

## **Intonation in Turkish:**

### **The realization of noun compounds and genitive possessive NPs\***

#### **1 Introduction**

Little work has been done on the intonation of Turkish. This study examines how the intonational phonology treats noun compounds and genitive possessive noun phrases. Many authors have argued that noun compounds in Turkish pattern like other lexical items in terms of accent placement (Underhill 1976, Barker 1989). This study shows that indeed, compounds maintain only a single accent and that this accent is on the leftmost accentable syllable. This is in contrast to Lees 1961 who claims that the second member of the compound maintains some prominence. It is generally thought that genitive possessive noun phrases behave as separate lexical items (Underhill 1976). This is generally shown to be correct in the study discussed here. In addition to considering the differences between the realization of compounds and genitive possessives in the intonation, this study examines the differences between two types of lexical accent, default final accent and lexically marked accent.

#### **2 Overview of Turkish accent**

Turkish accent placement has been widely discussed in the literature (e.g. Lees 1961, Lewis 1967, Underhill 1976, Sezer 1983, Kaisse 1985 & 1986, Barker 1989, Inkelas 1999). The majority of Turkish stems are accented on the final syllable ("regular" accent). When these roots are combined with regular suffixes, the accent surfaces on the rightmost syllable of the word. In addition to these regular roots, Turkish has a class of words that is accented on a non-final syllable, sometimes called "Sezer" roots (Inkelas

1999, after Sezer's 1983 study). When these roots are combined with regular suffixes, accent remains on the root. Examples illustrating both regular and specially accented roots are given in (1) and (2).

(1) Regular roots with regular suffixes (-)

a. kitáp        'book'

babá        'father'

b. kitap-lár<sup>1</sup>    'books'

baba-lár      'fathers'

(2) Sezer roots with regular suffixes (+)

a. sandálje    'chair'

ábla        'older sister'

b. sandálje-ler 'chairs'

ábla-lar      'older sisters'

In the remainder of this paper, I will refer to the words in (1) as "-" (minus) (i.e. those lacking a specially marked syllable) and those in (2) as "+" (plus). The former comprise the group where accent falls on the final syllable, while the latter is the group where accent can be specified elsewhere in the word.

When the accented syllable occurs in non-final position, it is realized by a rise on the accented syllable followed by a fall on the following syllable. Thus, accented syllables are realized with a H\*+L pitch accent. When it is in final position, no fall occurs (Levi

2002). In this position, the pitch accent is trimmed to H\*. This shows that Turkish prefers deletion of a tone, to tonal crowding or contour tones (more than one tone on a syllable). This is illustrated in (3).

(3) Default final vs. lexically marked accent

|                 |            |
|-----------------|------------|
| ba ba-lar       | san dal je |
|                 |            |
| H*              | H*+L       |
| 'father-plural' | 'chair'    |

### 3 Compounds vs. genitive possessive constructions

In Turkish, compound nouns and genitive possessive noun phrases (GNPs) behave differently (Underhill 1976: 94-6). In terms of the morphology, both compounds and GNPs have the suffix *-(s)I* on the second element, but only the GNPs have the possessive suffix *(n)In* on the first noun.<sup>2</sup> In compounds, modifiers come before the first member and apply semantically to the entire group. In GNPs, on the other hand, modifiers can appear before either noun. In terms of prosody, Underhill notes that in compounds, only the first member retains its accent, while in GNPs, both members do. Some examples are given below.

## (4) Compounds

bir tʃodʒuk kitab-i 'a children's book' (Underhill 1976: 94)

*det. child book-poss.*

jeni bir tʃodʒuk kitab-i 'a new children's book' (Underhill p.94)

*new det. child book-poss.*

\*tʃodʒuk jeni kitab-i

*child new book-poss.*

## (5) GNPs

bir tʃodʒu-un<sup>3</sup> kitab-i 'a child's book' (Underhill p.94)

*det. child-gen. book-poss.*

tʃodʒu-un jeni kitab-i 'the child's new book' (Underhill p.94)

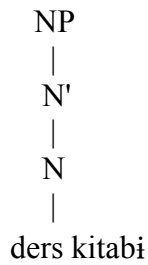
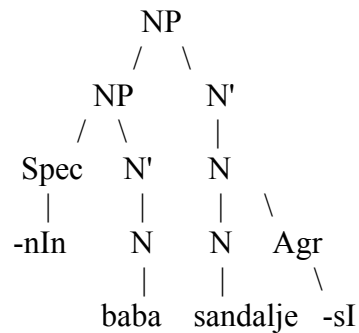
*child-gen. new book-poss.*

kytʃyk tʃodʒu-un jeni kitab-i 'the small child's new book' (Underhill 94)

*small child-gen. new book-poss.*

Based on these morphological, syntactic, and semantic differences, I assume the structures in (6) in which compounds are represented as single nouns, while GNPs have a more complex structure.

(6) Compound 'text book'

GNP<sup>4</sup> 'father's chair'

Given these different structures, we expect that GNPs and compound nouns will be treated differently in the intonational phonology. We expect that the compound nouns will be treated just as other lexical items are treated. That is, despite being formed from two words, they should behave as though they were a single unit. The nouns in GNPs, on the other hand, are expected to behave as separate entities as a result of their structure.

It is clear that compounds behave as single lexical items when they are compared with words that have several possible accentable syllables. Both compounds and other single lexical items exhibit the property of placing accent on the left-most accentable syllable. The forms below show the pre-accenting suffixes *me* (verbal negative marker) and *ti* (past auxiliary). When these suffixes appear on a verb, the accent surfaces on the syllable preceding them (see (7a&b)). (7c) is provided for comparison.

- (7) a. sinirlén-me-jedžék 'will not become irritated' (3 p. sg.)  
 b. sinirlen-edžék-ti 'will have become irritated' (3 p. sg.)  
 c. sinirlen-edžék 'will become irritated' (3 p. sg.)

When both of these pre-accenting suffixes occur in a word, only the leftmost accent is retained, as shown in (8). Notice that there is no accent on the syllable [d̄ʒek].

(8) sinirlén-me-jed̄ʒek-ti 'will not have become irritated' (3 p. sg.)

Similarly, when two nouns are combined to form a single compound, accent falls on the leftmost accentable syllable. In this case, the leftmost accent is simply the accent that would appear on the first word if it were to occur in isolation.

(9) a. aják 'foot'  
       káp 'cover'<sup>5</sup>  
       aják kab-i 'shoe' (lit. foot cover)

b. fabríka 'factory'  
       bad̄ʒá 'chimney'  
       fabríka bad̄ʒa-si 'factory chimney'

Because compounds are formed as single lexical items, they will have a tonal pattern and assignment analogous to (3), with a H\*+L pitch accent located on the accented syllable. This is illustrated in (10).

(10) t̄ʃod̄ʒuk kitab-i 'children's book'  
       | |  
       H\* + L

The H\* is linked to the location of the accent in the first word and the L to the following syllable. Notice, all compounds will include the low tone because the H\* will never appear on the final syllable of the compound.

The GNPs, being syntactic phrases of the form NP-genitive case + NP-possessed suffix, are expected to behave as two units. Unlike the noun components of the compounds, the noun components of the GNPs enter the intonational phonology as two separate units. Thus, we expect the two nouns of GNPs to look like their component parts, as shown in (11).

- (11)   ba ba-nín                      san dál je-si  
          |                                    |   |  
          H\*                                   H\*+L  
          'father's                          chair, possessed'

Compounds and GNPs are expected to behave differently. That is, there should be some evidence of an intonationally relevant boundary between the two component nouns of GNPs. This does not preclude the possibility that one of these nouns might become dephrased in some way, thus not showing an intonational boundary between the two.

Here I will add a brief note about the Accentual Phrase. For Japanese, Pierrehumbert & Beckman 1988 define the Accentual Phrase (AP) as the smallest prosodic unit with a well-defined tone pattern. The AP in Japanese has at most one lexical pitch accent. They say *at most one* pitch accent because Japanese also has unaccented lexical items. I will follow this definition for APs in Turkish. Thus, each AP is made up of a lexical item with one pitch accent. Two separate words can be grouped into a single AP, but in this

case one of the words must be dephrased and will not have a lexical pitch accent.

Compounds in Turkish constitute one AP because they have one pitch accent (see (12)).

The GNPs are expected to be two APs (see (13)), but we will see in §6.2 that speakers may dephrase the second member and thus produce only a single AP.

