Accounting for lexical exceptions in grammatical theory*

John T. Jensen & Margaret Stong-Jensen
University of Ottawa
jjensen@uottawa.ca

Abstract: We discuss three approaches to representing lexical exceptions: prespecification, rule exception features, and lexically specific constraints. We argue that the ternary use of binary features leads to loss of generalizations for Turkish Coda Devoicing, and predicts a non-occurring pattern for Finnish Assibilation. We argue that lexically specific constraints overgenerate, allowing non-occurring stress patterns in English, whereas a rule analysis with rule exception features predicts just the occurring patterns. We argue that harmony patterns are active within stems in Hungarian back and round harmony, justifying morpheme-internal underspecification, contrary to OT approaches requiring full specification morpheme-internally, such as Lexicon Optimization.

Keywords: lexical exceptions, exception features, harmony, Hungarian, Turkish, Finnish

1. Introduction

In very broad terms, the linguistic knowledge of a native speaker includes a set of regularities, expressed in terms of rules or constraints, and a set of irregularities, generally assigned to underlying representations in the lexicon. It has long been recognized that underlying representations of morphemes may also contain regularities. These have been traditionally expressed by morpheme structure rules or morpheme structure conditions (Stanley 1967) and more recently by the use of underspecification, with redundant elements unmarked and interpreted by structure-building rules (Kiparsky 1982, 1993). Current phonological theory makes available several approaches to representing lexical exceptions. One is to prespecify exceptional elements in lexical representation, with high-ranking faithfulness constraints, or restrictions on rules preventing them from changing structure, to ensure that prespecified values are preserved in the output. Another (in rule theory) is to refer directly to rules by specifying a lexical item as exceptional to that rule. The corresponding mechanism in constraint theory is a constraint specific to the exceptional lexical item, ranked above the general constraint and specifying the exceptional value for that lexical item. This is called a *parochial constraint* or *lexically specific constraint* (Green 2005). Some

* Portions of this paper were presented at the 2006 meeting of the Montréal–Ottawa–Toronto Phonology workshop at the University of Toronto (February 10–12, 2006) and at the 2006 annual meeting of the Canadian Linguistic Association at York University (May 27–30, 2006). We thank an anonymous reviewer for helpful comments.

underspecification analyses have used binary features in a ternary way in order to avoid using rule exception features or lexically specific constraints.

Looking at the role of underspecification in lexical representation, we argue on the basis of data from Turkish and Finnish that strict binarity has empirical advantages over ternary representations. We suggest that full specification of non-alternating lexical items, as required by Lexicon Optimization (Inkelas 1998), makes it difficult to account for regularities within morphemes, such as back harmony and round harmony in Hungarian, and that lexical entries underspecified for back and round are preferred in this case. Finally, we suggest that an empirical basis for choosing between rule exception features and lexically specific constraints is found in English stress, where lexically specific constraints overgenerate, incorrectly predicting morpheme-internal stressed light syllables, a result that is avoided in a rule analysis.

2. Turkish Coda Devoicing

Consider Coda Devoicing of stops in Turkish.[1] This rule is nearly exceptionless in word-final position, as illustrated by forms such as (1), based on Inkelas, Orgun, & Zoll 1997 (IOZ).

(1)	a.	kanat	‘wing’
		kanatlar	‘wings’
		kanadɨ	‘wing (acc.)
	b.	devlet	‘state’
		devletler	‘states’
		devleti	‘state (acc.)’
	c.	etüd	‘study, étude’
		etüdler	‘studies’
		etüdü	‘study (acc.)’

In standard generative phonology, in the tradition of SPE (Chomsky & Halle 1968), where underlying representations are fully specified for all features, the

[1] We cite Turkish words phonetically, with front rounded vowels represented as [ü] and [ö] (as in Turkish orthography) rather than IPA [y] and [ø]. We use [ɨ] for the high back unrounded vowel rather than IPA [ɯ] or Turkish orthography <ı>. We use [č], [ǰ] for palato-alveolar affricates, Turkish orthography <ç> and <c>, as these are unitary consonants and not clusters as implied by IPA [tʃ] and [dʒ], respectively. Occasionally we cite orthographic forms, enclosing these in angle brackets (<>).

final consonant of these stems would be represented as in (2) and the rule in (3) accounts for the alternation in (1a). The feature specified on the second line is specifically part of the final phoneme. The stem in (1c) is represented parallel to that in (1a), but with an exception feature, specifying that the form is exempt from rule (3). This feature belongs to the entire morpheme. (CD = Coda Devoicing)

(2) *Underlying representations in standard Generative Phonology*

a. /kanad/
[+voice]

b. /devlet/
[–voice]

c. /etüd/
[+voice]
[–CD]

(3) $\begin{bmatrix}-\text{son}\\ -\text{cont}\end{bmatrix} \rightarrow [-\text{voice}] \ / \ \_\_\_\_ \ ]_{\sigma}$

Rule (3) is necessarily feature changing, since underlying representations are fully specified. Full specification is assumed because Stanley (1967) had shown that underspecification could lead to covert ternarity in a binary feature system. That is, leaving some feature specification blank could result in forms which are distinct from both the plus and minus values of that feature. To avoid this consequence, Stanley proposed that all underlying representations must be fully specified.

However, other ways are possible to retain strict binarity while allowing some features to be unspecified, which was explored in depth in underspecification theory (e.g., Kiparsky 1982). Kiparsky avoids covert ternarity as follows:

> In any environment, only two lexical specifications are possible for a feature F, namely the marked specification /αF/ and the unmarked specification [0F], where the most specific lexical rule applicable in that environment assigns the value –α to F. The existence of such a rule is guaranteed by the stipulation that for every F there is minimally a universal markedness rule [ ] → [βF] (β = + or –). Thus the system remains strictly binary while incorporating the built-in asymmetry of markedness theory (Kiparsky 1982: 61).

Applied to Turkish Coda Devoicing, Markedness theory would allow only the values [+voice] and [0voice] to be specified on syllable-final stops. The stems for ‘wing’ and ‘etude’ would have final [+voice] stops, as in the standard theory, while 'state' would be represented with [0voice] on the final stop. Rule (3) would account for the alternation of 'wing,' operating in a structure-changing function, and would also operate in a structure-filling function in all forms of 'state.' The underlying representations in markedness theory are as in (4); we still require an exception marking for 'study.'

(4) *Underlying representations in Markedness (Underspecification) Theory*

a. /kanad/
[+voice]

b. /devlet/
[0voice]

c. /etüd/
[+voice]
[–CD]

IOZ propose to analyze this example in yet a third way, implicitly rejecting strict binarity. In their analysis, all three values of [voice] may appear in word-final position. Stops invariant in voicing (either voiced or voiceless) are specified with the appropriate value of [voice]. Stops that alternate in voicing are specified [0voice], which can be realized as [+voice] or [–voice]. In their Optimality Theoretic analysis, Coda Devoicing is a constraint requiring [–voice] on coda stops. For onset stops, a default rule would be required to specify stops as [+voice] regardless of context.[2] By ranking FAITH [VOICE] over CODA DEVOICING, they achieve the nonalternating cases and the voiceless form in alternating cases; ranking DEFAULT [+VOICE] below CODA DEVOICING would be required to account for the voiced form in alternating cases. We summarize this in (5).

