

EXTRAMETRICALITY, THE CYCLE, AND TURKISH WORD STRESS

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Assuming cyclic stress, Turkish supports a highly restrictive version of extrametricality.

1. INTRODUCTION

Extrametricality is a formal tool for prosodic analysis. It amounts to temporary invisibility for part of a form for the purposes of rule application: first you cover up the extrametrical material, then you apply the rule, then you uncover the extrametrical material again and continue. An appeal to extrametricality can significantly increase the elegance of a particular grammar. More importantly, extrametricality currently plays a crucial role in various areas of prosodic research; for instance, the typology of stress systems (e.g., Hayes (1981), Prince (1983)), as well as the prosodic morphology of McCarthy and Prince (1986, 1988) both depend on extrametricality. Its value to phonological theory in the long run, however, will depend on the degree to which it can be constrained by universal principles. Turkish is interesting in this regard since Poser (1984) suggests that Turkish word stress motivates a weakening in the

I would like to acknowledge the work of Jorge Hankamer, whose name does not appear in the bibliography. In some sense, my analysis of Turkish presents his unpublished insights dressed up in a fancier form. The work reported here has also benefited from the comments of Judith Aissen, Sandra Chung, Junko Itô, Lucille Ito, and Armin Mester. Thanks to Armin Mester for pointing out the relevance of my analysis for the Extended Invisibility Principle. The Syntax Research Center at the University of California, Santa Cruz, provided logistical support.

theory of extrametricality. My main goal will be to show that Turkish supports a highly restrictive version of extrametricality. More specifically, I seek to maintain the following general constraints: extrametrical material must consist of some independently motivated prosodic or morphological constituent; extrametrical material must be peripheral; and extrametricality never persists for more than one cycle.

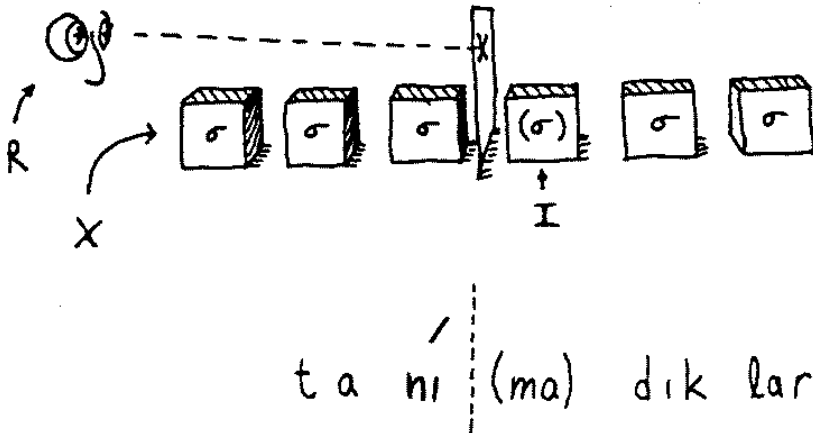
Poser (1984) proposes the following principle, motivated in part by examples from Turkish such as the word illustrated immediately below.

(1)

Extended Invisibility Principle (Poser (1984, 127)):

Let R be a directional rule which scans from left to right, and let I be an invisible constituent in string X. Then the substring bounded on one side by I and extending to the boundary of X is invisible to rule R.

(2)



The Extended Invisibility Principle (EIP) accounts for main stress in a word like *tanımadıklar* ‘those who are not known’ as shown in (2). The verbal negative suffix *-mE* (realized here as *-ma*) is designated as invisible, i.e., extrametrical. Assuming default stress scans left to right, the extrametrical suffix in the middle of the word renders the rest of the word invisible, correctly predicting main stress on the second

syllable of the root: *tanímadıklar*.

On the EIP analysis, then, the suffix *-mE* has underlying extrametricality, and the string of syllables *-madıklar* is extrametrical by virtue of the EIP. But *-mE* is not peripheral, nor is *-madıklar* a constituent. Clearly the EIP account is inconsistent with the claim that only peripheral constituents can be extrametrical.

I propose to reconcile the facts of Turkish with the more restrictive version of extrametricality by developing a cyclic analysis of Turkish word stress. Notice that the EIP analysis attempts to assign stress to a word as a whole after all morphological operations have taken place, as shown in (2). Poser (1984) shares this approach to Turkish word stress with Lees (1961), Lightner (1972), Dobrovolsky (1976, 1986), Halle and Vergnaud (1987), and Kaisse (1985). In contrast, I will argue that stress is properly cyclic in Turkish. That is, I claim that certain prosodic rules can assign stress or adjust stress after every morphological operation. There is a middle ground on this issue taken by Hameed (1985), Kaisse (1986), and Underhill (1988) in which each metrical rule limits its activity to a certain class of morphological operations as defined by the levels of a lexical phonology. However, no analysis I am aware of argues, as I do, that some rules must apply more than once during a single derivation, let alone more than once during a single lexical stratum.

The analysis given here adopts the essential insight of Poser (1984) that the suffix *-mE* is lexically marked as extrametrical, and that it is this extrametricality which determines the placement of stress in the larger word. On the cyclic account, however, *-mE* is extrametrical only during the cycle immediately following its suffixation. During this cycle, default stress sees *taní(ma)* and deposits stress on the rightmost visible syllable, that is, on the second syllable of the root, giving the intermediate form *taníma*. The cyclic default stress rule will go on to stress the non-extrametrical suffixes *-DIk* and *-lEr* on later cycles, but an independently motivated instance of End

Rule Left gives prominence to the leftmost stress, correctly predicting main stress on the second syllable of the root and resulting in *tanímadıklar*.

Crucially, the suffix *-mE* is extrametrical only during the cycle on which it is first affixed. Clearly the extrametrical material is a constituent (here, a syllable) at the periphery of the form. Thus a cyclic account describes the facts of Turkish without giving up the requirements that extrametricality marks only peripheral constituents and lasts at most one cycle. The theoretical point of the paper, then, is that factoring out underlying extrametricality from its potential for cyclic aftereffects can lead to a simpler, stronger theory of extrametricality.

Outline. Section 2 sets out my analysis for Turkish word stress. I begin by proposing a stress assignment rule along with a destressing rule. These two rules operate cyclically, and together they describe default stress on which the final syllable of the word receives main stress. Next I motivate final syllable extrametricality for place names and unassimilated borrowings. Given extrametricality, we can predict stress on place names by building a binary right-dominant foot at the right margin of the word. With these assumptions in place, the analysis automatically extends to a certain class of suffixes traditionally known as ‘stressless’ or ‘enclitic’ suffixes which affect the placement of main and secondary stress.

Section 3 gives two empirical arguments in support of the analysis. It happens that all polysyllabic suffixes are exceptional with respect to stress. This is accidental on the accounts mentioned above, but it could not be otherwise on a cyclic account. In addition, words derived from monosyllabic place names differ from words derived from polysyllabic place names in that main stress may fall on a suffix. This fact also falls out automatically from the analysis presented in section 2.

Section 4 develops the theoretical implications of the analysis, beginning with a

brief discussion of the formal nature of extrametricality and the typical reasons for invoking it. I discuss the common assumption that extrametricality systematically fails to take effect just in case it would render the entire target form invisible. I call this the **WHOLE-FORM EXCEPTION**. Kaisse (1985) suggests that the whole-form exception operates in Turkish. On the account presented here, however, the whole-form exception is redundant. Those cases which seem to motivate the whole-form exception, namely uninflected monosyllabic place names, receive their stress by virtue of stress rules operating at different levels in the phonology without stipulating the whole-form exception. Furthermore, I suggest that this reassessment of the whole-form exception generalizes to other languages.

Finally, I show that a cyclic account describes the facts as well as the EIP but without giving up any of the desirable general constraints on extrametricality. I conclude that Turkish supports a simple, highly restrictive version of extrametricality.