(12) [tʃo dʒuk ki ta bi]<sub>AP</sub>  
           |      |  
           H\*+L

(13) [ba ba nin]<sub>AP</sub> [san dal je si]<sub>AP</sub> (expected)  
           |                  |      |  
           H\*                  H\*+L

## 4 Experiments

### 4.1 Data set

In order to test the idea that GNPs would exhibit a stronger intonational boundary than compound nouns, speakers were recorded on a list of approximately 23 noun combinations.<sup>6</sup> In particular, the list was constructed so as to determine whether the second noun of the compound would be completely deaccented, as has always been stated (e.g. Lewis 1967, Zimmer 1970, Underhill 1976, Barker 1989). Furthermore, the accent pattern was varied on both the first and second members of the GNPs and compounds, thus creating four pairs. The groups are given in (14). Recall from §2 that "+" refers to words that have an irregular non-final accent, and "-" to words with the normal final accent.



(14)

| Compounds            |                      | Genitives            |                      |
|----------------------|----------------------|----------------------|----------------------|
| 1 <sup>st</sup> word | 2 <sup>nd</sup> word | 1 <sup>st</sup> word | 2 <sup>nd</sup> word |
| +                    | +                    | +                    | +                    |
| +                    | -                    | +                    | -                    |
| -                    | +                    | -                    | +                    |
| -                    | -                    | -                    | -                    |

An example of each of these possibilities is given in (15). The full list is given in Appendix A.

(15) Predicted accentual patterns

|    | Compounds  | Genitives                                     |
|----|--|---|
| ++ | litvánja lokanta-si<br>'Lithuanian restaurant'<br>(c.f. lokánta) | áblam-in sandálje-si<br>'my sister's chair'   |
| +- | týrktŷe dersler-i<br>'Turkish courses'<br>(c.f. derslér)         | áblam-in gyverdŷin-í<br>'my sister's dove'    |
| -+ | tŷobán salata-si<br>'shepherd's salad'<br>(c.f. saláta)          | kadın-ín gazéte-si<br>'the woman's newspaper' |
| -- | japrák dolma-si<br>'leaf stuffed with rice'<br>(c.f. dolmá)      | babam-ín gyverdŷin-í<br>'my father's dove'    |

#### 4.2 Methodology

Three female speakers from Istanbul (S1, S2, S4) and one male speaker from Samsun (S3) were asked to participate in the study. All four were living in the United States at the time of the recording.

Three repetitions of the data set were recorded with filler words, intended to distract the speaker from the target words. In addition to the compounds and GNPs, each

component noun was also recorded alone in order to verify where normal accent would fall on the words in question. For example, the compound *tʃodʒúk kitabî* 'children's book', as well as the two nouns *tʃodʒúk* 'child' and *kitabî* 'book' were included in the word list. Each speaker was recorded in the recording booth in the phonetics lab at the University of Washington. Speakers were recorded onto a DAT tape at 44.1 kHz with a SHURE unidirectional head-mounted dynamic microphone.<sup>7</sup> The target and filler words were embedded in the following carrier phrase, written in Turkish orthography.<sup>8</sup>

(16) Neslihan "X" dije søjledi.

Neslihan X said.

'Neslihan said X.'

Recordings were digitally transferred, down sampled to 11.025 kHz, and segmented using SoundEdit 16. All measurements and figures were done with Praat. All figures show a range of 200 Hz.

## 5 Results: Compounds

As predicted by the previous phonological descriptions of compounds in Turkish (e.g. Lewis 1967, Zimmer 1970, Underhill 1976, Barker 1989), the accent of the first noun is retained, while that of the second is not. Because each compound acts as a single lexical item (i.e. having only one pitch accent), it also must act as only one Accentual Phrase. In Figures 1-4, I have only provided the pitch accents and have omitted any phrase accents. The presence of phrase accents will be dealt with in §6.1 and 6.2. Figures 1-4 show typical renditions of these types of compounds.

Figure 1 is an example of a "- -" compound. Recall, this is the type of compound where each member would normally receive accent on the final syllable. Figure 1 shows the compound *mejvá suju* 'fruit juice' as produced by S1. We see a rise in pitch at the end of the first word *mejvá* followed by a drop in pitch on *suju*. Notice that there is no rise on the last syllable of *suyu*.

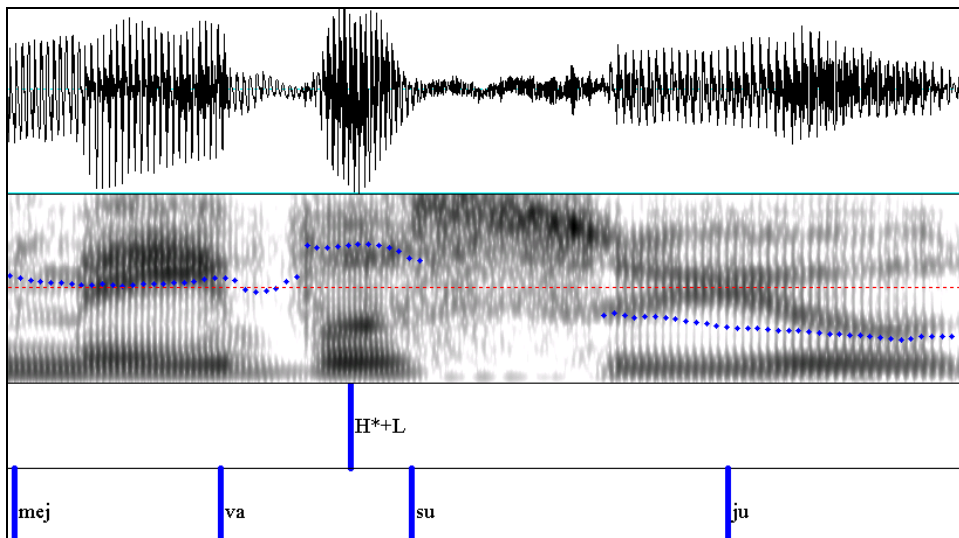


Figure 1 "- -" Compound<sup>9</sup>

Pitch track, spectrogram, and wave form of S1's *mejvá suju* 'fruit juice' (lit. 'fruit water')

Figure 2 shows a typical example of a "+ -" compound. If these nouns were in isolation, the first element would have the accent on the initial syllable and the second element would have it on the final syllable. Because this is a compound, the accent of the second noun does not surface. Here we see a H\*+L pitch accent on the first syllable *ánykara* 'Ankara', but we see no H tone on the last syllable of *firindzísî* 'baker'.

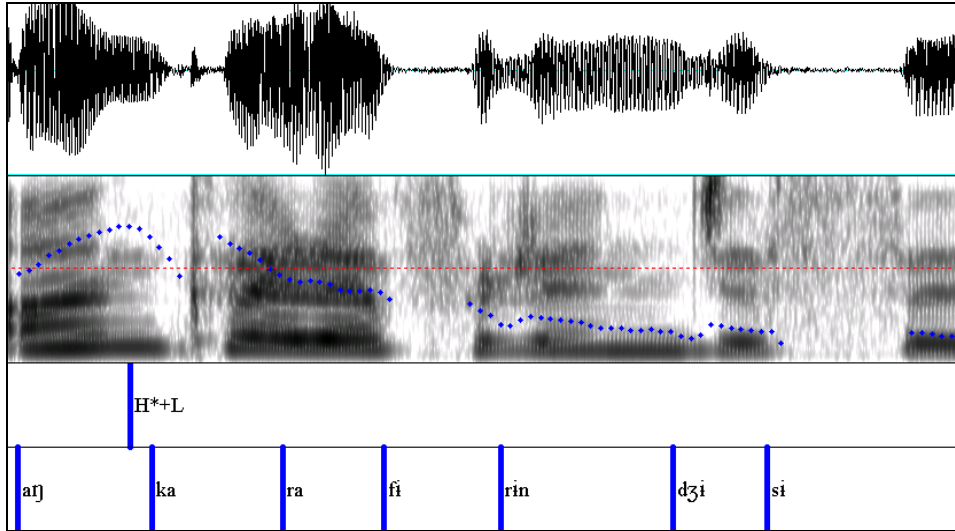


Figure 2 "+ -" Compound

Pitch track, spectrogram, and wave form of S4's *ánkara firindzisi* 'Ankara baker'.

Figure 3 shows the "- +" compound *tʃobán salatasi* 'shepherd salad'. As with the two previous examples, we see that the pitch accent on the first word is retained while that of the second is not. That is, there is no pitch peak on the second syllable of *salátasi* 'salad'.