(5) *Underlying representations and constraints in IOZ (OT analysis)*

a. /kanaD/
[0voice]

b. /devlet/
[–voice]

---

[2] IOZ do not explicitly formulate such a constraint. They appear to assume that all features are fully specified on the surface, but this is not self-evident. Ringen & Vago (1998a: 399) allow unspecified features in the output.

c. /etüd/
[+voice]

Constraint ranking:
FAITH [VOICE] >> CODA DEVOICING >> DEFAULT [+VOICE]

There are two important objections to this approach. One is the explicitly ternary use of a binary feature. Phonetically, there are only two contrastive possibilities, [+voice] and [–voice], so the [0voice] specification is used as a diacritic, not in the manner of radical underspecification theory, where the specification of +F and –F for any feature F in the same context is disallowed, and 0F is used for the predictable value in that context.[3] Perhaps more seriously, this analysis puts irregular cases like *etüd* (1c) on a par with the regular cases, whereas such cases are largely restricted to recent borrowings.[4] By contrast, there are many examples like (1a, b) in the native vocabulary of Turkish. We summarize this in (6).

(6) Regular cases: *kanat, devlet*
Irregular cases (restricted largely to recent borrowings): *etüd*

We will see in Section 3 that the use of a ternary contrast makes an incorrect empirical prediction for Finnish Assibilation.

In proposing the underlying representations in (5), IOZ are defending the use of prespecification to account for lexical irregularities over the rule feature approach that is illustrated in (2) and (4). They claim that rule exception features are a specific case of a more general phenomenon, which they call "cophonologies." Rule exception features cannot be employed in OT, where generalizations are expressed in constraints, rather than in rules. If you don't have rules, you can't have exceptions to rules. Cophonologies can be established in any sort of theory by what they call the "distributional method," which they define as in (7).

[3] A reviewer has noted that the devoiced stop in *kanat* may not be phonetically identical to the underlying voiceless stop in *devlet*. Port & Crawford (1989), for example, claim that German does not completely neutralize voicing contrasts in final position. Jassem & Richter (1989), however, show in a phonetic study of Polish that there are no grounds for rejecting phonetic neutralization of voicing in internal and phrase-final position. In any case, this debate does not bear on the question of the underlying distinctions.

[4] Kaisse (1990) states that there are old, well-integrated words with invariant final voiced stops, but, except for the name *Serhad,* her examples appear recent (*ofsayd* 'offside,' *diftong* 'diphthong'). Inkelas & Orgun (1995: 779) list also a number of monosyllabic roots with no final devoicing such as *ad* 'name,' *id* 'id.'

(7) DISTRIBUTIONAL METHOD for establishing co-phonologies: Given a phonological property P, assume that its presence is enforced by a grammar. If not all morphemes in the language possess property P, then establish two co-phonologies: one which requires the presence of P and another which requires its absence. Assign each morpheme to one of these two co-phonologies. (IOZ 1997: 399)

As IOZ point out, this leads to the establishment of uninteresting cophonologies, such as a pair of cophonologies (8) in Turkish such that in one all roots conform to NOCODA and the other in which some syllables have codas.

(8) *Two co-phonologies* (from IOZ 1997, 399)
Co-phonology A: No syllable may have a coda.
Examples: *su* 'water,' *iki* 'two,' *Adana* 'place name'

Co-phonology B: At least one syllable must have a coda.
Examples: *ham* 'unripe,' *karpuz* 'watermelon'

As they correctly point out, no insight is achieved by establishing such cophonologies, and no learner would establish such categories. But, they claim, the distributional method requires that such categories *must* be established. Accordingly, they reject the distributional method, and with it, the possibility of having marked exceptions to rules.

In discussing Turkish Coda Devoicing, Green (2005: 154ff) avoids input underspecification by appealing to *parochial constraints,* defined as morpheme-specific faithfulness constraints. In the Turkish devoicing case, this would be a morpheme-specific constraint requiring faithfulness to the [+voice] marking on the final stop of *etüd* ranked over the markedness constraint requiring devoicing of stops in this context. He does not succeed in avoiding cophonologies, as he claims, since surely the use of parochial constraints is as much a cophonology as the use of rule exception features. In effect, Green uses the same underlying representations as the standard generative analysis (2), replacing the morpheme exception feature [–CD] with a parochial constraint for lexical items such as *etüd*.

We certainly agree that the distributional method as defined by IOZ leads to the establishment of absurd cophonologies, but reject their conclusion that rules cannot have exceptions. A learner of Turkish would not learn the cophonologies in (8) (strict NOCODA vs roots that have at least one coda), since this corresponds to no linguistic generalization whatever. Instead, the learner would simply learn the morphemes, some of which have codas and some of which do not. There is nothing to be gained by dividing morphemes as suggested by the two cophonologies, and by the simplicity criterion the learner would rightly ignore such a division.

On the other hand, a linguistic generalization like Coda Devoicing in Turkish does correspond to a clear generalization that is robust for the learner in that it is supported by a great many alternations. If exceptional morphemes appear, the learner will mark these as exceptions to the generalization, establishing "cophonologies" only when there is ample evidence for a generalization.

A related problem that IOZ claim for cophonologies is that they proliferate unacceptably. This is a problem only when the distributional method for establishing cophonologies is applied in an unconstrained manner. Obviously, a great many uninteresting cophonologies will be established by this method. If the distributional method is rejected and only such cophonologies are allowed that conform to genuine linguistic generalizations, there will not be such a profusion of cophonologies. Any well motivated linguistic rule can have exceptions. In what follows we will avoid the term 'cophonology' and simply speak of lexical exceptions to rules.

A more serious objection that IOZ raise to rule exception features involves the claim that exception markings may have to be marked on individual segments and cannot be restricted to marking whole morphemes. They cite the examples in (9), which have word-internal codas that do not devoice by Coda Devoicing. (*eǰdat* is apparently an Arabic broken plural.) Note that voiceless stops also occur in word-internal coda position (9c)

(9)	a.	eǰdat	<ecdad>	'ancestors' (singular: ǰet <ced>)
		eǰda:dɨ	(accusative)	
	b.	istibdat	<istibdad>	'despotism'
		istibda:dɨ	(accusative)	
	c.	kutbu	'pole (acc.)	(nom: kutub)
		makbul	'accepted'	

IOZ argue that these morphemes cannot be marked with a single exception marking, since each has two stops in coda position, one of which is always voiced, while the other alternates in voicing. In their representation (10a), these stops would be marked respectively [+voice] (morpheme internal) and [0voice] (morpheme final).

(10) a. *eǰdat* according to IOZ
e ǰ da t
[+vc] [0 vc]

b. *eǰdat* according to rule theory
e ǰ da t
[+vc] [+ vc]

In a rule theory representation (10b), both could be lexically marked [+voice]. A principle, variously known as Strict Cyclicity (Kiparsky 1982, 1985) or Nonderived Environment Blocking (NDEB, Kiparsky 1993), can be invoked to prevent Coda Devoicing from applying in the word-internal case, where it is not in a derived environment, while allowing its application in word-final position, where it is in a derived environment. Alternatively, the rule of Coda Devoicing could be restricted to stops which are morpheme final in addition to being syllable final. The exception feature required for *etüd* can refer to the morpheme and does not have to be differently stated for different segments of the morpheme. This is represented in (11). Stops of interest are given in bold and underlined. This analysis also conforms to strict binarity, since in every context only one of [+voice] or [–voice] is specified.