Note on the orthography. Suffixes in Turkish show alternations governed by vowel harmony and by voicing assimilation in consonants. I follow standard practice in using underspecified segments when citing suffixes. For instance, *E* denotes a non-high unrounded vowel which is unspecified for backness. Non-high vowels assimilate in backness to the closest preceding vowel, so that *-mE*, the verbal negative morpheme, alternates as in *gel-me* ‘not come’ and *tanı-ma* ‘not know’ (where *ı* is the back high unrounded vowel). Similarly, *I* denotes a high vowel which assimilates with the preceding vowel both in backness and in rounding, and *D* is an alveolar stop which takes on the voicing of the stem-final segment. The suffix *-DIk* ‘one who’, then, has eight allomorphs, including the one which appears in *tanıdık* ‘acquaintance’.

Otherwise I follow the conventions for Turkish orthography as laid out by Lewis (1967), with three adjustments for investigating stress: I use an acute accent to mark

primary stress and a grave accent for secondary stress, as in *taní-ma-dík-lar-ım-ız*; a macron marks long vowels, and a period will occasionally separate syllables, as in *Ay.zın.hō.ver* ‘Eisenhower’; and I have systematically suppressed the apostrophe which usually separates a place name root from its suffixes, so that I have *Ankaranın* ‘of Ankara’ instead of *Ankara’nın*.

2. THE ANALYSIS

This section shows how cyclic stress and extrametricality provide a unified account of three major stress patterns in Turkish: default final stress, non-final stress in place names and recent borrowings, and the non-final stress associated with certain exceptional suffixes.

2.1. *Cyclic default stress*

Stress in Turkish normally falls on the last syllable of the word. This is true of the majority of roots, both monosyllabic and polysyllabic. It is also true for words containing suffixes. No matter how many suffixes the word contains, stress usually appears on the final syllable of the word.

(3)

a.	<i>taní</i>	know
b.	<i>tanı-dík</i>	acquaintance
c.	<i>tanı-dík-lár</i>	acquaintances
d.	<i>tanı-dík-lar-ím</i>	my acquaintances
e.	<i>tanı-dík-lar-ım-ız</i>	our acquaintances
f.	<i>koalisyon</i>	coalition
g.	<i>koalisyon-um-úz</i>	our coalition
h.	<i>koalisyon-um-uz-dá</i>	in our coalition

The pattern in (3) gives a strong impression of motion. The main stress seems to move one syllable rightward with each successive suffixation. We will say that stress MIGRATES onto the rightmost suffix.

Since (3a) and (3f) are both polysyllabic and monomorphemic, Turkish must have a rule which stresses the final syllable in a root.

(4) Default stress: stress the rightmost element.

Formally, (4) is an instance of Prince's (1983) End Rule Right. Default stress will apply at least to all roots which happen to be complete words. To judge from the pattern in (3), we should simply let default stress apply to completed words to get stress on the final syllable of the word. I will argue below that a cyclic analysis is preferable. For now, I will assume that default stress applies after every suffixation, and I will show how this leads to an equally effective explanation for the stress migration shown in (3).

For the sake of concreteness, I will adopt the metrical theory presented in Hayes (1985, 1987), in which the relative prominence of the syllables of a word is represented by a grid of 'x's. Syllables with more 'x's are more prominent with respect to stress.¹ In addition, I assume that Turkish has a lexical phonology of the sort suggested by Kiparsky (1982) and Mohanan (1981).² A LEVEL associates a class of morphological operations with a particular set of phonological rules. After each execution of a

¹ Although it is common practice to give every syllable an 'x' at level 0 in the grid, I know of no rules in Turkish which refer to level 0 (but see Halle and Vergnaud (1987, 54) for an alternative analysis of some of the facts explained here). For the sake of clarity in the derivations I will omit level 0 from my representations, giving instead only levels 1 and 2.

² See Hameed (1985) and Kaisse (1986) for alternative lexical models of Turkish

morphological process, the phonological rules at that level apply; this constitutes one CYCLE.³

For instance, assume that suffixation occurs at Level I and that the Level I phonology includes the default stress rule. If we begin with a root *tanı*, default stress on the bare root gives us *tanı*. After combination with the suffix *-DIk*, the application of the default stress rule on the second cycle gives *tanıdik*. Only one syllable bears stress in the surface form, of course, so (3) cannot be the whole story.⁴ But notice that the intermediate form *tanıdik* has two adjacent syllables with equal prominence. Prince (1983) suggests that this situation, which he calls STRESS CLASH, is unstable cross-linguistically. I propose that Turkish resolves the tension created by stress clash by deleting the leftmost clashing element.

(5) Stress clash resolution (destressing):

$$\begin{array}{ccccc} \text{x} & \text{x} & & & \text{x} \\ \sigma & \sigma & \rightarrow & \sigma & \sigma \end{array}$$

The schema in (5) says that when you have two adjacent equal stresses, delete the leftmost. Destressing also resides at Level I, and is intrinsically ordered after the default stress rule. The analysis thus far is summarized in the derivation in (6).

which give special attention to stress. Hameed in particular argues for levels on phonological evidence independent of stress, such as vowel deletion and *h*-deletion.

³ Note that ‘level 1’ refers to a row in a metrical representation of a form, and ‘Level I’ refers to a stratum in the lexical phonology.

⁴ This is the point at which Underhill (1988, 5) abandons the cyclic approach.

(6)

<i>Underlying shape</i>	tanı	-DIk
<i>Level I</i>		
<i>First cycle</i>		
	x	
Default stress	tanı	
Stress clash resolution	_____	
<i>Second cycle</i>		
	x	
Suffixation	tanıdık	
	x x	
Default stress	tanıdık	
	x	
Stress clash resolution	tanıdık	
<i>Other rules</i>		
Attested form:	<i>tanıdık</i> ‘acquaintance’	

After stress clash resolution applies we have the form attested in (3b): *tanıdık*. If there are more suffixes, it is clear what happens: the default stress rule sets up stresses on each of them, and the destressing rule in (5) knocks them down one by one after each suffixation, leaving only the rightmost one. The sense of movement in the pattern in (3), then, is an illusion; it is really just cyclic application of the default stress rule and the destressing rule. We will see this domino effect in later derivations.

2.2. Extrametricality in place names and recent borrowings

Place names and recent borrowings (PLACE NAMES for short) are exceptions to the default stress rule. Instead of final stress, they take main stress on the penult or the antepenult, depending on syllable weight. In fact, place names may form minimal pairs with other words in Turkish from which they differ only in stress: *mısr* ‘maize’ versus *Mısır* ‘Egypt’. Thus stress is contrastive in Turkish, although all such contrasts can always be predicted systematically from the morphological subclass of the word in question. There are, however, individual words whose stress is not predictable (see

below).

The traditional position (see, e.g., Lewis (1967, 22)) is that place names typically have initial stress and borrowings are stressed as in their source language. However, Demircan (1980) demonstrates that the Turkish stress diverges from that of the source language: compare Turkish *sinéma* with French *cinemá*, English *cínema*. Sezer (1983) argues convincingly that place names and borrowings with non-final stress take stress according to a single fully productive rule of Turkish. Furthermore, the rule distinguishes between light and heavy syllables, where open syllables with short vowels (C)V are light and all other syllable types are heavy.

(7)

Sezer's description of stress in place names:

If the antepenult is heavy and the penult is light, stress the antepenult; otherwise, stress the penult.

The reason *sinéma* takes penultimate stress, then, is that both the penult and the antepenult are light.

The list in (8) gives some representative place names and unassimilated borrowings. The sublists (A) through (D) correspond to the four possible weight combinations for the penultimate and antepenultimate syllables, where $\bar{\sigma}$ denotes a heavy syllable, $\check{\sigma}$ a light syllable, and σ a syllable which is either heavy or light.

