*Phonology* **18** (2001) 315–360. © 2001 Cambridge University Press
DOI: 10.1017/S0952675701004201 Printed in the United Kingdom

# *The phonological word and stress assignment in Turkish**

**Barış Kabak**
**Irene Vogel**
University of Delaware

It is generally believed that Turkish stress is always word-final. Closer examination, however, reveals several types of exceptions to this pattern involving both roots and affixes. This paper proposes a unified analysis of regular and irregular stress in Turkish that crucially depends on our definition of the Phonological Word. In addition, we discuss stress in constituents beyond the word, and provide evidence for the Clitic Group as well as the Phonological Phrase. Finally, we also briefly discuss vowel harmony and a set of syllabification phenomena, and show how the latter, in particular, provide independent support for the proposal we advance here.

## 1 Introduction

Stress assignment in Turkish is generally considered to be very simple and systematic. Closer examination, however, reveals several types of exceptions to the general pattern in both roots and affixes. This paper proposes a unified analysis of Turkish stress that handles both the regular and exceptional cases in a simple and straightforward manner. Our analysis crucially depends on our definition of the Phonological Word in Turkish, one that we base on widely accepted principles. In addition, reference is made to the Clitic Group and the Phonological Phrase in our account of stress. Our proposal is further motivated by the insight it offers into the analysis of several syllable-related phenomena. Vowel harmony, by contrast, is shown not to crucially refer to any prosodic domain, either in the system we propose or in an alternative system that uses recursive Phonological Words as opposed the Clitic Group. Our analysis is presented in derivational terms; however, an appendix is provided that

* This paper is an expanded version of a paper presented at the 22nd Annual Conference of the Linguistic Association of Germany, Workshop on *Das Wort in der Phonologie*, Marburg, Germany, March 2000. We would like to thank the participants in the workshop for their valuable feedback on our paper. We are also grateful to Bill Idsardi, Nihan Ketrez and Jaklin Kornfilt, as well as to the anonymous reviewers of *Phonology*, for their comments on an earlier version of this paper.



https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

indicates how our main results might also be achieved within a constraint-based system. Of course, the ultimate choice of phonological model depends on considerations beyond the scope of the present research.

## 2 Regular and irregular stress in Turkish

Turkish is known to have a simple stress assignment rule that places primary stress on the final syllable of a word irrespective of the length of the word and weight of the syllables (Lees 1961, Lewis 1967, Sezer 1983). Thus stress can be seen to move rightwards in the following examples, where a series of suffixes is attached to a stem:[1]

(1) a. ki**táp** 'book'
b. kitap**lík** 'bookcase'
c. kitaplık**lár** 'bookcases'
d. kitaplıkla**rím** 'my bookcases'
e. kitaplıkları**míz** 'our bookcases'
f. kitaplıklarımız**dán** 'from our bookcases'

In addition to this regular stress assignment pattern, Turkish also has a number of instances of non-final stress, which can be further classified into two types. First, we occasionally observe exceptional root stress, a phenomenon that is limited to certain place names (2a–c), unfamiliar personal names (2d, e), uninflected adverbs and conjunctions of foreign origin (2f, g) and certain other borrowings (2h, i):[2]

(2) a. **Án**kara 'Ankara'
b. Üs**kű**dar 'Üsküdar'
c. Bel**çík**a 'Belgium'
d. **Bár**bara 'Barbara'
e. Man**dé**la 'Mandela'
f. **fá**kat 'but'
g. **á**caba 'one wonders'
h. ak**vár**yum 'aquarium'
i. **né**gatif 'negative'

The second type of exceptional non-final stress arises when certain affixes are attached to a word. These affixes prevent the placement of stress to their right, and thus result in non-final stress. This can be seen in (3) for

[1] In this paper, we use Turkish orthography. *ı* represents the high back unrounded vowel, *ü* the high front rounded vowel, and *ö* the non-high front rounded vowel. *ş* represents the voiceless palatal fricative; *ç* and *c* indicate voiceless and voiced palatal affricates, respectively. Unless otherwise stated, the examples and pronunciations provided throughout this paper are based on the speech of the first author, and are characteristic of the standard educated dialect of Turkish spoken in Istanbul.

[2] It has been claimed that vocatives may also exhibit initial stress (Foster 1969). According to Zimmer (1970), initial stress may be used with vocatives as well as some intensive adjectives in particularly emphatic speech. We will not address such stress patterns here since it is not clear (i) how widespread they are (e.g. they are absent from the Standard Istanbul dialect of the first author), and (ii) precisely under what conditions they apply since they fall beyond the basic stress rules of Turkish.

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

a subset of the affixes in question. The relevant affixes are underlined; for a full list, see (22) in §6.1. below.

(3) a. gel-di-**níz** 'You came.'
come-PAST-2PL

**gél**-me-di-niz 'You didn't come.'
come-NEG-PAST-2PL

gel-di-**níz**-mi 'Did you come?'
come-PAST-QUES

b. sakla-n-dı-**lár** 'They hid (themselves).'
hide-RECIP-PAST-3PL

sakla-n-dı-**lár**-da 'They also hid (themselves).'
hide-RECIP-PAST-3PL-CONN

sakla-n-**míş**-tır-**lar**-da 'They might also have hidden (themselves).'
hide-RECIP-EVID-EP COP-3PL-CONN

## 3 Problems of exceptional word stress

Exceptional word stress in Turkish has received attention from a number of linguists. We examine here several proposals that have been advanced for the two types of atypical stress patterns within words: exceptional root stress and special stress patterns related to the presence of certain affixes.

### 3.1 Exceptional word stress: roots

In order to handle a particular category of exceptional root stress, Sezer (1983) proposed a quantity-sensitive rule. The claim is that this rule is needed to account for the stress properties of loanwords and place names. The rule can be roughly formulated as in (4), and the items to which it applies have come to be known as 'Sezer roots':

(4) *Sezer stress rule*

If the antepenultimate syllable is heavy and the penultimate syllable is light, stress the antepenultimate syllable; otherwise stress the penultimate syllable.

Though the rule in (4) makes the correct prediction in many irregularly stressed words in Turkish, there are still exceptions to this rule. Note, for example, that (2b, c, e, g, i) seen above do not follow the rule in (4).

More recently, Inkelas & Orgun (1998) have developed a cophonology approach to exceptional root stress in Turkish, invoking separate stress systems for different parts of the lexicon. Lexical items are thus assigned to different cophonologies as needed; those roots that carry exceptional stress but do not obey the rule in (4) are furnished with a lexical

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

specification to this effect. Inkelas & Orgun's claims are unclear with regard to the criteria on which Turkish grammar assigns roots to different cophonologies, yielding what appears to be a rather idiosyncratic classification of exceptionally stressed roots, and in particular, those that do not obey the rule in (4). In fact, it appears that place names would thus need to be located in three different cophonologies. Some names would appear in a cophonology governed by the rule in (4) (e.g. ***Án****kara*), others in a cophonology for irregularly stressed roots that do not follow (4) (e.g. *Üs****kü****dar*, *Belçíka*) and still others in the regular stress cophonology (e.g. *Anado****lú***, *Işık****lár***). It should be noted that while Inkelas & Orgun propose to use only two cophonologies, they are in effect making a three-way distinction among root types. That is, their Word cophonology contains two distinct types of roots, the regular ones, and the irregular ones that do not follow the Sezer rule. The latter require, furthermore, prespecification of the atypical stress and a stipulation that any underlyingly specified stress prevails over the regular stress rule associated with that cophonology.

At this point we must question the picture of Turkish phonology that is created by establishing a separate cophonology for the Sezer roots, while the other irregular roots require a more complex system involving lexical prespecification and a stipulation about the application of the regular stress rule in regard to such prespecification. In such a model, it would appear that among the irregular roots the more general case is that of the Sezer roots. In fact, the opposite is true. A dictionary survey of polysyllabic names reveals that of the 206 irregularly stressed place names that contain a heavy antepenultimate and a light penultimate syllable, 155 words have primary stress on the penultimate and only 51 have stress on the antepenultimate, the pattern predicted by the Sezer rule (Çakır 1998).

Another type of irregular root stress has received some attention. Specifically, there are certain adverbs that are distinguished from otherwise homophonous nouns or adjectives only by stress on their first syllable (e.g. ***yál****nız* (ADV) 'lonely, only' *vs.* *yal****níz*** (ADJ) 'alone', ***ní****hayet* (ADV) 'finally' *vs.* *niha****yét*** (N) 'end'). Hameed (1985) proposes to derive the adverbs from the related nouns and adjectives by a zero-suffixation rule that has the effect of shifting stress to their initial syllable. A drawback of this approach is that such a rule is not generalisable to other cases where there is homophony between adverbs and related adjectives (e.g. *ko****láy*** (ADV) 'easily' *vs.* *ko****láy*** (ADJ) 'easy', *ça****búk*** (ADV) 'quickly' *vs.* *ça****búk*** (ADJ) 'quick', *i****yí*** (ADV) 'well' *vs.* *i****yí*** (ADJ) 'good'). In fact, many adjectives can be used as adverbs in Turkish without any change in stress, the difference being determined only by what they modify in a phrase (e.g. *i****yí*** *yık-****ár*** '(s)he washes well' *vs.* *i****yí*** *a****dám*** 'good man'). Another disadvantage of deriving initial stress on the adverbs in question is that this would make them appear distinct from other types of irregular roots with initial stress. In fact, they behave in precisely the same way, retaining their idiosyncratic stress regardless of any further suffixation, and whether or not they follow the Sezer stress rule in (4) above (e.g. ***yár****ın-a* (tomorrow-DAT) 'for

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

tomorrow', *Üs**kű**dar-a* (Üsküdar-DAT) 'to Üsküdar', ***Án**kara-dan* (Ankara-ABL) 'from Ankara').

### 3.2 Exceptional word stress: affixes

Other proposals are more concerned with the exceptional stress related to the presence of certain affixes (exceptional affix stress). Typically, these proposals have been developed within the framework of Lexical Phonology, where different stress assignment rules are interspersed among a number of morphological strata. A problem encountered by such proposals (e.g. Hameed 1985, Kaisse 1985, 1986, Inkelas & Orgun 1995) is that they often result in undesirable loops back to preceding levels and/or require ad hoc classifications of morphemes.

Indeed, as Inkelas & Orgun (1998: 369) point out, in contrast to an earlier claim (Inkelas & Orgun 1995), neat level ordering in Turkish is 'illusory' since the language has a great deal of recursive morphology. In fact, a main source of the problems relating to stress assignment is the fact that the suffixes and syntactic processes involved in word formation in Turkish permit numerous combinatorial possibilities. Loops are typically required to handle alternations of the so-called stress-neutral and stress non-neutral suffixes, since the two types of suffixes are usually assigned to different strata. This can be seen, for example, in Hameed's (1985) analysis, where the derivational morphemes *-CA*[3] and *-lI*,[4] assigned to Level 3, may precede certain Level 2 suffixes, as in (5).

(5) a. Türk-çe → Türk-çü → Türk-çe-ci
Turk-ish Turk-'er' Turk-ish-'er'
L3 L2 L3 L2

b. çamur-lu → çamur-lar → çamur-lu-lar
mud-with mud-PL mud-with-PL
L3 L2 L3 L2

Aside from such loops, Hameed's analysis considers only a limited set of data and morphemes, and thus fails to be generally predictive.

Kaisse (1985), too, requires loops. In this analysis, words with non-final stress are assigned to Level 1, which is associated with Foot Formation and a Word Stress Rule. Level 2 is the stratum of regular suffixes. Yet another level is included for a set of suffixes that are never stressed. Since regular suffixes may follow certain unstressable suffixes, a loop must be introduced, as shown below. Specifically, (6a) shows that *-Il*, *-DI* and *-lAr*

[3] In this paper, we use capital letters to indicate segments that undergo assimilation processes. /A/ and /I/ represent vowels that undergo harmony for frontness and rounding, respectively. The capital letter consonants represent consonants that undergo voicing assimilation.

[4] Note that Hameed (1985) erroneously classifies *-lI* as a Level 3 (stress-neutral) suffix on the basis of a case in which it is attached to an irregularly stressed stem. In fact, *-lI* behaves like other productive native Turkish suffixes, and regularly receives stress when it is final in a word that does not carry any idiosyncratic stress.

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

are regular suffixes since they give rise to regular final stress, and would thus be included at Level 2. Kaisse considers *-mA* a 'neutral' or unstressable suffix, and assigns it to a different level. The loop arises when *-mA* appears within a string of Level 2 suffixes, interrupting the regular stress pattern by causing the previous syllable to bear stress, as seen in (6b).

(6) a. at-ıl-dı-**lár** 'They were thrown away.'
throw-PASS-PAST-3PL
L2 L2 L2

b. at-**íl**-ma-dı-lar 'They were not thrown away.'
throw-PASS-NEG-PAST-3PL
L2 L3 L2 L2

By contrast, loops are avoided by van der Hulst & van de Weijer (1991), who consider all suffixation processes to take place at Level 1, following Barker (1989). A rule of Cyclic Stress Assignment (CSA) associated with Level 1 applies each time a suffix is attached to a base, placing primary stress on the final syllable of the newly formed word. A stress clash generally arises at the end of each cycle, requiring the introduction of an additional convention, Stress Clash Resolution (SCR). This process removes the leftmost of the two stresses on immediately adjacent syllables. To account for exceptional stress patterns, van der Hulst & van de Weijer, like Kaisse, crucially classify certain affixes as 'stress-neutral' (i.e. unstressable). These suffixes (e.g. the negative morpheme *-mA*) create a gap between the stress immediately to their left on the root or preceding suffix and the stress on the suffix attached to their right. The SCR fails to apply in such cases of two equally prominent stresses since it only applies when the stresses are adjacent. Thus, yet another (postcyclic) Word Stress Rule is proposed, the effect of which is to select the leftmost of two equally prominent stresses. All other stresses are deleted. The series of rules is illustrated in (7), in relation to the final cycle, which has introduced the suffix *-lAr*. Note that stress is present on other morphemes due to earlier applications of the same cyclic stress rules; no stress appears on *-mA* since it is 'unstressable'.

