. (2011). Topics at the PF interface of Turkish. Doctoral thesis, Harvard University.

Kan, S. (2009). Prosodic Domains and the syntax-prosody mapping in Turkish. MA thesis. Boğaziçi University

Karlsson, A. (to appear). Intonation in Halh Mongolian. In Sun-Ah. Jun (eds.) Prosodic Typology II: The New Development in the Phonology of Intonation and Phrasing (tentative title), OUP.

Karlsson, A. M., Svantesson, J-O., and House, D. (2012). Adaptation of focus to lexical tone and phrasing in Kammu. In Proceedings of the Third International Symposium on Tonal Aspects of Languages. Nanjing, China, O3-01.

Kılıçaslan, Y. (2004). Syntax of information structure in Turkish. In Linguistics 42, 717–765.

Konrot, A. (1981). Physical correlates of linguistic stress in Turkish. University of Sussex Language Centre Occasional Papers 24: 26-52.

Ladd, R. D. (1996). Intonational Phonology. Cambridge University Press.

Levi, S. (2005). Acoustic correlates of lexical accent in Turkish. In Journal of the International Phonetic Association, 35. 73-97.

Lewis, G. (1967). Turkish Grammar. New York: Oxford University Press, second edition

Nespor, M. and Vogel I. (1986) Prosodic phonology. Foris, Dordrecht

Özge, U. (2003). A tune-based account of Turkish information structure. Master's thesis, Middle East Technical University.
Özge, U. (2012). Notes on focus projection in Turkish. In Proceedings of the 15th International Conference on Turkish Linguistics, August 2010, Szeged, Hungary.
Özge, U. and Bozşahin, C. (2010). Intonation in the grammar of Turkish. In Lingua, 120:132-175.
Öztürk, Ö. (2005). Modeling Phoneme Durations and Fundamental Frequency Contours in Turkish Speech. PhD Dissertation. Middle East Technical University.
Pierrehumbert, J. (1980). The Phonology and Phonetics of English Intonation. Ph.D. dissertation. MIT, Cambridge, MA. Published in 1987 by Indiana University Linguistics Club, Bloomington.
Pierrehumbert, J. and Beckman, M. (1988). Japanese Tone Structure. Cambridge, MA: MIT Press.
Pierrehumbert, J. and Hirschberg, J. (1990). The meaning of intonational contours in the interpretation of discourse. In Intentions in Communication, P.R. Cohen, J. Morgan and M.E. Pollock (eds.). Cambridge, MA, MIT Press.
Potts, C. (2005). The Logic of Conventional Implicatures. In Oxford Studies in Theoretical Linguistics, Oxford University Press, Oxford.
Rump, H. H. and Collier, R. (1996). Focus conditions and the prominence of pitch-accented syllables. In Language and Speech 39:1-17.
Samek-Lodovici, V. (2005). Prosody-Syntax Interaction in the Expression of Focus. In Natural Language and Linguistic Theory 23:687–755.
Selkirk, E. (1986). On derived domains in sentence phonology. In Phonology Yearbook 3, 371-405.
Selkirk, E. (1995). The prosodic structure of function words. In Papers in Optimality Theory, J. Beckman, L. Walsh Dickey

and S. Urbanczyk (eds.). Amherst, MA: GLSA Publications: 439-470.
Selkirk, E. (2005). Comments on intonational phrasing. In Sonia Frota, Marina Vigario and Maria Joao Freitas (eds.) Prosodies, 11–58. Berlin: Mouton de Gruyter.
Selkirk, E. (2009). On clause and intonational phrase in Japanese: the syntactic grounding of prosodic constituent structure. In Gengo Kenkyu 136, 35-74.
Sezer, E. (1981). On non-final stress in Turkish, Journal of Turkish Studies 5: 61-69
Steedman, M. (2000). Information Structure and the Syntax-Phonology Interface. In Linguistic Inquiry 31:649–689.
Truckenbrodt, H. (1995). Phonological Phrases: Their relation to syntax, focus, and prominence. Doctoral thesis, MIT.
Üntak-Tarhan, A. (2006). Topics in syntax-phonology interface in Turkish: Sentential stress and phases. Master's thesis, Boğaziçi University.
Wagner, M., and D. G. Watson. (2010). Experimental and theoretical advances in prosody: A review. *Language and Cognitive Processes*, 25:7-9, 905-945