(8) Stress in Place Names and Unassimilated Borrowings

A. ... $\check{\sigma}\check{\sigma}\sigma\#$

- | | | |
|----|--------------|---------------------------|
| a. | Oedipus | <i>O.dí.pus</i> |
| b. | Kennedy | <i>Ke.né.di</i> |
| c. | Indianapolis | <i>Ín.di.ya.na.pó.lis</i> |

B. ... $\check{\sigma}\bar{\sigma}\sigma\#$

- | | | |
|----|------------------|----------------------|
| a. | (Paul) Samuelson | <i>Sa.mu.él.son</i> |
| b. | Washington | <i>Va.şínk.ton</i> |
| c. | Halicarnassus | <i>Ha.li.kár.nas</i> |

C. ... $\bar{\sigma}\check{\sigma}\sigma\#$

- | | | |
|----|-----------|---------------------|
| a. | Ankara | <i>Án.ka.ra</i> |
| b. | buoy | <i>şa.mán.di.ra</i> |
| c. | Chevrolet | <i>şév.ro.le</i> |

D. ... $\bar{\sigma}\bar{\sigma}\sigma\#$

- | | | |
|----|-------------|----------------------|
| a. | Mendelssohn | <i>Men.dél.son</i> |
| b. | Kamchatka | <i>Kam.çát.ka</i> |
| c. | Eisenhower | <i>Ay.zın.hó.ver</i> |

Sezer multiplies examples such as these until there is no doubt both that the pattern is systematic and that it depends on syllable weight. The fact that recent politicians's names such as *Ay.zın.hó.ver* 'Eisenhower' fall into this class shows that it is not closed, and that the rule governing non-final stress in place names and borrowings is productive. There are several isolated exceptions to this rule, such as *iskéle* 'quay', *firtína* 'storm' and *tambúra* 'drum'. I assume these few words are prestressed in the lexicon, but that all other stress is derived by rule.

Final syllable extrametricality for place names. The standard view in modern metrical theory is that feet span at most two syllables (see section 4.1 for a brief discussion on this point). Antepenultimate stress, then, can only be achieved by means of extramet-

ricality.⁵ Thus our strategy for antepenultimate stress in Turkish place names will be to mark the final syllable extrametrical. I assume that Turkish feet are characterized as in (9).

- (9) Iambic foot construction (stress for place names and recent borrowings):
Scanning right to left, build a quantity-sensitive right dominant binary foot.

A quantity-sensitive foot is one which will not tolerate a heavy syllable for its weaker half. I intend this foot building rule to operate exactly as Hayes's (1987, 279) iamb does; look there for a more explicit development.⁶ If we stipulate that place names take final syllable extrametricality, the net result of (9) is as given in (10).

⁵ L. Ito (1988) argues that a binary foot and antepenultimate stress do not necessarily entail extrametricality. However, her alternative analysis for Manam crucially involves cyclic rule application to morphologically complex forms. Since all of the words in (8) are monomorphemic, I take it that extrametricality is indispensable for describing place names in Turkish.

⁶ Hayes (1987, 282) lists Turkish place names in his survey of stress systems as an example requiring his moraic (i.e., weight-sensitive) trochaic foot rule. The discussion on page 283 implies that Hayes's analysis of Turkish place names involves building moraic trochees, then marking the rightmost foot extrametrical. If I understand his proposal, he predicts **Pi.tó.le.mi* rather than the correct *Pi.to.lé.mi* 'Ptolemy'. My analysis predicts the correct stress. There is a set of adverbs in *-en*, a suffix borrowed from Persian, which arguably shows quantity-sensitive trochaic stress (see Sezer 1981 for data), but the suffix is far from productive. I conclude that the general foot-building rule in Turkish builds iambic feet.

(10)

a. Ke.né.(di) b. Va.şínk.(ton) c. mán.dı.(ra) d. Men.dél.(son)

The parentheses around the final syllable of each word represents extrametricality. At level 1, the dot is a placeholder which contributes no prominence to the syllable it dominates, and the parentheses here group syllables into feet. The foot containing only a dot in (10c) is Hayes’s so-called ‘stressless foot’. We must build a stressless foot for (10c) in order to avoid having a heavy syllable (*man*) as the weak branch of an iamb. In such cases, Hayes stipulates that the foot building rule will iterate until a stress has been assigned, giving stress on the antepenult.⁷

Since extrametrical material is invisible to the foot-building rule, the shape of the extrametrical syllable may neither influence the operation of the rule nor itself be modified by the rule. We can observe from the data in (8) that although the weight of both the penult and the antepenult is crucial, the weight of the ultima is irrelevant. Furthermore, final syllables never bear stress (but see the discussion of monosyllabic place names in sections 3.2 and 4.2). Thus the data in (8) are consistent with the assumption that final syllables are extrametrical in place names.

The fact that iambs are right-dominant opens the possibility of rationalizing the discrepancy between place names and the rest of Turkish, namely, it is odd that foot building seems to be limited entirely to place names. That is, it is tempting to try to build non-quantity sensitive iambs at the right margin of normal words so that all words in Turkish have feet.

⁷ See Hammond (1986) for a different proposal for building feet for Turkish place names.

2.3. Word stress

We need just one more rule to complete our stress system. This rule deals with morphologically complex words in which the destressing rule does not apply. Since the default stress rule applies more than once, there will be a stage in the derivation in which more than one syllable receives stress. Since there is only one main surface stress, we must decide which syllable will receive prominence. For instance, lexical compounds give rise to such a situation.

(11)

báš ‘one’ + *bakán* ‘minister’ = *bášbakan* ‘prime minister’

Notice that the stress on the first element dominates the stress on the second. The rule for compounds, then, is:

(12)

Word stress (Level II):

Stress the leftmost of equally prominent elements.

I call this rule ‘word stress’ since it alone guarantees that every word receives stress (see section 4.2). This new rule works in the opposite direction of the default stress rule and the stress clash resolution rule. That is, it favors stress on the left rather than on the right. Indeed, Dobrovolsky (1987) suggests that the character of Turkish stress is a reversal of direction at each prosodic level: end rule right at Level I, end rule left for words, end rule right for phrases, and so on.

The derivation for *bášbakan* appears in (13).

(13)

<i>Underlying shape</i>	baş	bakan
<i>Level I</i>		
<i>First (and only) cycle</i>		
	x	x
Default stress	baş	bakan
Iambic Foot Construction	_____	_____
Stress Clash Resolution	_____	_____
<i>Level II</i>		
	x	x
Compounding	başbakan	
	x	
	x	x
Word Stress	başbakan	
Attested form: <i>báşbakan</i> ‘prime minister’		

Default stress gives each element of the compound one stress, and the word stress rule says that the left one wins.

The lexical model. All the rules mentioned so far fit together in the lexical phonology model drawn in (14).

(14) The lexical model

A root starts life in the base component. Following the arrows, at Level I it undergoes

either default stress or iambic stress, depending on whether or not it is a place name, and it cycles again at Level I, perhaps triggering destressing (stress clash resolution), once for each suffix. At Level II, it may undergo compounding, maybe multiple compounding, with an application of word stress after each instance.

Notice that iambic foot construction is in complementary application with the default stress rule. They can be considered as two aspects of a single morphologically conditioned stress rule: if a base form is a place name or an unassimilated borrowing, apply iambic foot construction; otherwise, apply default stress. Since the domain of application of the default stress rule properly includes that of iambic foot construction (since the default stress rule says to give final stress to every root), the rules are in an elsewhere relationship in which iambic foot construction plays the part of the more specific rule.⁸

⁸ Other details of the lexical phonology of stress are not so clear. For instance, is word stress properly cyclic, or does it apply once after all compounding? Since in either case the leftmost element of the compound receives prominence no matter what the bracketing, this seems to be untestable.