(7) *Cyclic Stress Assignment* **yáp**-ma-**dí-lár** 'They did not do (it).'
do-NEG-PAST-3PL
*Stress Clash Resolution* **yáp**-ma-dı-**lár**
*Word Stress Rule* **yáp**-ma-dı-lar

While van der Hulst & van de Weijer's analysis has the advantage of avoiding level ordering paradoxes by placing all suffixation phenomena in a single stratum, Level 1, it loses its advantage over other analyses of Turkish stress when long series of suffixes are attached to a stem. In such cases, each instance of affixation of a regular (i.e. not stress-neutral or 'unstressable') suffix creates a stress clash and thus necessitates the repetitive application of the SCR rule. For instance, in deriving the

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

following example, eleven applications of the CSA rule and eight applications of the SCR rule are needed in order to arrive at the correct surface stress pattern.[5] The postcyclic Word Stress Rule must also apply to ensure that only one stress appears in the final form of the word.

(8) güzel-leş-tir-**é**-me-dik-ler-im-iz-den-mi-sin-iz
beauty-DERIV-CAUS-IMPOSS-NEG-OBJ PRT-PL-1SG-PL-ABL-QUES-2SG-PL
'Are you among those whom we could not beautify?'

Another weakness of this model is that the SCR predicts secondary stress on syllables that van der Hulst & van de Weijer actually consider extrametrical for other purposes. Recognising this problem, the authors opt to exclude secondary stress from consideration, pointing out that, in any case, there is little agreement about secondary stress in the literature.

Taking a slightly different approach, Inkelas (1999) proposes the use of cophonologies, as seen above in relation to irregularly stressed roots. The Sezer cophonology includes those stems that obey the rule seen above in (4). A distinct Word cophonology is responsible for words with regular final stress. In addition, stress prespecification is required in a number of cases: non-Sezer stems (i.e. irregularly stressed roots that fail to obey the Sezer rule), 'pre-stressing' suffixes that are claimed to shift stress to the preceding suffix and idiosyncratic suffixes that always bear stress. Not only is Inkelas' list of prespecified morphemes not exhaustive, certain suffixes such as the past morpheme *-DI* would need to be classified as both regular and 'pre-stressing' since they appear to be pre-stressing in some cases (e.g. with a nominal host as in (9a)) but regular in others (e.g. with a verbal host as in (9b)).

(9) a. **éş**-ti-niz 'You (PL) were mates/partners.'
mate-PAST-3PL

b. eş-ti-**níz** 'You (PL) dug (it) up.'
dig-PAST-3PL

Distinct specifications for suffixes such as the past tense morpheme that behave differently when attached to a verbal or a nominal host, however, would inevitably lead to extensive prespecification in the lexicon. More significantly, such prespecification would obscure an important generalisation about the verbal and nominal structures involved. Specifically, we will show (see §7 for details) that the apparent presence or absence of prestressing is not, in fact, a property of the affixes themselves, but rather is due to the presence or absence of a copula, whether it is phonetically manifested or not. Thus, we see in (10a) that stress is assigned regularly to the final syllable in a verbal construction without a copula, *-lar* (3PL

[5] There are eleven applications of the Cyclic Stress Assignment rule if we include a cycle on the root, and eight applications of the Stress Clash Resolution (SCR) rule: *güzél-léş* (SCR 1), *-léş-tír* (SCR 2), *-tír-é* (SCR 3), *-é-me* (no clash: *-me* is unstressable), *-me-dík* (no clash: *-me* is unstressable), *-dík-lér* (SCR 4), *-lér-ím* (SCR 5), *-ím-íz* (SCR 6), *-míz-dén* (SCR 7), *-dén-mi* (no clash: *-mi* is unstressable), *-mi-sín* (no clash: *-mi* is unstressable), *-sín-íz* (SCR 8).

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

agreement marker), while in (10b), it is assigned to the left of a phonetically manifested copula. It is also assigned to the left of a phonetically null copula in (10c), not to the final syllable *-lar*. By comparison, stress is always final in nominal constructions, where the copula is not present, as illustrated in (10d) with the homophonous plural marker *-lár*.

(10) a. kız-dı-**lár** 'They got angry.'
angry-PAST-3PL

b. ka**bá**-y-dı-lar 'They were rude.'
rude-COP-PAST-3PL

c. **kíz**-∅-dı-lar 'They were girls.'
girl-COP (null)-PAST-3PL

d. kız-**lár** 'girls'
girl-PL

These are not the only types of stress irregularities. In fact, there are also exceptional stress patterns that involve clitics and these, in turn, interact with the root and affixal stress patterns we have just seen. In addition, there are interesting stress facts relating to compounds and phrases, although not one of the analyses of Turkish to date accounts for the systematic differences between compound and phrasal stress. As will be seen in subsequent sections, our proposal also addresses the stress phenomena that involve clitics, as well as the compound and phrasal stress patterns.

## 4 Clitics and stress

The presence of clitics (CL) contributes to the stress pattern of a word, although clitics themselves never receive stress when they are attached to the right of a word (e.g. *a**dám**-mı* 'man-QUES (CL)', *ço**cúk**-da* 'child-CONN (CL)', *bı**çák**-la* 'knife-INSTR (CL)', *Musta**fá**-dır* ('Mustafa-EP COP (CL)'). This in itself would not be problematic for the previous analyses of Turkish stress, since clitics could easily be excluded from word-level stress assignment. Closer examination, however, reveals what is an insurmountable problem for such analyses. That is, in certain cases clitics may be followed by suffixes that are generally considered to be among the regular ones, again giving these suffixes the appearance of having both regular and irregular stress properties. For instance, in (11a), the conditional suffix (*-sA*) and the 2PL suffix (*-(y)nIz*) remain unstressed in the presence of a preceding copula (*y*), and thus appear to be irregular, while in (11b), the 2PL suffix undergoes the regular stress assignment rule.[6] The example in (11c) shows, furthermore, that the conditional suffix can bear

[6] We assume Kornfilt's (1996, 1997: 366) analysis of copular constructions in these examples. Accordingly, the suffix for the conditional (*-sA*) occurs in two different uses. In its copular use, the conditional suffix is attached to the copula *-y*/∅ (null). In its use as a simple finite form, the same suffix is attached to the bare verbal stem.

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

stress word-finally when it is not preceded by a seemingly 'pre-stressing' suffix, the copula in this case. Note that in this example the past tense suffix *-DI* is not stressed, unlike in (11a), where it does bear stress.

(11) a. kal-**dí**-y-sa-nız 'if you have stayed'
stay-PAST-COP-COND-2PL

b. kal-sa-**níz** 'if you were to stay'
stay-COND-2PL

c. kal-**sá**-y-dı-nız 'had you stayed/if only you had stayed'
stay-COND-COP-PAST-2PL

Another well-known challenge for linguists working on Turkish is the appearance of stress in non-final position in non-verbal predicates and structures with aspect, mood and modality markers (e.g. *-Ir/-Ar* (AORIST), *-mIş* (PAST PARTICIPLE), *-Iyor* (PROGRESSIVE), *-mAlI* (NECESSITATIVE)). This stress pattern has typically been considered an irregularity of the constructions in question, and has given rise to rather ad hoc classifications of tense, aspect and person markers, as well as to further ad hoc analyses based on these classifications.

Inkelas (1999), for example, mentions that several aspect and modality markers must be underlyingly specified as stress-bearing; that is, they retain their stress even when additional affixes follow them (e.g. *bul-**úr**-um* (find-AOR-1SG) 'I find'). Underlying specification is also required for person markers that follow nominals indicating that they are 'stress shifting' (e.g. *avu**kát**-ım* (lawyer-1SG) 'I am a lawyer', *dok**tór**-uz* (doctor-1PL) 'we are doctors').

At first glance it appears that these two cases might be handled in the same way since both the participles that include the aspect markers and the nominals are often further inflected with person markers from the same agreement paradigm. That is, instead of attributing stress properties to the aspect markers and nominals themselves, we might rely on a pre-stressing property assigned to the following agreement morphemes to place stress on them as needed. The problem with this approach, however, is that there are cases where the aspect marker and the person marker are interrupted by a regular morpheme (e.g. past tense marker *-du*, i.e. /-DI/), as in (12b). In these cases, stress still appears on the aspect marker.

(12) a. konuş-**úr**-lar 'They speak.'
speak-AOR-3PL

b. konuş-**úr**-du-lar 'They used to speak.'
speak-AOR-PAST-3PL

We are thus left again with the undesirable situation in which two different types of specification are required for a single morpheme: pre-stressing with the agreement markers and stress-bearing with the aspect markers. As we show below, the model we have developed for word stress handles the stress facts related to clitics without modification.

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

## 5 Turkish word stress: a reanalysis

The reanalysis of Turkish stress that we develop here crucially relies on a model of phonology such as Prosodic Phonology that divides the representation of speech into hierarchically arranged units. These phonological or prosodic constituents delimit the domains of different phonological processes (e.g. Selkirk 1980, Nespor & Vogel 1986, Hayes 1989). The prosodic constituent at the core of our proposal is the Phonological Word (PW), though we also make crucial reference to two higher constituents, the Clitic Group (CG) and the Phonological Phrase (PPh).

### 5.1 The Phonological Word and stress assignment

Let us begin with the following very simple definition of the PW in Turkish:

(13) *Turkish Phonological Word*
The PW consists of a root + (most) suffixes.

Given this definition, word stress is assigned by an equally simple rule, as follows:

(14) *Word Stress Assignment in Turkish* (WSA)
Stress the final syllable of a PW.

The examples in (15) illustrate the PW domain and stress assignment.

(15) a. [se**pét**]$_{PW}$ 'basket'
b. [sepet-**lér**]$_{PW}$ 'baskets'
c. [sepet-ler-**ím**]$_{PW}$ 'my baskets'
d. [sepet-ler-im-**dén**]$_{PW}$ 'from my baskets'

The definition of the PW and the WSA rule given here apply to all regular roots and neutral (i.e. regular) suffixes. As indicated in the definition of the PW, there are some affixes that do not participate in the PW. These exceptional suffixes will be addressed below, following our discussion of exceptional stress in roots.

### 5.2 Exceptional stress

5.2.1 *Roots.* As was noted above, two types of irregularly stressed roots may be identified in Turkish, the so-called Sezer roots in which stress is assigned by a quantity-sensitive rule, and those that do not exhibit any generalisation with regard to the location of their stress. Previous analyses have attempted to identify criteria for establishing different classes of words in order to predict which stress assignment rule would apply in each case. As a minimum, they have needed to introduce lexical information regarding the linguistic origin of words and whether or not they

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

refer, for instance, to a geographical location. Any such classification system is fraught with exceptions, however, and as was seen above, still requires the prespecification of stress in certain cases.

In this paper, we propose an analysis that handles not only regular roots, but also the various types of irregular roots (Sezer roots and others) in a straightforward and unified manner. The fact that some irregular (Sezer) roots reflect quantity-sensitivity is an interesting generalisation about the items in question; however, it is not at all clear that this pattern reflects a productive phenomenon in Turkish. Indeed, we also find geographical locations and foreign words that exhibit the stress pattern of the language from which they were borrowed, or some other consideration such as the regular stress pattern of Turkish. Thus, while the Sezer rule would predict stress on the antepenultimate syllable, in certain items we instead find (i) the stress pattern of the language of origin (e.g. *Man**dé**la* from English *Man**dé**la*) or (ii) yet another stress pattern – that of Turkish in this case (e.g. *Parle**mént*** (cigarette brand) from English ***Pár**liament*, *Marbo**ró**/Marbo**rá*** (cigarette brand) from English ***Márl**boro*). In the last two cases, either following the Sezer stress rule or retaining the stress of the language of origin would result in stress falling on the first syllable, but both are overridden by the usual stress rule of Turkish which places stress at the end, regardless of syllable weight.

Given the lack of generality of the Sezer stress pattern, we recognise only two types of roots in Turkish, those that follow the general principle of final stress assignment and those that do not. We propose to lexically specify the position of stress for any root that is irregular. This is similar in principle to Lees' (1961: 42) proposal to treat stress as phonemic only in loanwords and in suffixes. Once a lexically specified syllable is assigned stress as in (16), it is exempt from any further (regular) stress assignment since there is only one primary stress per word.

(16) *Exceptional root stress*

Assign stress to a syllable that is lexically marked as stress-bearing.

Examples of stress assignment in exceptionally stressed roots are given in (17). Since we are not concerned here with how stress is to be represented in the lexicon, in the following examples we simply indicate the syllable that bears irregular stress with boldface letters in the underlying representation.

| | | | |
|---|---|---|---|
| (17) a. | *input* | /**mos**kova/ | 'Moscow' |
| | | [**mós**kova]$_{PW}$ | |
| | | [**mós**kova-dan]$_{PW}$ | 'from Moscow' |
| b. | *input* | /er**zin**can/ | 'Erzincan' |
| | | [er**zín**can]$_{PW}$ | |
| | | [er**zín**can-a]$_{PW}$ | 'to Erzincan' |

It should be noted that our proposal requires a minimum of 'machinery'. All that is needed is the prespecification of the position of stress in

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

irregular roots, something that is required along with various other mechanisms in any of the previous analyses. Beyond this prespecification, our basic definition of the PW remains unchanged, as does the regular stress assignment rule.

5.2.2 *Affixes*. As we mentioned above, there are suffixes in Turkish that disturb the regular anchoring of stress on the final syllable of a word. Even suffixes that typically behave regularly with respect to stress assignment also appear at times to exhibit exceptional stress behaviour, as illustrated in (18), as well as in (3) and (5) above.

(18) a. [kara-la-dı-**níz**]$_{PW}$ 'You (PL) blackened (it).'
black-DERIV-PAST-2PL

b. [kara-**lá**]$_{PW}$-ma-dı-nız 'You (PL) didn't blacken (it).'
black-DERIV-NEG-PAST-2PL

It is precisely this type of situation that led researchers to introduce the host of mechanisms discussed above, including distinct lexical levels, separate cophonologies and idiosyncratic lexical markings.