(11) Turkish devoicing with a structure-changing rule with NDEB

	t~d	t	D
in env ____]σ ⟧	[+voice] kana<u>**t/d**</u>	[0voice] devle<u>**t**</u>	[+voice] etü<u>**d**</u> [–CD]
Elsewhere	— —	[0voice] <u>**k**</u>anat/d ku<u>**t**</u>bu	[+voice] <u>**d**</u>evlet e<u>**ǰ**</u>dat (NDEB)

Rules: CD: [–cont,–son] → [–voice] / ____]σ
Default: [–cont, –son] → [–voice]

As an alternative to an explicit principle of NDEB, Kiparsky (1993) proposes that rules can be structure building and that lexical representations can be underspecified, with no more than two lexical distinctions in any given environment. Turkish Coda Devoicing can be analyzed in this framework as in (12), again conforming to strict binarity. An exception feature is required for *etüd,* but no principle of NDEB needs to be stipulated. Again, stops of interest are in bold and underlined.

(12) Turkish devoicing following Kiparsky (1993)

	t~d	T	D
in env ____]σ ⟧	[0voice] kana**t/d**	[–voice] Devle**t**	[0voice] etü**d** [–CD]
in env ____]σ	— —	[0voice] Ku**t**bu	[+voice] E**ǰ**dat
elsewhere	— —	[–voice] **k**anat/d	[0voice] **D**evlet

Rules: CD: [–cont,+obst] → [–voice] / ____]σ
Default [–cont,+obst] → [+voice]

These rules are feature filling only and CD takes precedence over the Default rule by the Elsewhere Condition (Kiparsky 1973).

To summarize this section, Turkish Coda Devoicing is observed both as a word-internal generalization and as an alternation in stem-final position. It has a limited number of exceptions in both situations. These exceptions can be accounted for with a combination of exception features and prespecification within a strictly binary feature system.

3. Finnish assibilation and raising

As we mentioned in section 2, the restriction of certain types of rules to application in derived contexts helps to explain some apparent exceptions to rules. Previous approaches to NDEB held this to be a property of cyclic rules, hence the term Strict Cyclicity. Kiparsky (1993) shows that this holds of certain noncyclic rules as well, word level and even postlexical. His revised approach accounts for NDEB effects exclusively in terms of underspecification and structure building rules. He discusses two rules of Finnish, Assibilation of /t/ before /i/ and Raising of word-final /e/. He claims that both are purely structure filling; this accounts for the NDEB effects in Assibilation. Some examples of Assibilation are given in (13).[5]

(13) a. /tilat+i/ → tilasi 'ordered' (first infinitive: *tilata*)
b. /vete/ (Raising) → veti → vesi 'water' (essive: *vetenä*)

Assibilation is stated in (14a), and the default for obstruents is in (14b).

[5] We cite Finnish forms orthographically. Front rounded vowels are y, ö; ä = [æ]. Double letters indicate length (for vowels) and gemination (for consonants).

(14) a. Assibilation (Kiparsky 1993: 286)

$$\begin{bmatrix} \text{+coronal} \\ \text{+obstruent} \end{bmatrix} \rightarrow [\text{+continuant}] \ / \ \underline{\quad\quad} \ \text{i}$$

b. Default [–continuant]

[+obstruent] → [–continuant]

Raising is stated as in (15a) (our formulation based on Kiparsky 1993: 287), and the default in (15b).

(15) a. Raising

$$\begin{bmatrix} \text{V} \\ \text{–back} \\ \text{–low} \\ \text{–round} \end{bmatrix} \rightarrow [\text{+high}] \ / \ \underline{\quad\quad} \ ]\!]$$

b. Default [–high]

V → [–high]

As in his 1982 paper, Kiparsky requires strict binarity of features: "[i]n each environment, we can have at most [0F] and [αF], where [–αF] is the value assigned by the most specific rule (language-particular or universal) which is applicable in that environment" (Kiparsky 1993: 285). Kiparsky proposes that non-alternating /t/ is specified [–continuant] before /i/ (16e). /s/ is not specified [+continuant] before /i/ (16d), because here [0continuant] will be realized as /s/ by Assibilation (14a). In other contexts, [0continuant] will be realized as /t/ (16c), and /s/ is specified [+continuant] (16c). Where /t/ alternates with /s/, the segment will also be specified [0continuant] and its realization will depend on the context, as in (16a, b).

(16) a. tilaT+a → [tilata] 'to order'
b. tilaT+i → [tilasi] 'ordered'
c. saTa → [sata] 'hundred'
d. laTi → [lasi] 'glass'
e. koti → [koti] 'home'
where /s/ = [+continuant], t = [–continuant], T = [0continuant]

The obstruents /t/ and /s/ also alternate in words like *vesi* 'water' (17c). /s/ is invariant in *kuusi* 'fir' (17d), where the final segment alternates between /i/ in final position and /e/ before a suffix.

(17) a. lasi, lasi+na 'glass, nom. sg. and essive sg.' /laTi/
b. koti, koti+na 'home' /koti/
c. vesi, vete+nä 'water' /veTE/
d. kuusi, kuuse+na 'fir' /kuusE/
where /i/ = [+high], /e/ = [–high], E= [0high]

The chart in (18) observes strict binarity, since in any context, only two values — [0cont] and either [+cont] or [–cont] — can appear (Kiparsky 1993: 287, his (26)). We have added some examples to the chart and added the third set of cases where a morpheme-final *t* or *s* may appear before suffixes, some of which may begin with the vowel *i* that conditions Assibilation. The consonants of interest are in bold and underlined.

(18)

	/t~s/	/t/	/s/
Before tautomorphemic /i/	— —	[–cont] ko**<u>t</u>**i 'home' **<u>t</u>**ilata **<u>t</u>**ilasi 'order'	[0contl la**<u>s</u>**i 'glass'
Before tautomorphemic /E/	[0cont] ve**<u>s</u>**i, ve**<u>t</u>**enä 'water'	— — *ma**<u>t</u>**i, ma**<u>t</u>**ena	[+cont] kuu**<u>s</u>**i, kuu**<u>s</u>**ena 'fir'
Morpheme final before various suffixes	[0cont] tila**<u>t</u>**a, tila**<u>s</u>**i 'order'	— — (No exceptions in derived environments)	[+cont] kihi**<u>s</u>**tä, kihi**<u>s</u>**i 'sizzle'
Elsewhere	— —	[0cont] sa**<u>t</u>**a 'hundred'	[+cont] **<u>s</u>**ata 'hundred'

Kiparsky notes that a fifth hypothetical pattern in (19) does not exist in Finnish.

(19) /…tE/ *mati, *matena (hypothetical)

To acount for (19), we would have to specify /t/ [–continuant] in the context before /E/, violating strict binarity by having a three-way contrast in this context. As we saw in section 2, IOZ (1997) propose a three-way contrast to account for Coda Devoicing in Turkish; however, we see that a theory that allows three-way contrasts is incapable of predicting that examples such as (19) do not exist in Finnish. (Since there are no exceptions to Assibilation in derived environments in Finnish, there are also no examples of a morpheme final /t/ that remains constant before /i/ or suffixes beginning with other sounds.)

Kiparsky notes that a marginal three-way contrast exists in the case of height. In addition to the stable /i/ in *lasi* and alternating /i~e/ as in *vesi, vetenä,* there are a few cases of stable /e/ as in (20).