Or again, does stress clash resolution continue to operate throughout later levels of the phonology, or does it turn off at the end of Level I? If it persists, then for a compound where the second element is monosyllabic, stress clash would result, predicting main stress on the final syllable. This does not happen. For example, *baş* ‘head’ + *kent* ‘city’ = *báškent* ‘capital’, and *kará* ‘black’ + *göz* ‘eye’ = *karágöz* (the Turkish ‘Punch’). Also, for reduplicated adjectives (see the subsection immediately below), we have *boş* ‘empty’ → *bómbaş* ‘completely empty’ and *mor* ‘purple’ → *mósmor* ‘really purple’. We can assume that the domain of application of the stress clash resolution rule extends through Level I and no further.

Reduplication and left stress. Independent support for the word stress rule comes from a reduplicative morpheme which intensifies adjectives, and which generally takes word-initial stress.

(15)

- | | | | | |
|----|--------------|---------|-----------------|-------------|
| a. | <i>kará</i> | ‘black’ | <i>kápkarà</i> | ‘jet black’ |
| b. | <i>temíz</i> | ‘clean’ | <i>tértemiz</i> | ‘spotless’ |
| c. | <i>açík</i> | ‘open’ | <i>ápaçík</i> | ‘wide open’ |

The reduplicative process takes a $(C_1)V_1C_2$ skeleton and places it in front of the stem. The initial consonant C_1 appears only when the stem begins with a consonant (compare (15a) and (15b) with (15c)). The reduplicated vowel V_1 is always a copy of the first vowel of the stem. The choice of the final consonant C_2 is limited to *m*, *r*, *p*, and *s*, though the selection within this set is somewhat mysterious; at least there is dissimilation with the second consonant of the stem.

Dobrovolsky (1987) argues that the reduplicative morpheme has the shape of the minimal Turkish word. He concludes that reduplication should be thought of as compounding rather than as prefixation (see also McCarthy & Prince (1986)). Even more compelling than the minimal-word argument, note that if the reduplicative morpheme were a prefix, it would be the only prefix in the language. Viewing reduplication as

Finally, I have assumed that the phonological rules at Level I cycle once on the bare root before the first suffix is affixed. This is strictly necessary only for iambic foot construction, however. For default stress, even if the first application of default stress is systematically delayed until the first suffix has been affixed, the derivations all still work correctly. Of course, there would still have to be a cycle at Level I for uninflected roots (e.g., *taní* ‘know’) which are stressed by the default rule.

compounding, our word stress rule predicts main stress on the left element, that is, on the reduplicated portion of the word, just as for proper compounding. Since the reduplicated material is usually a single syllable, the net effect of intensifying an adjective is initial stress, as desired.⁹

Word stress and place names: no migration. We are now in a position to let our analysis do some work for us. Since we are primarily interested in the interaction between extrametricality and the cycle, we should consider what happens when place names take suffixes, as shown in (16). The word stress rule predicts that main stress will not migrate from place names, which is correct.

⁹ There is another less plausible analysis for the stress on reduplicated adjectives. Adverbs, vocative, interjections, as well as diminutives in *-Cik* also exhibit word-initial stress (see Lewis (1967, pp. 22–23) and Sezer (1981) for a description of the facts, and Zimmer (1970) for some discussion). I assume these word classes trigger a rule which adds prominence to the initial syllable of the word; perhaps, as Hameed (1985) suggests there is a separate lexical level for these morphological word classes. I don't develop an explicit account here, since the details do not bear on my main argument. In any case, the reduplicative morpheme could trigger the initial stress rule as well. However, Jorge Hankamer (personal communication) points out that for certain adjectives reduplication adds not one syllable, but two: *yalnız* 'alone' → *yapáyalnız* 'totally alone'. Thus reduplicated adjectives exhibit non-initial stress exactly where the compounding analysis predicts.

(16)

<i>Underlying Shape</i>	ankara _{+odd}	-II	-DEn
<i>Level I</i>			
<i>First cycle</i>			
Default Stress	_____		
	x		
Iambic Foot Construction	anka(ra)		
Stress Clash Resolution	_____		
<i>Second cycle</i>			
	x		
Suffixation	ankaralı		
	x x		
Default Stress	ankaralı		
Stress Clash Resolution	_____		
<i>Third cycle</i>			
	x x		
Suffixation	ankaralıdan		
	x x x		
Default Stress	ankaralıdan		
	x x		
Stress Clash Resolution	ankaralıdan		
<i>Level II</i>			
	x		
	x x		
Word Stress	ankaralıdan		
Attested form: <i>Ánkaralıdàn</i>	'from the Ankaranian'		

Here +odd is a morphological diacritic marking place names and unassimilated borrowings. Suffixes will always be separated from the stress placed on the root by at least one syllable, namely, the syllable which was extrametrical during the application of iambic foot construction. Therefore stress clash cannot arise, and stress will not migrate from the stem onto the suffixes. However, the suffixes will be stressed as usual, and the default stress on the first suffix will migrate onto successive suffixes in the manner described in Section 2.1.

Notice that iambic foot construction operates only on the first cycle, and that default stress takes over for stressing the suffixed forms. I follow Williams (1981) in

assuming that derived forms inherit the morphological class of the suffix, so that we have $[[[ankara]_{+odd} \textit{h}]_{-odd} \textit{dan}]_{-odd}$. Since iambic foot formation occurs only for place names and unassimilated borrowings, we expect that default stress governs all but the innermost cycle of a place name. Consequently, for clarity in the derivations below I will indicate application of Iambic Foot Construction rule only on the first cycle.

To summarize, there will be two stressed syllables in a morphologically complex word which has a place name for a root: the one placed on the root by iambic foot construction; and the one due to default stress on the first suffix, which typically migrates to the end of the word. Word stress will emphasize the leftmost of the two, predicting main stress on the root and a secondary stress at the end of the word, which is exactly the observed pattern.

2.4. *Exceptional suffixes*

This section shows how the assumptions motivated in sections 2.1 and 2.2 explain the behavior of a certain class of suffixes which systematically interfere with word-final stress. Three suffixes from this set appear in brackets in (17).

(17)

- | | | |
|----|--|----------------------|
| a. | <i>tani</i> [- <i>ma</i>]- <i>dik-lar-im-iz</i> | those we do not know |
| b. | <i>tani-dik-lar-im-iz</i> [- <i>mi</i>] | our acquaintances? |
| d. | <i>koalisiyón</i> [- <i>la</i>] | with coalition |

In (17a) the verbal negation marker *-mE* appears between the root and the rest of the suffixes, and main stress falls on the final syllable of the root. A secondary stress is heard on the final syllable of the word where main stress would fall in the absence of *-mE*. In (17b) and (17c) as well main stress falls on the syllable immediately before the bracketed suffix, which never itself bears stress.

I shall call such suffixes **EXCEPTIONAL**. To borrow the terminology of Clements and Sezer (1982) for describing vowel harmony in Turkish, exceptional suffixes are blockers and non-undergoers of stress migration. Informally, stress migrates until it bumps up against an exceptional suffix. If additional suffixes appear after the exceptional one, a secondary stress may be heard on the final syllable of the word, as indicated in (17a).