The analysis proposed in this paper brings a different perspective to the specification of suffixes. Analogously to our analysis of exceptional root stress, we make a simple distinction between two types of suffixes: those that never obey the regular stress rule and those that, at least in some cases, do obey it. Our proposal differs, furthermore, from previous analyses in which the exceptional suffix patterns are attributed either to stress properties of the suffixes themselves or to different rules operating at different lexical levels. We propose, by contrast, that the difference between regular and exceptional stress assignment resides in a single distinction, but one that does not directly refer to stress. Instead, the crucial distinction between suffix types depends on the prosodic domain to which they are attached.

It will be recalled that while our preliminary definition of the PW in (13) was extremely simple, it involved a certain degree of vagueness. In particular, it stated that most, but not all, suffixes are incorporated within the PW, but it did not identify which suffixes were included and which were excluded. We are now in a position to make this distinction, and suggest that only one piece of information is required.

Since we take the domain of regular stress assignment in Turkish to be the PW, it follows that those suffixes that do not follow this rule must be external to the PW. It was seen above that some suffixes always violate the regular word-final stress pattern of Turkish, while others appear to be regular in certain cases and irregular in others. What we propose is that only those suffixes that never follow the general rule are lexically marked as exceptional. That is, the only exception feature needed for atypical suffixes (and clitics) is a specification that they are excluded from the PW. (A full list of these items can be found in (22) in §6.1.) Since such suffixes are incorporated into the prosodic structure of a word by adjunction to the PW, rather than by inclusion within it, we designate them as Phonological

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

Word Adjoiners (PWAs) and lexically mark them as such, as shown in (19). No other marking or classification of these suffixes is necessary.[7]

(19) *Phonological Word Adjoiners* (PWAs)

Morphemes that are obligatorily excluded from the PW are (lexically) specified as Phonological Word Adjoiners.

Once a PWA appears following a root, and possibly other suffixes, we know that the end of a PW is present. That is, the PW ends just to the left of the PWA suffix, since the PWA adjoins as a sister of a PW.

Our regular stress rule now correctly assigns stress to the last syllable of the PW. No further statements are required in the assignment of primary word stress in Turkish.[8] Stress is thus assigned to words containing a PWA as illustrated in (20b) and (21b), where *-mA* and *-CA* are lexically specified PWAs. Note that once a PW is closed by the presence of a PWA, not only is the PWA external to the PW, any suffixes following the PWA are also external to the PW.

(20) a. [sev-il-di-**níz**]$_{PW}$ 'You were loved.'
love-PASS-PAST-2PL

b. [[sev-**íl**]$_{PW}$-me$_{(PWA)}$-di-niz] 'You were not loved.'
love-PASS-NEG-PAST-2PL

(21) a. [Alman-cı-**lár**]$_{PW}$ 'German-ers' (guest workers in Germany)
German-'er'-PL

b. [[Al**mán**]$_{PW}$-ca$_{(PWA)}$-cı-lar] 'German-ers' (those who take German at school, German teachers)
German-ADJ-'er'-PL

If there is more than one PWA in a word, the first PWA induces the right PW bracket, and any subsequent PWAs adjoin as sisters of that PW, in the same way that other subsequent non-PWA suffixes do. It should be noted that we have used a second set of brackets to indicate that the PWA and following suffixes are adjoined to the PW. The specification of the higher prosodic constituent thus created will be addressed below.

Our analysis is advantageous with respect to the previous ones in that it handles all the data in a maximally simple way. By introducing only a

[7] For completeness, it should be noted that there are two adverb-forming suffixes that bear stress on the first syllable: -(*y*)***Ín****cA* and -(*y*)***Á****rAk* (e.g. *yap-**ín**ca* 'when doing', *koş-**á**rak* 'when running'). Since these are not PWAs, in that they do not induce stress on the syllable to their left, but are simply idiosyncratic like the idiosyncratic roots that bear non-final stress, we propose to treat them in the same way, with an underlying prespecification of stress (cf. also Inkelas 1999). One reviewer raised the question of what would happen if an idiosyncratic root were followed by an idiosyncratically marked affix. Interestingly, we do not find instances of such combinations since the affixes we mark with idiosyncratic stress are verbal morphemes, while idiosyncratic root stress is typically observed in nouns (e.g. place names, proper names, borrowings).

[8] Since the questions of whether or not secondary stress exists in Turkish, and if it does, how it is assigned, remain controversial, we limit ourselves here to accounting for primary stress. If it is eventually demonstrated that secondary stress does exist, it will be possible to introduce a rule to supply it in terms of alternating syllables, syllable weight or some other appropriate property.

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

single type of lexical marking on those exceptional suffixes that are always external to the PW, as well as on clitics, we automatically account for the apparent 'pre-stressing' property of the morphemes in question. That is, stress is assigned just to their left because we find the end of a PW there, not because they bear some inherent pre-stressing characteristic. In addition, without any further rules, we account for the fact that subsequent suffixes are not stressed even though they would normally bear stress if the 'exceptional suffix' were not present. It was seen in (20a) and (21a), for example, that the suffixes *-nIz* and *-lAr* receive regular stress in word-final position when no PWA intervenes. By contrast, in (20b) and (21b), where a PWA (*-mA* and *-CA*, respectively) does intervene, *-nIz* and *-lAr* are no longer within the PW, and are thus not subject to regular stress assignment. What this analysis reveals, furthermore, is that there is nothing special about the suffixes that appear to undergo regular stress assignment in some cases but not in others, a source of substantial difficulty in previous analyses. Instead, the determination of whether or not these suffixes participate in regular stress assignment has only to do with the presence or absence of a PWA to their left.

## 6 The Phonological Word and stress revisited: a proposal

### 6.1 Defining the Phonological Word

On the basis of the data we have just examined, we can identify the following set of PWAs in Turkish, those morphemes, both suffixes and clitics, that require the closing of a PW just to their left.

(22) *PWAs in Turkish*

a. -mA negative
b. adverb/adjective-deriving suffixes (e.g. *-CA*, *-leyin* 'at' (as in *sabáh-leyin* 'at morning'; not productive), *-In* 'in/when' (as in *yáz-ın* 'in fall'; not productive)
c. -dA post-clitic coordinator
d. ki complementiser
e. -DIr epistemic copula
f. -y/∅ copular clitic (full form: *i*)
g. -mI yes/no question clitic
h. -(y)lA commutative/instrumental (full form: *ile*)
i. -(y)ken 'when' (full form: *iken*)
j. -gil suffix that derives family names from nouns

Since it is precisely these items that adjoin as sisters of a PW, and not within it, we can now remove the vagueness from our original definition of the PW, and reformulate it as in (23).

(23) *Phonological Word in Turkish* (revised)

The PW consists of a root plus all suffixes up to, but not including, a PWA.

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

It should be noted that by referring to the class of PWAs, and not suffixes *per se*, we are able to provide a unified account of the behaviour of both the exceptional suffixes and clitics, as discussed above.

### 6.2 A unified stress rule

It will be recalled that we have proposed to handle irregular root stress simply by prespecifying the appropriate syllable. What has previously been treated as irregular suffix and clitic stress, on the other hand, is no longer irregular given our redefinition of the PW in relation to the small, finite, set of PWAs. We thus formulate the following Stress Assignment Rule for Turkish, in which the two subparts apply in accordance with the Elsewhere Principle:

(24) *Stress Assignment in Turkish* (revised)

a. Stress a lexically marked syllable.

b. Otherwise, stress the final syllable of a PW.

The presence of irregular root stress exempts a word from any further stress assignment, and in the absence of such an irregularity, the default rule of final stress applies.

## 7 Accounting for clitics

As we mentioned above, the overall stress pattern of a word may be influenced by the presence of clitics, in addition to the stress properties of the root and affixes. As we show here, the apparently irregular stress patterns involving clitics that have plagued previous analyses follow directly from our proposal regarding the Phonological Word and Phonological Word Adjoiners. We base our analysis on recent proposals regarding certain aspects of Turkish syntax, in particular Kornfilt's (1996, 1997) analysis of the copular clitic (cf. Göksel, in press, Lees 1962, for similar observations).

Following Kornfilt (1996), we assume the structure in (25) for participle constructions. It should be noted that (25) is a simplified illustration of the participle structure, which does not include the negative morpheme or derivational suffixes that might immediately follow the verb.

(25) *Turkish participle structure*

$$\left[\ \text{Verb} \left\{ \begin{array}{ll} \text{-Ir/-Ar} & (\text{AORIST}) \\ \text{-mIş} & (\text{REPORTED PAST}) \\ \text{-Iyor} & (\text{PROGRESSIVE}) \\ \text{-mAlI} & (\text{NECESSITY}) \\ \text{-(y)EcEG} & (\text{FUTURE}), \text{ etc.} \end{array} \right\} \right]_{\text{PW}} \text{-COPULA-TENSE-AGREEMENT}$$

As Kornfilt shows, the copula, which can follow non-verbal predicates as well as participle forms, is underlying /-y/. When it appears in its full form it is [-i], but when it is cliticised it appears as [-y] or null. As with

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

certain other items that have a full form and a clitic form,[9] the full form of the copula initiates its own Phonological Word. It thus participates in regular word-stress assignment, and additionally it begins a new vowel harmony domain, since the domain of vowel harmony does not include more than one PW, a point we return to below. By contrast, the corresponding clitic form attaches to the word to its left and functions phonologically as a PWA. Unlike the full form, it falls within the vowel-harmony domain of the PW to its left. This can be seen in (26) with the full and cliticised forms of *ile* 'with' and in (27) with the full and cliticised forms of the copula. What is particularly noteworthy is that the same stress results obtain whether the copular clitic is phonetically manifested or null.

(26) 'with' (COMM/INSTR)

a. Full form: *ile*

[Ni**hán**]$_{PW}$ [i**lé**]$_{PW}$ 'with Nihan'
Nihan with

[çe**kíç**]$_{PW}$ [i**lé**]$_{PW}$ 'with a hammer'
hammer with

b. Cliticised form: *-lA*

[[Ni**hán**]$_{PW}$-la$_{(PWA)}$] 'with Nihan'
Nihan-COMM

[[çe**kíç**]$_{PW}$-le$_{(PWA)}$] 'with a hammer'
hammer-INSTR

(27) Copula (full form is rarely used in colloquial speech)

a. Full form: *i*

[ka**bá**]$_{PW}$ [i-di-**níz**]$_{PW}$ 'You were rude.'
rude COP-PAST-2PL

[gid-e**cék**]$_{PW}$ [i-di-**lér**]$_{PW}$ 'They would go.'
go-FUT COP-PAST-3PL

b. Cliticised form: *-y* or null ∅

[[ka**bá**]-y$_{(PWA)}$-dɪ-nɪz] 'You were rude.'
rude-COP-PAST-2PL

[[gid-e**cék**]$_{PW}$-∅$_{(PWA)}$-ti-ler] 'They would go.'
go-FUT-PAST-COP-3PL

With regard to another type of structure in Turkish, Kornfilt (1996) argues that in non-verbal constructions, tense, aspect, mood and person markers are obligatorily suffixed to the copula, and *not* to the non-verbal stem. Given our analysis of clitics, including the copular clitic, as PWAs, the seemingly irregular stress patterns associated with the non-verbal constructions in question become totally predictable. That is, the presence

[9] It should be noted that in Turkish most clitics also have corresponding full forms, although these forms tend to be either obsolete or restricted to certain styles of speech.

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

of the copular clitic in these constructions, whether phonetically manifested or null, induces stress on the immediately preceding syllable. This can be seen in (28a, b), where the copula is followed by the past tense marker (*-DI*) and the conditional marker (*-sA*), respectively, and is phonetically manifested, surfacing as [y] in the segmental context V __ C. The examples in (28c, d) show the same stress pattern when the copula is null, and thus does not surface as [y], as in the present tense (Kornfilt 1997).

(28) a. [[has**tá**]$_{PW}$-y$_{(PWA)}$-dɪ-lar] 'They were sick.'
sick-COP-PAST-3PL

b. [[dikkat-**lí**]$_{PW}$-y$_{(PWA)}$-se-ler] 'if they are careful'
care-ful-COP-COND-3PL

c. [[has**tá**]$_{PW}$-∅$_{(PWA)}$-lar] 'They are sick.'
sick-COP-3PL

d. [[dikkat-**lí**]$_{PW}$-∅$_{(PWA)}$-ler] 'They are careful.'
care-ful-COP-3PL

Verbal predicates with an Aspect or a so-called 'fake' tense marker show similar patterns with regard to the copula. According to Kornfilt (1996), unlike the past tense marker (a genuine verbal form), participle forms such as the aorist, progressive and future are 'fake' tenses, and are never directly inflected. Instead, they are inflected only via the intermediary of a copula (1996: 111). We now have a straightforward explanation for the fact that in Turkish word stress always falls on an aspect marker when present. That is, since the copular clitic is a PWA, an aspect marker that is inflected for tense or mood via this clitic just to its right will automatically be the final syllable of the PW it is in. As such, it is assigned stress by the regular stress rule. By the same token, any suffixes that follow the copula are external to the PW and are not stressed, even though they might otherwise be stressed if they ended a PW. In (29a), for example, the aorist marker precedes the copula (PWA). As predicted, stress regularly falls on the final syllable of the PW, in this case the aorist marker. We see, furthermore, that the suffixes that follow the copula remain outside the PW and do not participate in word-stress assignment. By contrast, when there is no PWA in the construction, as in (29b), the same suffixes fall within the PW domain and undergo the regular stress assignment rule.

