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LEVEL ORDERING AND ECONOMY IN THE LEXICAL PHONOLOGY OF TURKISH

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We support the theory of level ordering by demonstrating, on the basis of productive morphology and phonology, that Turkish has four lexical levels. The evidence, however, motivates modifications in the way level ordering is implemented. The first is the principle of LEVEL ECONOMY, according to which a form is subject to the phonology only of those levels at which it is morphologically derived. The second is level prespecification, which exempts a root entirely from early lexical levels. Level Economy accounts for systematic exceptionality, while level prespecification accounts for idiosyncratic exceptionality, to the entire phonology of given levels. These mechanisms yield analyses of facts in Turkish that prove intractable in other theories. Both rely on a structural, rather than a temporal, approach to level ordering.*

This paper provides new evidence for level ordering in (Standard) Istanbul Turkish, demonstrating on the basis of productive morphology and phonology that Turkish has at least four lexical levels. While the evidence supports the need for level ordering (Kiparsky 1982a,b; Mohanan 1982, 1986), it also motivates certain modifications in the way level ordering is understood and implemented. The first is Level Economy, a principle according to which a form is subject to the phonological rules and/or constraints only of those levels at which it is morphologically derived. Level Economy makes it possible to account not only for the regular aspects of the morphology/phonology interface in Turkish but also for a number of systematic exceptions which have proved intractable in other theories.

The second way in which our approach departs from past theories is in the option of prespecifying roots for level, so that a root may be entirely exempted from early phonology and morphology. Certain Turkish roots are lexical exceptions to a surprising array of phonological alternations, all related to the failure of these roots to meet prosodic minimality conditions enforced on a level which, due to level prespecification, the roots do not pass through. Exceptions form an important part of our analysis, which we hold responsible for all of the data, not just for the "regular" forms. Level Economy and level prespecification

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Data are given in standard phonemic transcription (with the exception of uppercase letters (as in /kitaB/ 'book'), the conventional notation for segments that alternate in their value for a certain feature (in this case, [voice])). Except where noted otherwise, data reflect the speech of the alphabetically second author, a native speaker of (Standard) Istanbul Turkish. The following abbreviations are used: 1, first person; 2, second person; 3, third person; ABL, ablative; ACC, accusative; ADJ, adjectivalizer; ADV, adverbializer; COND, conditional; DAT, dative; EVID, evidential; FUT, future; GEN, genitive; IMPF, imperfective; INF, infinitive; LOC, locative; NEG, negative; NML, nominalizer; PASS, passive; PL, plural; POSS, possessive; PPL, participle; PRED, predicator; PROG, progressive; REL, relative; SG, singular; UR, underlying representation.

rely on a structural approach to level ordering, in contrast to the temporal approach taken in early work in Lexical Phonology. We assume a constituent-based theory of levels, using ideas developed in Selkirk 1982; Cohn 1989; Inkelas 1990, 1993b,c; and Orgun 1994, 1995b.

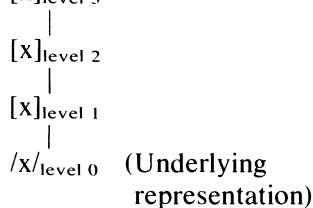
1. BACKGROUND. The standard view in level-ordering theory (Kiparsky 1982a,b; Mohanan 1982, 1986) is that every form, derived or underived, is subject to every level of the phonology. Mohanan, who relates word formation metaphorically to a factory whose rooms correspond to lexical levels, describes the scenario as follows (1986:47):

- (1) There is a conveyor belt that runs from the entry gate to the exit gate passing through each of these rooms. This means that every word that leaves the factory came in through the entry gate and passed through every one of these rooms.

The hypothesis that every form undergoes every level is independent of the (serial) factory metaphor, however. A theory in which levels are constituent types (e.g. Selkirk 1982; Cohn 1989; Inkelas 1990, 1993b,c; Orgun 1994, 1995b) could incorporate the same fundamental idea. With this goal, Inkelas (1990) extends into lexical structure Selkirk's Strict Layer Hypothesis, developed originally for postlexical prosodic constituents (Selkirk 1984:26).

- (2) STRICT LAYER HYPOTHESIS: "a category of level *i* in the hierarchy immediately dominates a (sequence of) categories of level *i-1*."

Applied to lexical constituent structure: [x]_{level 3}



Thus, whether level is conceptualized as temporal or structural, the standard claim is identical: every form is subject to the phonology of all lexical levels. It is this claim we challenge by showing that in Turkish forms are NOT subject to the phonology of levels at which they do not undergo morphology.

The structure of the paper is as follows. Morphological evidence for level ordering in Turkish is introduced in §2; §§3–5 confirm the level distinctions with phonological evidence. Section 6 motivates Level Economy on the basis of the systematic exemption of nonderived words from certain phonological constraints, and §7 introduces level prespecification to handle other, idiosyncratic exceptions in the system.

2. TURKISH WORD STRUCTURE: A LEVEL-ORDERED LEXICON. Turkish is an agglutinative language in which suffixes occur in a relatively fixed order.¹ Exx. 3 and 4 depict words containing a small number of the possible suffixes.

¹ For an extensive discussion of affix ordering in Turkish, see Hankamer (1986). Hankamer notes the existence of recursive morphology, whose ramifications for level ordering are discussed in Inkelas & Orgun 1995. We will assume strict ordering for present purposes, as level ordering is logically separable from Level Economy.

- (3) a. verb root-passive-aspect-tense-agreement
 b. *öp -ül -üyor -du -m*
 kiss -PASS -PROG -PAST -1SG
 'I was being kissed'
- (4) a. noun root-plural-possessive-case
 b. *tebrik -ler -im -i*
 congratulation -PL -1SG.POSS -ACC
 'my congratulations (ACC)'

In this paper we present morphological and phonological evidence that the productive suffixes in Turkish subdivide into (at least) three levels, as shown below.²

(5)	LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
	root	passive- <i>n~-ll</i>	plural - <i>LER</i>	case
	early compounding	aspect	possessive	tense
		relative - <i>En</i>		agreement
		negative - <i>mE</i>		
		nominalizing - <i>gen</i>		
		adjectivalizing - <i>i:</i>		
		adverbializing - <i>en</i>		
		nominalizing - <i>iyet</i>		

The morphological evidence comes from a phenomenon Lewis (1967) terms 'suspended affixation', in which 'one grammatical ending serves two or more parallel words' (Lewis 1967:35). Essentially, when two conjuncts ending in identical strings of suffixes are coordinated, some or all of the suffixes may be omitted from the first conjunct, such that the suffixes on the second conjunct have scope over the entire construction. Examples are given below (constituent bracketing and phonemicization are ours).

- (6) a. [*tebrik ve teşekkür*]-*ler-im-i sun-ar-im*
 [congratulation and thank]-PL-1SG.POSS-ACC offer-IMPF-1SG
 'I offer my congratulations and thanks' [Lewis 1967:41]
- b. [*sihhat ve a:fiyet*]-*te*
 [health and well-being]-LOC
 'in health and well-being' [Lewis 1967:35]
- c. *halk-in* [*ađi ve sevinč*]-*ler-i*
 people-GEN [pain and joy]-PL-3POSS
 'people's pains and joys' [Lewis 1967:43]
- d. *hič bir şey* [*gör-m-üyor ve duy-m-uyor*]-*muş-časına...*
 any one thing [see-NEG-PROG and hear-NEG-PROG]-PPL-ADV
 'as if (s)he weren't seeing or hearing anything...' [Lewis 1967:189]
- e. [*genč ve güzel*]-*im*
 [young and beautiful]-1SG
 'I am young and beautiful' [Underhill 1976:83]

² The classification of suffixes into levels is, as yet, incomplete; we anticipate that more levels will ultimately be required. Kaisse (1985, 1986b) and Hameed (1985) propose a different, incompatible level stratification of suffixes on the basis of stress. However, we follow Inkelas 1994b in accounting for suffix-specific stress effects through lexical specification of stress feet, rather than through level ordering. For this reason we do not discuss suffix stress in this paper.

Intended: 'imprisonment and freedom' (cf. *mahk'u:m-iyet* 'imprisonment')

Exx. 11 and 12 reconfirm that suspended affixation is possible with verbs (cf. 10a–c), as long as the level generalization is respected.

- (11) a. *gel-en* *ve gid-en-ler*
 [2 [2]-3]
 come-REL and go-REL-PL
 'those who come and (those who) go'
- b. *gel-en-ler* *ve gid-en-ler*
 [2 -3 [2 -3]
 come-REL-PL and go-REL-PL
 'those who come and (those who) go'
- (12) a. *gör-m-üyor* *ve duy-m-uyor-muş-çasına*
 [2 -2 [2 -2] -3 -4
 see-NEG-PROG and hear-NEG-PROG-PPL-ADV
 'as if (s)he weren't seeing or hearing anything'
- b. *gör-m-üyor-muş* *ve duy-m-uyor-muş-çasına*
 [2 -2 -3 [2 -2 -3] -4
 see-NEG-PROG-PPL and hear-NEG-PROG-PPL-ADV
 'as if (s)he weren't seeing or hearing anything'
- c. *gör-m-üyor-muş-çasına* *ve duy-m-uyor-muş-çasına*
 [2 -2 -3 -4 [2 -2 -3 -4]
 see-NEG-PROG-PPL-ADV and hear-NEG-PROG-PPL-ADV
 'as if (s)he weren't seeing or hearing anything'

The purely morphological evidence that suspended affixation provides for a level-ordered lexicon is confirmed by the three phonological phenomena that we turn to in §§3–5. These range from the very familiar to the less well known. Each applies under different morphological conditions, which can be most simply characterized in terms of lexical level.