The list in (18) shows all the exceptional suffixes I am aware of. Each appears in at least one of Lees (1961, 46–47), Lewis (1967, 23–24), or Underhill (1988).¹⁰

¹⁰ Halle and Vergnaud (1985, 54) assert that the past tense morpheme *-DI* triggers exceptional stress. They are thinking, perhaps, of forms involving nonverbal predication such as *tás-ti* ‘it was (a) rock’, in which *-DI* seems to throw the main stress onto the preceding syllable. But for verbal predication *-DI* is transparent to stress and can itself bear stress, witness *ara-dí* ‘he sought’ and *ara-di-lár* ‘they sought’. Jorge Hankamer (personal communication) has convinced me that *-DI* is a normal suffix without any special properties with respect to stress. What is happening in the nonverbal cases is that there is a suffix *-I* immediately following the nonverbal stem which deletes after consonants (cf. *babá-y-di* ‘he was a father’, in which it surfaces as a semivowel), and it is this vanishing suffix which interferes with stress migration. This hypothesis predicts, for instance, that the same pattern of occasional stress blocking will occur with the conditional *-sE*, which is correct: compare *git-sé* ‘if he goes’ with *evlí-y-se* ‘if she is married’. Curiously, the verbal aspectual suffixes also trigger this nonverbal morphology: compare *git-ím* ‘I go’ with *git-míś-im* ‘I (reportedly) went’. Thus I would like to explain the behavior of, e.g., *-Im*, which Lees lists as exceptional, by means of the same story involving nonverbal predication; however, I am not prepared to cope with the intricacies of *-I* in more detail here. See also Underhill (1988)

(18)

Monosyllables:

<i>-mE</i>	Negative	<i>taní-ma</i>	‘to not know’
<i>-DIr</i>	Predicative	<i>sinék-tir</i>	‘it is a fly’
<i>-DE</i>	Locative	<i>sinék-te</i>	‘on the fly’
<i>-In</i>	Polite imperative	<i>gíd-in</i>	‘go!’

Monosyllabic enclitics:

<i>-ken</i>	‘while’	<i>yazár-ken</i>	‘while writing’
<i>-cE</i>	Adverbializer	<i>iyí-ce</i>	‘well’
<i>-mI</i>	Questioner	<i>tanıdık-mı</i>	‘an acquaintance?’
<i>-lA</i>	‘with’	<i>koalisyon-la</i>	‘with coalition’
<i>-kI</i>	‘which’	<i>madém-ki</i>	??

Polysyllables:

<i>-leyin</i>	adverbializer	<i>akşam-leyin</i>	‘at evening’
<i>-cEsInE</i>	adverbializer (cf. <i>-cE</i>)	<i>hayván-casına</i>	‘bestially’
<i>-ArAk</i>	‘by’	<i>yap-arak</i>	‘by doing’
<i>-Iyor</i>	Progressive aspect	<i>gel-iyor</i>	‘she is coming’
<i>-IncE</i>	adverbializer	<i>gid-ince</i>	‘having gone’
<i>-EyIm</i>	Optative	<i>gid-eyim</i>	‘let me go’

There are no obvious phonological or semantic properties which characterize the exceptional suffixes, although all polysyllabic suffixes are exceptional. We will discuss

on this issue.

polysyllabic suffixes at some length in the next section. Also, enclitics, including all postpositions, are exceptional.¹¹

I propose that the exceptional suffixes differ from normal suffixes merely in that the exceptional suffixes are marked for final syllable extrametricality. For monosyllabic suffixes, of course, this will amount to rendering the entire suffix extrametrical. The idea of extrametrical suffixes is not new; Nanni (1977) and Hayes (1982) analyze the English suffix *-ative*, for example, as extrametrical. A derivation will show how this simple assumption accounts for *tanímadıklàr* ‘those who are not known’.

¹¹ Enclitics differ from proper suffixes, among other things, in that they never occur word-medially. Similarly, postpositions and syntactic particles, which behave as separate words that are never stressed, e.g., *gibi* ‘like’ as in *sizín gibi* ‘like you’, or *de* ‘too’ as in *bíz de* ‘we too’, result in stress patterns similar to that involving exceptional suffixes. These cases might be analyzed along the lines suggested here for normal suffixes. The crucial difference, of course, is that the proper exceptional suffixes, and, arguably, the enclitics, are part of a single morphological word, but the postpositions combine in the syntax.

(19)

<i>Underlying Shapes</i>	tanı	-mE _{+ex}	-DIk	-lEr
<i>Level I</i>				
<i>First Cycle</i>				
	x			
Default Stress	tanı			
Iambic Foot Construction	_____			
Stress Clash Resolution	_____			
<i>Second Cycle</i>				
	x			
Suffixation	tanıma			
	x			
Default Stress	tanı (ma)			
Stress Clash Resolution	_____			
<i>Third Cycle</i>				
	x			
Suffixation	tanımadık			
	x x			
Default Stress	tanımadık			
Stress Clash Resolution	_____			
<i>Fourth Cycle</i>				
	x x			
Suffixation	tanımadıklar			
	x x x			
Default Stress	tanımadıklar			
	x x			
Stress Clash Resolution	tanımadıklar			
<i>Level II</i>				
	x			
	x x			
Word Stress	tanımadıklar			
Attested form: <i>tanımadıklàr</i> ‘those who are not known’				

Here +ex is a diacritic marking exceptional suffixes. The default stress rule gives final stress to the root when the Level I rules cycle on the bare root. We next affix *-mE*. But *-mE* is exceptional, which means extrametrical; it is invisible to the default stress rule, and does not take stress. Therefore when it is suffixed to *tanı* there is no stress

clash. Stress clash does occur two cycles later, however. After resolution there is one stress on the final syllable of the root, and one on the final suffix. Word stress gives extra prominence to the leftmost one, and the result is main stress and secondary stress just where it actually occurs: *tanímadıklàr*.

Similarly, if normal suffixes precede the exceptional suffix, stress will migrate until it reaches the stressless suffix. It will stop there and remain undisturbed by later suffixation, just as for non-final stress in morphologically complex place names. In addition, if two exceptional suffixes appear in the same form, the word stress rule predicts that the leftmost will determine the placement of main stress, as the following derivation shows.

(20)

<i>Underlying shapes</i>	gel	-mE _{+ex}	-DI	-mI _{+ex}
<i>Level I</i>				
<i>First Cycle</i>				
	x			
Default Stress	gel			
Iambic Foot Construction	_____			
Stress Clash Resolution	_____			
<i>Second Cycle</i>				
	x			
Suffixation	gelme			
	x			
Default Stress	gel(me)			
Stress Clash Resolution	_____			
<i>Third Cycle</i>				
	x			
Suffixation	gelmedi			
	x x			
Default Stress	gelmedi			
Stress Clash Resolution	_____			
<i>Fourth Cycle</i>				
	x x			
Suffixation	gelmedimi			
	x x			
Default Stress	gelmedi (mi)			
Stress Clash Resolution	_____			
<i>Level II</i>				
	x			
	x x			
Word Stress	gelmedimi			
Attested form: <i>gélmedimi</i> ‘didn’t he come?’				

Strictly speaking, our analysis predicts a secondary stress on *-DI*, the third person past marker. The observed form is *gélmedimi* ‘didn’t he come?’. However, by all accounts secondary stress is difficult to hear even in the best of circumstances. It seems to be more salient the further it is from the main stress.

To summarize, exceptional suffixes must be differentiated from normal suffixes

lexically in some manner. Letting them differ only in (final syllable) extrametricality provides just such a minimal distinction. Thus the exceptional suffixes share extrametricality with the class of place names, the other major domain of non-final stress in Turkish. This assumption, in conjunction with our other independently motivated rules governing default stress, automatically correctly predicts main and secondary stress for words containing stressless suffixes.

3. TWO EMPIRICAL ARGUMENTS

There are two empirical arguments which support the analysis proposed here over other descriptions. The first comes from polysyllabic suffixes. Lewis (1967, 23) reports that all polysyllabic suffixes are exceptional with respect to stress. More precisely, main stress never migrates across a polysyllabic suffix. This generalization is accidental on all other accounts I am aware of, but it cannot be otherwise on the analysis given here.

The second argument comes from monosyllabic place names. As shown in section 2.3, main stress generally does not migrate from roots with final syllable extrametricality. However, Kaisse (1985) discovers that stress does migrate from monosyllabic place names. This fact also follows directly from the analysis in section 2.