(29) a. [[sakla-n-**ír**]$_{PW}$-∅$_{(PWA)}$-dɪ-nɪz] 'You used to hide (yourselves).'
hide-RECIP-AOR-COP-PAST-2PL

b. [sakla-n-dɪ-**níz**]$_{PW}$ 'You hid (yourselves).'
hide-RECIP-PAST-2PL

The apparent dual behaviour of the conditional suffix *-sA* is also automatically accounted for within our analysis of the copula as a PWA. While it was necessary for previous proposals to posit two distinct representations for this suffix, one as 'pre-stressing' and one as 'regular', our model requires no specification at all for the conditional suffix. That

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

is, we treat the conditional suffix as a regular suffix; its so-called 'pre-stressing' property is merely a consequence of its position following the copula, a PWA (e.g. nominal predicate: *öğrenci-y-se-m* (student-COP$_{(PWA)}$-COND-1SG) 'if I am a student'), even though the copula may be phonetically null. In all other cases, the conditional suffix, like any other regular suffix, receives stress if it occurs word-finally (e.g. *git-**sé*** (go-COND) 'if he goes') or if it directly precedes any other PWA (e.g. *git-**sé**-mi* (go-COND-QUES$_{(PWA)}$) 'if he goes?').

It should be noted that the progressive marker, *-Iyor*, shown above in (25), at times appears to be exceptional with regard to both stress and vowel harmony.[10] Of particular interest here is the fact that the final syllable /yor/ may fail to bear stress as would be expected, especially in careful and official speech. This irregular stress of *-Iyor*, however, is easily handled in our analysis by means of prespecification of stress on the first syllable. In more casual (and poetic) varieties of Turkish, the second syllable /yor/ does receive stress, and no stress specification is needed. That is, since *-Iyor* must be followed by the copula (i.e. a PWA), stress falls on its final syllable, the one directly preceding the PWA. In sum, our analysis of clitics as PWAs provides significant insight into the Turkish stress system. It has previously seemed problematic that certain suffixes and clitics have similar types of idiosyncratic stress properties since they do not form a natural class either morphologically or syntactically. By considering these items in terms of a single phonological property, however, we are now able to identify a natural class, albeit one that is independent of their morphological and/or syntactic properties. The crucial property, as we have demonstrated, is that the set of suffixes and clitics in question attaches by adjunction to a Phonological Word. The result is that these Phonological Word Adjoiners all exhibit the same stress behaviour: (i) they do not bear stress themselves and (ii) they cause stress to fall on the syllable immediately to their left. This analysis also automatically accounts for the fact that when an otherwise regular suffix follows one of the relevant suffixes or a clitic, it no longer receives stress when in final position. That is, since the PWA suffix or clitic is obligatorily external to the PW, any subsequent suffixes are also external to the PW, and thus are not subject to the regular word stress assignment rule. Nothing further must be stated to account for such cases.

## 8 Higher-order prosodic constituents and stress in Turkish

Since stress phenomena are not limited to the word, we now address the issue of prosodic constituents beyond the word. In this regard, we will

[10] Similar exceptions are also observed in aspectual expressions formed with an auxiliary verb along with a lexical verb (e.g. *-I-ver-*, *-A-gel*, *-A-dur* with the verb roots *ver* 'give', *dur* 'stop', *gel* 'come', respectively). In fact, it has been claimed that *-Iyor* has evolved from such suffix-verb constructions (Banguoğlu 1986), although the auxiliary verb is no longer lexically active in this case.

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

examine (i) the way in which the PW and the morphemes excluded from the PW are incorporated into the overall phonological structure of a sentence and (ii) the way in which stress is assigned in compounds and larger strings.

### 8.1 Adjunction to the PW

Crucial to our proposal is the fact that PWAs and all following suffixes are excluded from the PW to their left. This raises the question, however, of how they are incorporated into the prosodic structure of a sentence. We can identify three options on the basis of analyses of similar problems in a variety of languages (among others Selkirk 1995, Peperkamp 1997, Vogel 1999). These options can be represented schematically as follows:

(30) *Adjoining the PW and following morphemes*

a. *Option 1* (Recursive PW)
[[[[…]$_{PW}$ PWA]$_{PW'}$ suffix]$_{PW'}$ suffix]$_{PW'}$

b. *Option 2* (Clitic Group)
[[…]$_{PW}$ PWA suffix suffix]$_{CG}$

c. *Option 3* (Phonological Phrase)
[[…]$_{PW}$ PWA suffix suffix]$_{PPh}$

Option 1 groups a PW and any following morphemes one at a time into recursive PW′ structures. The outermost PW/PW′ (or uppermost PW/PW′ in a tree structure) would then group with other PWs and PW′s into the next constituent in the prosodic hierarchy. Option 2, by contrast, directly groups the PW and any following morphemes together into the next higher prosodic constituent, the Clitic Group, in models that include this constituent. Option 3 is similar to Option 2 in directly grouping the PW and following morphemes into the next higher constituent, but it assumes that this constituent is the Phonological Phrase, given a model that does not include a Clitic Group.

While we know of no analysis of Turkish in terms of recursive PWs, as in Option 1, it is possible to consider the facts under investigation in light of the general principles of such a model. Typically, in a phonological system that permits recursive PWs, a compound is analysed as a PW′ containing two (or more) PWs. Thus, we would posit a recursive structure for items such as ***báş*** *bakan* (head minister) 'prime minister': [[**báş**]$_{PW}$ [bakan]$_{PW}$]$_{PW'}$. The PW′ is also typically used to group a PW with affixes that do not cohere phonologically with the base, 'level II' affixes in terms of Lexical Phonology. Since PWAs are defined precisely in terms of their failure to participate in the stress rules of a PW, we can assume that they form a PW′ with the PW to which they are associated (e.g. [[dok**tór**]$_{PW}$ mu]$_{PW'}$ (doctor-QUES) 'Is (s)he a doctor?', where *-mu* is a PWA). This is in contrast with regular suffixes which simply fall within the PW with the root.

At first glance, such an analysis appears to be advantageous, yielding a generalisation about the stress pattern of the two types of PW′s. That is,

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

if we assume that stress is originally assigned (i) to each member of a compound or (ii) to the root of a word and to a PWA and any subsequent (PWA or regular) suffixes when a PWA is present, we find in both cases that there is surface main stress in the position of the leftmost original stress (i.e. PW stress). For example, we find stress on the syllables *báş* and *tór*, respectively, in ***báş*** *bakan* and *dok****tór****-mu*. Note that this generalisation also holds for roots that are (underlyingly) idiosyncratically stressed (e.g. [**mí**sır-da]$_{PW}$-dır]$_{PW'}$ (Egypt-LOC-EP COP$_{(PWA)}$) 'it is in Egypt'), where the leftmost stressed syllable, i.e. the syllable prespecified for stress, prevails (see Inkelas 1999 for a similar analysis).

Further examination, however, reveals drawbacks to the recursive PW analysis. As has been amply illustrated above, Turkish permits extensive interspersing of suffixes that are regular with regard to stress and PWAs. Since prosodic tree geometry does not permit a constituent of a category C to dominate a constituent of a higher category such as C′, we must assume that a construction consisting of a root followed by a PWA and then by a regular suffix must be analysed as a PW′, even though the final suffix is not a PWA (e.g. [[[**gít**]$_{PW}$ me]$_{PW'}$ di]$_{PW'}$ (go-NEG-PAST) 'he did not go', where *-mA* is a PWA). While the surface stress pattern, with main stress on the leftmost element (i.e. the root), is correctly accounted for with this structure, arriving at this result involves a series of operations for which there is no independent evidence. Specifically, stress is first assigned to the root. It is subsequently also assigned to the suffix *-me*, but then it is removed from this suffix by a rule that promotes the leftmost stress. Stress is then assigned to the suffix *-di*, only to be removed, too, by the rule that promotes the leftmost stress. We could avoid multiple applications of the rule that promotes the leftmost stress if it applied only once, postcyclically, rather than cyclically; however, even this option has drawbacks. Consider the examples in (31), which contain a series of PWAs (underlined) as well as regular suffixes.

(31) a. [al**mán**]$_{PW}$-cá]$_{PW'}$-c**í**]$_{PW'}$-ylá]$_{PW'}$-m**í**]$_{PW'}$-y]$_{PW'}$-d**í**]$_{PW'}$-n**í**z]$_{PW'}$
German-ADJ-'er'-COMM-QUES-COP-PAST-2PL
'Were you (PL) with the German teacher?'

b. [gü**zél**]-léş]$_{PW'}$-tír]$_{PW'}$-mé]$_{PW'}$-dí]$_{PW'}$-y]$_{PW'}$-sé]$_{PW'}$-lér]$_{PW'}$-dé]$_{PW'}$
beauty-ADJ-CAUS-NEG-PAST-COP-COND-3PL-CONN
'in case they haven't beautified (it)'

Even if we admit only a single, postcyclic, application of the rule that promotes the leftmost stress, before we arrive at this point we have assigned stress to every morpheme as it is added, often resulting in the placement of stress on morphemes that *never* surface with stress, in particular the PWAs.

Since the recursive PW model involves the introduction of a potentially quite rich constituent structure between the core PW and the uppermost PW′, we would expect there to be some motivation for these constituents.

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

Typically, constituents are motivated by evidence that they exhibit a particular property that cannot be insightfully accounted for without referring to them. Stress cannot be considered appropriate motivation here since the stresses assigned to such intervening constituents are always erased, and there is no surface indication that they ever existed. We have found no other motivation for the PW′s intervening between the innermost PW and the uppermost PW′.

Although it is unclear what mechanism might be invoked, the problem of the (overly) rich constituent structure might be avoided if there was some way to eliminate all the brackets between the core PW and the uppermost PW′. Accomplishing this would yield a relatively simple structure: the core PW plus all following affixes grouped into an *n*-ary branching PW′, assuming a geometry that does not require all structures to be binary branching. In fact, this would be essentially equivalent to the structure in Option 2, with the primary difference being the label of the upper constituent, PW′ as opposed to CG. The use of a superordinate PW, or PW′, is sometimes claimed to be advantageous with respect to the Clitic Group because it does not require the introduction of an additional level in the prosodic hierarchy (cf. among others Booij 1988, Zec & Inkelas 1991, Peperkamp 1997). If the difference is merely terminological it is uninteresting, and we could refer to the constituent just above the PW with PW′, CG or any other symbol. There is, however, a specific claim inherent in the choice of the node label PW′, namely that this larger constituent is in some way a variety of Phonological Word. As such, we would expect the PW′ to share some crucial phonological property with the PW constituent.[11] In fact, though, the two types of constituent are crucially distinct from each other. As we have seen above, regular stress in Turkish is on the rightmost syllable of the PW, while the generalisation observed in relation to the superordinate constituent involves promotion of the leftmost stress. Thus, labelling the constituent superordinate to the PW as some variety of PW, at least implicitly, makes the incorrect prediction that the two types of constituents are, in fact, the same in some crucial way.[12]

It is true that certain morphemes may appear either within the PW or within the superordinate constituent; however, this is a consequence of the relatively rich possibilities Turkish provides for ordering its suffixes. It does not in itself mean that we are dealing with the same type of structure in the two cases, but rather appears to more accurately reflect the non-isomorphism between morphological and phonological structure.

[11] The same argument holds for another terminological option that is sometimes used, namely the essentially diacritic distinction between LEXICAL PW and POSTLEXICAL PW.

[12] One reviewer suggested that the recursive PW′ is well motivated cross-linguistically. Certainly, cross-linguistic validity is a strong argument for any proposal, however, showing that a particular analysis *can* work does not mean that it is the best analysis, and as we demonstrate here, the PW′ analysis has substantial drawbacks, at least for Turkish.

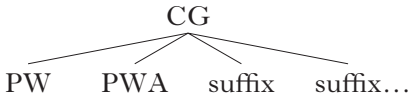
https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

Given that, on the one hand, we do find phonological motivation for a constituent above the PW, but on the other hand, we do not find phonological motivation for unifying it in some way with the PW itself, we reject the model represented in Option 1.

Both Options 2 and 3 avoid the problem of using the same type of label for both the basic PW domain and larger strings that include the PW plus other morphemes otherwise excluded from the PW. Furthermore, both Options 2 and 3 provide relatively flat structures, with no additional constituent structure between the PW and CG or PPh, respectively. The main difference between Options 2 and 3 is that the former recognises the need for a prosodic constituent that is larger than the PW, but one that is nevertheless phonologically distinct from the next higher constituent, the PPh. The latter option predicts that groupings of a PW plus following affixed items will not be phonologically distinct from groupings of other items in a PPh, for example, two or more lexical items. In the following sections, we provide evidence that supports Option 2 over Option 3. That is, in addition to distinguishing a string consisting of a PW plus its following morphemes from the PW itself, we must distinguish both of these groupings from strings consisting of two or more independent (phonological) words (i.e. PPhs). As seen above, Option 2 (30b) groups a PW with a following PWA and any other suffixes into a constituent that is intermediate between the PW and the PPh, namely the Clitic Group (cf. among others Nespor & Vogel 1986, Hayes 1989). We adopt a distinct term for this constituent so as to clearly reflect its distinct phonological properties with respect to those of other constituents, in particular the PW and PPh. While any name could serve as the label for this additional constituent, 'Clitic Group' seems appropriately descriptive since it groups clitics, and certain other material, with a phonological host.

Finally, it should be noted that our analysis of Turkish is consistent with the proposal advanced in Vogel (1999) that all material not grouped with a PW (i.e. affixes, clitics) be incorporated into the immediately higher phonological constituent, which is argued to be the CG, as opposed to any higher constituent. The material in question is incorporated into the CG in the simplest way available, adjunction to the PW. Thus, the PWA and all following suffixes constitute sisters of the PW, and form an *n*-ary branching tree structure as shown in (32).

(32) n-*ary branching Clitic Group*




## 8.2 Stress beyond the Phonological Word

8.2.1 *Compounds*. We have seen thus far how stress is assigned to the final syllable of a PW. Examination of compounds reveals a contrasting

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

tendency with regard to stress, as mentioned above. That is, when two or more primary stresses are present, the leftmost element is assigned the strongest stress, and the other stresses are perceptually reduced. We thus need a stress rule for compounds that is distinct from the word-level stress rule. Such a rule is provided in (33), and illustrations follow in (34).

(33) *Compound Stress in Turkish*

Assign main stress to the leftmost syllable bearing PW stress; reduce the prominence of any other stress(es).

Since it is necessary to group the members of a compound into a single phonological constituent so that the Compound Stress Rule applies only over the appropriate PWs, we include external brackets in our examples. We leave the identification of this constituent, however, to a subsequent section. We indicate the reduction in prominence on the second word in the above compounds by removing boldface type and the acute accent diacritic.