(20) *Nursery words*
nukke 'doll'
nalle 'teddy bear'
Hypocoristic names
Kalle 'Charlie'
Ville 'Willie'
Abbreviations
Yle 'public radio,' from Ylesradio

This could be accounted for by (21), where a three-way height distinction appears word-finally.

(21)

	/e~i/	/e/	/i/
In env. __]]	[0high]	[–high]	[+high]
Elsewhere	— —	[0high]	[+high]

(Kiparsky 1993: 288)

However, Kiparsky prefers to maintain strict binarity, and to mark the words in (20) as exceptions to Raising (rule (15)), as in (22). He remarks that this solution better represents the marginal status of these stems. The feature distinctions are given in (23). The bold underlined vowel in *nukke* receives the indicted specification for [high].

(22) nukke
[–Raising]

(23)

	/e~i/	/e/	/i/
In env. __]]	[0high]	[0high] nukk**<u>e</u>** [–Raising]	[+high]
Elsewhere	— —	[0high]	[+high]

In this respect the exceptions to Raising in Finnish are accounted for by an exception feature rather than by a three-way feature contrast, exactly as we proposed in the case of Turkish Coda Devoicing. The marginal third case is treated as a true exception, not put on a par with the regular cases.

As with Turkish Coda Devoicing, an OT solution, following Green, preserving strict binarity, could be developed where words like *nukke* retain their final mid vowel by virtue of a parochial constraint requiring that vowel, ranked over the constraint responsible for Raising.

4. Hungarian backness harmony

Hungarian has both backness and roundness harmony. Backness harmony can be argued to be feature changing rather than merely feature filling because of the independent use of certain relational suffixes, which in certain constructions can act like roots and take suffixes of their own. In this independent use, each suffix has a predetermined backness value, either [+back] or [–back]. We illustrate both uses in (24).[6]

(24)	*suffix use*	*independent use*
	-ban/-ben 'in'	bennem 'in me'
	ház-ban 'in the house'	
	víz-ben 'in the water'	
	-ról/-ről 'from off of'	ról-am 'from off of me'
	ház-ról 'from off of the house'	
	víz-ről 'from off of the water'	

With underlying full specification, both values of [back] have to be able to spread to suffixes in a feature changing manner.

In an underspecification analysis, we might have only [+back] specified in underlying representations, with [–back] filled in as a default. The root *ház* 'house' and the suffix *ról* would have an underlying [+back] specification, while the root *víz* and the suffix *-ben* would not be specified in the underlying representation (25a). In *ház-ban,* [+back] spreads from the root to the suffix. In *víz-ben,* both root and suffix are underlyingly unspecified for back, and receive

[6] Hungarian forms are given orthographically, with the addition of the diacritic on ë, which marks a front mid vowel in opposition to the plain e, which is a low vowel. This distinction appears phonetically in the dialect of Pécs but is neutralized in standard Hungarian (Budapest), where both vowels are phonetically [ɛ]. An acute accent marks vowel length; long front rounded vowels have a double acute accent, as in ő. The orthographic a is a low back round vowel [ɒ], while its long counterpart á is unround [ɑː]. In addition, the following consonant correspondents are to be noted:

c	[t͡s]	sz	[s]
cs	[č]	ty	[c]
gy	[ɟ]	zs	[ž]
s	[š]		

the specification [–back] by default. In *ház-ról* both root and suffix are underlyingly [+back] and do not change (25b). Examples like *víz-ről* cannot be generated in a purely feature-filling mode. It would appear that we would have to fill in the default [–back] on the vowel of the root *víz* and then spread this to the suffix in a feature-changing mode when the suffix is underlyingly specified with a back vowel (25c).

(25) a. /ház/ /víz/ /ról/ /ben/
[+back] [0 Back] [+back] [0 Back]

b. /ház - ban/ /víz - ben/ /ház - ról/
[+bk] [0 bk] [0 bk] [0 bk] [+bk] [+bk]

c. /víz - ról/ → víz - ról → víz - ről
[0 bk] [+bk] [–bk] [+bk] [–bk] [–bk]

An alternative would be to strip [+back] markings from suffixes prior to the spread of [+back]. Then *víz-ről* would get [–back] on the suffix by default and no feature changing operation would be required (26).[7] (This is modelled on Kiparsky's (1993: 297–299) discussion of Chumash.)

(26) a. /ról/ → /ról/
[+bk] [0 bk]

b. /víz - ról/ → víz - ről
[0 bk] [0bk] [–bk] [–bk]

Hungarian roots of more than one syllable are normally harmonic internally; that is, all vowels are either [+back] or [–back]. Neutral vowels, [–low, –back, –round], can appear in back vowel words without affecting their status as back harmonically (27).

(27)	város	'city'	(all vowels [+back])
	öröm	'joy'	(all vowels [–back])
	radír	'eraser'	(back vowel plus neutral vowel; harmonically [+back])

[7] A reviewer objects to the stripping hypothesis as ad hoc and cites Hayes & Cziráky Londe (2006), who have all the suffix variants in underlying representations, including full lexical listing of suffixed forms. We regard this as highly redundant and a denial of any general rule for suffix harmony.

These can be straightforwardly represented in an underspecification framework as in (28).

(28)		város	öröm	radír
	B	+ 0	0 0	+ 0

Spreading of [+back] can take place within the root, and to any suffixes, in the case of *város*. In the case of *öröm,* all root vowels and any suffix vowels will be marked [–back] by default. In *radír,* the second root (neutral) vowel is transparent to harmony, so [+back] can spread to suffixes and the neutral vowel gets a [–back] specification.

Hungarian contains a fair number of disharmonic roots among recent loans (29).

(29)	sofőr	'driver'	sofőrnek
	nüánsz	'nuance'	nüánsznak
	amőba	'amoeba'	amőbának

In an early underspecification analysis, Ringen (1988) assumed that only one value of [back] could be specified in underlying representations, and so had difficulty accounting for such forms. Kiparsky's contextual feature specification allows a straightforward solution. Normally only [+back] can be specified, but specification of [–back] is permitted in the context of a preceding [+back] specification. In this context [–back] is not redundant. The representation of disharmonic forms is shown in (30). This further accounts for the fact that the last harmonic vowel of the root determines the harmonic value of suffixes.

(30)		sofőr	nüánsz	amőba
	B	+ –	0+	+ – +

The specification for [back] in this system conforms to strict binarity in Kiparsky's terms, as shown in (31). The bold underlined vowels have the indicated feature specification for [back].

(31)

	harmonic back vowels	harmonic front vowels
in env [+back]C_0 ____	[0back] vár**<u>o</u>**s	[–back] sof**<u>ő</u>**r
Elsewhere	[+back] v**<u>á</u>**ros	[0back] **<u>ö</u>**r**<u>ö</u>**m

Thus, an analysis of Hungarian backness harmony can be constructed along the lines of Kiparsky's 1993 proposal. Harmony is strictly binary, in that, in any context, only two values of [back] may appear, [0back] and one of [±back]. Harmony is strictly feature filling, and no specific principle of NDEB or strict cyclicity is required.[8]

In an OT account, one could account for the same range of facts using the constraint ranking in (32), roughly the approach taken by Ringen & Vago (1998a).

(32) ROOT FAITH >> HARMONY >> SUFFIX FAITH

ROOT FAITH would require identity of backness values specified in roots to be maintained in the output. Harmony would require that the backness value of roots appear in suffixes also. SUFFIX FAITH would require the maintenance of backness values in suffixes, so that these would retain their lexically marked backness values in their independent use as stems. The ranking in (32) ensures that suffixes are harmonized to preceding stems regardless of their underlying backness values.