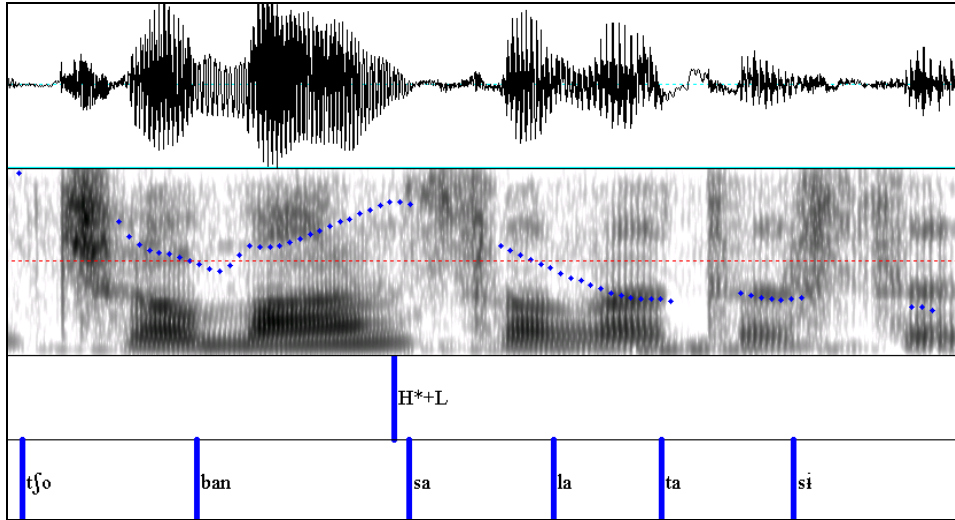


Figure 3 "- +" Compound

Pitch track, spectrogram, and wave form of S2's *şöban salatası* 'shepherd salad'.

Similarly, Figure 4 shows that the second noun of the compound *litvánja lokantasi* 'Lithuanian restaurant' does not retain its lexical pitch accent. There is no H\*+L on the second and third syllables in *lokántasi* 'restaurant'.

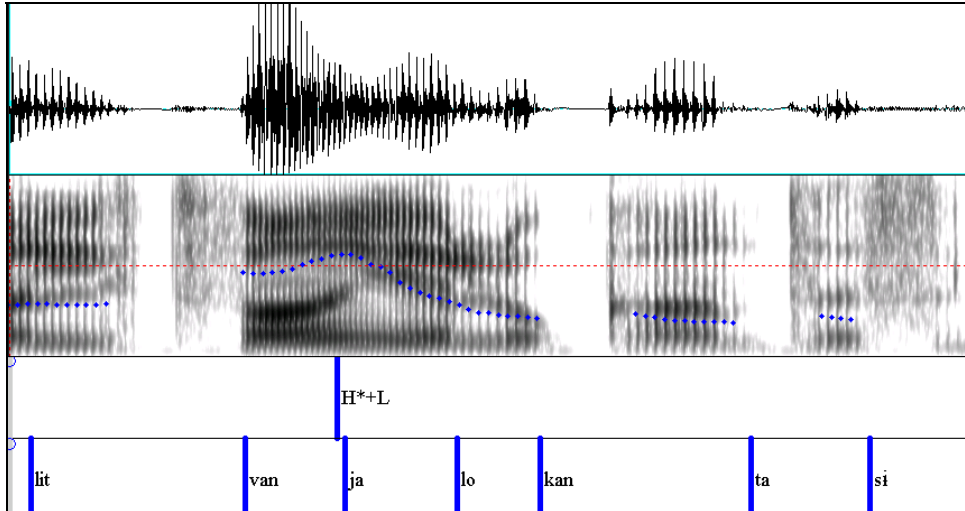


Figure 4 "+ +" Compound

Pitch track, spectrogram, and wave form of S3's *litvánja lokantasi* 'Lithuanian restaurant'.

We cannot determine from the compounds whether or not there is a phrase tone (T-) at the end of these compounds since they all end in a low tone from H\*+L. In §6.1 and 6.2, we will see evidence for the existence of a phrasal L- in this position. All of the figures in this section show that the type of accent (that is, "+" or "-") does not affect the contours of the compounds. Thus, both types of accent (lexical and default) exhibit the analogous surface pitch representations. All cases show a dramatic drop in pitch on the syllable following the accented syllable of the first word and no accent on the second word.

Though the figures coincide with the statements made by Underhill 1976, they differ from the predications of Lees 1961.<sup>10</sup> Lees claims that there is a 'reduced primary accent' (represented by "^") on the second member of the compound (Lees 1961: 47). The figures in this section show that this is not the case.

## 6 Results: Genitive constructions

This section will show that there are two ways in which GNPs can be realized. One possibility is for each component Noun Phrase (NP) to form a separate Accentual Phrase. The other is for one of the NPs to dephrase. Speakers 3 & 4 maintain separate Accentual Phrases, while Speakers 1 & 2 do not. Crucially, compounds differ from GNPs in never retaining the accent on both nouns.

### 6.1 GNPs as two Accentual Phrases

Speakers 3 & 4 show that it is possible to realize the GNPs as two separate APs. 32/39 (82%) of S3's GNPs and 35/36 (97%) of S4's GNPs were produced with two APs while the remaining ones were produced with only one.

Figures 5 and 6 show "- +" GNPs for these two speakers. There is a trimmed H\* on the final syllable of the first noun, as well as a H\*+L on the second noun.<sup>11</sup>

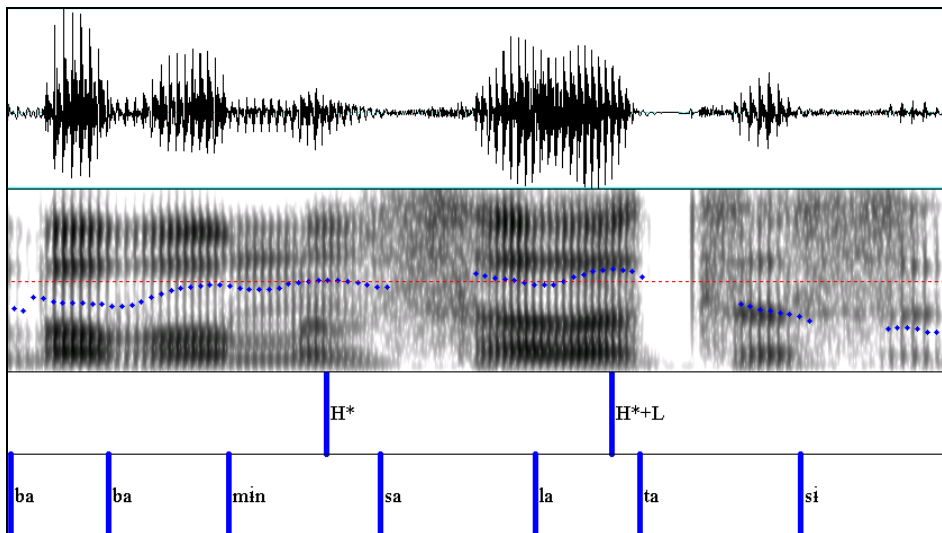


Figure 5 "- +" GNP

Pitch track, spectrogram, and wave form of S3's *babamın salási* 'my father's salad'.

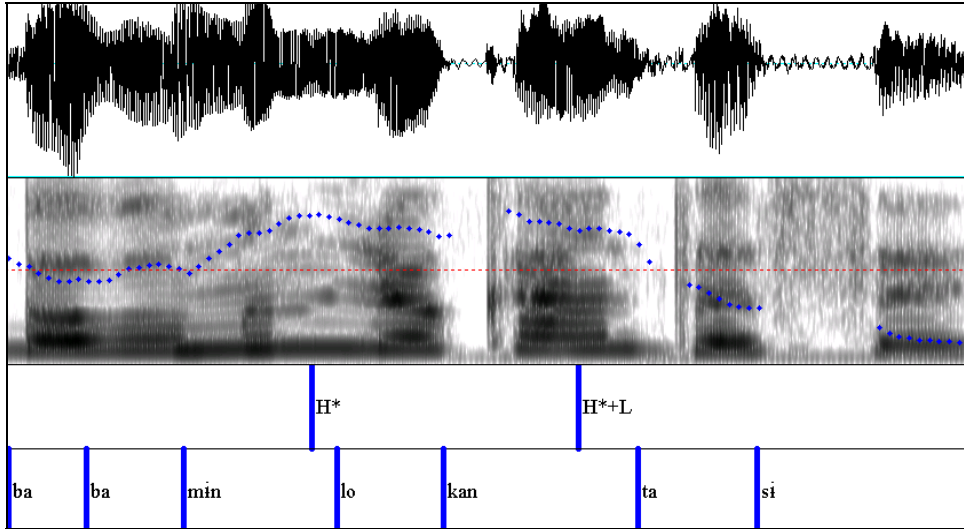


Figure 6 "- +" GNP

Pitch track, spectrogram, and wave form of S4's *babamín lokántasi* 'my father's restaurant.'

