

## **Paradigmatic Uniformity and Contrast\***

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This paper reviews several cases where either the grammar strives to maintain the same output shape for pairs of inflected words that the regular phonology should otherwise drive apart (paradigmatic uniformity) or where the grammar strives to keep apart pairs of inflected words that the regular phonology threatens to merge (paradigmatic contrast).

### **1. Introduction**

The general research question which this paper addresses is the proper treatment of cases of opacity in which the triggering or blocking context for a phonological process is found in a paradigmatically related word. Chomsky & Halle's (1968) discussion of the minimal pair *comp[ə]nsation* vs. *cond[ɛ]nsation* is a classic example of the problem. In general, the contrast between a full vowel vs. schwa is predictable in English as a function of stress; but *comp[ə]nsation* vs.

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*cond[ɛ]nsation* have the same  $\sigma \sigma \acute{\sigma} \sigma$  stress contour and thus raise the question whether English schwa is phonemic after all. SPE's insight was that the morphological bases from which these words are derived provide a solution to the problem: *comp[ə]nsate* has a schwa while *cond[é]nse* has a full stressed vowel.

Chomsky and Halle's suggestion is that such paradigmatic relations among words can be described by embedding the derivation of one inside the derivation of the other. In other words, the derivation of complex words proceeds cyclically with the morphological base forming an intermediate stage /kómpensé:t/ vs. /kóndéns/ over which stress and vowel reduction are computed and relies on the model's serial architecture for subsequent destressing processes to obscure the context for vowel reduction. The cycle became the basic (and essentially only) tool for describing paradigmatic phonological relations in the generative framework. It received considerable theoretical development in the Lexical Phonology model Kiparsky (1982, 1985). While many languages have been successfully described in cyclic terms (see Cole 1995 for a recent review), cases were discovered where the cycle does not provide the proper coverage or elucidation (e.g. Chung 1983; see also Crosswhite 1997).

For constraint-based models of phonology which eschew structure building and structure changing rules in favor of static well-formedness conditions evaluating output forms, such "cyclic" phenomena present a real challenge. Within Optimality Theory there have been two contrasting approaches to the problem. The first (pursued by Kiparsky 1999; cf. also Kenstowicz 1995,

Booij 1996, Rubach 2000) retains Lexical Phonology's modular conception of the grammar but trades in rules for constraints and a one step input-output mapping within each module. The hypothesis is that a minimal number of intermediate levels (ideally motivated independently by the morphology of the language)--root, stem, word--will provide just enough leverage to handle all types of opacity. (See Goldsmith 1993 for a similar proposal). The second approach has been to extend OT faithfulness constraints from Input-Output and Base-Reduplicant relations to related words in a paradigm in the form of so-called Output-Output constraints. This approach has been pursued by Benua (1997), Burzio (1996), Crosswhite (1998), Flemming (1995), Itô-Mester (1997), Kager (1999), Kenstowicz (1996), Kraska-Szlenk (1995), McCarthy (2002), Raffelsiefen (1995), Steriade (2000), and others. The general idea is that words sharing the same morphological base form a network of possible phonological influences. The research program is to document these influences, to characterize their nature, and to develop appropriate formalisms to express them. Of particular interest is whether cases can be shown to exist which do not meet the containment condition of the classical SPE cycle in which the derivation of one word is embedded in the derivation of the other. Of course, analogical relations of this form are well-known from traditional historical linguistics. Genuine cases of grammar change based on the idea that certain allomorphs have a privileged status certainly exist: see Lahiri and Dresher (1982) for discussion. The question is whether such paradigmatic relations play an active role in the synchronic grammar in computing input-output mappings or instead are more properly viewed as the product of the learning module for constructing

underlying/base forms with particular members of the paradigm having a privileged status because of their frequency, their perceptual salience, their relative markedness, etc.

This paper presents some additional examples of paradigmatic relations that are arguably part of the synchronic system rather than simply the residue of a diachronic restructuring process. Once a critical number of such cases have been documented and described, we can begin to provide a theoretical account of the phenomenon. In section 1 we examine a hitherto overlooked aspect of the distribution of the allomorphs of the Spanish diminutive suffix which exhibit a striking example of paradigmatic uniformity. We then document cases of paradigmatic contrast from Russian, Bulgarian, Ch-Mwi:ni and Arabic in which the phonology conspires to ensure that underlyingly distinct members of the inflectional paradigm remain phonetically distinct. The paper concludes with a summary of the findings and tasks for future research.

## **2. Spanish Diminutive Allomorphy**

It is well known that the Spanish diminutive suffix has two allomorphs *-sit-o/a* and *-it-o/a* (see Crowhurst 1992, Harris 1994, and Elordieta and Carreira 1996 for recent discussion). Our remarks here are based on the observations of Agüero-Bautista (1998). Scrutiny of the data in (1) indicates that the *-sit* allomorph is chosen when the nondiminutive base word ends in [r] or [n]. *-it-o/a* is chosen when the base word ends in a vowel. This distribution does not conform to the

widespread tendency for  $C \approx V$  allomorphy to be resolved by syllable markedness constraints optimizing CV sequences at the juncture between the base and the affix (see Mascaró 1996 for discussion).