(34) a. [**báş**]$_{PW}$ + [ba**kán**]$_{PW}$ → [[**báş**]$_{PW}$ [bakan]$_{PW}$] 'prime minister'
head minister

b. [a**çí**]$_{PW}$ + [ölç-**ér**]$_{PW}$ → [[a**çí**]$_{PW}$ [ölç-er]$_{PW}$] 'protractor'
angle measure-AOR

c. [ka**rá**]$_{PW}$ + [de**níz**]$_{PW}$ → [[ka**rá**]$_{PW}$ [deniz]$_{PW}$] 'the Black Sea'
black sea

While it is clear that the first word in compounds is perceived as having stronger stress than the second one, it is not clear precisely which acoustic correlates of the original word stress are eliminated from the second word, and to what extent. In fact, there is evidence in English that at least certain perceived changes in relative stress patterns do not correlate significantly with the standard acoustic measures of stress (Vogel *et al.* 1995). In the absence of any information in the literature on the acoustic correlates of stress in different contexts in Turkish, we refer to the stress of the second word as 'reduced', but we do not take a position as to what, if any, the corresponding acoustic properties are.

The same pattern of stress reduction is observed in another common type of compound, one that consists of a loanword and an 'auxiliary' verb. These forms are sometimes referred to as 'composite verbs' (Lees 1961) or 'verbal compounds' (Kornfilt 1997). In such structures, auxiliary verbs, among which *et-* and *ol-* are the most productive, combine with a noun (e.g. *telefon et-* 'to phone', *sünnet ol-* 'to be circumcised') or an adjectival complement (e.g. *pişman ol-* 'to feel regretful') and, according to Lees (1961), exhibit a reduced primary stress on the auxiliary.

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

As compounds, the structures in question consist of two roots, each of which is a Phonological Word. Like other PWs, the auxiliaries undergo the PW stress rule, applied to the string that begins with the auxiliary itself and includes any suffixes up to, but not including, a PWA. The Compound Stress Rule in (33) above subsequently applies, and the primary stress on the second PW (i.e. the auxiliary) is reduced, as in (35).

(35) a. [tele**fón**]$_{PW}$ + [et-ti-**lér**]$_{PW}$ → [[tele**fón**]$_{PW}$ [et-ti-ler]$_{PW}$]
telephone AUX-PAST-3PL 'They telephoned.'

b. [**tést**]$_{PW}$ + [ol-**úr**]$_{PW}$-∅-du-k → [[**tést**]$_{PW}$ [ol-ur]$_{PW}$-∅-du-k]
test AUX-AOR-COP-PAST-1PL 'We used to be tested.'

It is interesting to note that despite their behaviour as compounds, the auxiliary structures also bear a resemblance to suffixed items. Specifically, when a loanword is attached to a vowel-initial auxiliary verb in such constructions, it displays special phonological, especially syllable-structure, adjustments that are typically observed when the same word is followed by a vowel-initial suffix. Indeed, the seemingly 'suffix-like' phonological behaviour of auxiliary verbs has led some researchers to posit a special kind of morpheme juncture before them, rather than the usual word juncture (Lees 1961), or even to consider them as vowel-initial suffixes (Sezer 1981), a point we discuss more extensively in §9.2. For now, it is sufficient to note that despite their phonological behaviour, the auxiliary verbs cannot be analysed as suffixes since they exhibit several properties crucially associated with free morphemes. First, in the loanword + auxiliary combinations it is possible to interrupt the string with a free function word such as *bile* 'even', as in (36a). Second, the auxiliaries can be used in isolation, typically appearing as the answer to a question involving a word + auxiliary combination, as in (36b). Furthermore, as we also observe in (36), the auxiliaries behave like verbal stems in that they can freely take verbal affixes that are normally attached to regular verb roots including tense, aspect, modality and person markers.

(36) a. telefon bile et-ti-m 'I even phoned (him/her).'
telephone even AUX-PAST-1SG

b. Speaker A: pişman ol-ma-dı-n-mı 'Didn't you feel regretful?'
regretful AUX-NEG-PAST-2SG-QUES

Speaker B: ol-du-m 'I did.'
AUX-PAST-1SG

Given that the auxiliaries in question behave as free morphemes, in addition to exhibiting the compound stress pattern when combined with nouns and adjectives, we must conclude that they cannot be analysed as

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

suffixes, and that the constructions involving these auxiliaries are indeed verbal compounds, along the lines of Kornfilt (1997).

8.2.2 *Phrases.* At first glance, phrases appear to be stressed in the same way as compounds, that is by assigning the strongest stress to the leftmost PW level stress. Closer examination, however, reveals a crucial difference between the two. While only a single strong stress is observed in compounds, in (phonological) phrases, a strong stress is observed at the location of the primary stress of each PW included in the phrase. Thus, in the following examples, each word exhibits stress as assigned to it by the regular Word Stress Rule, indicated by the acute accent marks. In addition, the syllables in boldface bear the main phrasal stress.

(37) a. kırmı**zí** çantá 'red bag'
b. gü**zél** arabá 'beautiful car'

Although the stress difference between compounds and phrases might appear subtle, there are nevertheless minimal pairs that differ only in this respect. This can be seen in the examples below, where the only difference between the compounds and their corresponding phrases is the degree of stress perceived on the second word. While the primary word stress is still perceived on the second word in the phrases, it is substantially reduced, if not eliminated, on the second word in the compounds.

(38) a. *Phrase*
[[[a**çí**]$_{PW}$]$_{CG}$ [[ölç-ér]$_{PW}$-mi]$_{CG}$] 'Does (it) measure an angle?'
angle measure-AOR-QUES
*Compound*
[[[a**çí**]$_{PW}$ [ölç-er]$_{PW}$-mi]$_{CG}$] 'Is it a protractor?'
b. *Phrase*
[[[**sű̇t**]$_{PW}$]$_{CG}$ [[beyáz]$_{PW}$-dır]$_{CG}$] 'Milk is white.'
milk white-EP COP
*Compound*
[[[**sű̇t**]$_{PW}$ [beyaz]$_{PW}$-dır]$_{CG}$] '(It) is milk-white.'

Given the distinction between the stress-assignment rules operating in compounds and phrases, we now have a total of three distinct stress rules in Turkish. So that each rule applies only to the appropriate string, we must unambiguously identify each type of string. As suggested above, we propose to do this in terms of the constituents provided by the prosodic hierarchy. Word stress is assigned to the PW, as was amply demonstrated above. It also seems quite uncontroversial to assign phrasal stress within the PPh domain. This leaves only compound stress unaccounted for.

## 8.3 Compound stress and the Clitic Group

Given that we have argued independently for the existence of a prosodic constituent between the PW and the PPh, namely the Clitic Group, we

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

examine here the possibility that this constituent is also the domain of compound stress. In this case, we would be able to associate each of the three stress patterns in Turkish with its own prosodic constituent, as shown in Table I.

| *stress type* | *domain* | *rule* |
|---|---|---|
| word stress | Phonological Word | Stress last syllable in PW. |
| clitic group stress | Clitic Group | Promote stress of first word in CG; reduce the prominence of any other stress(es). |
| phrasal stress | Phonological Phrase | Promote stress of first word in PPh. |

*Table I*
Turkish stress domains

In our analysis of word stress, we defined the Clitic Group as consisting of a PW plus any following morphemes that are excluded from the PW by virtue of the presence of a PWA. We must now expand the definition of the CG by also permitting it to comprise the two (or more) members of a compound. At first glance, it may appear undesirable to group the suffixes and clitics excluded from a PW into the same type of phonological constituent as the members of a compound; however, closer examination reveals that such a grouping has a number of advantages.

While word stress is assigned within the PW domain, this stress is, in effect, the single primary stress of a larger string that includes the morphemes that do not fall within the PW; no other stress is assigned to this larger grouping. Thus, the property of having a single primary word stress is characteristic of both the PW and the CG constituents. We predict then that any string that is identified as a CG will have only one primary word stress. Indeed, our analysis of compounds which incorporates an entire compound into a single CG yields precisely this result. That is, the Compound Stress Rule has the effect of retaining (and promoting) only a single primary word stress, all other stresses being substantially reduced or possibly eliminated, at least perceptually.

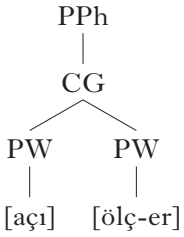
In phrases, by contrast, each word perceptually retains the primary stress assigned by the Word Stress Rule, the first such stress being further promoted within the PPh. If the members of a compound were directly assigned to the PPh domain, we would expect the stress on each word to be retained in this case, too. We would thus lose the ability to account for the distinction between minimal pairs such as those seen above in (38) on the basis of their stress patterns.

Our analysis of compounds as single CGs, in contrast with phrases, is represented graphically by the trees in (39a) and (39b), showing the compound meaning and the phrasal meaning of *açı ölç-er* (angle + measure-'er'), respectively.

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

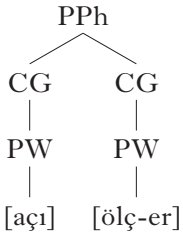
(39) *Compound* vs. *phrasal tree structure*

a. Compound structure




'protractor'

b. Phrasal structure

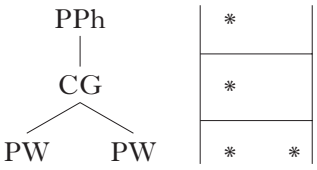



'(It) measures (an) angle.'

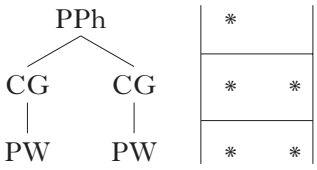
The difference between the stress patterns of compounds and phrases can now be represented in a straightforward manner in terms of metrical grids, as shown below.

(40) *Compound* vs. *phrasal stress*

a. Clitic group stress




b. Phrasal stress




In constructing these grids, we have followed Nespor & Vogel (1989) in (i) associating each row of the grid with a separate phonological constituent and (ii) assigning a grid mark (*) to the head of each constituent at the appropriate level in the grid. Thus, according to the stress-assignment rules shown in Table I, a grid mark is assigned to all syllables bearing primary stress at the lowest (PW) level. At the next level, the CG, a grid mark is assigned only over the first PW in the compound, since we have analysed compounds as consisting of only one CG. By contrast, in the phrase, a grid mark is assigned over each PW, since each one heads its own CG. The effect of promoting both PW stresses to CG stress in phrases, but not in compounds, is to retain the perception of two relatively prominent syllables in the former case, but not in the latter. As was mentioned above, it is not clear whether the perceived lessening of stress on the second word in compounds actually corresponds to an acoustic reduction of the syllable or is just a perceived reduction due, perhaps, to the fact that it is not additionally strengthened by the CG stress rule. Finally, at the PPh level, a grid mark is assigned over the leftmost CG stress, as the head of the PPh.

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

## 9 Prosodic constituents and other phonological rules

In this section, we examine several rules of Turkish phonology that operate in strings that appear to involve the types of prosodic constituents we have investigated thus far. First, we discuss the well-known phenomenon of vowel harmony. We then discuss a set of rules that involve restrictions on Turkish syllable structure. We will show that while the domain of vowel harmony does not coincide with a particular prosodic constituent, the phenomena relating to Turkish syllable structure do coincide with one, specifically the Clitic Group.

### 9.1 Vowel harmony

The system of vowel harmony (VH) in Turkish requires that the vowels of a particular string, the nature of which we address here, all be either front or back, and in the case of high vowels, also share the same value for rounding, as exemplified in (41). Since the nature of the representation of VH is not our present concern, we will assume here that the first vowel of a word is specified for all the crucial features, and that these are spread to subsequent vowels (except in the case of disharmonic roots), although there are certainly other possible representations.

| | | | |
|---|---|---|---|
| (41) a. | /çal-DI-nIz-mI/ → | çaldınızmı | 'Did you steal (it)?' (spread [−front, −round]) |
| b. | /ger-DI-nIz-mI/ → | gerdinizmi | 'Did you stretch (it)?' (spread [+front, −round]) |
| c. | /gör-DI-nIz-mI/ → | gördünüzmü | 'Did you see (it)?' (spread [+front, +round]) |
| d. | /bul-DI-nIz-mI/ → | buldunuzmu | 'Did you find (it)?' (spread [−front, +round]) |

While at first glance, it might appear that the domain of VH is a word, closer inspection reveals that this is not the correct generalisation. It is simple enough to show that the word, in the sense of 'lexical item' or $X^o$, cannot possibly be the domain for VH. First, there are disharmonic roots in which the spreading of the features of the first vowel is interrupted by the presence of a vowel with a different set of features. This causes subsequent vowels to harmonise with the new vowel features, rather than with the original vowel features, as in (42a). There are also cases in which the vowel of a suffix within a lexical item interrupts the spreading of the original features, and causes any subsequent vowels to harmonise with its features instead, as in (42b). Perhaps less surprising is the fact that the two members of a compound do not harmonise with each other (42c), although in a model with a recursive PW, we would expect compounds to be dominated by the same type of node as words with suffixes, namely PW′. In the transcriptions, the symbol ‖ is placed at the beginning of the syl-

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

lable that introduces the new vowel feature(s); the original features and the new ones are shown below each example.

(42) a. /rötar-sIz-sA/ → 'if without a delay'
rö ‖ tarsızsa ([+front, +round] ‖ [−front, −round])

b. /amca-m-gil-DA-lAr/ → 'They are at my uncle's (place).'
amcam ‖ gildeler ([−front, −round] ‖ [+front, −round])

c. /deli+kan-lI/ → 'a young man'
deli ‖ kanlı ([+front, −round] ‖ [−front, −round])

Leaving aside the issues of disharmonic roots and compounds for the moment, it is also clear that the PW constituent in the model we propose fails to provide the domain for VH. That is, a PW constituent that ends just before a PWA does not correctly delimit the spreading of vowel features, which often continues through one or more PWAs, as in (43).