3.1. *Polysyllabic suffixes trigger non-default stress*

Although the majority of suffixes in Turkish are monosyllabic, there are a handful of disyllabic suffixes, all of which trigger non-final stress. The list of exceptional suffixes in (18) includes all disyllabic suffixes (though see below for a discussion of the plural possessive endings). There are no clear examples of suffixes longer than two syllables, but I will use the term ‘polysyllabic’ for the sake of generality. Polysyllabic suffixes fall into two classes according to the characteristic position of main stress: either the

main stress falls on the syllable preceding the polysyllabic suffix, as in *akşam-leyin* ‘at evening’, or on the first syllable of the suffix itself, as in *yap-arak* ‘by doing’.

The analysis in section 2 predicts that exactly these two patterns are possible. If monosyllabic suffixes may vary idiosyncratically according to whether they take extrametricality or not, we would expect that polysyllabic suffixes also come in two varieties, plain (or NORMAL) and extrametrical. We shall consider the normal case first.

Normal polysyllabic suffixes interfere with stress migration because the default stress rule will stress the rightmost syllable, thus leaving at least one syllable unstressed. This means that there can be no stress clash with the stem, since the stress on the ultimate syllable of the suffix will always be separated from any stress on the stem by at least one unstressed syllable. Since stress clash requires adjacent stress, and since stress clash resolution is the one and only mechanism by which stress migrates towards the end of the word, non-final stress results. More specifically, main stress will remain on the stem immediately in front of the polysyllabic suffix.

(21)

<i>Underlying Shapes</i>	akşam	-leyin
<i>Level I</i>		
<i>First cycle</i>		
	x	
Default Stress	akşam	
Iambic Foot Construction	_____	
Stress Clash Resolution	_____	
<i>Second cycle</i>		
	x	
Suffixation	akşamleyin	
	x	x
Default Stress	akşamleyin	
Stress Clash Resolution	_____	
<i>Level II</i>		
	x	
	x	x
Word Stress	akşamleyin	
Attested form: <i>akşámleyin</i> ‘at evening’		

On this analysis, then, the only peculiar quality of suffixes such as *-leyin* is that they happen to be polysyllabic. They are ‘exceptional’ only in the sense that they systematically prevent main stress from falling on the final syllable of the word.

Now we turn to the second possibility: polysyllabic suffixes which are idiosyncratically marked for extrametricality. As was the case for place names, the extrametrical material guarantees that main stress will never migrate across the suffix. The result, given stress clash resolution, is main stress on the first syllable of the suffix.

(22)

<i>Underlying Shapes</i>	yap	-ErEk _{+ex}
<i>Level I</i>		
<i>First cycle</i>		
	x	
Default Stress	yap	
Iambic Foot Construction	_____	
Stress Clash Resolution	_____	
<i>Second cycle</i>		
	x	
Suffixation	yaparak	
	x x	
Default Stress	yapar(ak)	
	x	
Stress Clash Resolution	yaparak	
<i>Level II</i>		
	x	
	x	
Word Stress	yaparak	
Attested form: <i>yaparak</i>		'by doing'

Since only the final syllable of the suffix *-ErEk* is extrametrical, when the default stress rule stresses the rightmost visible syllable, the first syllable of the suffix receives stress. But suffixation creates a stress clash involving the final syllable of the stem. Stress clash resolution deletes the stress on the stem, and main stress ends up on the first syllable of the suffix.

Here is the place where it becomes important to distinguish between suffix extrametricality (as for Hayes's (1982) analysis of certain suffixes in English) and final syllable extrametricality. I claim that Turkish supports a relatively impoverished set of choices for extrametricality: final syllable extrametricality is the only available option. Although suffix extrametricality might have been a plausible analysis for *-leyin*, the derivation in (21) shows that assuming no extrametricality at all for *-leyin* works equally well. However, for *-ErEk*, at least, suffix extrametricality will not

work. If the entire suffix were extrametrical, the entire suffix would be unstressable; but main stress clearly falls on the first syllable of the suffix. I conclude that suffix extrametricality is not needed for the description of Turkish, and that final syllable extrametricality is.

We can generalize across the two cases, normal and extrametrical, by noting that our analysis makes two predictions concerning polysyllabic suffixes: such suffixes never take main stress on their final syllable, nor are they ever transparent to stress migration.

There is an apparent class of counterexamples. Lewis (1967, 39), for instance, has a suffix *-ImIz* which he glosses as the first person plural possessive and which takes main stress on its final syllable (consider, e.g., *kap-ımíz* ‘our door’). But inspection of the paradigm for the possessive endings shows that this suffix is clearly related to *-Im*, the first person singular possessive ending, and furthermore, this pair is exactly parallel to *-InIz* and *-In*, the second person plural and singular possessive endings, respectively. If there is a morpheme boundary between the two syllables of *-ImIz*, then the two morphemes will combine with the stem on successive cycles, and stress class resolution gives the desired result (see, e.g., the derivation below in (24)).

It is worth pointing out that our theory makes a prediction concerning dialectal variation: if there is a dialect (or a change in standard Turkish) in which such a pair of morphemes is reanalyzed as simplex, then the simplex morpheme will exhibit the anomalous stress behavior of the true polysyllabic suffixes. In fact, this seems to be exactly what has happened in the case of *-leyin*, which is historically derived from an instrumental suffix *-in*.

Previous formal descriptions which treat exceptional suffixes, including Lees (1961), Lightner (1970), Halle and Vergnaud (1985), Hameed (1985), Kaisse (1986), Dobrovolsky (1986), and Underhill (1988) make no predictions concerning polysyl-

labic suffixes. To the extent this generalization is systematic, my analysis is more descriptively adequate.

3.2. *Stress migration from monosyllabic place names*

The preceding subsection compared the behavior of polysyllabic suffixes with that of monosyllabic ones. Place names provide a similar contrast, but in the opposite direction: for place names, it is the monosyllables which are peculiar. Recall from section 2.3 that when suffixes combine with a polysyllabic place name, main stress does not migrate onto the suffix; instead, it remains on the place name (e.g., *Vasínkton-um-uz-dán* ‘from our Washington’). However, Kaisse (1985) observes that main stress does migrate from monosyllabic place names.

(23)

- | | | |
|----|--------------------|----------------------------|
| a. | <i>Bonn-dán</i> | from Bonn |
| b. | <i>Of-dán</i> | from Of (a city in Turkey) |
| c. | <i>Of-umuz-dán</i> | from our Of |

Except for Kaisse, no other treatment of Turkish stress accounts for these facts. The advantage of our account over Kaisse’s is that Kaisse (1985) does not attempt to account for the exceptional suffixes.

I will now show how we predict that stress will migrate from monosyllabic place names. Recall that in section 2 I argued that place names and borrowings productively receive non-final stress according to a foot building rule combined with final syllable extrametricality. We have two things to account for: how the monosyllable comes to be stressed in its unsuffixed form, and why stress migrates when the monosyllable does combine with suffixes.

Consider a monosyllabic place name such as *Of* appearing without suffixes. Since iambic foot construction applies, we would first make the final syllable extrametrical.

But the final syllable is the only syllable, and the entire form becomes invisible to the foot building rule. Then *Of* will be totally invisible during the first cycle. The iambic foot construction rule, having nothing to work with, will have no effect at all. But at Level II, the word is visible again, since extrametricality never persists more than one cycle. (See section 4 for a discussion of these assumptions concerning extrametricality.) Thus the word stress rule will stress the monosyllable when it is unaffixed.

Now consider what happens when *Of* takes suffixes.