But the OT account would lose the generalization that harmony within roots such as *város* and *öröm* is accounted for in the same way as the harmonization of suffixes, if "lexicon optimization" is assumed. Under Lexicon Optimization, both harmonic roots such as *város* and *öröm* and disharmonic roots such as *sofőr*

---

[8] Some suffixes are invariable and do not participate in backness harmony. The neutrality of those containing only neutral vowels follows from the lack of phonetic back counterparts to these vowels (ia). A nonalternating back-vowel suffix like *-kor* 'time' can be lexically marked [+back] and be exempted from the process of stripping [+back] from suffixes prior to harmony (ib). We note that *-kor* is also exceptional with respect to the process lengthening low vowels before a suffix.

(i) a. Neutral vowel suffixes

-i 'adjective'		
Buda-i	'from Buda'	
föld-i	'earthly' (föld 'earth)	
-ért 'for'		
sajt-ért	'for cheese'	
öröm-ért	'for joy'	

b. Nonneutral vowel nonalternating suffixes

kor 'time'		
hat-kor	'at six o'clock'	
öt-kor	'at five o'clock'	
öt orakor	'at five o'clock'	(*orákor)

would be fully specified in underlying representation (33), so that there would be no way to distinguish the regular from the irregular cases, as is the case with Ringen & Vago's (1998a) analysis.[9]

(33)	/város/	/öröm/	/sofőr/	(assuming Lexicon Optimization)
B	+ +	− −	+ −	

5. Hungarian round harmony

Hungarian round harmony is less familiar and more restricted than backness harmony. It affects only suffixes containing short mid front vowels (34) and syncopating roots with those vowels in the second syllable (35). The independent use of the suffix *-hoz* in *hozzam* suggests that its underlying representation must contain a back round vowel: /hoz(z)/.

(34) hoz 'toward'
  a. ház-hoz 'toward house'
  b. tűz-höz 'toward fire'
  c. víz-hëz 'toward water'
  d. hozzam 'toward me' (independent use)

(35)	'bush'	'mirror'	'river bed'
nominative	bokor	tükör	mëdër
accusative	bokrot	tükröt	mëdrët
plural	bokrok	tükrök	mëdrëk
inessive	bokorban	tükörben	mëdërben
'toward'	bokorhoz	tükörhöz	mëdërhëz

Rounding harmony affects sequences of appropriate vowels, as in (36).

(36) szövët-ëtëk-hëz 'toward your (pl.) cloth'

Like backness harmony, round harmony generally holds within roots, as in (37).

(37) gërëzd 'slice'

But it also admits root-internal exceptions, as in (38).

---

[9] A reviewer asks how we can distinguish morpheme-internal regularities from morpheme-internal exceptions, citing Labial Attraction in Turkish, which appears to be a regularity but turns out not to be. In the case of Hungarian backness harmony, morpheme-internal harmony is easier to assess, since exceptions that combine back vowels and front nonneutral vowels "are all borrowings and are sometimes felt to be foreign" (Hayes & Cziráky Londe 2006: 78 n. 13). Words combining back vowels and front neutral vowels are regular. Harrison & Kaun (2000) offer some experimental evidence from Tuvan, Turkish, and Finnish that noninitial vowels are underspecified for the harmonic feature in regular (harmonic) stems but that disharmonic stems are fully specified. Their evidence shows that regular harmony processes are active within harmonic stems.

(38)	szëmölcs	'wart'	szëmölcs-höz
	erkölcs	'morals'	erkölcs-höz

There is also one suffix that is exceptional to rounding harmony but not to backness harmony, shown in (39).

(39)	mér-nök	'engineer' (mér 'measure')
	el-nök	'chairman' (elő- 'to in front of')
	hír-nök	'messenger' (hír 'news')
	ír-nok	'clerk, writer' (ír 'write,' back neutral vowel word)
	gond-nok	'caretaker' (gond 'care for')
	szó-nok	'orator' (szó 'word')

To account for round harmony in a rule analysis, we can assume a left-to-right iterative rule that assimilates a short mid front vowel in the feature [–round] to a preceding [–round] vowel. This rule is ordered after the rule for back harmony. In this analysis, assuming underspecification and a binary feature [±round], the marked value of [round] is [–round] and [+round] is the default. Then the suffix *-hoz/-höz/-hëz* is marked [+back] but not [+round] in underlying representation. The suffix *-nok/-nök* is marked as an exception to round harmony, and so always has a round vowel (by default).

The specification [+round] is permitted only where it is not redundant, as in the second vowel of *szëmölcs* (38). We can capture the marked nature of these roots in contrast to the unmarked cases like *gërëzd* (37) with the (partial) lexical specifications in (40).

(40)		gërëzd	szëmölcs
	R	– 0	– +

This analysis conforms to strict binarity, as shown in the table (41). The bold underlined vowels are marked with the specified feature.

(41)

	harmonic nonround vowels	harmonic round vowels
in env [–round]C_0 ____	[0round] gër**<u>ë</u>**zd	[+round] szëm**<u>ö</u>**lcs
elsewhere	[–round] g**<u>ë</u>**rëzd, v**<u>í</u>**z	[0round] **<u>ö</u>**r**<u>ö</u>**m, t**<u>ű</u>**z

The exceptional suffix *-nok/-nök* must be considered an exception to Rounding Harmony, that is, the spreading of [–round]. It cannot simply be lexically marked [+round], since this would violate strict binarity: the three markings [0round], [+round], and [–round] would all exist in the "elsewhere" context in (41). Thus we appeal to prespecification for the lexical exceptions of (38) but a rule exception feature for the suffix *-nok/-nök*.

Steriade (1987: 357) claims that [round] should be regarded as privative, claiming that "[t]here are no instances of [–round] assimilation or dissimilation and no other kind of evidence that unrounded segments have any specification for this feature." Our analysis of Hungarian rounding harmony would appear to be a counterexample to this claim. Steriade (1995, n. 31, p. 170) sketches an analysis of Hungarian round harmony that involves privative round. In this analysis the suffix *-hoz/-höz/-hëz* contains a mid vowel that must stay mid but is underlyingly unspecified for backness and roundness. This does not link the suffix with the independent use of this suffix (34d), which would have to be marked underlyingly [back] and [round] in her analysis. To attain a representation unspecified for [round], she would have to adopt a rule stripping *-hoz/-höz/-hëz* of [round] when it is used as a suffix, analogous to (26), which strips personal forms of [back] specifications when they are used as suffixes. In her analysis, *-hoz/-höz/-hëz* surfaces with a back round vowel after back vowels such as the /á/ of *ház* 'house' (34a) because it is back and there is no back nonlow unround vowel. Steriade must assume that there is spreading of privative round in the front round vowel examples like *tűz-höz* (34b). This spreading must be restricted to target short mid vowels, since no rounding assimilation affects high *i, í* and long *é*. In her analysis, *-nok/-nök* could be marked underlyingly [round], and would surface as [round] (assuming it is exempt from the stripping rule). Examples like *szëmölcs* (38) would be marked [round] on the second vowel, and would trigger regular rounding harmony. Examples like *szövët* (36), however, which would be marked for [round] on the first vowel, would wrongly be predicted to harmonize throughout the morpheme *(*szövöt)*. To avoid this, Steriade would need to restrict round harmony from applying within roots, thereby losing the generalization that round harmony generally holds within roots (37), with some exceptions like (38) .