Similarly, Figures 7 and 8 show that the lexical accent H\*+L is retained on both nouns of the GNP. What is interesting about these examples is that they also show evidence for a H- genitive *continuation rise* between the two nouns.



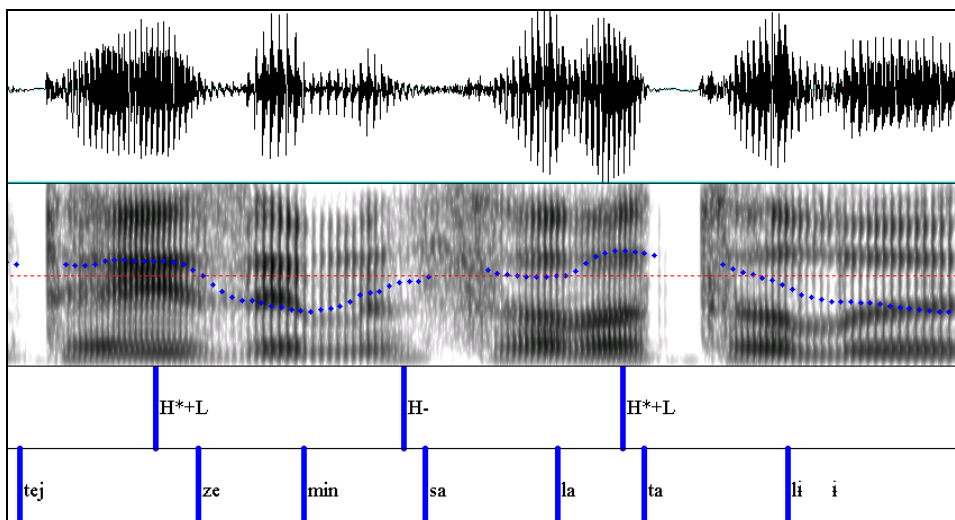
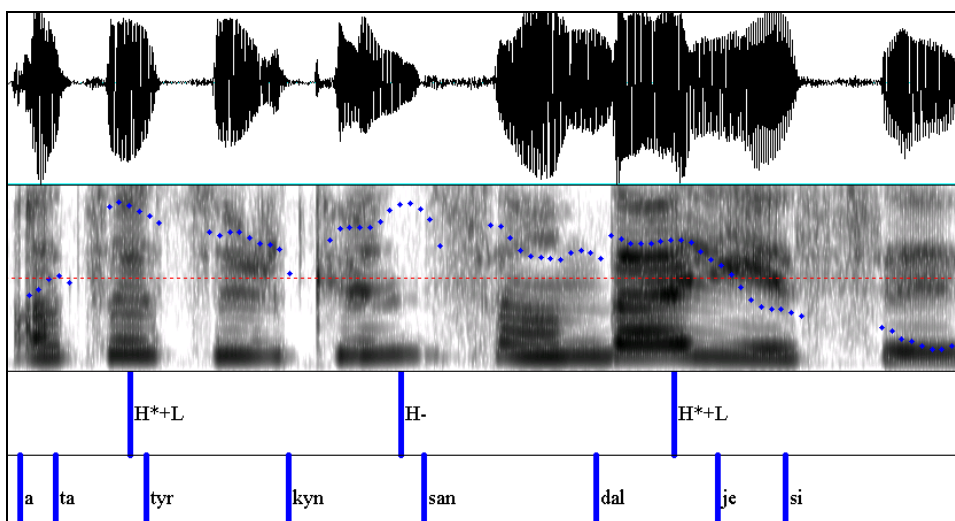


Figure 7 "+ +" GNP

Pitch track, spectrogram, and wave form of S3's *téjzemin salátalii* 'my aunt's cucumber'.

Figure 8 "+ +" GNP<sup>12</sup>

Pitch track, spectrogram, and wave form of S4's *atátyrkyn sandáljesi* 'Ataturk's chair'.

Figures 9-12 show examples where the second member of the GNP has the default final accent. In these cases, S3 and S4 differ in their realization of the lexical and phrasal accents. Figures 9 and 10 show examples of "- -" GNPs. Notice that S3 exhibits a rise on the final syllable of the first noun as well as a rise to the final syllable of the second noun, indicating that he maintains a H\* on this syllable. Conversely, Figure 10 shows only the rise on the final syllable of the first noun, but no rise for the second noun. Thus, S4 does not realize the lexical accent H\* on the second noun.

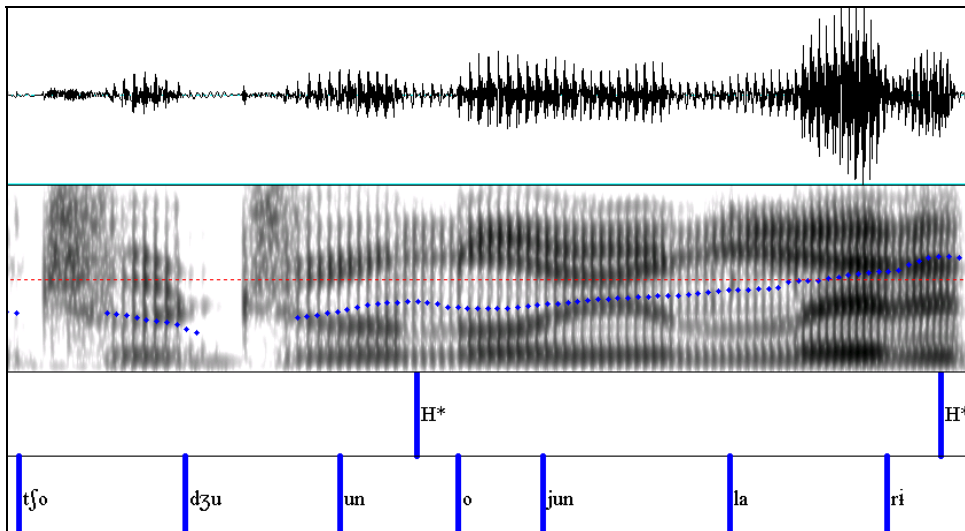


Figure 9 "- -" GNP

Pitch track, spectrogram, and wave form of S3's *tʃo dʒu un o jun la ri* 'the child's toys'.

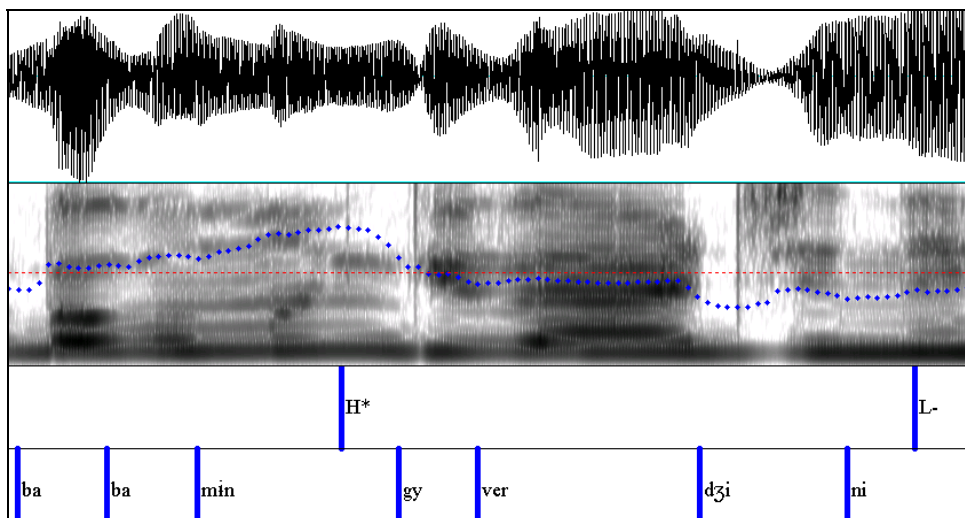


Figure 10 "- -" GNP

Pitch track, spectrogram, and wave form of S4's *babamın gyverdžini* 'my father's dove'.