(43) a. $[[giy\text{-}dir]_{PW}$-me-di-niz 'You didn't let (it) be worn.'
wear-CAUS-NEG-PAST-2PL

b. $[[baba\text{-}sı]_{PW}$-mı-y-dı 'Was (he) his/her father?'
father-3SG POSS-QUES-COP-PAST

Since VH spreads throughout a PW as well as suffixes and clitics that are external to the PW, it might appear that the Clitic Group provides the appropriate domain for this rule. Closer examination, however, reveals that the CG, too, fails to correctly delimit the domain of VH. While VH does spread through some morphemes outside the PW, it does not spread through all of them, as would be predicted by claiming that the CG is the domain for VH. As can be seen in (44), the [+front, −round] features of the root spread through the suffixes outside the PW up to, but not including, the suffix -(*I*)*yor*. This suffix, instead, introduces the features [−front, +round], which then spread to the morphemes that follow it.

(44) $[[sev\text{-}il]_{PW}$-mi ‖ -yor-∅-uz] 'We are not loved.'
love-PASS-NEG-PROG-COP-1PL

The CG also fails to provide the appropriate domain for VH in the case of disharmonic roots, in which the original vowel features do not even spread throughout the entire PW. Compounds, too, escape treatment in terms of the CG. Since the two members of a compound are included in the same CG, we would expect the same features to continue throughout the entire compound. This is not the case, however, since each member of a compound begins its own VH domain, as was seen above in (42c).

As discussed above in §8, we find the recursive PW model inadequate for independent reasons; however, it is interesting to note that this model fares no better than the CG approach in defining the domain of VH. That is, the (innermost) PW is too small a domain to account for the spreading of features across certain morphemes following the root. Furthermore,

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

since the PW′ also includes both members of a compound, it incorrectly predicts the spreading of VH features throughout an entire compound. Finally, disharmonic roots also escape treatment, though for the opposite reason; in this case, even the (innermost) PW defines a domain that is too large for the spreading of VH features.

Independently of domains, a common treatment of disharmonic segments in harmony systems is to specify such segments for their crucial features (e.g. Clements & Sezer 1982). This interrupts the spread of the preceding features since segments are generally not permitted to have multiple specifications for the same feature. The new set of features then spreads to any relevant segments that follow it, as illustrated below, where we are assuming a system that spreads from left to right. The solid lines indicate associations to underlyingly specified vowel features and the dotted lines show the spreading of these features.

(45) [−fr] [+fr]

k A b A r E - n I n → kabarenin 'of a cabaret'

[−rd]

We propose that such a mechanism, whereby exceptional vowel features are specified underlyingly, actually makes the delimitation of VH extremely simple. While we have seen that none of the available prosodic constituents, however defined, correctly delimits the spreading of vowel features in Turkish, it is always, and only, the case that the presence of a new set of vowel features blocks the spread of the previous features. This is obvious in the case of disharmonic roots, which, by definition, involve an interruption in the spreading of the original vowel features, and the subsequent spreading of a new set of vowel features to any following vowels. In compounds, too, it is obvious that the underlying specification of a set of vowel features must block VH. That is, in compounds (as in phrases), we assume that each root has, as part of its phonological representation, the features that spread rightward from the first vowel; each new root thus begins a new VH domain. The only case that remains, then, is that of suffixes and clitics that fail to participate in the harmony of their root. Since such items, too, must be lexically specified for their required features, precisely the same blocking mechanism used for disharmonic roots and compounds accounts for the spreading of features up to, but not including, a lexically specified vowel in a suffix or clitic, and the subsequent spreading of the new set of features, as illustrated below.

(46) [+fr] [−fr]

b A ğ A n - I y o r - I m → beğeniyorum 'I like (it).'

[−rd] [+rd]

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

In sum, while it is certainly true that each PW begins a new VH domain, this in itself is not adequate since we have seen that new harmony domains may also originate within a root or with certain suffixes and clitics. The closing of the VH domain is equally resistant to definition in terms of phonological constituents since we have seen that the right edge of the PW yields a domain that is too small and the right edge of the CG yields one that is too big. By the same token, in the recursive PW model, the domain determined by the right edge of a PW is too small, while the right edge of a PW′ provides a domain that is too big.

What we are thus left with is an extremely simple linear account of VH whereby the relevant features merely spread as far as they can until they are interrupted by a new set of underlyingly specified features. At this point, the new features begin a new VH spreading domain, and so forth.

## 9.2 Syllable structure rules

We now turn to the interaction of prosodic constituents and syllable structure. In Turkish, the possible syllable rhymes are quite restricted. If a long vowel is present, no coda is possible. If a short vowel is present, a single consonant is possible, and only certain types of consonant clusters are possible – those consisting of a sonorant followed by an obstruent, or two different obstruents (i.e. not geminates). Some possible clusters are illustrated in (47) (cf. Lees 1961).

(47) a. ölç ‘measure’ c. üst ‘upper surface’
b. sert ‘harsh’ d. aşk ‘love’

By contrast, the syllable types that are not permitted consist of a long vowel followed by a consonant (48a), a short vowel followed by a geminate consonant (48b) and a short vowel followed by certain combinations of consonants (48c). Interestingly, these restrictions only apply at the surface level, since each of these illicit syllable types in (48) can be found in underlying roots, in particular in items borrowed from Arabic, as well as in a small set of native Turkish nouns, mostly referring to body parts (cf. Lees 1961), as seen in the examples below.

(48) a. /mera:k/ ‘curiosity’ (< Arabic)
/ceva:b/ ‘answer’ (< Arabic)
b. /hiss/ ‘feeling’ (< Arabic)
/hacc/ ‘haj’ (< Arabic)
c. /boyn/ ‘neck’
/burn/ ‘nose’

When one of these illicit rhyme types occurs, one of several rules applies, depending on the precise nature of the rhyme. As we show below, the domain of the various syllable structure rules does, in fact, coincide with an established phonological constituent – the Clitic Group.

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

First, let us briefly consider more closely the nature of the restriction on the rhymes of Turkish. What we propose is that a rhyme, or more generally a syllable, in Turkish may consist of at most two moras. We are assuming that a short vowel constitutes a single mora and a long vowel two moras. Furthermore, the first postvocalic consonant, if any, also constitutes a mora. If there is a second consonant, while it is not moraic, it may be incorporated into the syllable only if it is in accordance with the Sonority Sequencing Principle, that is, if it is less sonorous than the consonant to its left. The relevant sequence of segment types in Turkish is: vowels > (other) sonorants > fricatives > stops. This means that CV, CV: and CVC syllables are permitted since they contain only two moras, as illustrated in (49a). Syllables consisting of $CVC_{\alpha}C_{\beta}$ in which $C_{\alpha}$ is more sonorous than $C_{\beta}$ are also permitted since they fulfil the sonority sequencing requirement, as illustrated in (49b).

(49) a. ka.ba 'rude'
ga:.lip 'winner'
kal.ker 'calcium deposit'

b. çarp 'collide'
park 'park'

Syllables consisting of more than two moras or containing a sequence that fails to fulfil the sonority requirement, by contrast, are not permissible. Thus, CV:C and $CVC_{\alpha}C_{\beta}$ syllables, where $C_{\alpha}$ and $C_{\beta}$ are either of the same sonority ranking (including geminates) or involve an increase rather than a decrease in sonority, are illicit. While such syllables do exist underlyingly, they may not surface as such, as indicated in (50).

(50) a. /mera:k/ *[mera:k] 'curiosity'
b. /hayr/ *[hayr] 'charity, fortune'
c. /kahr/ *[kahr] 'grief'
d. /haps/ *[haps][13] 'prison'
e. /hall/ *[hall] 'solution'

When an illicit syllable is present in Turkish, the extra consonant at the end may be preserved if it is followed by a vowel-initial morpheme that permits it to function as an onset. When a vowel-initial morpheme is not in the appropriate domain with the C, or when there is no vowel-initial morpheme following the C, however, one of three rules applies to ensure that the two-mora and sonority restrictions on Turkish syllables are respected. Depending on the nature of the illicit syllable, we observe Long Vowel Shortening, Degemination or Vowel Epenthesis, as illustrated in (51)–(53), respectively. In each case, the (a) example shows the syllabification of the 'extra' consonant with a following morpheme, the (b)

[13] It should be noted that there are a few words in Turkish that do have a stop+fricative cluster at the end, for example [çips] 'chips', [seks] 'sex', [faks] 'fax'. These words are typically quite recent borrowings, and are recognised as being somewhat foreign. Furthermore, it is interesting to note that they always involve [s] at the end, a pattern that is consistent with many other languages, including English, in which /s/ has a special status, perhaps as the fricative at the unmarked coronal place of articulation.

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

example shows the application of the appropriate rule when the consonant is followed by a consonant-initial morpheme and the (c) example shows its application when nothing follows it. The relevant segments are shown in boldface.

(51) CV:C

*Long Vowel Shortening*

a. /hasa:r-(s)I/ has**a:**rı 'his damage'
damage-3SG

b. /hasa:r-DAn/ has**a**rdan 'from damage'
damage-ABL

c. /hasa:r/ has**a**r 'damage'

(52) CVC:

*Degemination*

a. /hiss-(y)A/ hi**ss**e 'to feeling'
feeling-DAT

b. /hiss-lAr/ hi**s**ler 'feelings'
feeling-PL

c. /hiss/ hi**s** 'a feeling'

(53) $CVC_{\alpha}C_{\beta}$ ($C_{\alpha}$, $C_{\beta}$ violate Sonority Sequencing Principle)

*Vowel Epenthesis*

a. /burn-(I)m/ bu**rn**um 'my nose'
nose-1SG&POSS

b. /burn-lAr/ bu**run**lar 'noses'
nose-PL

c. /burn/ bu**run** 'a nose'

The case of geminates is particularly interesting. On the one hand, geminates are like the consonant sequences that fail to respect the Sonority Sequencing Principle since they include two consonants of the same sonority ranking. On the other hand, however, they do not undergo the same rule for reestablishing permissible syllable structures: Vowel Epenthesis applies in sequences involving two different consonants while Degemination applies with geminates. In fact, this is precisely what we would expect according to the principle of Geminate Integrity. That is, since geminate consonants constitute a single unit in certain respects, we may not consider the two segmental slots they occupy independently of each other. In the case at hand, we may not split a geminate with an epenthetic vowel, while this is what occurs in sequences of two different consonants.

Let us now consider the domain in which the three syllabic phenomena operate, since it was suggested above that the 'extra' consonants do not always syllabify with a following vowel-initial morpheme. Given that

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

affixes and clitics were shown above not to behave in a uniform way with respect to other phenomena, specifically stress and vowel harmony, it is reasonable to ask whether they behave in a uniform way with respect to the syllabification facts under investigation. What we see in (54) is that syllabification of an 'extra' consonant takes place with (a) morphemes that fall within the PW with the root, and (b) morphemes that fall outside the PW.

(54) a. /haps-(y)A/ [hapsé]$_{PW}$ to the prison
prison-DAT

b. /haps-∅-(y)Im/ [háps]$_{PW}$-∅$_{(PWA)}$-im 'I am imprisoned.'
prison-COP-1SG

It would thus appear that the appropriate domain for syllabification is the constituent above the PW. We argued above that compounds provide motivation for the CG as a distinct phonological constituent between the PW and the PPh since they exhibit stress patterns different from both of these constituents. If the CG is also the appropriate domain for the syllable phenomena of Turkish, we predict that the same syllabification patterns observed in CGs consisting of a root plus affixes and/or clitics will also be found in compounds. Indeed, this prediction is borne out.

As discussed in §8.2.1, a common type of compound in Turkish consists of loanword + auxiliary constructions (see Kardeştuncer 1982 for an analysis of such constructions in an early generative framework). Not only do these compounds behave as single CGs with respect to stress assignment, the examples below show that they also exhibit the same syllabification patterns as CGs consisting of a single root plus following suffixes and/or clitics. For example, in (55a), we see that a final consonant at the end of the first root in a compound (i.e. the N) syllabifies with the vowel-initial syllable of the second root (i.e. the Aux). By contrast, similar sequences in phrasal constructions do not permit syllabification across the roots in question. Instead, Vowel Epenthesis applies to render the consonant sequence at the end of the first root acceptable, as in (56a). If the second root is consonant-initial, we are unable to observe a difference between these structures since syllabification of the 'extra' consonant is not possible, regardless of the prosodic constituent structure, as in (55b) and (56b).

(55) a. /ha**ps** + ol-mAk/ ha**ps**olmak 'to be imprisoned'
prison + AUX-INF

b. /ha**ps** + ye-mAk/ ha**pis**yemek 'to be sentenced to prison'
prison + AUX-INF

(56) a. /ha**ps** + iyi/ ha**pis**iyi 'the prison is good'
prison + good

b. /ha**ps** + kötü/ ha**pis**kötü 'the prison is bad'
prison + bad

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

Analogous differences are observed between compounds and phrases where the other types of illicit syllable structures occur. If the second root is vowel-initial, syllabification of the final consonant of the first root as its onset is observed in compounds, as shown in (57a) and (59a). In phrases, however, one of the syllable-structure rules applies, as illustrated in (58a) and (60a). Of course, if the second root begins with a consonant, one of the syllable-structure rules must apply regardless of the prosodic structure, as illustrated in (57b), (58b), (59b) and (60b).

(57) CV:C

*Long Vowel Shortening : compounds*

a. /har**a**:m + et-mAk/ har**a**:metmek 'to take the pleasure out of something for someone'
forbidden + AUX-INF

b. /har**a**:m + ye-mAk/ har**a**myemek 'to get something illegally'
forbidden + AUX-INF

(58) *Long Vowel Shortening : phrases*

a. /har**a**:m + et/ har**a**met 'religiously forbidden meat'
forbidden + meat

b. /har**a**:m + mal/ har**a**mmal 'a thing taken by theft or deceit'
forbidden + property

(59) CVC:

*Degemination : compounds*

a. /za**mm** + et-mAk/ za**mm**etmek 'to add' (archaic)
increase + AUX-INF

b. /za**mm** + yap-mAk/ za**m**yapmak 'to increase a price'
increase + 'do'-INF

(60) *Degemination : phrases*

a. /za**mm** + iste-mAk/ za**m**istemek 'to ask for a raise in salary'
increase + want-INF

b. /za**mm** + kötü/ za**m**kötü 'the increase is bad'
increase + bad

There are also compounds in Turkish with the structure N + N. When the second root begins with a vowel, we see that an 'extra' consonant syllabifies with this root when it is part of a compound (61a, b). It fails to syllabify with the second root, however, when the latter begins with a consonant (62a, b) or when it is part of the same phrase but does not constitute a compound (62c). In such cases, one of the syllable-structure rules will apply, as in the previous examples. Thus, the CG domain delimits the appropriate domain for the syllable phenomena in this type of compound as well.