Alternatively, if we assume binary [±round], with [+round] as the marked value, and a harmony rule spreading [+round] to short mid vowels, then *szövët* can be represented with the first vowel marked [+round] and the second marked [–round]. The suffix vowels in (36) get default [–round]. No restriction need be put on round harmony applying within roots. This underlying specification does not violate strict binarity, since [–round] is specified only in the context of a preceding [+round]. In this analysis, *-nok*/*-nök* is marked [+round] underlyingly and surfaces as [+round] (assuming as above that it is exempt from a rule stripping underlying [+round] from suffixes before harmony applies). Thus the suffix *-nok*/*-nök* does not need to be marked as an exception to round harmony.

Ringen & Vago (1998a, 411), in their OT analysis, claim that, even if the constraint responsible for spreading round is restricted to short mid vowels, it would not account for the distribution of the segment [ö] in Hungarian, which they claim to be restricted in suffixes to a position following a front rounded vowel. While this claim is generally true, it has a lexical exception, the suffix *-nok*/*-nök* (39). Ringen & Vago attempt to avoid this problem by denying morphemic status to *-nok*/*-nök,* following Polgárdi & Rebrus (1987), who discuss the issue in a more radically privative framework, that of Government Phonology, where all features are privative. According to Polgárdi & Rebrus, "we have only found 34 items that contain it, many of which are obsolete" (Polgardi & Rebrus 1987: 11, fn. 2). Even so, by any reasonable *morphological* criteria, *-nok*/*-nök* is a morpheme, given that it has a constant meaning ('person (professionally) concerned with base') and a constant form, varying only in terms of backness harmony. Thus, rejection of morphemic status for this suffix appears to be merely an arbitrary attempt to salvage the claim that [round] is privative. Ringen & Vago claim that the distribution of [ö] in Hungarian is a matter of *licensing* rather than assimilation, following Polgárdi & Rebrus. They formalize this as a linking constraint (42).

(42) LINK[ROUND] (Ringen & Vago 1998a, 407)
[ROUND] may be linked to a short (monomoraic) mid front suffix vowel only if it is also linked to a preceding vowel.

This constraint has the effect of Steriade's spreading of [round] but, like Steriade's account, puts no restriction on the appearance of [ö] within roots (including, on their account, "monomorphemic" *mérnök*).

Although Ringen & Vago claim that Steriade does not account for the distribution of [ö], their approach does not fully account for it either. This segment is not completely free within roots, since, as we have seen, rounding harmony is generally observed within roots as well, i.e., regular forms like (37) in contrast to lexical exceptions like (38).

6. Labial attraction in Turkish

It is useful to contrast Hungarian backness harmony with Labial Attraction in Turkish. Labial Attraction is a root-internal requirement that a high back vowel following the sequence aB(C)__ (where B=any labial consonant) be round [u] rather than unround [ɨ]. Consider the rule (43a) and the examples (43b). (Examples from IOZ p. 394, written orthographically.) Labial attraction contravenes the rounding harmony rule of Turkish, according to which high vowels agree in roundness with a preceding vowel.

(43) a. $$\text{aB(C)}\underset{\displaystyle [\text{+round}]}{\underset{\downarrow}{\begin{bmatrix}\text{V}\\ \text{+back}\\ \text{+high}\end{bmatrix}}}$$ (B = any labial consonant)

b. (Examples from IOZ p. 394, our transcription)

karpuz	‘watermelon’
sabun	‘soap’
habur	(place name)
yavru	‘cub’

There are numerous exceptions to Labial Attraction, such as (44).

(44)	kapɨ	‘door’
	kalamɨš	‘reed bed’
	tavɨr	‘attitude’

Labial attraction is not involved in alternations; a high vowel suffix under the same conditions is phonetically unround, as in (45).

(45)	kitap <kitab>	‘book’
	kitabɨ	‘book (accusative)’

IOZ conclude that Labial Attraction need not be represented in the grammar of Turkish at all, since “because of Lexicon Optimization, the lexicon of Turkish will look the same whether or not Labial Attraction is actually part of the grammar” (IOZ, p. 412). We argue that this is true for Labial Attraction in

Turkish but not because of Lexicon Optimization, which we reject, but on the basis of the simplicity criterion. Labial Attraction seems to be another case of a spurious "cophonology" which we discussed earlier. Hungarian backness harmony is much more robustly attested root internally than Labial Attraction in Turkish. It would appear that Lexicon Optimization makes the incorrect prediction about the status of morpheme-internal harmony in Hungarian, which should be represented by the same principle as that governing backness harmony in suffixes (see footnote 9).

7. English trisyllabic laxing

In this section we will consider whether English TSL can be analyzed as a structure-building rule which accounts for NDEB effects in terms of Kiparsky's 1993 proposal. We give examples in (46), in all cases referring to stressed vowels only.

(46) a. Tense vowel in final or penultimate syllable alternating with lax vowel in trisyllabic context

serene	divine	sane	semen
serenity	divinity	sanity	inseminate, seminal

b. Tense vowel in final or penultimate syllable that remains tense in all contexts

obese	nice	siphon
obesity	nicety	siphonal

c. Lax vowel in final or penultimate syllable

abet	banner

d. Tense vowel in morpheme-internal antepenultimate syllable

nightingale	stevedore	overture

e. Lax vowel in morpheme-internal antepenultimate syllable

sycamore	veronal

Lexical specifications are in (47), and the rules are in (48). The vowels under consideration in (47) are bold and underlined. Note the three-way distinction of the feature [ATR] in the first line, contrary to strict binarity. Note also that *obese* and *stevedore* have the same feature representation, though *obese* is truly exceptional and *stevedore* is regular by NDEB.

(47)	$\bar{V} \sim \breve{V}$	$\bar{V}$	$\bar{V}$	$\breve{V}$	$\breve{V}$	$\bar{V}$
	ser**e**ne, s**e**men	s**i**phon, ob**e**se	st**e**vedore	ab**e**t	v**e**ronal	w**ee**d
Morpheme-internal final or penultimate σ	[0ATR]	[+ATR]	— —	[–ATR]	— —	[0ATR]
Morpheme-internal antepenultimate σ	— —	— —	[+ATR]	— —	[0ATR]	— —

(48) a. Trisyllabic Laxing

$$V \rightarrow [-ATR] \,/\, \_\_\_\_ \; C_1 \begin{bmatrix} V \\ -\text{stress} \end{bmatrix} C_0 \, V \, C_0$$

b. Default
$V \rightarrow [+ATR]$

Alternatively we can analyze *siphon* and *obese* as underspecified for ATR and exceptions to Trisyllabic Laxing, as shown in (49). This representation has the desirable effect of distinguishing *obese,* which is a true exception, from *stevedore,* which, though exceptional, is regular by NDEB.

(49) siphon, obese [0ATR]
[–TSL]

We ask now if TSL can be reanalyzed as a structure-filling rule without resorting to exception features, along the lines that Kiparsky (1993: 295ff) adopts for Finnish Consonant Gradation.

We represent *sane* and *sanity* as in (50) with two tiers, a CV tier and a melody tier, which are initially unassociated in most cases.