(24)

<i>Underlying Shape</i>	of _{+iamb}	-Im	-Iz	-DEn
<i>Level I</i>				
<i>First cycle</i>				
Default Stress	_____			
Iambic Foot Construction	(of)			
Stress Clash Resolution	_____			
<i>Second cycle</i>				
Suffixation	ofum			
	x			
Default Stress	ofum			
Stress Clash Resolution	_____			
<i>Third cycle</i>				
	x			
Suffixation	ofumuz			
	x x			
Default Stress	ofumuz			
	x			
Stress Clash Resolution	ofumuz			
<i>Fourth cycle</i>				
	x			
Suffixation	ofumuzdan			
	x x			
Default Stress	ofumuzdan			
	x			
Stress Clash Resolution	ofumuzdan			
<i>Post Lexical Rules</i>				
	x			
	x			
Word Stress	ofumuzdan			
Attested form: <i>Ofumuzdán</i> ‘from our Of (a city in Turkey)’				

On this view, the root never bears stress at any level of the derivation. Stress clash resolution cyclically deletes all but the last of the stresses on the suffixes. Then, when word stress looks for the leftmost prominent stress, the only candidate is the final syllable, and final main stress results.

Thus the simple mechanisms of cyclical destressing and final syllable extramet-

ricality motivated in sections 1 and 2 predict that polysyllabic suffixes will trigger non-final stress and that stress will migrate from monosyllabic place names. The fact that this analysis automatically extends to these two limiting cases supports the analysis on the grounds of descriptive adequacy and elegance.

4. THEORETICAL IMPLICATIONS

In sections 2 and 3 I argued in favor of a cyclic analysis of Turkish word stress which crucially depends on extrametricality. In this section I will show how the proposed analysis bears on the theory of extrametricality, beginning with a more explicit characterization of extrametricality. I then discuss two separate aspects of the behavior of extrametricality. First, it is commonly assumed that extrametricality systematically fails to apply when it would render the entire target of a rule invisible. This uncomfortable stipulation is extraneous given a cyclic approach to Turkish stress, and may potentially be removed from metrical theory altogether. Second, I give three common constraints on the operation of extrametricality. Poser (1984) suggests that Turkish exceptional suffixes motivate a relaxation of at least one of the three constraints; however, I show that a cyclic analysis obeys all three. Thus the Turkish data argues for a clean, restrictive version of extrametricality.

4.1. *Extrametricality*

Extrametricality is proposed in its modern form by Nanni (1977) and developed by Hayes (1981, 1982) and others. Extrametricality is a relationship between a prosodic rule and a morphologically determined class of objects (words, roots, suffixes, etc.) which undergo the rule. We can make do with a definition modeled on the one given in Poser (1984, 121).

(25)

Extrametricality:

Certain phonological material may be stipulated to be invisible (i.e., EXTRAMETRICAL) to a particular class of rules, so that those rules can neither consider the extrametrical material in their structural description, nor affect it in performing their structural change.

See McCarthy and Prince (1988) for a more formal definition of extrametricality. On this view, extrametricality is a property of rules. Each basic rule must be interpreted as two separate but related rules: the original rule, plus one which incorporates the extrametrical constituent in its structural description but which does not affect it in its structural change. Which of the two rules applies would be morphologically conditioned.

It may be helpful to locate the implementation of extrametricality in the mechanics of executing derivations. Imagine a *dæmon* which performs derivations. In the left hand it holds a phonological representation; in the right, a prosodic rule. Before applying the rule to the representation, it checks the morphological diacritics associated with the item in its left hand. If the stem is marked for, say, final syllable extrametricality, it removes the final syllable from the representation and sets it aside, much like a cook setting aside the white of an egg. It then applies the rule to the reduced representation. Then it reattaches the final syllable and moves on to the next step in the derivation.

Motivating extrametricality. There are two common situations which call for extrametricality. If you have a restrictive theory which constrains the shape of possible rules, extrametricality can extend the descriptive power of the resulting theory without increasing the inventory of rules. For example, Halle and Vergnaud (1978) suggest that binary, ternary, and unbounded feet suffice to characterize all known stress sys-

tems. Hayes (1981) demonstrates that we can eliminate ternary feet if we combine binary feet with extrametricality. That is, where we would have called upon a ternary foot to give antepenultimate stress, we can instead mark the final syllable extrametrical and use a binary foot. Thus extrametricality enables a more restrictive metrical theory.¹² The extrametricality posited for place names in section 2.2 is an example of this general strategy, since it permits a binary foot to give antepenultimate stress. In effect, final syllable extrametricality for place names extends the reach of the iambic foot building rule by exactly one syllable.

The second common motivation for extrametricality is to allow a single rule to distinguish between two morphological classes of words. The difference between the two classes is then located in their extrametricality stipulations, leaving the rule as general as possible, reducing repetition in the grammar. For instance, Hayes (1982) proposes that a single rule of foot formation governs stress in verbs, nouns, and adjectives in English. The one rule gives different effects by stipulating that verbs take final consonant extrametricality, nouns take final syllable extrametricality, and adjectives take suffix extrametricality. In Turkish, distinguishing exceptional monosyllabic suffixes from normal suffixes as in section 2.4 is a second example of this technique, allowing a single rule, the default stress rule, to describe stress for all morphologically complex forms.

¹² In the same spirit Prince (1985) argues that unbounded feet should be removed from the inventory of basic foot types, replacing them with his end rules (supplemented by adjunction of stray elements). I follow Hayes (1985, 1987) in assuming that binary feet, end rules, and extrametricality suffice to describe stress crosslinguistically.

4.2. *The whole-form exception*

Simple formulations of extrametricality such as that in (25) can run into trouble when dealing with words whose size approaches the extent of the extrametricality. For instance, assume nouns in Latin are marked for final syllable extrametricality, and consider a monosyllabic noun. On the most naïve interpretation, the entire noun would be extrametrical and would not receive stress. However, monosyllabic nouns do bear stress, as can be seen in compounds or by juxtaposing such nouns with function words. Therefore Hayes¹³ (1982, 235) suggests

(26)

The whole-form exception:

... A final, trivial constraint must be added to our account: in order to stress Latin monosyllables, we must assume that extrametricality rules are blocked if their application would mark the entire stress domain as [+ex]. This condition is apparently universal, and thus should not add any cost to the grammars of particular languages.

Kaisse (1985) invokes the whole-form exception to account for monosyllabic place names in Turkish. If the whole-form exception holds for Turkish, the reason a monosyllable such as *Bónn* shows stress is that the iambic foot rule puts it there: the entire word would normally be extrametrical, but the whole-form exception prevents the extrametricality from applying.

¹³ Hayes (1982) implements extrametricality by means of morphologically triggered rules which mark segments with the feature [+extrametrical]. In terms of our derivation dæmon, (26) amounts to saying that the dæmon will refuse to respect a request for extrametricality if (temporarily) setting aside the extrametrical material would leave it nothing to apply a rule to.

In fact, we could adopt the whole-form exception without harm. The monosyllabic place name *Bónn*, for instance, would fail to take extrametricality and would therefore receive stress twice: once at Level I from iambic foot construction and once at Level II from the word stress rule. Furthermore, stress would still migrate from monosyllabic place names, as desired, since there would be stress clash between the root and the first suffix.

But on the present account, no such stipulation is necessary. Instead, *Bónn* is indeed extrametrical on the first cycle at Level I, and consequently the iambic foot building rule does fail to place stress on it. However, since extrametricality does not persist for more than one cycle, the form is visible again by the time it reaches the word stress rule. The word stress rule, then, is the sole source of the observed stress. Since we can make do without the whole-form exception, we should prefer to leave it out of our grammar on the grounds of formal simplicity.

Thus I propose that the apparent effect of the whole-form exception is actually the interaction of extrametricality with stress rules which apply at different levels. Crucially we must have at least two rules which assign stress: one early rule, such as our default stress rule, which is affected by extrametricality; and one late rule, such as our word stress rule. On this view, extrametricality does take effect without exception, but later rules can apply after the extrametricality wears off.