Again, Figure 11 and 12 show that S4 differs in not maintaining the H\* at the end of the second noun. Importantly, Figure 12 shows that S4 is indeed maintaining two separate Accentual Phrases, as evidenced by the H- between the two nouns. This is different from the case of dephrasing that we will see with S1 & S2 in §6.2.

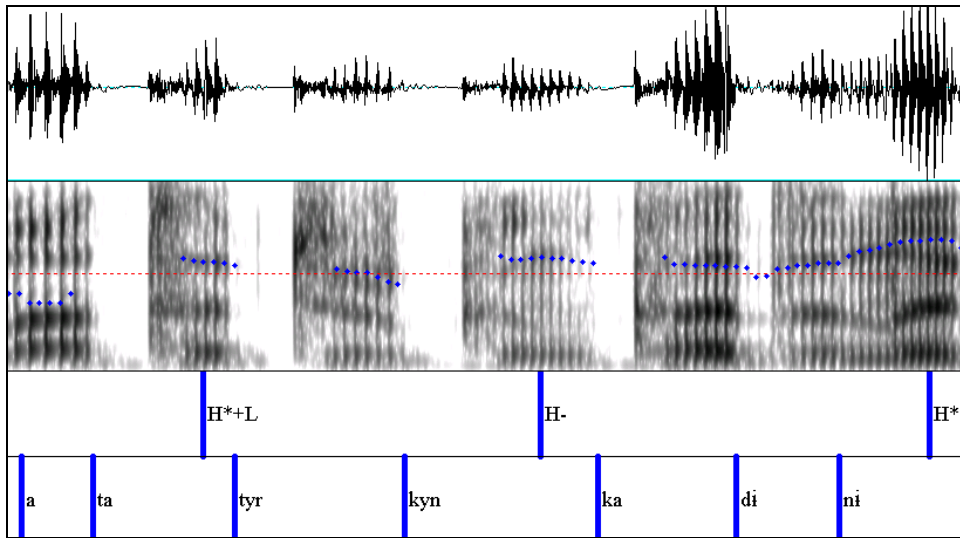


Figure 11 "+ -" GNP

Pitch track, spectrogram, and wave form of S3's *atátyrkyn kadinî* 'Ataturk's wife'.

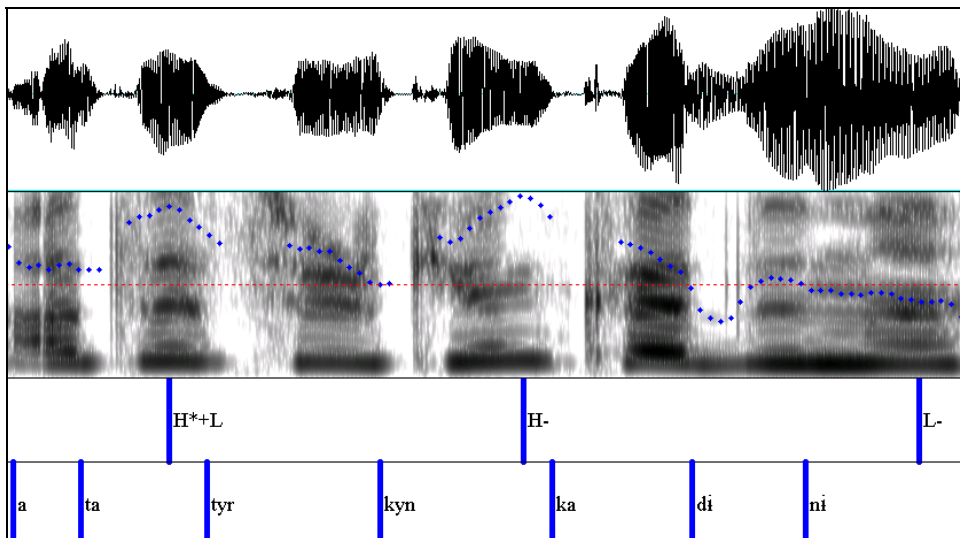


Figure 12 "+ -" GNP

Pitch track, spectrogram, and wave form of S4's *tyrkyn kadinî* 'Ataturk's wife'.

In Figure 10 and 12, the drop in pitch is marked with a L-. In these GNPs, there is a competition between L- and H\* on the final syllable. In fact, the difference in the realizations of these GNPs by S3 and S4 can be attributed to what information they prefer to delete. Whereas S3 maintains the lexical information in the form of H\*, S4 maintains the phrasal information with a L-. The trimming of lexical H\*+L to H\* on the final syllable of words has already provided evidence against tonal crowding in Turkish. Here, we have another example of a ban on multiply linked tones. Where H\* and L- compete for realization on the same syllable, only one may surface. In the case where H\* and H- compete for the same syllable, I have elected to mark it as H\*.

### ***6.2 GNPs as one Accentual Phrase***

Instead of producing the GNPs as two separate APs, S1 and S2 produced all tokens as a single AP by dephrasing the second noun. This is illustrated by the fact that the second element never surfaces with its own lexical accent, whether it is a "+" (non-final) or a "-" (final). Further evidence for dephrasing comes from the lack of a H- continuation rise between the two nouns.

Figures 13 and 14 show examples of "+ -" GNPs with a dephrased second noun. It is clear that the second noun is dephrased because (1) there is no H- continuation rise on [min] and (2) there is no rise on the final syllable [ni]. Notice how these differ from Figure 11 and Figure 12 in the previous section.

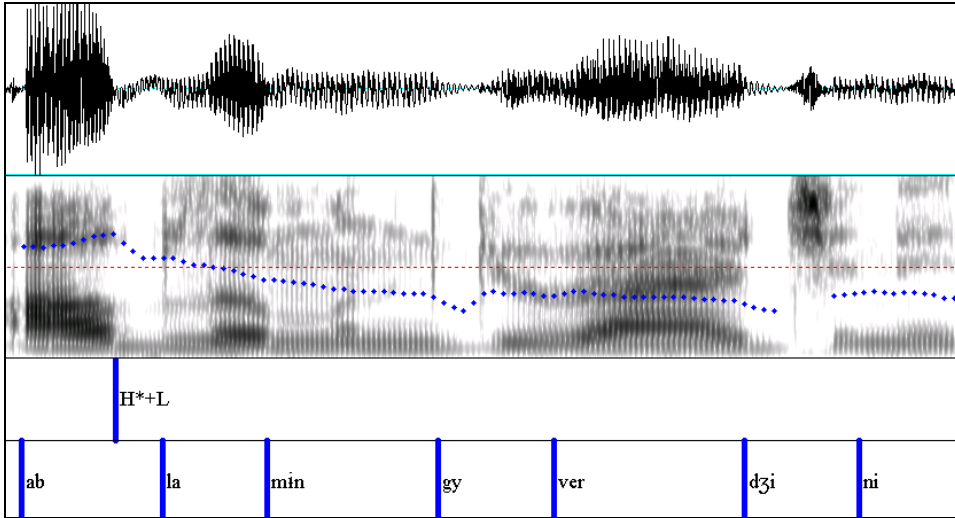


Figure 13 "+ -" GNP

Pitch track, spectrogram, and wave form of S1's *ábamin gyverḍʒini* (from *áblamin* and *gyverḍʒini*) 'my sister's dove'.

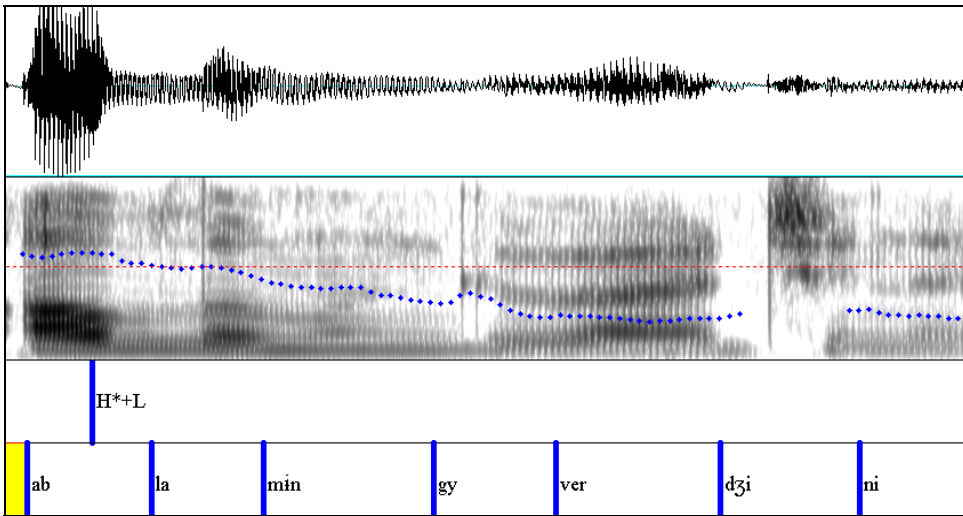


Figure 14 "+ -" GNP

Pitch track, spectrogram, and wave form of S2's *ábamin gyverḍʒini* (from *áblamin* and *gyverḍʒini*) 'my sister's dove'.