3. VELAR DROP. It has long been noted (e.g. Lees 1961, Lewis 1967, Zimmer 1975, Underhill 1976, Zimmer & Abbott 1978, Sezer 1981a) that velars (/k/,/g/) delete intervocalically.³

- (13) *bebek* 'baby'
bebe-i 'baby-3POSS'
oluk-tan 'gutter-ABL'
olu-u 'gutter-ACC'
salak-lar 'stupid-3PL' (= 'they are stupid')
sala-ım 'stupid-1SG' (= 'I am stupid')
katalog 'catalog'
katalo-u 'catalog-3POSS'

³ In orthographic representations, the deleted velar is written as a 'soft g' (e.g. in *bebeği* = *bebe-i* 'baby-3POSS'), corresponding to the historical voiced velar fricative still found in many other dialects (e.g. Lewis 1967:5, Underhill 1976:12, Sezer 1981a). Early accounts (e.g. Lees 1961) assumed that only /g/ deletes, but Sezer 1981a makes a forceful case for Zimmer's (1975) contention that the rule can apply to /k/ directly. The data in 13 show that /k/ and /g/ delete equally. Past authors have debated whether velars go through an intermediate abstract fricative stage before deleting; this issue is immaterial to our conclusions.

<i>žeolog-dan</i>	'geologist-ABL'
<i>žeolo-u</i>	'geologist-ACC'
<i>gel-ejek-ler-i</i>	'come-FUT-PL-3POSS' (= 'that they will come')
<i>gel-eje-im</i>	'come-FUT-1SG.POSS' (= 'that I will come')
<i>gör-dük-ler-i</i>	'see-PPL-PL-3POSS' (= 'those that (s)he saw')
<i>gör-dü-ü</i>	'see-PPL-3POSS' (= 'the one that (s)he saw')

In each of the above examples, VELAR DROP applies before vowel-initial suffixes of level 3 (possessive) or level 4 (case, agreement).

Velar drop, however, does not apply unconditionally: it fails morpheme-internally (historically, /g/, though not /k/, was lost in this position), as shown in 14, and also before level 2 suffixes, as in 15.⁴

(14) <i>gaga</i>	* <i>gaa</i>	'beak'	
<i>sigara</i>	* <i>siara</i>	'cigarette'	
<i>agamennon</i>	* <i>aamennon</i>	'Agamemnon'	
<i>magazin</i>	* <i>maazin</i>	'magazine'	
<i>oku</i>	* <i>ou</i>	'read'	
<i>sekiz</i>	* <i>seiz</i>	'eight'	
<i>sokak</i>	* <i>soak</i>	'street'	(cf. <i>soka-i</i> 'street-ACC')
(15) <i>gejik-ir</i>	* <i>gejiir</i>	'be late-IMPF'	
<i>birik-en</i>	* <i>birien</i>	'accumulate-REL'	
<i>birak-aĵak</i>	* <i>biraaĵak</i>	'release-FUT'	
<i>meslek-i:</i>	* <i>meslei:</i>	'profession-ADJ' (= 'professional')	
<i>na:zik-en</i>	* <i>na:zien</i>	'kind-ADV' (= 'kindly')	
<i>elastik-iyet</i>	* <i>elastiyyet</i>	'elastic-NML' (= 'elasticity')	

Analyses of velar drop vary considerably (see above references). We adopt a syllable-based approach, attributing velar drop to a constraint on syllabification, active only at levels 3 and 4, banning intervocalic velar onsets.

(16) *VGV ("G" ranges over /k, g/)

Velars unable to syllabify in consequence of 16 are deleted (the alternative, syllabifying an intervocalic velar leftward as a coda, is impossible in Turkish and probably in all other languages as well).

In order to explain why *VGV does not affect stem-internal velars, as in 14, we propose that deletion applies only to velars unsyllabified in the input. Once licensed by syllable structure, velars must remain in the representation. As a consequence, stem-internal velars which are syllabified in the input to levels 3 or 4 are immune to the effects of *VGV, to which only newly syllabified material will be subject. (This analysis correctly predicts that no suffix of levels 3 or 4 will contain an intervocalic velar.)⁵

⁴ Verb root-final velars never delete (Sezer 1981a), since in order for a verb root to combine with a suffix of level 3 or 4, it must first combine with a suffix of level 2, in which velar drop does not apply.

⁵ As a reviewer notes, this analysis also predicts that any velar-initial suffixes of levels 3 or 4 should lose their initial velar when attaching to a vowel-final stem. We know of three velar-initial suffixes in Istanbul Turkish, none of which is a counterexample to this prediction. One, *-gen* (which attaches to number terms and forms the names of polygons), attaches at level 2 and thus is not

Stem-final velars, of course, ARE subject to velar drop when suffixed at levels 3 or 4 (see 13). It would simplify matters to be able to assume that these velars are unsyllabified in the input to levels 3 or 4, permitting them to undergo initial syllabification while *VGV is in effect and correctly predicting their failure to surface when a vowel follows. To achieve this result, we propose that final consonant invisibility applies throughout the lexicon.⁶

(17) FINAL CONSONANT INVISIBILITY: [...]C

We provide substantial justification for invisibility in §5. For now, observe that it protects a stem-final velar from being syllabified into coda position on levels 1 and 2. Such a velar becomes visible only when a suffix is added or, failing that, at a later level, which we assume to be the phrase; only then is it syllabified. Ex. 18 shows a stem combining with a level 3 suffix.

(18) [.so.ka.]k + [[]I] → [.so.ka.i.] 'street-3POSS'

The stem-internal /k/, syllabified initially at level 1, is unaffected by level 3 syllabification. However, the stem-final /k/, protected from prior syllabification by invisibility, is initially subjected to syllabification at level 3. There, due to *VGV, it fails to syllabify and deletes.⁷ In conclusion, velar drop follows from a condition against syllabifying previously unsyllabified intervocalic velars that holds at levels 3–4 but not at levels 1–2.

We turn next to a phenomenon which provides phonological motivation for distinguishing levels 2, 3 and 4.

4. DISYLLABIC MINIMAL SIZE CONDITION. As observed by Itô & Hankamer

subject to velar drop (see e.g. *alti-gen* 'six-sided' (= hexagon); *on-iki-gen* 'ten-two-sided' (= dodecagon)). The second such suffix, *-ken* 'while doing' or 'while being', has a consonant-initial allomorph (*-yken*) following vowels (e.g. *ev-de-yken* 'house-LOC-while' (= while in the house)) and therefore does not meet the structural description of *V.GV. The third suffix is relativizing *-ki*, which permits morphological recursion (e.g. *köşe-de-ki-nin-ki* 'corner-LOC-REL-GEN-REL' (= the one of the one in the corner) (Swift 1963:139). *-ki* occurs between morphemes of levels 1 and 3 (*şimdi-ki-ler₃* 'now-REL-PL' (= the ones that are current)), between suffixes of level 4 (*on-un₄-ki-nden₄* '3sg-GEN-REL-ABL' (= from that which is his/hers)), and even between suffixes of levels 4 and 3 (*köy-de₄-ki-ler₃* 'village-LOC-REL-PL' (= the ones in the village)) (Underhill 1976: 212). Phonologically *-ki* never alternates, and its behavior in suspended affixation is also inconclusive (e.g. some speakers are able to suspend *-ki* when it follows suffixes of level 4, while others are not). Because we cannot tell from ordering or other criteria what level *-ki* belongs to, it does not provide a test for the prediction that velar-initial suffixes of levels 3 and 4 should be subject to velar drop.

⁶ We use the representation of invisibility advocated in Inkelas 1990, where the invisible material is excluded from the phonological domain (enclosed in brackets). Any representation of invisibility would do, however, including (mis)alignment in the sense of Prince & Smolensky 1993 and McCarthy & Prince 1993; what matters is that the final consonant not be syllabified.

⁷ As noted in Sezer 1981a, velar deletion fails when the preceding vowel is long (e.g. *merak*, *mera:k-i* 'curiosity (-3.POSS)'). While Turkish does have underlying V:V sequences (e.g. *ka:ide* 'rule', *a:u* 'poison'), it seems to prevent such sequences from being derived (Sezer 1981a). We assume that a prohibition on V:V forces the intervening velar in V:GV sequences to syllabify. The fact that underlying V:V sequences surface unaltered may be understood as an 'emergence of the unmarked' effect (see McCarthy & Prince 1994), in which, in Optimality Theory (Prince & Smolensky 1993), the effects of some constraints are observable only in derived environments.

(1989) and Orgun and Inkelas (1992), certain speakers of Istanbul Turkish impose a disyllabic minimal size condition on complex words.⁸ Following Orgun & Inkelas 1992, we refer to these speakers as Group B. The data in 19 show that Group B speakers judge a monosyllabic noun or verb consisting of (C)V root and consonantal level 3 possessive or level 2 passive suffix to be ungrammatical (19a,c).⁹

(19) Group B speakers

- | | | |
|----|---------------|-----------------------------|
| a. | <i>*fa-m</i> | '[note]fa-1SG.POSS' |
| | <i>*fa-n</i> | '[note]fa-2SG.POSS' |
| | <i>*be-m</i> | '[letter]b-1SG.POSS' |
| | <i>*be-n</i> | '[letter]b-2SG.POSS' |
| b. | <i>fa-dan</i> | '[note]fa-ABL' |
| | <i>fa-miz</i> | '[note]fa-1PL.POSS' |
| | <i>be-ler</i> | '[letter]b-PL' |
| c. | <i>*ye-n</i> | 'eat-PASS' (= 'be eaten!') |
| | <i>*de-n</i> | 'say-PASS' (= 'be said!') |
| d. | <i>ye-di</i> | 'eat-PAST' |
| | <i>ye-se</i> | 'eat-COND' |
| | <i>de-mek</i> | 'say-INF' |
| | <i>de-miş</i> | 'say-EVID' |

As 19b and 19d show, the same roots are grammatical in combination with phonologically longer suffixes.

The data in 20 confirm that the condition active for Group B speakers is a disyllabic word-size minimum. Ex. 20a shows that there is no difficulty in adding a consonantal suffix to a vowel-final base for these (or any other) speakers; 20b, in which the vowel-initial allomorphs of the possessive and passive suffixes appear following a consonant-final root, shows that there is no semantic obstacle to combinations like that in 19a,c.