Clearly we can adapt this solution to any stress system which seems to need the whole-form exception. For the cases in Hayes (1982), this would involve recognizing the existence of an end rule in addition to the foot-building rule. For words in which the whole-form exception would not apply, this end rule will simply re-emphasize the stress placed by earlier rules. For words in which the whole-form exception might seem to be necessary, the earlier rule fails to assign stress because of extrametricality, but the end rule does assign stress, exactly as I have proposed for Turkish monosyllabic

place names.

Saying that all stress systems contain an end rule is tantamount to saying that all words must somehow receive stress, which, after all, is the original intention of the whole-form exception. Nor is it any more costly to particular grammars than stipulating the whole-form exception as a part of universal grammar. The advantage over the whole-form exception approach is that this end rule can occasionally be independently motivated, as is the word stress rule in Turkish, whereas the whole-form exception cannot be independently confirmed.

4.3. *Constraints on extrametrical material*

We now turn to the second set of issues, namely, constraints on the possible range of variation in extrametricality stipulations.

Extrametricality unconstrained would be too powerful. We could accomplish almost anything by selectively blanking out portions of a form before applying a rule—just put parentheses around any troublesome part. Therefore certain authors, notably Hayes (e.g., 1982), have suggested limiting the descriptive power of extrametricality by placing restrictions on its behavior. I have listed three of the most important proposals in (27) through (29):

(27)

CONSTITUENCY:

Extrametrical material must consist of some (independently motivated) constituent.

That is, you can make a consonant or a syllable extrametrical, but not, say, the first three morae. On certain analyses, e.g., those which involve suffix extrametricality, the constituency may be morphological. Optimally there should be evidence for the constituency of the extrametrical material from phonological domains independent of prosody. Certainly the syllable, the constituent called upon for extrametricality duty

in Turkish, satisfies this criterion.

(28)

PERIPHERALITY:

Extrametrical material must be at the periphery of the form.

This means that you can't draw parentheses around material in the middle of a word. Extrametricality has been proposed on both the left and the right margin of words, although it is far more common to have word-final extrametricality.

(29)

EPHEMERALITY:

Extrametricality persists for at most one stratum.

That is, extrametricality is a one-shot deal: extrametrical material can't stay invisible for more than one cycle of rule application.

It may seem at first that ephemerality and peripherality are two aspects of the same constraint. That is, it seems moot to wonder whether extrametricality disappears after a suffixation because the extrametrical material is no longer peripheral or because a new cycle has begun. However, peripherality and ephemerality are logically distinct. Peripherality can be construed as a constraint on which part of a form may be marked as extrametrical without going on to say that that extrametricality must disappear later in the derivation when peripherality is no longer satisfied. On this view peripherality would prohibit medial extrametricality in monomorphemic polysyllables, but could permit medial extrametricality in morphologically complex forms. Ephemerality, on the other hand, would permit medial extrametricality in monosyllables, but will tolerate extrametricality in morphologically complex forms only in the material added by the last morphological operation. For example, consider a language with both suffixes and prefixes in which a particular suffix has final syllable extrametricality. If we add a prefix at the other end of the word, the extrametrical material is still peripheral, but ephemerality requires that the extrametricality be erased.

The Extended Invisibility Principle.

Recall that Poser (1984) calls upon the Extended Invisibility Principle given in (1) to explain exceptional stress in Turkish. The EIP has been repeated here for convenience.

(1)

Extended Invisibility Principle (Poser (1984, 127)):

Let R be a directional rule which scans from left to right, and let I be an invisible constituent in string X. Then the substring bounded on one side by I and extending to the boundary of X is invisible to rule R.

Assuming that default stress looks left to right and that the suffix *-mE* is extrametrical, the EIP marks *-madıklar* as invisible in the form *tanı(ma)dıklar*. Default stress will then place stress on the rightmost visible syllable, correctly predicting main stress on the second syllable of the root: *tanímadıklar*.

In addition to the arguments given in section 3, there are two objections to the EIP analysis for Turkish exceptional suffixes. First, notice that the secondary stress on the final syllable of the word remains mysterious, although the proposal could doubtless be extended. On the account here, however, secondary stress is a natural consequence of the operation of the default stress and the destressing rules. That is, the same mechanism predicts main and secondary stress.

The second objection is that the EIP leads to a violation of either constituency, peripherality, or ephemerality. Which principle is violated depends on perspective. If all of the word following *-mE* is invisible, we have extrametricality of a non-constituent. We can attempt to save constituency by claiming that it is the extrametricality of *-mE* alone which causes the effect. But now have a violation of peripherality, since the extrametrical *-mE* is embedded in the middle of a word. We

can attempt to save peripherality by noting that $-mE$ was peripheral when it was suffixed, and it was at that moment that it was marked as extrametrical. But then we have a violation of ephemerality, since the extrametricality of $-mE$ only interacts with the EIP after several addition suffixations. Therefore constituency, peripherality, and ephemerality cannot all be maintained under the EIP.

If we re-examine the derivation in (19), repeated here, we can see how our analysis predicts main and secondary stress while satisfying the spirit and the letter of all three conditions on extrametricality.

(19)

<i>Underlying Shapes</i>	tanı	-mE _{+ex}	-DIk	-lEr
<i>Level I</i>				
<i>First Cycle</i>				
	x			
Default Stress	tanı			
Iambic Foot Construction	_____			
Stress Clash Resolution	_____			
<i>Second Cycle</i>				
	x			
Suffixation	tanıma			
	x			
Default Stress	tanı (ma)			
Stress Clash Resolution	_____			
<i>Third Cycle</i>				
	x			
Suffixation	tanımadık			
	x x			
Default Stress	tanımadık			
Stress Clash Resolution	_____			
<i>Fourth Cycle</i>				
	x x			
Suffixation	tanımadıklar			
	x x x			
Default Stress	tanımadıklar			
	x x			
Stress Clash Resolution	tanımadıklar			
<i>Level II</i>				
	x			
	x x			
Word Stress	tanımadıklar			
Attested form: <i>tanımadıklàr</i> ‘those who are not known’				

The cycle on the root gives a stress mark on the final syllable of the root. The extrametricality of *-mE* takes effect only during the cycle immediately after it has been suffixed to the root. Since the extrametrical material is at the right margin of the stem, peripherality is obeyed. Moreover, the extrametrical material is a syllable,

which is patently a constituent. As for ephemerality, we know that the previously extrametrical syllable is visible again by the third cycle since it blocks application of the destressing rule. Therefore we can deduce that the extrametricality disappears immediately after the default stress rule has applied in the second cycle, satisfying ephemerality. (Section 4.2 discusses the relevance of ephemerality for Turkish in more detail.) The level 1 stress mark on the final syllable of the form is the result of normal stress migration on the suffixes which follow the exceptional suffix. Finally, the word stress rule emphasizes the leftmost of the two level 1 stress marks, correctly predicting main stress immediately before the exceptional suffix and secondary stress on the final syllable of the word.

My claim, then, is that the EIP mixes up extrametricality with cyclic stress, and that we arrive at a deeper understanding of Turkish if we separate out underlying extrametricality from its cyclic aftereffects.

5. CONCLUSION

Cyclic stress in Turkish is motivated by stress migration and word compounding. Extrametricality is motivated by place names. Combining these two mechanisms automatically predicts exactly the observed pattern of exceptional suffixes, as well as those situations in which stress will migrate from place names. I conclude, then, that cyclic stress and extrametricality give an elegant and robust explanation of Turkish stress.

More importantly, examining the interaction of cyclic destressing with extrametricality reveals that, far from motivating a relaxation of the constraints on extrametricality, Turkish supports a highly restrictive theory of extrametricality. In particular, extrametrical material is always a constituent; extrametrical material is always peripheral; and extrametricality never persists more than a single cycle.

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