(50) sane: C V V C   sanity: C V V C + V C V

s æ n   s æ n + ɪ t ɪ

In the unmarked case, the tiers link one-to-one, with consonants linking to C slots and vowels to V slots, but a single vocalic melody will link to two V slots if available, producing a long vowel. In the Trisyllabic context, however, a vowel is permitted to link to only one V slot. Prelinking vocalic melodies to two V slots overrides this restriction. On these assumptions, the representations of (47) can be recast as in (51).

(51)	V̄ ~ V̆	V̄	V̄	V̆	V̆	V̄
	ser**e**ne, s**e**men	s**i**phon, ob**e**se	st**e**vedore	ab**e**t	v**e**ronal	w**ee**d
Morpheme-internal final or penultimate σ	V V Rt	V V \/ Rt	— —	V Rt	— —	V V Rt
Morpheme-internal antepenultimate σ	— —	— —	V V \/ Rt	— —	V Rt	— —

The representations in (51) differ in two ways: in the number of V slots associated with each vowel and in whether or not the slots are prelinked. Considering these parameters separately allows us to maintain strict binarity in this case. However, *obese* and *stevedore* have the same representation in this analysis.

8. English stress

Stress is another area where both prespecification and rule exception features have been used to account for exceptions. Kiparsky (1982: 50) suggests that English words like *Attila* are lexically represented with a foot on the last two syllables (52a), which by the SCC blocks regular stress assignment to the first syllable. Jensen (1993: 116) suggests that *Attila* is an exception to Noun Extrametricality, which marks the final syllable of nouns extrametrical prior to the operation of stress rules (52b).

(52) a. F (Kiparsky 1982: 50)

A t t i l a

b. /Attila/ (Jensen 1993: 116)
[–Noun Extrametricality]

Otherwise, however, the English Stress Rule operates normally in (52b), placing a binary foot over the last two syllables. This rule builds maximally binary quantity-sensitive feet from right to left, excluding extrametrical material. Lexical prespecification as in (52a) could in principle place stress on any syllable, allowing the three possibilities in (53a) (assuming feet may be monomoraic, as in *raccoon*). In contrast, the exception marking analysis in (52b) allows only the two possibilities in (53b).

(53) a. 'Attila At'tila Atti'la (with lexically specified feet)

b. 'Attila [+Noun extrametricality]

At'tila [–Noun extrametricality]

Within OT, Pater (2000) analyzes secondary stress on the second syllable of words like *chimpanzee* as a consequence of two factors: (1) the lexically marked stress on the syllable *-pan-* and (2) a morpheme-particular constraint IDENT-STRESS-S_1 requiring faithfulness to this lexically marked stress. IDENT-STRESS-S_1 is ranked above *CLASH-HEAD, which prohibits adjacent stresses (54). (S_1 is the class of items subject to this IDENT-STRESS constraint.) Note that in *Argentina* and *information,* which do not belong to S_1, *CLASH-HEAD blocks any lexical stress on the medial syllable.

(54) Pater (2000: 253) on *chìmpànzée* (/chimpànzee/)
IDENT-STRESS-S_1 >> *CLASH-HEAD >> IDENT-STRESS
(S_1 = {chimpanzee, condensation, …})
(cf. Àrgentína, ìnformátion)

The analysis in (54) is doubly redundant. First, it uses two lexical markings—a lexical stress, and information that *chimpanzee* belongs to the class S_1, since other items, like *Argentina,* do not belong to that class and have no stress on the second syllable. Second, the lexically marked stress on *-pan-* of *chimpanzee* is on a heavy syllable that would be expected to receive stress anyway, given the constraint Weight-to-stress that favours stress on heavy syllables.

Pater points out that his constraint hierarchy does not allow for stressing light syllables in the same context. For example, a lexical stress on the second syllable of *Montebello* would be eliminated by FT-BINARY, which is ranked at the top of the hierarchy (55).

(55) Pater (2000: 256) on *Mòntèbéllo
FT-BIN >> IDENT-STRESS

However, the ranking in (55) creates other problems. FT-BINARY, being undominated, should never be violated, but there are a fair number of violations of FT-BINARY in English, with both primary and secondary stress, as in (56).

(56) Overt monomoraic feet in English (Pater 2000:268)

Primary stress	Secondary stress
sátìre	ràccóon
Sémìte	bàbóon
éssày	bàssóon
rábbì	sèttée

Pater notes that an IDENT-STRESS constraint ranked above FT-BINARY as in (57a) (with a lexical stress on the initial syllables of the words of (56)) would incorrectly allow monomoraic words (57b).

(57) a. IDENT-STRESS S_4 (word-initial) >> FTBIN
(S_4 = {satire, raccoon, …})

b. Monomoraic words excluded
*[bæ]
*[tɛ]
*[pɪ]

Assigning stress by rules, and allowing rules to have exceptions, accounts for these cases without any problem.

In the system we are assuming, *chimpanzee* is an exception to Sonorant Destressing, which removes stress on a medial sonorant-final syllable which lies between two other stressed syllables and which is not the main word stress. *Raccoon* is an exception to Initial Destressing, which removes the stress of an initial syllable which is either light or a Latinate prefix immediately followed by a stronger stress. *Satire* is actually not exceptional in any way. It is assigned two feet by the English Stress Rule. The first foot is marked strong by Word Tree Construction, which constructs a right-branching tree over the feet of a word, marking right nodes strong if branching (and under certain other conditions). Under the restriction that feet marked strong cannot be destressed, Initial Destressing is inapplicable in *satire,* and the observed stress pattern is obtained. The five rules under consideration are listed in (58).[10]

[10] These rules and their interaction with segmental rules are discussed at greater length in Jensen (1993).

(58) English stress rules
  Cyclic rules
    Noun Extrametricality
    English Stress Rule
    Sonorant Destressing
    Word Tree Construction
  Postcyclic rules
    Initial Destressing

The three examples are given in (59).

(59) chimpanzee
[–Sonorant Destressing]

raccoon
[–Initial Destressing]

satire (unexceptional)

In (60) we compare FT-BINARY with the English Stress Rule. The effect of both is binary feet in outputs. FT-BINARY requires binary feet in all positions, since it is undominated. The English Stress Rule builds maximally binary, quantity sensitive feet, and it can build a monomoraic foot if it has no other option. Hence it is not violated by the monomoraic foot on the initial syllables in (56).

(60) FTBIN: Feet must be binary
English Stress Rule: Feet are maximally binary; can be monomoraic

In (54), Pater is using a kind of constraint reranking, a form of cophonologies, such as have been proposed for different lexical strata in Japanese by Itô & Mester (1995). His proposal may not differ substantially from such lexically stratified reranking. For example, *CLASH-HEAD blocks a secondary stress immediately adjacent to a primary stress. *CLASH-HEAD is violated in *bàndána,* where the initial syllable, if unstressed, would not be parsed into a foot, expressed in the ranking in (61).

(61) Pater (2000: 263) on *bàndána*
PARSE-σ >> *CLASH-HEAD

However, a number of words, including many words with Latinate prefixes, lack stress in this position, such as *condémn*. For these, Pater proposes a lexically specific version of *CLASH-HEAD that is ranked above PARSE-σ (62). He calls this *CLASH-HEAD-S_2, where S_2 is the class of lexical items that show destressing of pretonic heavy syllables.