(20) All speakers:

- | | | |
|----|----------------|-------------------------------------|
| a. | <i>kafa-m</i> | 'head-1SG.POSS' |
| | <i>kaza:-n</i> | 'accident-2SG.POSS' |
| b. | <i>sol-üm</i> | '[note]sol-1SG.POSS' |
| | <i>yut-ul</i> | 'swallow-PASS' (= 'be swallowed!') |
| | <i>çi:ne-n</i> | 'chew-PASS' (= 'be chewed!') |
| | <i>iç-il</i> | 'drink-PASS' (= 'be drunk!') |

⁸ Itô and Hankamer (1989) leave open the question of whether the minimality condition is disyllabic or bimoraic; we show here, on the basis of the more detailed study of twelve speakers by Orgun and Inkelas (1992), that both conditions actually obtain in Istanbul Turkish, but that only the bimoraic condition is observed by all speakers. The data obtained by Orgun and Inkelas, and reported here, differ in significant respects from those reported by Itô and Hankamer (1989), which the reader may consult. (Itô and Hankamer, however, do not transcribe vowel length, making a comparison difficult.)

⁹ To obtain judgments of derived (C)VC nouns, consultants were shown musical notes or letters of the alphabet and told that individual notes/letters belonged to the consultant, the investigator, or both. Speakers were then prompted for the appropriate possessed forms. Verbal forms were collected using Itô and Hankamer's (1989) strategy of asking consultants to issue stage directions.

Some Group B speakers have long underlying vowels for the (C)V notes of the scale and letters of the alphabet (19a,b), as shown in 21b, though all speakers have short vowels for the roots in 19c,d (as we discuss in §7.1). From now on we will refer to the speakers exemplified in 19 as Group Bi and to those in 21 as Group Bii. As 21a shows, however, this difference in vowel length does not affect Group B judgments of derived monosyllables.¹⁰

(21) Group Bii speakers

- | | | |
|----|----------------|----------------------|
| a. | <i>*fa:-m</i> | '[note]fa-1SG.POSS' |
| | <i>*fa:-n</i> | '[note]fa-2SG.POSS' |
| | <i>*be:-m</i> | '[letter]b-1SG.POSS' |
| | <i>*be:-n</i> | '[letter]b-2SG.POSS' |
| b. | <i>fa:-dan</i> | '[note]fa-ABL' |
| | <i>fa:-miz</i> | '[note]fa-1PL.POSS' |
| | <i>be:-ler</i> | '[letter]b-PL' |

Not all speakers of Istanbul Turkish observe the disyllabic size condition. Ex. 22 shows that speakers of Group A accept complex monosyllabic words as grammatical. Like Group Bii speakers, Group A speakers have long vowels in all suffixed forms of the notes of the scale and letters of the alphabet (a,b).

(22) Group A speakers

- | | | |
|----|----------------|-----------------------------|
| a. | <i>fa:-m</i> | '[note]fa-1SG.POSS' |
| | <i>be:-n</i> | '[letter]b-2SG.POSS' |
| b. | <i>fa:-dan</i> | '[note]fa-ABL' |
| | <i>be:-ler</i> | '[letter]b-PL' |
| c. | <i>ye-n</i> | 'eat-PASS' (= 'be eaten!') |
| | <i>de-n</i> | 'say-PASS' (= 'be said!') |
| d. | <i>ye-di</i> | 'eat-PAST' |
| | <i>ye-se</i> | 'eat-COND' |
| | <i>de-mek</i> | 'say-INF' |
| | <i>de-miş</i> | 'say-EVID' |

Thus far, we have positive evidence that for Group B speakers the disyllabic size condition on affixed words holds at levels 2 (the level of the consonantal passive suffix) and 3 (the level of the consonantal possessive suffixes). We cannot find comparable evidence from levels 1 or 4, since neither possesses any consonantal suffixes.

However, the possibility of adding multiple affixes that belong to the same level confirms the distinction among levels 2, 3 and 4. The evidence comes from subminimality 'repair'. As shown in 23, violations of the disyllabic size

¹⁰ Long vowels shorten in closed syllables (e.g. *zaman(-dan)* 'time(-ABL)', *zama:n-i* 'time-ACC') except when the coda consonant is a suffix (e.g. *kaza:* 'accident', *kaza:-n* 'accident'-2SG.POSS). This is why we represent the vowels as long in 21a. (Furthermore, these pronunciations are actually attested by Group A speakers; see 22). The suffixes which fail to shorten tautosyllabic long vowels belong to level 3; it may be that coda weight is assigned differently there than that at other levels. See Inkelas & Orgun 1992 for one account of the vowel-shortening facts, which are tangential to the present paper.

condition can be repaired by further affixation; even Group B speakers judge the forms in 23 to be grammatical.

(23) All speakers

<i>ye-n-il</i>	'eat-PASS-PASS'	(cf. Group B * <i>ye-n</i>)
<i>ye-n-ir</i>	'eat-PASS-IMPF'	
<i>ye-n-ejek</i>	'eat-PASS-FUT'	
<i>ye-n-miš</i>	'eat-PASS-EVID'	

Crucially, violations of the disyllabic size condition can be repaired only level-internally. In 23, all suffixes belong to level 2. Ex. 24 shows, however, that a violation incurred on one level (here, level 3) CANNOT be repaired by suffixation at a later level (here, level 4).

(24) Group B speakers: root plus level 3 plus level 4 suffix

Group Bi	Group Bii	gloss
* <i>fa-m-i</i>	* <i>fa:-m-i</i>	Intended: '[note]fa-1SG.POSS-ACC'
* <i>fa-n-dan</i>	* <i>fa:-n-dan</i>	Intended: '[note]fa-2SG.POSS-ABL'
* <i>do-m-un</i>	* <i>do:-m-un</i>	Intended: '[note]do-1SG.POSS-GEN'
* <i>re-n-e</i>	* <i>re:-n-e</i>	Intended: '[note]re-2SG.POSS-DAT'

The fact that repair is possible within a level suggests that levels are noncyclic, a conclusion also reached on nonphonological grounds by Orgun (1995b) in an analysis of suspended affixation. We will return to the question of noncyclicity later. To summarize, for Group B speakers, the disyllabic minimal size condition is active at least in levels 2 (passive suffix) and 3 (possessive endings). For Group A speakers, it holds nowhere.

A serious question that remains to be answered is why, given the disyllabic minimal size condition, monosyllabic words exist in large numbers in the language for both speaker groups. While the number of (C)V content words is relatively small (around 40), see 25a, there is a large collection (around 700) of (C)V(X)C content words (see 25b), found in the vocabularies of all speakers (vowels which are long for speakers in Groups A and Bii but short for speakers in Group Bi are indicated with the subscript *i*).

(25) (C)V, (C)VC roots: all speakers

- a. *do_i*, *re_i*, *mi_i*, *fa_i*, ... [notes of the scale]
a_i, *be_i*, *je_i*, ... [letters of the alphabet]
ye 'eat', *de* 'say', *su* 'water', *ko*¹¹ 'put'

¹¹ The forms *ye*, *de*, *su*, and *ko*, whose vowels surface as short in all contexts for all speakers, are discussed further in §7.1. Note that only some speakers have the short root *ko* for 'put': all speakers (also) have a longer variant, *koy*. The forms *ye*, *de*, *su*, and *ko* are all morphologically irregular in various ways (see e.g. Lewis 1967, Underhill 1976). For all speakers, *su* has a suppletive allomorph *suy* when followed by consonantal possessive suffixes, e.g. *suy-um* 'water-1SG.POSS,' which could be interpreted as a minimality effect; the expected **su-m* would be a derived monosyllable. However, the irregular allomorphy of the other (C)V roots appears unmotivated by minimality concerns. *ye* and *de* exceptionally have MONOSYLLABIC, not disyllabic, imperfective forms (e.g. *yer* 'eat.IMPF', rather than the expected **yi-yer*), an irregularity completely at odds with minimality considerations. We believe these forms, while historically derived, are synchronically portmanteaus (like English *went*). Finally, for at least some Group A speakers who have both the short and long forms for 'put', the passive varies freely between *ko-n* and *koy-ul*. If minimality were governing allomorphy, *koy-ul* would be expected to be the only possible form.

b. <i>at</i>	'horse'	<i>ev</i>	'house'
<i>baş</i>	'head'	<i>ham</i>	'unripe'
<i>dil</i>	'tongue'	<i>yün</i>	'wool'
<i>ad</i>	'name'	<i>ek</i>	'affix'
<i>kap</i>	'container'	<i>kök</i>	'root'
<i>hap</i>	'pill'	<i>gök</i>	'sky'

We will return in §6 and §7 to a means of reconciling these data with the observed disyllabic size condition.

5. BIMORAIC MINIMAL SIZE CONDITION. The third phonological phenomenon we deal with is another minimality condition, a bimoraic size constraint for which there are three sources of evidence. Although, as we noted earlier, only Group B speakers respect the disyllabic size condition, all speakers of Istanbul Turkish enforce the bimoraic size constraint, to various extents. This is not unexpected, given the claim by McCarthy & Prince (1986) that a bimoraic minimal size condition is universal. We turn first to the most direct evidence for bimoraic minimality, namely vowel lengthening in (C)V roots.

5.1. VOWEL LENGTHENING: GROUP A_i SPEAKERS ONLY. As observed in Orgun & Inkelas 1992, certain Group A speakers, henceforth Group A_i, exhibit a vowel length alternation in (C)V roots. These roots surface with their underlying short vowels when part of a root-root compound (26c), but undergo vowel lengthening in isolation (26b).