Figures 15 and 16 show a similar pattern. Again, notice the lack of a H- on the final syllable of the first noun [min], as well as the lack of a H\*+L on the second syllable in [sandáljesi]. Because the second noun is dephrased and forms a single Accentual Phrase with the preceding noun, it does not surface with its own accent, regardless of whether the accent could be final (as in Figures 13 and 14) or non-final (as in Figures 15 and 16).

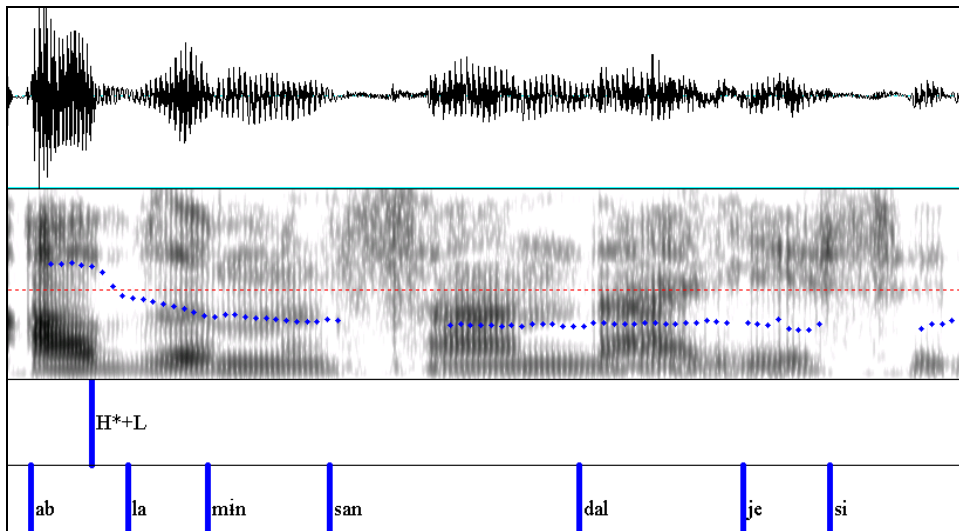


Figure 15 "+ +" GNP

Pitch track, spectrogram, and wave form of S1's *áblamin sandaljesi* (from *áblamin* and *sandaljesi*) 'my sister's chairs'.

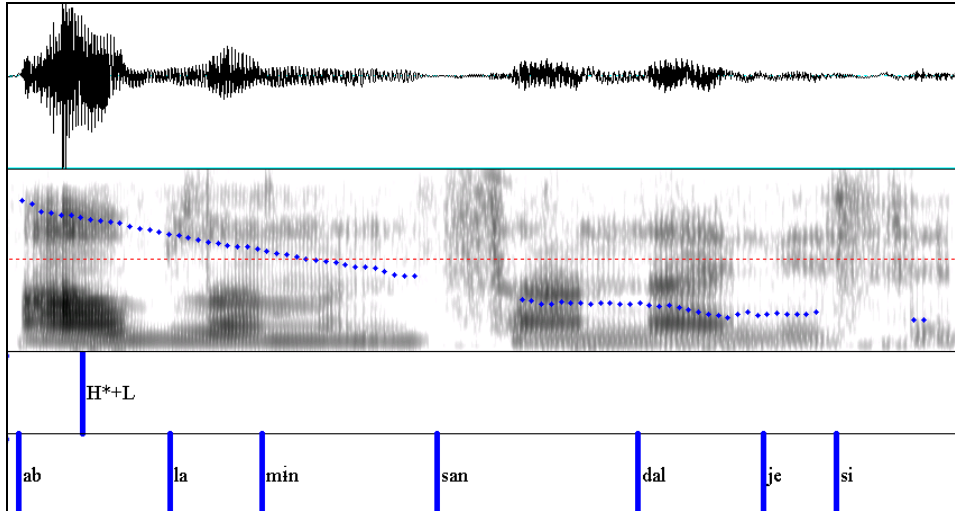


Figure 16 "+ +" GNP

Pitch track, spectrogram, and wave form of S1's *áblamin sandaljesi* (from *áblamin* and *sandáljesi*) 'my sister's chairs'.

Figures 13-16 show a drop in pitch on the lexically marked syllable of the first noun and that this tone is maintained throughout the GNP. In Figures 13-16, we did not have clear evidence for a L- because we already had a low tone from the H\*+L. In Figures 17-20, on the other hand, the first noun has final accent and therefore only a H\*. Therefore, the lowered pitch must be due to a phrasal L-. Notice that in all eight figures from this section, there is no accent on the second noun.



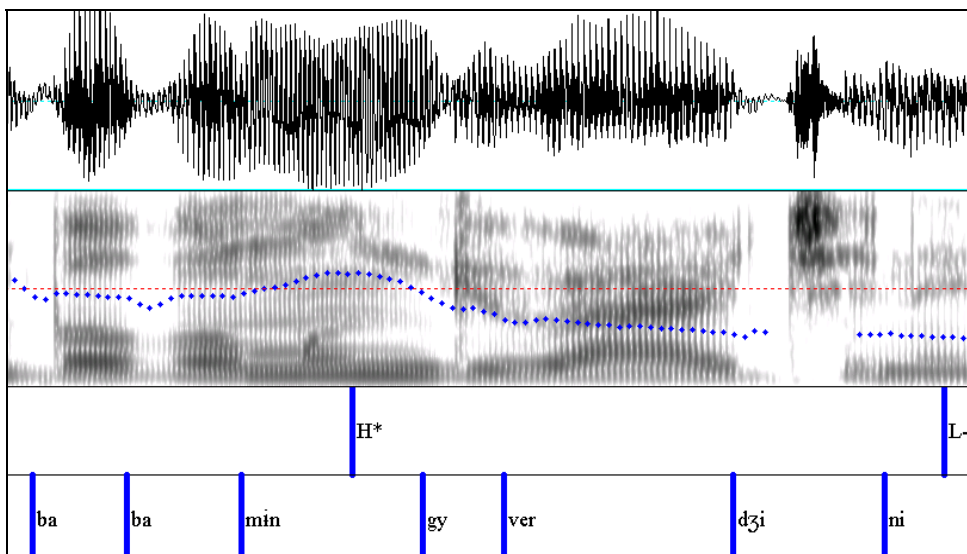


Figure 17 "- -" GNP

Pitch track, spectrogram, and wave form of S1's *babamın gyverdžini* (from *babamın* and *gyverdžini*) 'my father's dove'.

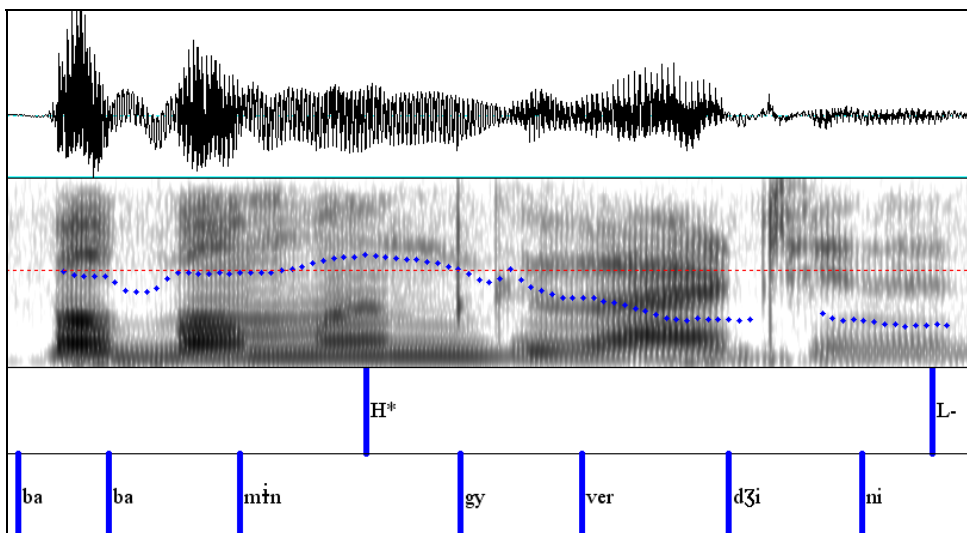


Figure 18 "- -" GNP

Pitch track, spectrogram, and wave form of S2's *babamın gyverdžini* (from *babamın* and *gyverdžini*) 'my father's dove'.