(62) Pater (2000: 265) on *condemn*
*CLASH-HEAD-S_2 >> PARSE-σ
(S_2 = {condemn, admire, companion, …})

In these cases Pater combines reranking with lexical specification; as he puts it: "…constraints can be multiply instantiated in a constraint hierarchy: in a general and a lexically specific version" (Pater 2000: 258).

We could also have constraint reranking without lexical specification, as in (63), where *chimpanzee* and *Argentina* are governed by two distinct constraint hierarchies.

(63) chimpanzee (without lexically specified stress) (chìmpànzée)
WEIGHT-TO-STRESS >> *CLASH-HEAD

Argentina (Àrgentína)
*CLASH-HEAD >> WEIGHT-TO-STRESS

Pater (2000: 262) opts for lexically specific constraints since they allow for maintaining a single grammar, rather than requiring multiple co-grammars, as Itô and Mester propose.

Lexically marked constraint reranking would however allow impossible stresses like **Mòntèbéllo* (cf (55)). This can be done with a lexical stress on the second syllable of *Montebello* along with lexically specific ID-STRESS-S_3 ranked above FT-BINARY (64).[11]

(64) *Mòntèbéllo* with lexically marked stress and constraint ranking (hypothetical)
ID-STRESS-S_3 >> FT-BINARY >> *CLASH-HEAD
(S_3 = Montèbello, Tatamàgouchi, phonètician …})

Pater's approach to irregular stress in English is problematic in two ways. One is that it is highly redundant, requiring two lexical markings to account for the exceptional stress on *chimpanzee*. The other is that it overgenerates in predicting nonexistent stress patterns. A theory with rules avoids these problems. *Chimpanzee* has a single lexical exception feature stating that it does not undergo

[11] Pater (2000: 255) ranks FT-BINARY over *CLASH-HEAD by transitivity: FT-BINARY >> ID-STRESS-S_1 >> *CLASH-HEAD.

Sonorant Destressing. Stressings like *Mòntèbéllo* are excluded by the formulation of the English Stress Rule, that requires the construction of binary feet where possible. Because the second syllable is light and there is a syllable before it, the only possible foot construction is a binary one on [Monte]. Monomoraic feet are allowed when only one syllable is available, as in *raccoon, satire*.

9. Conclusion

We have shown that phonological theory needs to include both prespecification and rule exception features or lexically specific constraints in different situations to account for lexical exceptions, in some cases to avoid the unfortunate effects that result from ternary use of binary features. We have suggested that maintaining underspecification for nonalternating morphemes is desirable to account for morpheme-internal regularities, as in Hungarian back and round harmony. Ringen & Vago's (1998a) analysis of back and round harmony in Hungarian, which assumes full specification for nonalternating forms, cannot distinguish regular from irregular morpheme-internal patterns. While in most cases, rule exception features (in rule theory) and lexically specific constraints (in OT) give an equivalent degree of empirical adequacy, we found that the use of lexically specific constraints to account for exceptional stress in English, as in Pater's (2000) analysis, can overgenerate to predict nonexistent stress patterns. A system of rules and rule exception features, on the other hand, is adequately constrained to generate the correct set of data. This suggests that rule theory may give an explanatorily superior account, at least for stress.

References

Chomsky, Noam & Morris Halle (1968). *The Sound Pattern of English*. New York: Harper & Row.

Green, Antoni D. (2005). *Phonology Limited*. ROA 745-0605.

Harrison, K. David & Abigail Kaun (2000). Pattern-responsive lexicon optimization. In GLSA (ed.) *Proceedings of NELS 30,* University of Massachusetts, pp. 327–340. ROA 392.

Hayes, Bruce & Zsuzsa Cziráky Londe (2006). Stochastic phonological knowledge: The case of Hungarian vowel harmony. *Phonology* 23: 59–104.

Inkelas, Sharon (1998). Phonotactic blocking through structural immunity. In B. Stiebels & D. Wunderlich (eds.) *Proceedings of the Lexicon in Focus Workshop*. Düsseldorf.

Inkelas, Sharon & C. Orhan Orgun (1995). Level ordering and economy in the lexical phonology of Turkish. *Language* 71: 763–793.

Inkelas, Sharon, C. Orhan Orgun, & Cheryl Zoll (1997). The implications of lexical exceptions for the nature of grammar. In Iggy Roca (ed.) *Derivations and Constraints in Phonology*. Oxford: Clarendon Press, pp. 393–418.

Itô, Junko & Ralf Armin Mester (1995). Japanese phonology. In John Goldsmith (ed.) *The Handbook of Phonological Theory*. Oxford: Blackwell, pp. 817–838.

Jassem, Wiktor & Lutosława Richter (1989). Neutralization of voicing in Polish obstruents. *Journal of Phonetics* 17: 317–325.

Jensen, John T. (1993). *English Phonology*. Amsterdam: Benjamins.

Kaisse, Ellen M. (1990). Toward a typology of postlexical rules. In Sharon Inkelas and Draga Zec (eds.) *The Phonology-Syntax Connection*. Chicago: University of Chicago Press, pp. 127–143.

Keyser, Samuel J. & Paul Kiparsky (1984). Syllable structure in Finnish phonology. In Mark Aronoff & Richard T. Oehrle (eds.) *Language Sound Structure*. Cambridge, MA: MIT Press, pp. 7–31.

Kiparsky, Paul (1973). 'Elsewhere' in phonology. In Steven R. Anderson & Paul Kiparsky (eds.) *A Festschrift for Morris Halle*. New York: Holt, Rinehart, & Winston.

Kiparsky, Paul (1982). Lexical morphology and phonology. In In-Seok Yang (ed.) *Linguistics in the Morning Calm*. Seoul: Hanshin, pp. 3–91.

Kiparsky, Paul (1985). Some consequences of lexical phonology. *Phonology Yearbook* 2: 85–138.

Kiparsky, Paul (1993). Blocking in nonderived environments. In *Phonetics and Phonology 4: Studies in Lexical Phonology*. San Diego: Academic Press, pp. 277–313.

Myers, Scott (1987). Vowel shortening in English. *Natural Language & Linguistic Theory* 5: 485–518.

Pater, Joe (2000). Non-uniformity in English secondary stress: The role of ranked and lexically specific constraints. *Phonology* 17: 237–274.

Polgárdi, Krisztina & Péter Rebrus (1998). There is no labial harmony in Hungarian: A government phonology analysis. *Approaches to Hungarian* 6: 3–20.

Port, Robert & Penny Crawford (1989). Incomplete neutralization and pragmatics in German. *Journal of Phonetics* 17: 257–282.

Ringen, Catherine O. (1988). Transparency in Hungarian vowel harmony. *Phonology* 5: 327–342.

Ringen, Catherine O. & Robert M. Vago (1998a). Hungarian vowel harmony in Optimality Theory. *Phonology* 15: 393–416.

Ringen, Catherine O. & Robert M. Vago (1998b). Hungarian roundness harmony in optimality theory. *Approaches to Hungarian* 6: 21–39.

Stanley, Richard (1967). Redundancy rules in phonology. *Language* 43: 393–436.

Steriade, Donca (1987). Redundant values. In Anna Bosch, Barbara Need, & Eric Schiller (eds.) *Papers from the Parasession on Autosegmental and Metrical Phonology*. Chicago: Chicago Linguistic Society, pp. 339–362.

Steriade, Donca (1995). Underspecification and markedness. In John Goldsmith (ed.) *Handbook of Phonological Theory*. Oxford: Blackwell, pp. 114–174.