(26) Group A_i speakers

a. UR	b. in isolation	c. in root-root compound
/a/	<i>a:</i> '[letter]a'	
/be/	<i>be:</i> '[letter]b'	
/je/	<i>je:</i> '[letter]c'	<i>a-be-je</i> 'alphabet'
/do/	<i>do:</i> '[note]C'	<i>do-diyez</i> 'C-sharp'
/mi/	<i>mi:</i> '[note]E'	<i>mi-bemol</i> 'E-flat'
/si/	<i>si:</i> '[note]B'	<i>si-bekar</i> 'B-natural'
/la/	<i>la:</i> '[note]A'	<i>la-minör</i> 'A-minor'
/re/	<i>re:</i> '[note]D'	<i>re-mažör</i> 'D-major'

We attribute vowel lengthening to a bimoraic size condition, which compounds by nature satisfy without further phonological incrementation.

The other Group A speakers, henceforth Group A_{ii}, have nonalternating long vowels in these same roots (thus: *do:*, *do:-bemol* ([note]'C'; 'C-flat')). In this respect they pattern exactly like Group B_{ii} speakers (except, of course, that Group A_{ii} speakers judge derived monosyllabic words as grammatical). Group B_i speakers have short vowels in all contexts for the roots in 26; we will come back to these speakers in §7.1.

Returning now to Group A_i speakers, examination of suffixed words shows that the bimoraic size condition is imposed on constituents smaller than the word. As (27) illustrates, suffixation does NOT block lengthening of underlying short vowels in (C)V roots, even though the output of suffixing a (C)V root would automatically be bimoraic even if lengthening had not occurred.

(27) Group Ai speakers

fa:-dan '[note]fa-ABL'
fa:-lar-dan '[note]fa-PL-ABL'

In fact, the only process that appears to bleed vowel lengthening is the limited, root-root compounding illustrated in 26.¹² We conclude that the bimoraic size condition is imposed at the earliest level (level 1), the domain of root-root compounding. (Note that for compounding to bleed vowel lengthening, we must characterize level 1 as noncyclic, a conclusion we also reached for levels 2 and 3 in the previous section.)

We conclude this section with a summary of the vowel lengthening facts for all four speaker groups.

(28) Group	Isolation	Before consonantal suffix (1 SG.POSS)	Before longer suffix (1 PL.POSS)	In root-root compound
Ai	<i>fa:</i>	fa:-m	fa:-miz	<i>fa-minör</i>
Aii	<i>fa:</i>	fa:-m	fa:-miz	<i>fa:-minör</i>
Bi	<i>fa</i>	—	fa-miz	<i>fa-minör</i>
Bii	<i>fa:</i>	—	fa:-miz	<i>fa:-minör</i>

5.2. INHIBITION OF INVISIBILITY: ALL SPEAKERS. The next evidence for a bimoraic minimality condition is more pervasive, if more subtle, and involves final consonant invisibility in stems. In brief, invisibility fails to apply to (C)VC roots, a phenomenon we attribute to minimality constraints. The facts discussed in this section hold for all speakers of Istanbul Turkish that we have consulted (Groups A and B alike).

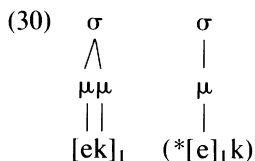
As noted earlier, postvocalic stem-final /k/ and /g/ delete before a vowel-initial suffix of levels 3 or 4. However, as shown in 29, this pattern is systematically violated when the stem is a (C)VC monosyllable (Lewis 1967:10, Zimmer 1975, Zimmer & Abbott 1978, Sezer 1981a).

(29) <i>kök</i> 'root'	<i>kök-e</i> 'root-DAT'	(* <i>köe</i>) (level 4 suffix)
<i>ek</i> 'affix'	<i>ek-i</i> 'affix-ACC'	(* <i>ei</i>) (level 4 suffix)
<i>ok</i> 'arrow'	<i>ok-um</i> 'arrow-1SG.POSS'	(* <i>oum</i>) (level 3 suffix)
<i>lig</i> 'league'	<i>lig-i</i> 'league-3POSS'	(* <i>lii</i>) (level 3 suffix)
<i>füg</i> 'fugue'	<i>füg-e</i> 'fugue-DAT'	(* <i>füe</i>) (level 4 suffix)

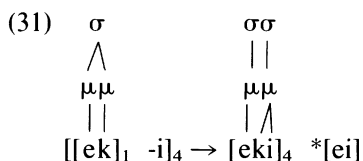
We attribute this seemingly anomalous behavior of (C)VC monosyllables to the bimoraic minimality condition. Recall that our analysis of stem-final velars crucially relies on their unsyllabified status in the input to the levels at which velar drop holds. This status is due to final consonant invisibility, in force throughout the lexicon.

¹² The root-root compounding illustrated in 26 is distinct from the more common stem-stem compounding, which, since it operates on stems that can bear suffixes (e.g. *baş* 'head' + *bak-an* 'look-REL'. = *başbakan* 'prime minister'; *unut-ma* 'forget-NEG' + *ben-i* '1SG-ACC' = *unutmabeni* 'forget-me-not' (Lewis 1967:232–34)), does not take place at level 1. Kaisse (1985, 1986b), Hameed (1985) and Barker (1989) propose that compounding occurs on a level following all suffixation; however, this does not account for the fact that compounds can themselves undergo suffixation (e.g. *başbakan-lar-i* 'prime minister-PL-ACC'). Inkelas and Orgun (1995) propose that the compounding level is distinct from, and unordered with respect to, all suffixation levels.

Our analysis of the data in 29 is that final consonant invisibility is blocked by the bimoraic minimality condition from applying to (C)VC roots. Marking off the last consonant of a (C)VC root would leave only a monomoraic portion visible; thus, invisibility fails and the final consonant is syllabified at level 1.¹³ (In 30, subscripts indicate lexical level and brackets enclose visible material, that is, material subject to the phonology of the specified level).



Once the phonology has 'committed' to a velar by syllabifying it, that velar is henceforth immune to deletion, even if further suffixation on a later level (in 31, level 4) leads to resyllabification, causing the velar to syllabify as an onset.



The claim that (C)VC roots owe their systematic velar drop immunity specifically to the bimoraic size condition is confirmed by the behavior of underlying (C)VGC roots (where G = velar). The penultimate velar of such roots can surface as intervocalic, as a result of vowel epenthesis, yet fails to delete, as predicted by our analysis.

We begin the demonstration of this point by illustrating vowel epenthesis in (C)VCC roots without velars. As shown in 32, unsyllabifiable final clusters in Turkish are subject to epenthesis unless a vowel-initial suffix follows (see e.g. Clements & Sezer 1982). Dots indicate syllable boundaries.

(32)

UR	ACCUSATIVE	NOMINATIVE	LOCATIVE	GLOSS
/film/	<i>fil.m-i</i>	<i>fi.lim</i>	<i>fi.lim.-de</i>	'film'
/burn/	<i>bur.n-u</i>	<i>bu.run</i>	<i>bu.run.-da</i>	'nose'
/resm/	<i>res.m-i</i>	<i>re.sim</i>	<i>re.sim.-de</i>	'picture'

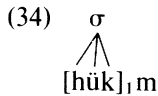
In the accusative forms in 32, the first consonant of the underlying cluster surfaces as a coda. By contrast, in the nominative and locative the same consonant surfaces as an onset, due to vowel epenthesis and resyllabification. Of interest to us is whether a velar beginning an underlying root-final cluster will

¹³ See Inkelas 1993a, Kager 1993, Prince & Smolensky 1993 and Hayes 1995 for other demonstrations that invisibility can be blocked by minimality conditions. Why Group Ai speakers, who lengthen vowels to satisfy minimality in (C)V roots, do not do so in (C)VC forms (/CVC/ → *[CV:]C) is easily answered, for example, in Optimality Theory (Prince & Smolensky 1993). One would need three constraints, ranked in the following order: a constraint enforcing bimoraicity (e.g. FTBIN in Prince & Smolensky 1993:47), a constraint against vowel lengthening, and a constraint forcing the final consonant to remain unsyllabified; the latter two constraints would be related to FILL and NONFINALITY (Prince & Smolensky 1993:25, 40), respectively. Given this ranking, vowel lengthening will bring (C)V roots up to size, but in a (C)VC root the final consonant will syllabify (contributing a mora) instead.

alternate with zero, as might a priori be expected because of the alternation in its surface syllable position. In fact, the velar never deletes:

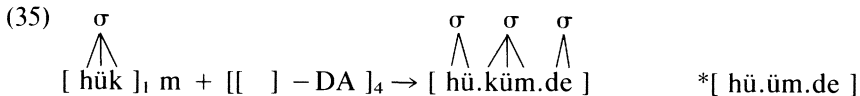
(33) UR	ACCUSATIVE	NOMINATIVE	PLURAL	GLOSS
/akl/	<i>ak.l-i</i>	<i>a.kil</i>	<i>a.kil.-da</i>	'intelligence'
/aks/	<i>ak.s-i</i>	<i>akis</i>	<i>akis-te</i>	'reflection'
/fikr/	<i>fik.r-i</i>	<i>fī.kir</i>	<i>fī.kir.-de</i>	'idea'
/hükm/	<i>hük.m-ü</i>	<i>hü.küm</i>	<i>hü.küm.-de</i>	'judgment'
/nakt/	<i>nak.t-i</i>	<i>na.kit</i>	<i>na.kit.-te</i>	'cash'
/šekl/	<i>šek.l-i</i>	<i>še.kil</i>	<i>še.kil.-de</i>	'shape'
/šükr/	<i>šük.r-ü</i>	<i>šü.kür</i>	<i>šü.kür.-de</i>	'gratitude'

This is exactly as our analysis predicts. On level 1, invisibility successfully marks off the final consonant of a (C)VGC root, leaving a visible remainder which satisfies the bimoraic minimality constraint. The final visible consonant, in this example /k/, thus syllabifies as a coda.



Epenthesis is not triggered at this level since there is no visible cluster.

Once syllabified, the velar is permanently immune to deletion, even in case epenthesis and resyllabification at later levels render it an intervocalic onset.¹⁴



Velar drop is not the only phenomenon to distinguish (C)VC from larger roots. A similar distinction, which we also attribute to the inhibition of invisibility by the bimoraic minimality condition, arises in the well-known phenomenon of final plosive devoicing.