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

(61) a. /ka**yn** + ana/ ka**yn**ana 'mother-in-law'
in-law + mother

b. /ka**yn** + ata/ ka**yn**ata 'father-in-law'
in-law + father

(62) a. /ka**yn** + valide/ ka**yın**valide 'mother-in-law'
in-law + mother

b. /ka**yn** + baba/ ka**yın**baba 'father-in-law'
in-law + father

c. /ka**yn** + iyi/ ka**yın**iyi 'brother-in-law is good'
in-law (= brother-in-law) + good

It should be noted that there is one type of compound in which the syllabification facts are more like those of a phrase, as opposed to those of the compounds we have just seen. This type of compound also contains two nouns, but crucially, it bears an explicit compound marker on the second root: N + N + compound marker. As seen in (63), when there is a compound marker following the second root, syllabification does not apply between the two roots, giving rise to one of the syllable-structure rules when the first root contains a non-permissible syllable type.

(63) a. /ka**rn** + ağrı-(s)I/ ka**rın**ağrısı 'stomach-ache'
stomach + pain-COMP MRK

b. /cev**a**:b + anahtar-(s)I/ cev**a**banahtarı 'an answer key'
answer + key-COMP MRK

c. /ha**cc** + aday-(s)I/ ha**c**adayı 'a person who is registered to
pilgrimage + candidate-COMP MRK go on pilgrimage to Mecca'

It should be noted that the compound marker resembles the 3rd person possessive suffix. In phrases involving this possessive marker, commonly known as genitive-possessive constructions, however, the first noun also bears a suffix. It is possible that compounds such as those in (63) actually are somewhat 'phrase-like' and, in fact, contain an abstract genitive marker on the first root, though it is phonetically null. (See Kornfilt 1984: 62–66 for a discussion of the syntactic arguments, motivated by the Case Filter theory, on which this analysis is based.) Thus, the compounds in question share the absence of an overt genitive on the first root with N + N compounds, and at the same time share the presence of an abstract genitive marker with similar types of phrases.

As is expected, once an item has the status of a compound, it is subject to semantic drift. Thus, in compounds, we often do not find the semantic (or thematic) relation between the possessor and the head that is typically found in genitive-possessive phrasal constructions. For example, there is a somewhat different relation between the first and second roots of compounds such as *kebap ev-i* 'kebab + house-COMP MRK', meaning 'a

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

place where kebabs are sold'. Indeed, Kornfilt (1984) argues that one would need to stretch the notion of ownership excessively in order to accommodate cases in which the genitive-marked NP is actually a patient (e.g. *Istanbul-un feth-i* (Istanbul-GEN conquest-3SG&POSS) 'the conquest of Istanbul') or an agent (e.g. *şekspir-in eser-ler-i* (Shakespeare-GEN work -PL-3SG&POSS) 'Shakespeare's works', where the unmarked meaning is 'written', and not 'owned', by Shakespeare). Thus, according to Kornfilt, the only clearly identifiable relationship within such NPs, other than the structural one of subjecthood, is that the genitive-marked subject is a definite, referential NP. By contrast, in the corresponding compounds where the morphological Case marker is absent, the meaning tends to be non-referential and/or generic.

Aside from their syntactic deviance from phrases (i.e. absence of an overt genitive marker on the first noun) and their potential for semantic drift, the compounds in question, more importantly, also deviate from phrases in their prosody. That is, while each word in a phrase exhibits a strongly stressed syllable, compounds only have a single strongly stressed syllable, that of the first word. The distinction between the stress pattern of a compound consisting of N + N + COMP MRK and a nearly identical phrase can be seen in (64).

(64) a. su**báy** elbise-si 'uniform for officers'
officer dress-COMP MRK

b. subay-**ín** elbise-sí 'officer's uniform'
officer-GEN dress-3SG&POSS

Despite their compound stress pattern and less transparent semantics, the fact that N + N + COMP MRK compounds appear to be somewhat phrasal in nature may be the source of their atypical behaviour with regard to syllabification phenomena. Further consideration of the possible effect of an abstract case marker on phonology, however, is beyond the scope of the present investigation.

Before concluding this section, it should be pointed out that a phonological model that includes recursive PWs encounters problems with respect to the syllable structure rules under investigation. At first glance, it might seem that we would arrive at the same results as we do with the CG since the *outermost* PW′ essentially coincides with our definition of the CG. We might thus claim that the domain of the syllable phenomena is this *outermost* PW′. The problem is that while the analysis we are proposing only requires a distinction between PW and CG, an analysis with recursive PWs would require a three-way distinction among types of PWs: a 'plain' PW and two distinct types of PW′, which we will refer to as PW′-1 (i.e. non-outermost PW′) and PW′-2 (i.e. outermost PW′). The need to distinguish between the two types of PW′ can be seen in comparing the domain of the syllable structure rules to that of the Word Stress Rule. We have seen that the former may apply to a PW′ that contains more than one root, i.e. a compound. The latter, however, applies

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

in a PW′ domain consisting of a single root and its following morphemes; it does not apply to a PW′ containing more than one root. Thus, in order to arrive at the correct syllable and stress patterns, we must allow the syllable structure rules to apply in PW′-2, the *outermost* PW′ (including any internal PW′s), while we must restrict the word stress rule to PW′-1, a PW′ that is embedded within another PW′. This can be seen in (65), where stress is assigned individually to the two members of the compound, while we have shown that the domain for syllabification must be the entire *outermost* PW′.

(65) $[[[[[\textbf{káy}n]_{PW}$ $[aná]_{PW}]_{PW'}$-mɪ$]_{PW'}$-y$]_{PW'}$-dɪ$]_{PW'}$ 'Was she a mother-in-law?'
in-law + mother-QUES-COP-PAST

Thus, the analysis involving recursive PWs is more complex than the one we have proposed involving the CG, involving a three-way distinction among prosodic constituents rather than a two-way distinction. By way of comparison, the prosodic structure of the example in (65) in terms of the CG is given in (66).

(66) $[[\textbf{káy}n]_{PW}$ $[ana]_{PW}$-mɪ-y-dɪ$]_{CG}$

Finally, to summarise our findings with respect to the domains of rules other than those involving stress, we have shown that vowel harmony does not lend itself to characterisation in terms of a particular phonological constituent. Instead, it was shown that all that is needed to account for VH are the assumptions that (i) each root bears a specification for the type of vowel features associated with it and (ii) any segment, be it in a root, suffix or clitic, that behaves exceptionally in not taking on vowel features in the usual spreading fashion contains in its lexical representation the particular features that are associated with it. Both of these assumptions are required in some form by any account of a VH system that permits exceptionality, such as Turkish. All that is required then to ensure the correct application of VH is a standard association rule that spreads the relevant vowel features rightward until a new specification of vowel features is encountered; this set of features then spreads until the next set of features is encountered, and so on.

The syllable-structure phenomena of Turkish, by contrast, were shown to operate in relation to a specific prosodic constituent – the Clitic Group. That is, a root-final consonant that is in excess of the permissible syllable structure is preserved by syllabifying it as the onset of a subsequent vowel-initial item, be it a suffix, a clitic or another root, as long as the two syllables in question are within the same CG. If anything other than a vowel-initial syllable within the same CG follows (including null), one of three phonological rules applies to reduce the syllable with three moras to one with only two moras. Depending on the nature of the syllable, we will thus observe (i) Long Vowel Shortening, (ii) Degemination or (iii) Vowel Epenthesis.

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

## 10 Conclusions

Although stress is not always on the final syllable of a word in Turkish, we have shown that its position can be predicted in a simple and straightforward manner with reference only to structures and principles that are independently motivated in other languages. In contrast to previous analyses of Turkish stress, we require relatively simple 'machinery' to account not only for the now familiar regular and irregular word-stress patterns of Turkish but also for the less well-known compound and phrasal stress patterns. Specifically, we have proposed an analysis of word stress that only requires minimal lexical specification for (i) the locus of irregular root stress and (ii) a small set of morphemes (suffixes and clitics) that do not participate in the regular Word Stress Assignment Rule of Turkish. No recourse is made to multiple lexical levels or to multiple cophonologies, and as a result, ordering paradoxes and loops are avoided. Other than the two types of lexical specification, our analysis only needs to make reference to the prosodic hierarchy, in particular to the Phonological Word, the Clitic Group and the Phonological Phrase.

Our analysis of Turkish word stress crucially requires that only two simple two-way distinctions be made. First, it must be determined whether a root exhibits irregular stress or not. Second, it must be determined whether the morphemes that follow a root exhibit irregular stress or not.

As far as the first distinction is concerned, lexical marking of idiosyncrasies is part of most, if not all, recent phonological theories. Furthermore, with regard to Turkish, all previous analyses have needed to resort to some form of lexical prespecification of irregular root stress. Indeed, they have all required much more elaborate systems to handle the irregular root stress than the proposal advanced here. In our analysis, once the position of irregular root stress is identified, all that is needed is an extremely simple stress rule that accounts for the well-known final stress pattern of Turkish: stress the final syllable of the (Phonological) Word. We rely on the independently motivated Elsewhere Condition to ensure that the regular stress rule applies to all and only those cases in which there is no lexically specified idiosyncratic stress.

With regard to the second two-way distinction, we have again relied on a principle that has been part of most, if not all, recent phonological theories, the recognition that morphemes fall into two groups based on whether or not they cohere phonologically to their associated root. This was seen in the form of the distinction between '+' and '#' boundaries in early generative phonology, and in terms of lexical levels in somewhat later models of phonology. In the present proposal, we only lexically specify the relatively small class of morphemes that do not cohere with the root, in the sense that they do not participate in the regular final stress pattern. Inherent in this analysis is the widely accepted claim that only idiosyncrasies are marked in the lexicon. In the case of coherence of morphemes with a root, we take the idiosyncratic case to be lack of

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

coherence. We thus propose to lexically identify non-cohering morphemes as Phonological Word Adjoiners (PWAs) in Turkish, a classification that we would like to suggest is valid more generally across languages.

It was seen in Turkish that there is only a small number of morphemes that must be specified as PWAs. This collection of morphemes does not form a natural class in morphological or syntactic terms, something that has been problematic for previous analyses. In shifting the burden from morphosyntax to phonology, however, our analysis permits us to group the morphemes in question into a natural class – one based strictly on their common phonological property of adjunction to the PW, rather than inclusion within it. We take this to be yet a further manifestation of the lack of isomorphism between phonological structure and morphosyntactic structure.

It was shown, furthermore, that once word-level stress is assigned, only two additional, very simple, rules are required to account for higher levels of stress. That is, we have proposed a rule that applies within the Clitic Group domain that accounts for compound stress, and another rule that applies within the Phonological Phrase domain that accounts for phrasal stress. While the Phonological Phrase is a widely accepted constituent in phonology, the Clitic Group has been more controversial. Our analysis of Turkish stress contributes to the evaluation of the Clitic Group as a prosodic constituent, providing evidence of the need for a phonological constituent between the Phonological Word and the Phonological Phrase. Specifically, it was shown that there are three distinct stress rules in Turkish, and we would not be able to provide distinct domains for them in a phonological model that only provides the two constituents, Phonological Word and Phonological Phrase.

Finally, the analysis we advanced in relation to stress was considered in relation to several segmental phenomena of Turkish. First, it was shown that vowel harmony is most simply accounted for in a linear fashion without reference to prosodic constituents of any sort. By contrast, it was shown that a series of rules related to syllable structure in Turkish, Long Vowel Shortening, Degemination and Vowel Epenthesis, do need to refer to prosodic constituents in the specification of their domain of application. Specifically, it was demonstrated that the application of these rules could be insightfully accounted for if reference is made to the Phonological Word and Clitic Group as defined in our proposal. Analyses in terms of recursive Phonological Words, on the other hand, encounter problems in this regard.

Finally, although we have preferred a derivational analysis to a constraint-based analysis here, the ultimate choice between these models depends on considerations beyond the scope of the present paper. In the meantime, however, we provide a preliminary analysis of the stress phenomena of Turkish in terms of phonological constraints in Appendix B.

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

## Appendix A: abbreviations

| | | | |
|---|---|---|---|
| ABL | ablative | EP COP | epistemic copula |
| ACC | accusative | EVID | evidential |
| AOR | aorist | FUT | future |
| ATTR | attributive | IMPOSS | impossibilitative |
| AUX | auxiliary | INF | infinitive |
| CAUS | causative | INSTR | instrumental |
| CL | clitic | LOC | locative |
| COMM | commutative | NEG | negative |
| COMP MRK | compound marker | OBJ PRT | object participle |
| COND | conditional | PASS | passive |
| CONN | connector | PAST | past tense |
| COP | copula | PL | plural |
| DAT | dative | QUES | question |
| DERIV | derivational morpheme | RECP | reciprocal |

## Appendix B: an OT account of stress assignment in Turkish

Our analysis of the Phonological Word and stress assignment in Turkish assumes a derivational model of phonology. Much of the analysis is also potentially compatible with a constraint-based model such as Optimality Theory. We present here the core of such an alternative analysis.

Phenomena reflecting the phonology–morphology interface that have been treated derivationally in the present paper are typically handled in OT in terms of alignment relations (e.g. McCarthy & Prince's 1993 analysis of 'generalised alignment'). The categories that appear in alignment constraints range over the alphabets of grammatical and phonological categories available in the grammar of a given language. Below, we examine stress within the word in relation to alignment and several other constraints and suggest a possible approach for stress within larger constituents in Turkish.