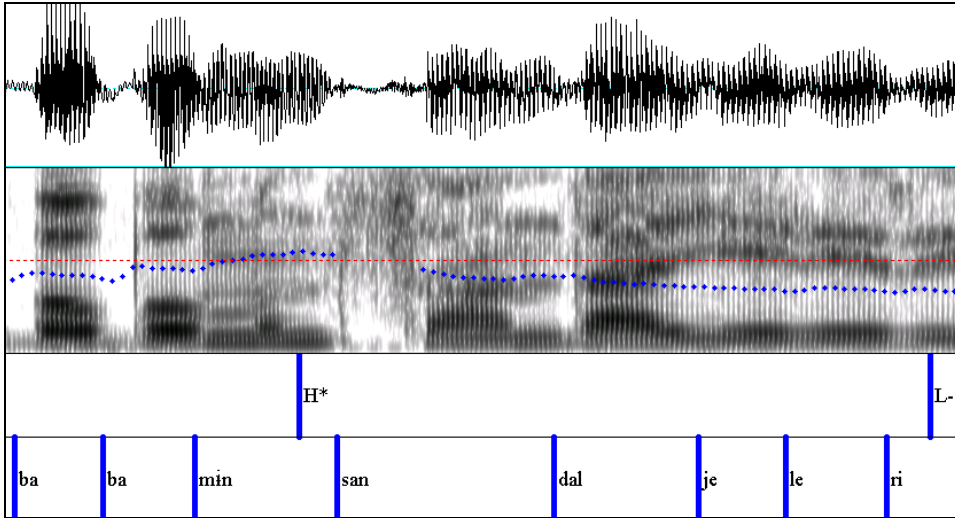


Figure 19 "- +" GNP

Pitch track, spectrogram, and wave form of S1's *babamın sandaljeleri* (from *babamın* and *sandaljeleri*) 'my father's chairs'.

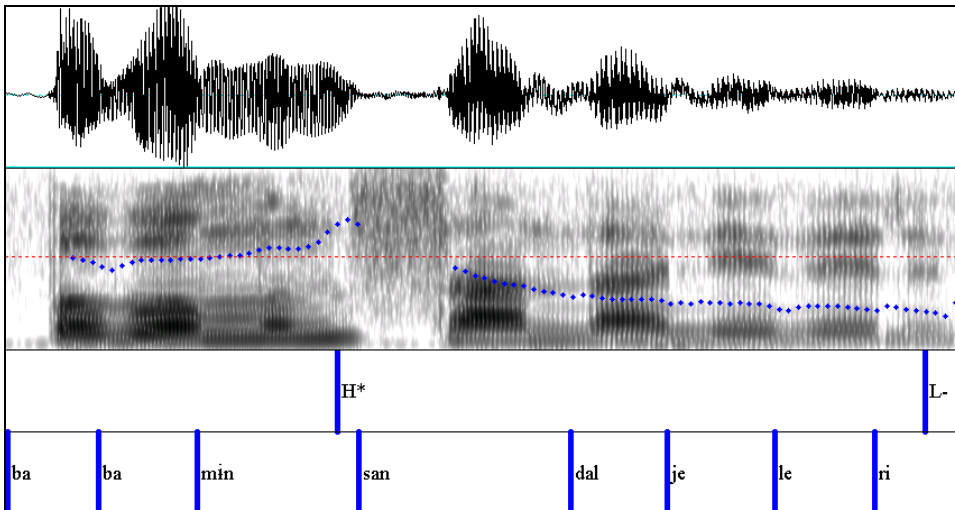


Figure 20 "- +" GNP

Pitch track, spectrogram, and wave form of S2's *babamın sandaljeleri* (from *babamın* and *sandaljeleri*) 'my father's chairs'.

We have three alternatives to consider that could account for lowering of pitch after the H\* in GNPs like those in Figure 17 through Figure 20. The examples of the compounds above did not shed any light on this case since they all ended in a low tone from the H\*+L. Therefore, we can only turn to the GNPs. I will assume the third possibility below, that this drop in pitch is the result of a phrasal L-. A first alternative could attribute the low pitch to the +L of H\*+L, as we did with the compounds. In this case, we would have to assume that the GNPs for these speakers retain the +L and allow it to attach to the second NP in a possessive NP. In these cases, the GNPs would look prosodically identical to the compounds. To test this, we would want to check how genitives surface with intervening modifiers, as in (5). It seems unlikely that speakers would treat a GNP with intervening modifiers as one giant lexical item, but this is left for future work. Another problem with assuming a +L is that in Figures 10 and 12, S4 has a lowered pitch after H-. These examples cannot be explained by a +L because the H- continuation rise has no +L component. A second alternative would be that this drop in pitch is due to declination. A phonetic study which controls for the number of syllables after the first noun, as well as for the accent placement, is necessary in order to determine which account is correct. A declination account cannot explain why it is only those nouns with a final accent that show its affect. The third alternative, and the one that I assume here, is that there is a L- in this position. Figures 13-16 do not provide outside evidence for a L- because these forms already have a low pitch as a result of +L on the first noun. Nonetheless, we would expect a H\*+L L- pattern on these GNPs. Assuming a L- in this position accounts for the lowered pitch on dephrased GNPs (Figures 17-20), as well as the lowered pitch on the separate APs of Figures 10 and 12.<sup>13</sup>

Finally, consider the location of the dephrased noun in the GNP. Indeed, for speakers who chose to dephrase one of the nouns in the GNP, there are two conflicting factors. The syntax dictates that the second noun is the head. It is therefore possible and even likely that this head NP should retain its prominence. Alternatively, the prosody dictates that the left element should retain its prominence (see §2). Since these speakers dephrase, only one of the nouns can retain its accent. In the case of Turkish, it is the prosody that is the stronger force, hence it is the leftmost noun whose lexical accent is retained and the head noun is dephrased.

A similar situation occurs in Japanese. When the adjectives are focused in Adjective + Noun sequences, the noun is dephrased and does not surface with its own pitch accent (Pierrehumbert & Beckman 1988). Just as is the case with Turkish, the head of the NP can be dephrased under certain circumstances.

## **7 Conclusion**

This study examined the differences between noun compounds on the one hand, and genitive possessive noun phrases on the other. All speakers were consistent in retaining only the lexical accent from the first member of the compound. Furthermore, the type of accent (default final or lexically marked) did not affect this. This finding is in accordance with Underhill 1976, but goes against Lees 1961. This study confirms that the lexical accent is H\*+L. Because Turkish exhibits a ban on tonal crowding, the lexical pitch accent is trimmed to H\* in word-final position.

Speakers showed variation in their realizations of the GNPs. First, speakers may vary in whether they treat the GNPs as one or two Accentual Phrases. Second, for those

speakers who maintain two separate APs, they may differ in whether they maintain lexical (H\*) or phrasal (L-) information when the two tones compete for placement on the same syllable. Again, because tonal crowding is disallowed, only one tone may surface.<sup>14</sup> The GNPs also showed evidence for the two phrasal tones H- and L-. The H- continuation rise occurs between the two members of the genitive possessive noun phrases, but only when the two nouns form separate Accentual Phrases. The L- is found at the end of all of the tokens that are in the position of the target word in the carrier phrase.

A schematic representation of the tones is given in (17) and (18). Tones that do not surface are underlined.