As discussed by Lees (1961), Lewis (1967), Underhill (1976), Kaisse (1986a), and Rice (1990), stem-final plosives are subject to the following alternation: voiced if a vowel-initial suffix follows and voiceless otherwise.

(36)	'mold'	'wing'	'clay pot'
a. nominative	<i>kalip</i>	<i>kanat</i>	<i>güveč</i>
b. third person possessive	<i>kalib-i</i>	<i>kanad-i</i>	<i>güveč-i</i>
c. dative	<i>kalib-a</i>	<i>kanad-a</i>	<i>güveč-e</i>
d. plural	<i>kalip-lar</i>	<i>kanat-lar</i>	<i>güveč-ler</i>
e. ablative	<i>kalip-tan</i>	<i>kanat-tan</i>	<i>güveč-ten</i>

Both Kaisse and Rice attribute voicing alternations to a structure-changing devoicing rule that delinks [+voice] from voiced plosives in coda position.

Although we agree with Kaisse and Rice that voicing alternations are related to syllable structure, the devoicing rule they posit does not cover the full range of data. As noted by Kaisse (1986a), voicing alternations are exhibited only by

¹⁴ Hall (1994) discusses other surface onsets that show coda effects because they were syllabified as codas on an earlier application of phonology (cycle or level). Hall observes that such data require resyllabification, which Rice (1990) had previously suggested might be made unnecessary through the use of final consonant extrametricality.

some final plosives. Ex. 37 shows two additional categories: those plosives that are always voiceless (a) and those that are always voiced (b), regardless of syllable position (dots indicate syllable boundaries).¹⁵

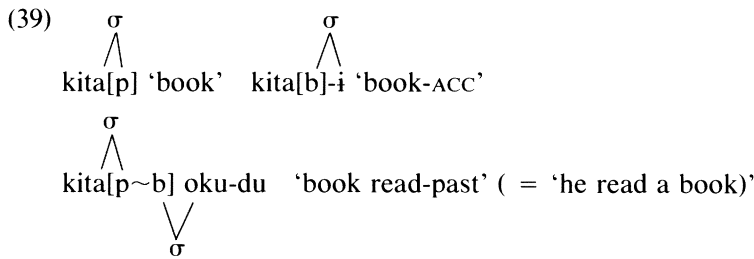
(37)		CODA POSITION	ONSET POSITION	
		NOMINATIVE	ACCUSATIVE	
a. Voiceless	<i>dev.let</i>	<i>dev.le-.ti</i>		'state'
	<i>a.nit</i>	<i>a.ni.t-i</i>		'monument'
b. Voiced	<i>e.tüd</i>	<i>e.tü.d-ü</i>		'study'
	<i>že.o.log</i>	<i>že.o.lo-.u</i>		'geologist'

Thus, although on the surface we find only the expected binary voicing contrast, underlyingly a ternary contrast obtains. A coda devoicing account can handle the data in 36 and 37a, but not that in 37b.

We follow Hayes 1990, Inkelas & Orgun 1993, and Inkelas 1994a in using underspecification to make the necessary underlying three-way distinction: alternating plosives (36) are underlyingly unspecified for [voice], while nonalternating voiceless plosives are underlyingly specified as [-voice]¹⁶ (37a) and nonalternating voiced plosives as [+voice] (37b). The assignment of [voice] is purely structure-filling: plosives underlyingly unspecified for [voice] surface as [+voice] in onset position and as [-voice] in coda position. (Any underlying [voice] feature, however, must surface; this is in line with our general program, discussed in detail in §7.5, to handle all exceptionally nonalternating structure through prespecification.) The rules in 38 neutralize the underlying three-way voicing contrast to a surface two-way contrast.

- (38) a. DEVOICING: Coda plosive → [-voice] (structure-filling)
 b. VOICING: Onset plosive → [+voice] (structure-filling)

Rice proposes that (de)voicing is an 'everywhere' process, holding lexically as well as postlexically. Her evidence is the observation of Kaisse 1986a that optional cross-word syllabification may bleed final devoicing.



¹⁵ Voiced and voiceless plosives also contrast morpheme-internally, e.g. *ab.dal* 'wise' vs. *ap.tal* 'stupid', *meř.mu.a:* 'magazine' vs. *sač.ma* 'nonsense'.

¹⁶ Mester and Itô (1989), Cho (1990), Lombardi (1991), and Steriade (1994, 1995) have claimed that [voice] is a privative feature. If true, no segment can be specified [-voice]. One alternative would be, extending a proposal of Mester and Itô (1989:279) and Lombardi (1991:917ff.) for sonorants, to mark voiceless obstruents as [+ aspirated]. However, following early work in autosegmental phonology (and, more recently, Inkelas 1994a) we assume not only that [voice] is binary-valued but also that the ternary use of a binary-valued feature ([+] vs. [-] vs. unspecified) is allowed when, as in this case, a three-way behavioral contrast in that feature occurs.

One interpretation of these data is that voicing is determined at the phrase level, and hence is sensitive only to surface syllable position. Rice, however, maintaining the Strong Domain Hypothesis (Kiparsky 1984) that rules always apply from the very beginning of the derivation, takes another view: devoicing applies 'everywhere', but is prevented from taking effect lexically by final consonant invisibility.

- (40) Lexical levels: [kita]B Invisibility prevents /B/ from devoicing
 Phrase level: [kitap] /B/ syllabifies as coda, devoices to [p]

Final consonant invisibility is, of course, exactly what we proposed earlier to handle the behavior of final consonants with respect to velar drop.

We have found striking support for Rice's (1990) assumption that consonant invisibility is the only inhibitor of devoicing. As noted by Lewis (1967:11) and Inkelas & Orgun (1993), there is a notable difference between plosives that end polysyllabic roots and those that end monosyllabic roots. While voicing alternations are common in polysyllables (as we have just seen), (C)VC root-final plosives exhibit just the opposite pattern: their laryngeal specifications do NOT alternate. Ex. 41 shows a few of the many monosyllabic roots (both verbal and nominal) ending in nonalternating voiceless plosives.

(41)	NOMINATIVE	ACCUSATIVE		GLOSS
	<i>at</i>	<i>at-i</i>	* <i>adi</i>	'horse'
	<i>sap</i>	<i>sap-i</i>	* <i>sabi</i>	'stem'
	<i>koč</i>	<i>koč-u</i>	* <i>koju</i>	'ram'
	IMPERATIVE	IMPERFECTIVE		GLOSS
	<i>at</i>	<i>at-ar</i>	* <i>adar</i>	'throw'
	<i>sap</i>	<i>sap-ar</i>	* <i>sabar</i>	'take a turn'
	<i>seč</i>	<i>seč-er</i>	* <i>sejer</i>	'choose'

This distinction between polysyllabic and monosyllabic roots is reminiscent of the velar drop data discussed earlier, and the analysis is identical. The virtual nonexistence of alternating final plosives in (C)VC roots may be attributed directly to the bimoraic minimal size condition, which blocks final consonant invisibility from applying at level 1. The final consonant of a (C)VC root is thus forced to syllabify—and, in case it is underlyingly unspecified for [voice], will devoice.

This is illustrated in 42, in which a hypothetical unspecified plosive is necessarily syllabified as a coda, and devoiced, on the root level, yielding *at* 'horse'.

(42)	σ	σ
	∧	
	μμ	μ
	[aD] ₁	(*[a] ₁ D)
	⋮	
	[− voice]	

(We cannot be sure whether such a voiceless monosyllabic root-final plosive is underlyingly unspecified or underlyingly linked to [− voice], since either

representation would lead to voicelessness once the root is syllabified on level 1.)¹⁷

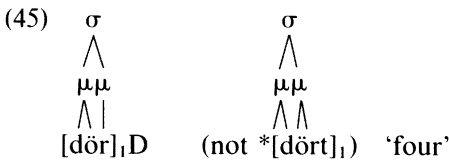
Underlyingly voiced plosives (43) exhibit the same surface behavior in monosyllabic and polysyllabic roots: voiced everywhere. This follows simply from the purely structure-filling nature of plosive voicing. An underlying [+voice] specification surfaces regardless of whether or not the segment that bears it is invisible on the root level.

(43)	NOMINATIVE SINGULAR	NOMINATIVE PLURAL	GLOSS
	<i>ad</i>	<i>ad-lar</i>	'name'
	<i>id</i>	<i>id-ler</i>	'id'
	<i>lig</i>	<i>lig-ler</i>	'league'
	<i>öj</i>	<i>öj-ler</i>	'revenge'
	<i>öd</i>	<i>öd-ler</i>	'gall'
	<i>ud</i>	<i>ud-lar</i>	'oud'

The claim that the systematic exceptionality of (C)VC roots to final plosive voicing alternations is due to their bimoraic size is supported by the behavior of minimally longer, i.e. (C)VXC, monosyllabic roots. As shown in 44, the final plosives of such roots (even velars, which fail to delete in this postconsonantal environment) exhibit the voicing alternation typical of polysyllabic roots.¹⁸

(44)	NOMINATIVE	3D POSSESSIVE	PLURAL	GLOSS
	<i>dört</i>	<i>dörd-ü</i>	<i>dört-ler</i>	'four'
	<i>harç</i>	<i>harç-i</i>	<i>harç-lar</i>	'mixed ingredients'
	<i>renk</i>	<i>reng-i</i>	<i>renk-ler</i>	'color'
	<i>harp</i>	<i>harp-i</i>	<i>harp-ler</i>	'war'
	<i>taç</i>	<i>taç-i</i>	<i>taç-lar</i>	'crown'

The reason for this patterning is illustrated in 45: the final consonant of (C)VXC monosyllabic roots can be invisible without violating the bimoraic minimality condition. (Whether or not the final consonant in *dört* projects its own mora when syllabified is unclear, but irrelevant).