(a) *Primary word stress*. Typically, the stressed syllable aligns with the right edge of a PW:

(67) ALIGN(stress-R, PW-R)

In most cases, the right edge of a PW aligns with the right edge of a lexical item ($X^o$):

(68) ALIGN(PW-R, $X^o$-R)

Certain morphemes (i.e. Phonological Word Adjoiners (PWAs)) must be excluded from the PW, although they are part of the corresponding $X^o$:

(69) *[… PWA …]$_{PW}$

The exclusion of PWAs from the PW must outrank the alignment of the PW with the $X^o$:

(70) *[… PWA …]$_{PW}$ ⩾ ALIGN(PW-R, $X^o$-R)

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

Morphemes excluded from a PW may not themselves form PWs, due to an undominated constraint in Turkish (and possibly universally) requiring that a PW contain a root:

(71) PW = Root

If a root carries an underlying (irregular) stress feature, faithfulness requires a stress in the same location in the output:

(72) Max-IO

This constraint outranks the PW-alignment constraint, as irregular stress takes precedence over the regular final stress:

(73) Max-IO ≫ Align(stress-R, PW-R)

An additional constraint prevents an extra stress on the final syllable of a PW bearing irregular root stress, a possibility excluded above by the Elsewhere Condition:

(74) *[… str … str …]$_{PW}$

This constraint must be ranked higher than the one that assigns stress to the right edge of a word:

(75) Max-IO, *[… str … str …]$_{PW}$ ≫ Align(stress-R, PW-R)

Combining all of the constraints, we arrive at the following ranking, illustrated below with a series of tableaux:

(76) Max-IO ≫ *[… str… str …]$_{PW}$ ≫ PW = Root ≫ *[… PWA …]$_{PW}$ ≫ Align(PW-R, X$^{o}$-R) ≫ Align (stress-R, PW-R)

The following tableaux demonstrate that this ranking accounts for all types of 'single word' structures in Turkish, as opposed to compound words. For completeness, all six constraints are shown in each tableau, even though not all of the constraints play a crucial role in all of the examples.

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

(77) *Word with regular root stress and regular suffix stress*
/para-lI-lAr-DAn/
money-ATTR-PL-ABL

| /para-lI-lAr-DAn/ | MAX-IO | *[…str… str…]$_{PW}$ | PW=RT | *[…PWA …]$_{PW}$ | ALIGN-R (PW,X$^0$) | ALIGN-R (str,PW) |
|---|---|---|---|---|---|---|
| a. [pará]$_{PW}$-lı-lar-dan | | | | | *!** | |
| b. [para-lí]$_{PW}$-lar-dan | | | | | *!* | |
| c. [para-lı-lár]$_{PW}$-dan | | | | | *! | |
| ☞ d. [para-lı-lar-dán]$_{PW}$ | | | | | | |
| e. [pará]$_{PW}$-lí-lar-dán | | | | | *!** | *** |
| f. [pará]$_{PW}$-lı-lár-dan | | | | | *!** | ** |
| g. [pará]$_{PW}$-lí-lar-dan | | | | | *!** | * |
| h. [pará]$_{PW}$-lı-lar-dan | | | | | *!** | |
| i. [pára-lı-lar-dan]$_{PW}$ | | | | | | *!*** |
| j. [pará-lı-lar-dan]$_{PW}$ | | | | | | *!** |
| k. [para-lí-lar-dan]$_{PW}$ | | | | | | *!* |
| l. [para-lı-lár-dan]$_{PW}$ | | | | | | *! |

(78) *Word with irregular root stress and regular suffixes*
/**za**ra-lI-lAr-DAn/
zara-ATTR-PL-ABL

| /**za**ra-lI-lAr-DAn/ *stressed:* [za] | MAX-IO | *[…str… str…]$_{PW}$ | PW=RT | *[…PWA …]$_{PW}$ | ALIGN-R (PW,X$^0$) | ALIGN-R (str,PW) |
|---|---|---|---|---|---|---|
| a. [zará]$_{PW}$-lı-lar-dan | *! | | | | *** | |
| b. [zara-lí]$_{PW}$-lar-dan | *! | | | | ** | |
| c. [zara-lı-lár]$_{PW}$-dan | *! | | | | * | |
| d. [zara-lı-lar-dán]$_{PW}$ | *! | | | | | |
| ☞ e. [zára-lı-lar-dan]$_{PW}$ | | | | | | **** |
| f. [zára]$_{PW}$-lı-lar-dán | | | | | *!** | *,*** |
| g. [zára]$_{PW}$-lı-lár-dan | | | | | *!** | *,** |
| h. [zára]$_{PW}$-lí-lar-dan | | | | | *!** | *,* |
| i. [zára]$_{PW}$-lı-lar-dan | | | | | *!** | * |
| j. [zára-lı]$_{PW}$-lar-dan | | | | | *!* | ** |
| k. [zára-lı-lar]$_{PW}$-dan | | | | | *! | *** |
| l. [zára-lı-lár]$_{PW}$-dan | | *! | | | * | *** |
| m.[zá]$_{PW}$ra-lı-lar-dan | | | *! | | **** | |

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

(79) *Word with regular root stress + regular suffix + PWA + regular suffix + PWA + …*

/kara-lA-mA$_{(PWA)}$-(y)AcAG-mI$_{(PWA)}$-sIn-Iz/
black-DERIV-NEG-FUT-QUE-2PL-PL

| /kara-lA-mA-(y)AcAG-mI-sIn-Iz/ PWAs: -mA, -mI | MAX-IO | *[…str… str…]$_{PW}$ | PW=RT | *[…PWA …]$_{PW}$ | ALIGN-R (PW,X$^0$) | ALIGN-R (str,PW) |
|---|---|---|---|---|---|---|
| a. [kara-la-ma-yacak-mı-sın-íz]$_{PW}$ | | | | *!* | | |
| b. [kara-la-má]$_{PW}$-yacak-mı-sın-ız | | | | *! | ***** | |
| c. [kara-lá-ma]$_{PW}$-yacak-mı-sın-ız | | | | *! | ***** | * |
| d. [kara-lá]$_{PW}$-ma-yacak-mı-sın-íz | | | | | ****** | *!*** ** |
| ☞ e. [kara-lá]$_{PW}$-ma-yacak-mı-sın-ız | | | | | ****** | |
| f. [karáa]$_{PW}$-la-ma-yacak-mı-sın-ız | | | | | ****** *! | |

(80) *Word with irregular root stress + regular suffixes + PWA*

/**za**ra-lI-lAr-DA$_{(PWA)}$/
zara-ATTR-PL-CONN

| /**za**ra-lI-lAr-DA/ *stressed:* [za] PWA -dA | MAX-IO | *[…str… str…]$_{PW}$ | PW=RT | *[…PWA …]$_{PW}$ | ALIGN-R (PW,X$^0$) | ALIGN-R (str,PW) |
|---|---|---|---|---|---|---|
| a. [zára]$_{PW}$-lı-lar-da | | | | | **!* | * |
| b. [zára-lí]$_{PW}$-lar-da | | | | | **! | ** |
| ☞ c. [zára-lı-lar]$_{PW}$-da | | | | | * | *** |
| d. [zára-lı-lar-da]$_{PW}$ | | | | *! | | **** |
| e. [zá]$_{PW}$ ra-lı-lar-da | | | *! | | **** | |
| f. [zára]$_{PW}$-lı-lar-dá | | | | | **!* | *,*** |
| g. [zára]$_{PW}$-lı-lár-da | | | | | **!* | *,** |
| h. [zára]$_{PW}$-lí-lar-da | | | | | **!* | *,* |
| i. [zára-lı-lár]$_{PW}$-da | | *! | | | * | *** |
| j. [zara-lı-lár]$_{PW}$-da | *! | | | | * | |
| k. [zára-lı-lár-da]$_{PW}$ | | *! | | * | | *,**** |

(b) *Stress beyond the Phonological Word.* An analysis of stress in the constituents above the PW will follow essentially the same principles of alignment. If we assume the presence of the Clitic Group (CG), all that is needed to cover most cases is a constraint that aligns the left edge of a CG with the left edge of a PW. Thus, any morphemes excluded from a PW are grouped with that PW into a single constituent – up to the next PW.

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

For compounds, a second stress-alignment constraint would ensure that the strongest stress of the CG aligns with the left edge of the CG. This constraint must be ranked lower than the stress-alignment constraint at the PW level, something that might occur automatically if there is a universal ranking convention related to the relative position of constituents in the prosodic hierarchy.

Analogously, an additional alignment constraint will be needed to ensure that the main phrasal stress is located on the first prominent syllable within the PPh. Any segmental phenomena will be handled by constraints that are ranked among the various alignment and stress-related constraints we have just seen.

## REFERENCES


Banguoğlu, T. (1986). *Türkçenin grameri*. Ankara: Atatürk Kültür, Dil ve Tarih Yüksek Kurumu.

Barker, C. (1989). Extrametricality, the cycle, and Turkish word stress. In J. Itô & J. Runner (eds.) *Phonology at Santa Cruz 1*. Santa Cruz: Linguistics Research Center. 1–33.

Booij, G. (1988). Review of Nespor & Vogel (1986). *JL* **24**. 515–525.

Çakır, M. C. (1988). On non-final stress in Turkish simplex words. Paper presented at the 9th International Congress on Turkish Linguistics, Lincoln College, Oxford.

Clements, G. N. & E. Sezer (1982). Vowel and consonant disharmony in Turkish. In H. van der Hulst & N. Smith (eds.) *The structure of phonological representations*. Part 2. Dordrecht: Foris. 213–255.

Foster, J. F. (1969). *On some phonological rules of Turkish*. PhD dissertation, University of Illinois, Urbana.

Göksel, A. (in press). The auxiliary verb at the morphology–syntax interface. In E. Taylan (ed.) *The verb: the core of clause structure in Turkish*. Amsterdam: Benjamins.

Hameed, J. (1985). Lexical phonology and morphology of Modern Standard Turkish. *Cahiers Linguistiques d'Ottawa* **14**. 71–95.

Hayes, B. (1989). The prosodic hierarchy in meter. In P. Kiparsky & G. Youmans (eds.) *Rhythm and meter*. Orlando: Academic Press. 201–260.

Hulst, H. van der & J. van der Weijer (1991). Topics in Turkish phonology. In H. Boeschoten & L. Verhoeven (eds.) *Turkish linguistics today*. Leiden: Brill. 11–59.

Inkelas, S. (1999). The exceptional stress-attracting suffixes in Turkish: representations versus the grammar. In R. Kager, H. van der Hulst & W. Zonneveld (eds.) *The prosody–morphology interface*. Cambridge: Cambridge University Press. 134–187.

Inkelas, S. & C. O. Orgun (1995). Level ordering and economy in the lexical phonology of Turkish. *Lg* **71**. 763–793.

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

Kaisse, E. (1985). Some theoretical consequences of stress rules in Turkish. *CLS* **21:1**. 199–209.

Kaisse, E. (1986). Toward a lexical phonology of Turkish. In M. Brame, H. Contreras & F. Newmeyer (eds.) *A Festschrift for Sol Saporta*. Seattle: Noit Amrofer. 231–240.

Kardeştuncer, A. (1982). A three-boundary system for Turkish. *Linguistic Analysis* **10**. 95–117.

Kornfilt, J. (1984). *Case marking, agreement, and empty categories in Turkish*. PhD dissertation, Harvard University.


https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press

Kornfilt, J. (1996). On some copular clitics in Turkish. In A. Alexiadou, N. Fuhrop, P. Law & S. Lohken (eds.) *ZAS Papers in Linguistics: Papers on the conference 'The word as a phonetic unit'*. Berlin: Zentrum für Allgemeine Sprachwissenschaft. 96–114.
Kornfilt, J. (1997). *Turkish*. London & New York: Routledge.
Lees, R. (1961). *The phonology of Modern Standard Turkish*. Bloomington: Indiana University.
Lees, R. (1962). A compact analysis for the Turkish personal morphemes. In N. Poppe (ed.) *American studies in Altaic linguistics*. Bloomington: Indiana University. 141–176.
Lewis, G. (1967). *Turkish grammar*. Oxford: Oxford University Press.
McCarthy, J. & A. Prince (1993b). Generalized alignment. *Yearbook of Morphology 1993*. 79–153.
Nespor, M. & I. Vogel (1986). *Prosodic phonology*. Dordrecht: Foris.
Nespor, M. & I. Vogel (1989). On clashes and lapses. *Phonology* **6**. 69–116.
Peperkamp, S. (1997). *Prosodic words*. The Hague: Holland Academic Graphics.
Selkirk, E. (1980). Prosodic domains in phonology: Sanskrit revisited. In M. Aronoff & M.-L. Kean (eds.) *Juncture*. Saratoga: Anma Libri. 107–129.
Selkirk, E. (1995). The prosodic structure of function words. In J. Beckman, L. Walsh Dickey & S. Urbanczyk (eds.) *Papers in Optimality Theory*. Amherst: GLSA. 439–469.
Sezer, E. (1981). The k/∅ alternation in Turkish. *Harvard studies in phonology* **2**. 354–382.
Sezer, E. (1983). On non-final stress in Turkish. *Journal of Turkish Studies* **5**. 61–69.
Vogel, I. (1999). Subminimal constituents in prosodic phonology. In S. J. Hannahs & M. Davenport (eds.) *Issues in phonological structure*. Amsterdam: Benjamins. 249–267.
Vogel, I., H. T. Bunnell & S. Hoskins (1995). The phonology and phonetics of the Rhythm Rule. In B. Connell & A. Arvaniti (eds.) *Phonology and phonetic evidence: papers in laboratory phonology IV*. Cambridge: Cambridge University Press. 111–127.
Zec, D. & S. Inkelas (1991). The place of clitics in the prosodic hierarchy. *WCCFL* **10**. 505–519.
Zimmer, K. E. (1970). Some observations on non-final stress in Turkish. *Journal of the American Oriental Society* **90**. 160–162.

https://doi.org/10.1017/S0952675701004201 Published online by Cambridge University Press