(17) Representation of compounds (all speakers)

[mej va su ju]<sub>AP</sub> 'fruit juice'  
 | | |  
 H\*+L L-

(18) Representation of GNPs

a. Speakers 1 and 2 (second noun dephrased)

"- -" [ba ba min gy ver d̥ʒi ni]<sub>AP</sub> 'my father's dove'  
 | | |  
 H\* L-

"- +" [ba ba min san dal je si]<sub>AP</sub> 'my father's chair'  
 | | |  
 H\* L-

"+ -" [ab la min gy ver d̥ʒi ni]<sub>AP</sub> 'my sister's dove'  
 | | |  
 H\*+L L-

"+ +" [ab la min san dal je si]<sub>AP</sub> 'my sister's chair'  
 | | |  
 H\*+L L-

## b. Speakers 3 and 4 (no dephrasing)

"- +" [ba ba mɪn]<sub>AP</sub> [san dal je si]<sub>AP</sub> 'my father's chair'  
 | | | |  
 H\* H- H\*+L L-

"+ +" [ab la mɪn]<sub>AP</sub> [san dal je si]<sub>AP</sub> 'my sister's chair'  
 | | | |  
 H\*+L H- H\*+L L-

## c. S3 (no dephrasing)

"- -" [ba ba mɪn]<sub>AP</sub> [gy ver dʒi ni]<sub>AP</sub> 'my father's dove'  
 | | | |  
 H\* H- H\* L-

"+ -" [ab la mɪn]<sub>AP</sub> [gy ver dʒi ni]<sub>AP</sub> 'my sister's dove'  
 | | | |  
 H\*+L H- H\* L-

## d. S4 (no dephrasing)

"- -" [ba ba mɪn]<sub>AP</sub> [gy ver dʒi ni]<sub>AP</sub> 'my father's dove'  
 | | | |  
 H\* H- H\* L-

"+ -" [ab la mɪn]<sub>AP</sub> [gy ver dʒi ni]<sub>AP</sub> 'my sister's dove'  
 | | | |  
 H\*+L H- H\* L-

## Appendix A

### List of Compounds:

| Type | Token                | Gloss  | Speakers   |
|------|----------------------|--|------------|
| + +  | atátyrk baŋkasi      | 'Ataturk bank' (i.e. the bank called Atatruk') | 1, 2, 3, 4 |
|      | litvánja lokantasi   | 'Lithuanian restaurant'                        | 1, 2, 3, 4 |
|      | sandálje fabrikasi   | 'chair factory'                                | 1, 2, 3, 4 |
| + -  | istábul simit t̃jisi | 'Istanbul roll dealer'                         | 1, 2,      |
|      | fabríka bad̃zasi     | 'factory chimney'                              | 1, 2, 3, 4 |
|      | t̃yrk t̃je dersleri  | 'Turkish course'                               | 1, 2, 3, 4 |
| - +  | t̃jobán salatasi     | 'shepard salad'                                | 1, 2, 3, 4 |
|      | masá lambasi         | 'table lamp'                                   | 1, 2, 3, 4 |
|      | kadın sandaljesi     | 'woman's chair'                                | 1, 2, 3, 4 |
|      | ekmék lokantasi      | 'break restaurant'                             | 1, 2, 3, 4 |
|      | áŋkara firincisi     | 'Ankara baker'                                 | 3, 4       |
| - -  | mejvá suju           | 'fruit juice'                                  | 1, 2, 3, 4 |
|      | japrák dolmasi       | 'stuffed leaf'                                 | 1, 2, 3, 4 |
|      | t̃jod̃zúk kitabi     | 'children's book'                              | 1          |
|      | t̃jod̃zúk elbisesi   | 'children's dress'                             | 2          |
|      | t̃jod̃zúk ojunları   | 'children's games'                             | 3, 4       |
|      | dérs kitabi          | 'course book'                                  | 1          |
|      | kapı kolu            | 'door handle'                                  | 1, 2, 3, 4 |

### List of GNPs

| Type | Token                | Gloss                    | Speaker    |
|------|----------------------|--------------------------|------------|
| + +  | atátyrkyn áblalari   | 'Ataturk's sisters'      | 1, 2, 3, 4 |
|      | áblamın sandáljesi   | 'my sister's chair'      | 1, 2, 3, 4 |
|      | atátyrkyn sandáljesi | 'Ataturk's chair'        | 2, 3, 4    |
|      | téjzemin salátalıı   | 'my aunt's cucumber'     | 3, 4       |
|      | atátyrkyn gazétesi   | 'Ataturk's newspaper'    | 2, 3, 4    |
| + -  | atátyrkyn kadını     | 'Ataturk's wife'         | 1, 2, 3, 4 |
|      | áblamın gyverđzini   | 'my sister's dove'       | 1, 2, 3, 4 |
| - +  | babamın sandáljesi   | 'my father's chair'      | 1, 2, 3, 4 |
|      | kadının gazétesi     | 'the woman's newspaper'  | 1, 2, 3, 4 |
|      | babamın lokántasi    | 'my father's restaurant' | 3, 4       |
|      | babamın salátasi     | 'my father's salad'      | 3, 4       |
| - -  | babamın gyverđzini   | 'my father's dove'       | 1, 2, 3, 4 |
|      | t̃jod̃zuún kitabi    | 'the child's book'       | 1          |
|      | t̃jod̃zuún elbisesi  | 'the child's dress'      | 2          |

|  |                   |                     |      |
|--|-------------------|---------------------|------|
|  | tʃodʒuún ojunlarí | 'the child's games' | 3, 4 |
|--|-------------------|---------------------|------|



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\* Thanks TO BE ADDED LATER.

<sup>1</sup> Turkish suffixes are subject to rules of vowel harmony (e.g. Lees 1961, Lewis 1967, Underhill 1976, Kornfilt 1997, Levi 2001). The plural suffix alternates between *-lar* and *-ler*. The former surfaces after back vowels and the latter after front vowels. Suffixes that contain a high vowel alternate between *i*, *y*, *u*, and *ü*.

<sup>2</sup> The compound suffix is of the form *-(s)I*, where the *s* surfaces only when the root ends in a vowel and the vowel *I* is a high vowel subject to the rules of vowel harmony. This is the same suffix that occurs on the second element of a genitive noun phrase. The genitive suffix is *-(n)In* where the first *n* surfaces when the stem is vowel-final.

<sup>3</sup> When two vowels are written next to each other, they should be interpreted as two syllables [tʃo.dʒu.un].

<sup>4</sup> This structure of the genitives is proposed by Kornfilt 1984 and Abney 1987.

<sup>5</sup> Turkish devoiced obstruents in coda. Thus the word *kap* “cover” has an underlyingly voiced segment /kab/.

<sup>6</sup> Because the genitive constructions were expected to behave in a straightforward manner, fewer were included in the word list for S1. Once it was discovered that S1 produced the compounds as expected, but not the GNPs, the number of GNPs was increased.

<sup>7</sup> S4 was recorded with an Electro-Voice RE 20 microphone positioned approximately 2 inches to the side of her mouth.

<sup>8</sup> This particular carrier phrase was used instead of “Neslihan X dedi” because speakers have a tendency to fall quickly into a creaky voice. Thus, the increased number of syllables after the target word decreased the likelihood that speakers would fall into creaky voice during the target word.

<sup>9</sup> A brief note on pitch perturbations. Pitch is often raised following voiceless obstruents, and lowered during voiced obstruents. In this example, we see a drop in the pitch at the beginning of the syllable *va*. Sonorants are generally neutral to pitch.

<sup>10</sup> I would like to thank the reviewer for bringing this claim of Lees 1961 to my attention.

<sup>11</sup> Interestingly, these speakers differed in whether the second noun had a higher pitch peak than the first noun.

<sup>12</sup> Notice that the H- can be aligned late in the syllable, on the nasal in [kyn]. Ladd 1996 writes that the actual alignment of tones will be in the “general vicinity” of the accented syllable, but that its exact placement can vary. Association, on the other hand, is the abstract phonological linking of a tone to a syllable. In this case, the H- is associated to the final syllable and its exact alignment on the nasal does not alter this.

<sup>13</sup> The location of the phrasal L- is considered to be phrase-final in these examples, but see Grice, Ladd, and Arvaniti 2000 for other locations of phrasal accents in a variety of languages.

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<sup>14</sup> A constraint-based model of phonology can easily explain this variation. By changing the ranking of (1) the ban on tonal crowding (\*CONTOUR), (2) the requirement that lexical information be kept, (3) the requirement that phrasal information be kept, and (4) the limiting of extra prosodic structure (\*STRUCT), we can account for the dephrasing of S1 and S2 and the variable representation of the non-dephrased GNPs of S3 and S4.