Finally, (C)VCC roots whose penultimate consonant is a plosive provide even further support for the hypothesis that the special behavior of (C)VC roots

¹⁷ See Inkelas 1994a, Steriade 1995, and Itô, Mester and Padgett 1996 for recent discussion of dilemmas of this kind.

¹⁸ A referee asks whether diphthongs are treated as VV or as VC sequences. The fact that the final velar of *peyk* 'satellite' patterns with the velar in /reng/ in not deleting prevocally (*peyk-i* 'satellite-ACC'; note that the final velar of /peyk/ happens to be prespecified as [-voice], as in *künk, künk-ü* 'sewer pipe (-ACC)') suggests that it follows a consonant. This is further confirmed by the behavior of roots such as *pey* 'bid', which patterns with consonant-final roots, not vowel-final ones, for purposes of possessive suffix allomorphy: *pey-i* 'bid-3POSS', *ben-i* 'freckle-3POSS' vs. *küpe-si* 'earring-3POSS').

is due to the bimoraic size condition. Recall that (C)VCC roots are expected to exhibit final consonant invisibility at level 1; this causes the penultimate consonant to syllabify as a coda. We saw earlier (33) that this level 1 syllabification protects penultimate velars in (C)VCC roots from deleting at later levels.

Strikingly similar effects occur with plosive voicing. Penultimate plosives in (C)VCC roots are either consistently voiced (46a) or consistently voiceless (46b).

(46)	UR	ACCUSATIVE	NOMINATIVE	GLOSS
a.	/haʃm/	haʃ.m-i	ha.ʃim	'volume'
	/ʃebr/	ʃeb.r-i	ʃe.bir	'algebra'
	/sabr/	sab.r-i	sa.bir	'patience'
b.	/kutɾ/	kut.r-u	ku.tur	'diameter'
	/metn/	met.n-i	me.tin	'text'
	/haps/	hap.s-i	ha.pis	'prison'

The lack of alternation follows directly from the fact that, as level 1 codas, these plosives are subject to devoicing if they are not already specified for [voice]. Ex. 47 illustrates the fate of a hypothetical underspecified coronal in the word *metin* 'text':

(47)	σ	
	/meD]₁n	(At a later level, epenthesis and resyllabification:
	⋮	[me.tin])
	[-voice]	

At later levels, regardless of what syllable position it ultimately surfaces in, the voicing status of a plosive syllabified at level 1 is preserved. The data in 46 confirm that syllabification AT LEVEL 1 is what leads to nonalteration in the voicing of plosives.

5.3. SUMMARY. To summarize, 48 shows the phonological levels at which the three phonological phenomena we have discussed are known to be active (yes) or inactive (no).¹⁹

(48)		LEVEL 1	LEVEL 2	LEVEL 3	LEVEL 4
	velar drop	no	no	yes	yes
	[σσ] (Group B only)	no	yes	yes	
	[μμ]	yes			

Blank cells indicate lack of evidence for the applicability of the relevant rule. (Note that no cells are marked 'no' for the [μμ] condition: since words are brought into conformity with bimoraic minimality at the first level, it is impossible to establish empirically whether or not the size condition is also enforced at later levels of the lexicon.)

6. DERIVED ENVIRONMENT EFFECTS: LEVEL AVOIDANCE. Thus far we have focused on the distribution of three phonological effects in the level-ordered

¹⁹ While 48 supports the Stratum Domain Hypothesis of Mohanan 1982, according to which a rule applying at two levels applies at all intervening levels, it violates the stricter Strong Domain Hypothesis of Kiparsky 1984.

lexicon. We turn now to the sensitivity of these effects to the derived/nonderived environment distinction. Both velar drop and the disyllabic size condition apply only to derived words, while the bimoraic size condition crucially applies in nonderived environments. Our aim in §6 is to explain this difference.

The restriction of velar drop to derived environments is easily explained. Because velar drop affects only previously unsyllabified velars and is not active on levels 1 and 2, our account correctly predicts velar drop to apply only before level 3 or 4 suffixes. Nonfinal velars in the inputs to these levels survive velar drop because they have already syllabified at levels 1 or 2.

(49) UR	<i>sokak</i>	<i>gejik</i>	
level 1	[so.ka]k	[ge.ʃi.]k	(velar drop inactive)
level 2	[so.ka]k	[ge.ʃi.k-i.]r	(velar drop inactive)
level 3	[so.ka]k	[ge.ʃi.ki.]r	(no unsyllabified /k/ in domain of velar drop)
level 4	[so.ka.-i]	[ge.ʃi.ki.]r	(velar drop applies only to unsyllabified input /k/)
	'street'	'be late'	

The exemption of nonderived forms from the disyllabic size condition, however, poses a more serious challenge for standard views of level ordering, which require each form to be subject to the phonology of every level. The problem is epitomized by monosyllabic roots used without affixes. We can partially account for their exemption from the disyllabic size condition by stating that the condition does not hold at level 1, but this does not explain why such forms (e.g. *ham* 'ripe') are not rejected at levels 2 and 3, where the constraint does hold.

(50) level 1	<i>fa:</i>	<i>ham</i>
level 2	<i>fa:</i>	<i>ham</i>
level 3	* <i>fa:-m</i>	<i>ham</i>
level 4	—	<i>ham</i>
	'my fa'	'unripe'

We turn now to several possible solutions to this problem.

6.1. DERIVED ENVIRONMENT CONDITION. It has long been observed that certain phonological rules are systematically blocked from applying in nonderived environments (e.g. Kiparsky 1973a,b,c, 1982a,b). To account for this, linguists have proposed a family of constraints that includes the Alternation Condition (Kiparsky 1973b), the Revised Alternation Condition (Kiparsky 1973c), various versions of the Strict Cycle Condition (Kean 1974, Mascaró 1976, Halle 1978) and the Elsewhere Condition (Kiparsky 1982a,b, 1985; Giegerich 1988, 1994). A representative statement of nonderived environment blocking is that of Kiparsky (1985:89), stated below.

- (51) STRICT CYCLE CONDITION (SCC): If *W* is derived from a lexical entry *W'*, where *W'* is nondistinct from *XPAQY* and distinct from *XPBQY*, then a rule *A*→*B*/*XP*__*QY* cannot apply to *W* until the word level.

This condition prevents neutralizing lexical rules from applying in nonderived environments.

There is some precedent for appealing to the SCC to account for exemptions to minimality; Itô (1990:224) suggests that the SCC is responsible for the fact that the bimoraic word-size template in Japanese is imposed only on derived words.²⁰ The SCC, however, is inadequate to account for the observed non-derived environment blocking in Turkish.

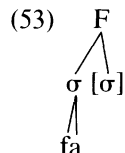
First, the disyllabic size condition is not technically subject to the SCC at all, as it is not a rule, nor does it neutralize any potential lexical contrasts. Second, the SCC does not prevent the BIMORAIC minimal size condition from affecting nonderived roots.

(52)	UR	/fa/	/ham/	
	level 1	[fa:]	[ham]	[μμ] active and imposed on nonderived form; [σσ] inactive
	level 2	[fa:]	[ham]	[σσ] active but not imposed
	level 3	*[fa:-m]	[ham]	[σσ] active, imposed only on derived form

Similar effects occur in Latin, in which all underived roots conform to the bimoraic minimality condition (Mester 1994).

Thus, even if we were to stipulate minimal size conditions as being in the purview of the SCC, we could not account for the disparity between the two conditions found in Turkish. Finally, Kiparsky (1993) has argued convincingly that the SCC is theoretically undesirable and descriptively inadequate to account even for the effects traditionally attributed to it. He rejects the SCC and related constraints in favor of 'organic' explanations for nonderived environment blocking, relying on the blockage by prespecified structure (features or metrical constituents) of cyclic structure-filling rules. Our analyses of plosive voicing alternations and velar drop, in which preexisting structure is protected from undergoing later structure-filling rules, are in the spirit of this new approach.

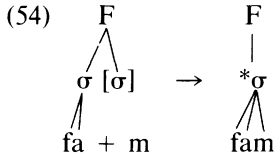
6.2. CATALEXIS. A second explanation that has been suggested for the apparent immunity of subminimal forms to minimality conditions is CATALEXIS, the postulation of an empty metrical constituent at the edge of the string which can be incorporated into a foot with an adjacent, noncatalectic constituent (Kiparsky 1991; Kager 1993, 1995). Catalexis effectively increases the prosodic size of a form; monosyllabic words can appear to be disyllabic for purposes of prosodic rules by virtue of a catalectic syllable.



²⁰ Itô (1990:219) proposes that monomoraic words in Japanese are underlyingly associated with a monomoraic foot, which blocks the imposition of the bimoraic template (see also Kiparsky 1993: 304). By extension, an underlying foot might exempt Turkish monosyllables from the disyllabic size constraint. However, such an analysis would fail to account for why monosyllables are not exempt from the bimoraic size constraint.

However, catalexis cannot account for the difference between derived and non-derived words. If catalexis saves *fa*, it should save **fa-m*; if **fa-m* is rejected, *fa* should also be bad.

One possibility might be to restrict catalexis to level 1 (ignoring the fact that the motivating disyllabic size condition holds only at levels 2 and 3) and stipulate that catalectic material does not survive suffixation.



However, no evidence in the literature suggests that catalexis is in any way incompatible with morphological complexity. For example, catalexis is used by Kiparsky (1991), Kager (1993, 1995) and Inkelas (1994b) to account for final stress in languages like Turkish which are known to have trochaic feet (Kaisse 1985, 1986b, 1993, Kiparsky 1991, Hayes 1995). If catalexis is indeed prohibited in the environment of suffixes, we would predict systematic stress differences between derived and nonderived words. But this is incorrect (cf. *elmâ* ‘apple’, *elma-lar-dâ* ‘apple-PL-LOC’): stress is systematically final throughout. Thus, either Turkish does not have catalexis at all or it has catalexis on all words, derived or nonderived. Catalexis will not explain the difference between *ham* and **fa-m*.

6.3. LEVEL ECONOMY. We are wrestling with the generalization that, with the exception of level 1, forms seem to be immune to phonological alternations at levels at which they are not derived.

(55) level 1	<i>fa:</i>	<i>yu:</i>	<i>ham</i>	[$\mu\mu$] enforced on all forms
level 2	<i>fa:</i>	<i>*yu:-n</i>	<i>ham</i>	[$\sigma\sigma$] enforced only on <i>*yu:-n</i>
level 3	<i>*fa:-m</i>	—	<i>ham</i>	[$\sigma\sigma$] enforced only on <i>*fa:-m</i>

‘fa-1SG.POSS’ ‘wash-PASS’ ‘unripe’

Having failed to find an explanation for this generalization in the Strict Cycle Condition or catalexis, we now propose an account that captures the systematic exceptionality of nonderived words in a direct fashion. The account is couched in a theory of level ordering that departs in significant ways from standard accounts such as Kiparsky 1982b or Mohanan 1982, 1986.

First, following Inkelas 1990, 1993b,c and Orgun 1994, 1995b we treat level as a feature of constituents, making levels different constituent types that words contain rather than different temporal stages through which words pass. A word that undergoes some level *n* is, in this approach, a phonological string which is a level *n* constituent. Second, we view the imposition of level constituency as inseparable from the application of those phonological rules and constraints that characterize a given level. Thus, rather than assuming that a form first ‘enters’ a given level and is subsequently subjected to the phonology of that

level, we construe the phonology at a given level as the set of rules and/or constraints that are imposed on strings that are to be constituents of that level (Orgun 1994, 1995b).

Following Inkelas 1990, 1993b,c (see Orgun 1994 and 1995b for a more formal, sign-based approach) we posit two possible sources for the assignment of level constituency to forms: affixes, which bring with them level structure (e.g. 56a), and redundancy rules, which assign level structure to unaffixed forms (e.g. 56b).

- (56) a. [root] + [[]suffix]_i → [rootsuffix]_i
 b. [root] → [root]_i

We specifically deviate from past models of level-ordered phonology in rejecting the assumption that all forms, derived or nonderived, must undergo (i.e. acquire the structure corresponding to) every level. Instead, a form does not become a constituent of a given level (and therefore does not undergo phonology at that level) UNLESS IT IS REQUIRED TO, either by a lexical redundancy rule or because of acquiring an affix of that particular phonological level. We call this LEVEL ECONOMY.²¹

To see how Level Economy works, consider the following sample derivations, which represent a Group Bii speaker. In 57, a bare root, /fa:/, is suffixed with the level 4 ablative case ending. The lexical entry of this suffix stipulates that the output of suffixation is a level 4 constituent, as shown in 57b.

- (57) a. UR: /fa:/
 b. Suffixation of [[]DEn]₄: [fa:dan]₄ '[note]fa-ABL'

By contrast, the form *fa:-m, shown in 58, is subject to the constraints of level 3 (one of which, [σσ], it fatally violates), precisely because it contains a level 3 (first person singular possessive) suffix.

²¹ One naturally wonders whether Level Economy effects occur in other languages as well. Although in such standard level-ordering analyses as Borowsky 1986 (English), Hargus 1988 (Sekani), and Buckley 1994 (Kashaya), all forms are assumed to pass through all levels, this assumption appears not to be necessary. For example, in Borowsky's two-level analysis of English, none of the rules restricted to level 1 apply to nonderived forms (excepting consonant extrametricality, which has no effect in such cases, and Structure Preservation, which is not a rule and whose effects on nonderived forms can be captured in underlying representation). In Buckley's five-level analysis of Kashaya, only levels 2 and 5 contain rules which crucially apply to nonderived forms. Levels 1, 3 and 4 can safely be skipped by forms not undergoing morphology at those levels (a similar point is made by Buckley 1995b in a different framework). In fact, Level Economy streamlines the analysis of both languages, obviating the need to stipulate that rules of level 1 in English and levels 1, 3 and 4 in Kashaya apply only in derived environments.

Not only is Level Economy possible in English and Kashaya; Buckley (1995a) argues that it is NECESSARY in Manam, where forms are crucially not subject to the phonology of levels at which they undergo no morphology. Interestingly, the earliest appeal to Level Economy that we know of was actually made for Turkish by Kaisse (1985). Kaisse's claim was based on stress; on the assumption that place names, which have a distinctive stress pattern (Sezer 1981b), receive stress at level 1, Kaisse proposed that stems not destined to be place names (including all those we discuss in this paper) skip directly to level 2 (the first of her two suffixational levels). Inkelas and Orgun (1995) adopt a related approach to place names, arguing, however, that the level at which place name stress is assigned is unordered with respect to the other levels of Turkish. Both analyses are compatible with the one proposed here.

- (58) a. UR: /fa/
 b. Suffixation of [[]m]₃: *[fa:m]₃ '[note] fa-1SG.POSS'

A more complex example, which represents all speaker groups, is shown in 59. Here, a bare root acquires both level 3 and level 4 suffixes. Each suffix 'promotes' the level of the derived form to the level specified in the outer brackets.

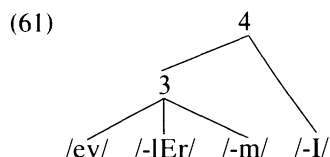
- (59) a. UR: /ev/
 b. Suffixation of [[]lEr]₃: [evler]₃
 c. Suffixation of [[]m]₃: [evlerim]₃
 d. Suffixation of [[]l]₄: [evlerimi]₄ 'house-PL-1SG.POSS-ACC'

Note that *ev-ler-im-i* lacks level 2 representation. This means that it is not subject to the constraints of level 2. There is little empirical evidence to support this prediction in the case of *ev-ler-im-i*, but it will be a critical prediction when we consider nonderived forms later in this section.

According to the representation in 59, *ev-ler-im-i* contains two level 3 substrings, *evler* and *evlerim*. This leads to the expectation that the word might be subject to two cycles of level 3 rules. However, as we have seen on several occasions, Turkish levels are crucially noncyclic. Orgun 1994 and 1995a,b provide a formal account for this noncyclic status; for present purposes, we simply suggest the following interpretive principle, holding within Turkish.

- (60) NO-NESTING: in a form containing multiple affixes with compatible level requirements, the subcategorization frames are unified, and a single rule domain of the appropriate level is formed.

This principle forces the following representation of *ev-ler-im-i*:



The constraint in 60 effectively bans self-embedding in the level structure of a word, and accounts for the noncyclicality of the phonological levels of Turkish.

As developed thus far, the Level Economy model is in a perfect position to account for the intractable nonderived monosyllabic words, which, as we have repeatedly observed, are exceptions to the disyllabic size condition. Since these words have no affixes, there is no source to assign them the structure of levels 2 or 3, where the condition holds. Ultimately, all forms in Turkish are contained in phonological phrases, by virtue of a default rule like that in 62.²²

- (62) PHRASAL MAPPING: $x \rightarrow [x]_{\Phi}$

Thus, the derivation of an unaffixed word like *ham* is simple: it goes directly

²² We assume that words are grouped into phrases on the basis of syntactic structure; 62 can be interpreted as the elsewhere clause of the phrasing algorithm. The point is that each word must be contained in some phrase, in conformity with the Strict Layer Hypothesis (Selkirk 1984).

to the phrase level. It does not pass through levels 2 or 3, and it is never subjected to the disyllabic size condition.

Now, however, we confront the paradox that has doomed all previous attempts to account for the inapplicability of the disyllabic size condition in non-derived environments: why does the bimoraic size condition affect every word, derived or nonderived? We account for the general applicability of the bimoraic size condition by virtue of a mapping, similar to that in 62, which assigns level 1 status to every bare root.

(63) LEVEL 1 MAPPING: $[x] \rightarrow [x]_1$

This rule forces all roots to adhere to level 1 constraints, specifically the bimoraic minimal size condition. A sample derivation is shown below (representing a Group Ai speaker, with underlying short vowel).

(64) a. UR: $/fa/$
 b. Level 1 mapping: $[fa:]_1$
 c. Phrasal mapping: $[fa:]_\phi$ '[note]fa'

The fact that the bimoraic size condition is enforced at an obligatory level accounts for its application in all words, derived and nonderived.²³

In addition to accounting for the alternations in vowel length observed in compounded vs. noncompounded (C)V roots, rule (63) may serve another, more general function. Kiparsky (1982a,b) proposes that, in Lexical Phonology, level 1 serves as the domain of morpheme structure constraints. If this view is correct, it is not surprising that a grammar would require all forms, derived or underived, to undergo the phonology of this level. Support for this view comes from the fact that function words are commonly immune from morpheme structure constraints to which content words in the same language are subject. Elsewhere (e.g. Inkelas 1990) the strong claim has been made that function words 'skip' the entire lexical component; we would propose that, minimally, non-derived function words can skip level 1.

7. EXCEPTIONS: LEVEL PRESPECIFICATION. Having dealt with regular forms and systematic exceptions, we now show that the mechanisms developed thus far provide a straightforward (and perhaps the only possible) account of several lexical exceptions in the phonology of Turkish.

7.1. SUBMINIMAL WORDS. The first set of exceptions addressed are the (C)V roots which can surface as words.

(65) a. All speakers
ye 'eat' *ko* 'put'
de 'say' *su* 'water'
 b. Group Bi speakers only
do '[note]do' *a* '[letter]a'
re '[note]re' *be* '[letter]b'

The roots in 65 are surface exceptions to both the disyllabic and the bimoraic

²³ With the exception of the (C)V roots that always have short vowels, discussed in the next section.

size conditions. We have already explained why the disyllabic size condition does not affect bare roots. However, our analysis does predict that all words will acquire level 1 status, entailing (incorrectly, in this case) the imposition of the bimoraic size condition. It would be improper to set these particular words aside as somehow not part of the regular grammar of Turkish. They are well integrated into the language and, despite some limited morphological irregularity on the part of the words in 65a (see n. 11), occur in the same morphological contexts as longer roots. It is therefore incumbent on us to ensure that our analysis of the regular forms also extends to these exceptional ones.

The solution we offer relies on our assumption that the introduction of level features into the representation is what incurs the phonology associated with those levels. That is, for example, the application of level 1 phonology and the assignment of level 1 status occur concomitantly.

- (66) /fa/ Underlying representation
 [fa] → [fa:]₁ Assignment of level 1 morphological constituency with concomitant application of level 1 phonology
 [fa:]₁ + [[]lar]₃ → [fa:lar]₃ Level 3 affixation
 '[note]fa-PL'

This assumption permits a simple lexical characterization of the exceptions to level 1 listed in 65. These roots are UNDERLYINGLY SPECIFIED for the level 1 feature.

- (67) [ye]₁ 'eat' [ko]₁ 'put'
 [de]₁ 'say' [su]₁ 'water'

As a consequence of possessing an underlying level feature, these forms do not undergo the redundancy rule in 56b.

- (68) /ye/₁ Underlying representation
 [ye]₁ + [[]di]₄ → [yedi]₄ Level 4 affixation
 'eat-PAST'

Since it is the ASSIGNMENT (rather than the mere possession) of level 1 status that entails the application of level 1 phonology, these forms are exempt from the level 1 bimoraic size condition.

7.2. (C)VC-FINAL ALTERNATING PLOSIVES. The prespecification of level 1 constituency solves another problem in Turkish, namely exceptional monosyllabic roots ending in an alternating plosive.

- (69) a. NOMINATIVE 3 POSSESSIVE PLURAL GLOSS
güç *güç-ü* *güç-ler* 'power'
kap *kab-i* *kap-lar* 'container'
saç *saç-i* *saç-lar* 'sheet steel'
jep *jeb-i* *jep-ler* 'pocket'
- b. IMPERATIVE IMPERFECTIVE INFINITIVE GLOSS
git *gid-er* *git-mek* 'go'
et *ed-er* *et-mek* 'do'

A search of the (1985) Moran Turkish-English dictionary revealed that, of

98 (C)VC roots ending in nonvelar plosives known to the native-speaker author, 81 ended in a nonalternating plosive (of which 4 were voiced) and only 17 ended in an alternating plosive. The breakdown by place of articulation is given below:

(70) FINAL PLOSIVE	NONALTERNATING		ALTERNATING	TOTAL
	VOICED	VOICELESS		
Labial (p~b)	0	17	7	24
Alveolar (t~d)	3	35	8	46
Alveo-palatal (č~ǰ)	1	25	2	28
Total	4	77	17	98

Nonalternating voiced final plosives are exceptional among monosyllables just as they are among polysyllables; we account for them through the prespecification of [+voice]. But what about the exceptionally alternating plosives? We need an account of them, not only because of our a priori commitment to all of the data, but also because the systematic alternations that these forms undergo are clearly parallel to those exhibited by regular polysyllabic forms and are indisputably regulated by the same grammar.

As it turns out, the analysis just proposed for the exceptional (C)V roots extends without any further amendment to the exceptional (C)VC roots. They are prespecified as level 1 constituents.

(71) Underlying representation: /kaB/₁ ‘container’

By thus avoiding level 1 phonology, such roots avoid the root cycle of syllabification where the bimoraic size condition holds. They undergo initial syllabification either when the first suffix is attached or, failing affixation, at the phrase level. The final consonant of such a root is directly syllabified into its surface position and, if underlyingly unspecified for voice, exhibits the expected voicing alternations.

7.3. EXCEPTIONS TO VELAR DROP. Given that certain (C)VC roots can be exceptions to plosive voicing alternations by virtue of avoiding the minimality condition of level 1, it should be no surprise to find that there are also lexical exceptions to the generalization that velar drop affects only polysyllable-final velars. As shown in 72, the final velar in the CVC roots *gök* and *čök* unexpectedly drops before a vowel-initial suffix of levels 3 or 4.

(72) *čök* ‘many’ *čo-u* ‘many-3POSS’
gök ‘sky’ *gö-ü* ‘sky-ACC’

A search of the Moran dictionary confirmed the minority status of alternating monosyllable-final velars: of 53 velar-final (C)VC roots known to the native-speaker author, 51 were nonalternating, while only those seen in 72 alternated (i.e. deleted).

(73) FINAL PLOSIVE	NONALTERNATING		ALTERNATING	TOTAL
	VOICED	VOICELESS		
Velar	2	49	2	53

We can account for the exceptional behavior of the roots in 72 by prespecifying them for level 1 status.²⁴ Just like the plosive-final roots in 69, they are

²⁴ The exemption of *čök* from level 1 phonology might be systematic rather than idiosyncratic, as it is a function word.

not subject to the level 1 bimoraic minimality constraint; their final velar is unsyllabified in the input to level 3 or 4 suffixation, and deletes as expected before vowel-initial suffixes of those levels.

7.4. THE SCOPE OF PRESPECIFICATION. In our analyses of exceptions, we have invoked only the prespecification of level 1. This raises the question of how much level prespecification is possible and, specifically, whether levels other than level 1 may be prespecified.

Turkish does not provide a solid answer to this question. The phonology conspires to make it impossible to distinguish the prespecification of level 1 structure from the prespecification of level 2, 3 or 4 structure. Since the only obligatory level in the system is level 1, and since prespecification of any level entails the avoidance of level 1, any prespecified nonderived form will avoid all lexical phonology (unless, of course, a suffix is added). Thus the phonological consequences of prespecifying level 1 or 2 or 3 or 4 are identical.

Our choice of level 1 is determined instead by morphological considerations. Prespecifying a root for a particular level predicts that the root will be unable to take affixes at any earlier level. Thus far we have found no evidence of any such roots (unless function words are analyzed in this manner); *ye* 'eat', *su* 'water', etc., can take the appropriate suffixes of levels 2, 3 and 4. This is consistent only with prespecifying them for level 1.

7.5. WHY USE PRESPECIFICATION? At various points in the history of phonology (see especially Chomsky & Halle 1968, Kiparsky 1973a,b,c, Zonneveld 1978), the favored analysis of lexical exceptions has been rule exception features, diacritics present in the underlying representation of morphemes that trigger or block individual phonological rules. One might think that rule features would provide a simpler analysis of exceptions than the Level Economy model we have argued for.

It may, indeed, be possible to describe the observed lexical exceptionality in Turkish using only a single diacritic feature, [– bimoraic minimality], which blocks imposition of the bimoraic size constraint on individual morphemes. The descriptive adequacy of diacritic features, however, is not really at issue. The pressing question is: Do rule features and prespecification make different predictions? They do, in at least three areas, and prespecification in general has greater empirical consequences (for more extended treatment of these issues, see Inkelas & Cho 1993 and Inkelas, Orgun & Zoll 1994).

First, rule (or constraint) exception features make it possible to describe exceptions that do not, and cannot, exist. In particular, structure-changing alternations and inviolable constraints cannot be overcome through prespecification of phonological structure, whereas it is trivial to devise a rule feature that would make a form immune to them. As noted in Inkelas & Cho 1993, prespecification blocks only structure-filling alternations (Kiparsky 1993), whereas rule features can block alternations of any type. Further, under level prespecification and Level Economy, every form, even a nonderived or exceptional one, must undergo at least one level of phonology, and any form derived at a given level is necessarily subject to the phonology of that level. There are

clear limits on the extent of exceptionality to which prespecification can give rise.

A second general objection to the rule feature approach to exceptionality has to do with economy. As Harris (1985) observes, a theory that treats exceptions by prespecifying them with the structure they surface with uses less machinery than one that must posit a new diacritic feature for every exception encountered. Diacritic rule features serve no purpose other than to trigger or block individual rules from affecting individual forms; unlike prespecified structure, they do not interact with other parts of the grammar, and have a low utility. The level feature is a particularly economical way of encoding exceptionality, as it is used not only by phonology but also by morphology, and clearly plays a necessary role in the system. In general, we prespecify only structure that is used elsewhere in the grammar and which surfaces in the word in question. In contrast to rule features, prespecification is both economical and constrained by the grammar.

The third objection involves the scope of exceptionality. Diacritic exception features remain in the representation unless rules are explicitly formulated to remove them, potentially making the exceptional status of some morpheme available to all rules of the grammar. By contrast, prespecification of structure is inherently local. It distinguishes forms only until default rules assign the same type of structure to previously underspecified forms and neutralize the contrast between specified (exceptional) and unspecified (regular). In terms of our analysis of level prespecification, for example, once rule (63) assigns level 1 status to all forms lacking it, there is no longer a representational contrast in level specification between the exceptional forms (e.g. *ye*) and the regular forms (e.g. *fa*, for all but Group Bi speakers), correctly predicting that these forms will behave in a similar manner with respect to the subsequent phonology. We consider it to be a virtue of prespecification theory that exceptionality is predicted to be inherently short-lived in this manner.

8. CONCLUSIONS AND IMPLICATIONS. In this paper we have shown that Level Economy, a theory in which forms are subject to lexical levels only when specifically required to be, handles a number of regularities and irregularities in Turkish which pose obstacles to other theories. However, there may be consequences of Level Economy beyond the advantages it offers for Turkish.

It is possible to think of past versions of Lexical Phonology as containing three mechanisms for generating constituent structure: compounding rules that create branching structures, subcategorizing lexical entries (affixes), and degenerate phrase structure rules which build the hierarchy of constituent types, or 'levels' (see Inkelas 1990). But the role of the latter is trivial: they exclusively create nonbranching phrases (ensuring that each constituent of level *i* is dominated by a constituent of level *i + 1*). Level Economy does without these rules, which have little utility in general and actually lead to incorrect predictions in Turkish.

There may be broader theoretical advantages to this move. Level Economy may be the manifestation in morphology of what is probably a more general

constraint on languages, namely a prohibition against building unnecessary structure.

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