(1)	a.	amor	amor-sit-o	'love'
		balkon	balkon-sit-o	'balcony'
		limon	limon-sit-o	'lemon'
	b.	koron-a	koron-it-a	'crown'
		libr-o	libr-it-o	'book'
		bark-o	bark-it-o	'ship'
		cokolat-e	cokolat-it-o	'chocolate'
		lava-dor-a	lava-dor-it-a	'washing machine'
		seca-dor-a	seca-dor-it-a	'dryer'

Aguero-Bautista suggests that the allomorphs are distributed so as to maintain the syllabic profile of the nondiminutive source: *-sit* nudges the preceding consonant into the coda so that [a.mor.si.to] matches [a.mor] while *-it* draws the final consonant of the stem into the onset so that [ko.ro.ni.ta] matches [ko.ro.na]. The tableau in (2) illustrates the idea with a constraint demanding corresponding syllabic roles: if  $x$  and  $y$  are corresponding segments then  $x$  and  $y$  have the same syllabic analysis (onset, nucleus, coda).

	/amor-sit≈-it-o/	<u>Corr-Σ-Role</u>
(2)	a.mor.-si.t-o	
	a.mo.r-i.t-o	*
	<hr/>	
	cf. a.mor	

	/koron-sit≈-it-a/	<u>Corr-Σ-Role</u>
	koron-sit-a	*
	koron-it-a	
	<hr/>	
	cf. ko.ro.n-a	

The data in (3) show cases where the syllable-matching generalization unexpectedly breaks down: *-sit* occurs even though the nondiminutive source ends in a vowel and hence the base-final consonants have divergent  $\Sigma$ -roles: e.g. the [n] in *rat-on-a* is an onset but occupies the coda in *rat-on-sit-a*. Corr- $\Sigma$ -role demands *rat-on-ita*.

(3)	rat-on-a	rat-on-sit-a	'mouse'
	ladr-on-a	ladr-on-sit-a	'thief'
	yoron-a	yoron-sit-a	'cry baby'

mandon-a	mandon-sit-a	'bossy' f.
trabaja-dor-a	trabaja-dor-sit-a	'worker' f.

Aguero-Bautista's explanation for the difference between (1b) and (3) is that the latter enter into a paradigmatic relation with the corresponding masculine forms in (4). The masculines take *-sit* by  $\Sigma$ -Role Correspondence.

(4)	rat-on	rat-on-sit-o	'mouse' m.
	ladr-on	ladr-on-sit-o	'thief' m.
	yoron	yoron-sit-o	'cry-baby' m.
	mandon	mandon-sit-o	'bossy' m.
	trabaja-dor	trabaja-dor-sit-o	'worker' m.

The reality of the phenomenon is demonstrated by the fact that the diminutive of *lavador-a* changes from *lavador-it-a* 'washing machine' to *lavador-sit-a* when it has the meaning of 'washer-woman' (paired with *lavador-sit-o* 'washer-man'). The generalization is thus that the syllable matching allomorphy is overridden in favor of a fixed shape for the stem in the subparadigm formed by the paired masculine and feminine inflection. A comparable example occurs in Polish diminutives (which level the *o~u* alternation that regularly appears in the inflection of the base word; for discussion see Kenstowicz 1996 based on Kraska-Szlenk 1995).

The Spanish example is interesting because there are two conflicting paradigm uniformity constraints at play. The first requires the diminutive stem to parallel the syllabification of the source and hence demands different allomorphs for the diminutive suffix when it is added to bases with zero inflection in the masculine. But a countervailing second force imposes a uniform stem shape for the paired masculine/feminine inflection. The latter constraint wins out here.<sup>1</sup> Finally, uniformity in the inflectional paradigm could be achieved by generalizing either the *-sit* or the *-it* allomorph. Leveling of *-sit* could reflect its status as the default allomorph. Alternatively, the choice might be resolved on the basis of the unmarked status of the masculine--comparable to the privileged status of singular (vs. plural), nominative (vs. oblique), present (vs. past), etc. as models for analogical generalization. The overall analysis is sketched in the tableau below. Following Flemming (1995), Raffelsiefen (1995), and others, the Paradigm Uniformity constraint evaluates alternative paradigms.

(5)	<u>Par Uniform</u>	<u>Corr-<math>\Sigma</math>-Role</u>	<u>*-it &gt;&gt;*-sit</u>
->	{ra.ton.-si.t-o,		
	ra.ton.-si.t-a}	*	

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<sup>1</sup> There are also cases in which the competition is resolved in favor of syllable matching: cf. *aleman*, *aleman-a* 'German' and the corresponding diminutives *aleman-sit-o*, *aleman-it-a*; also the personal names *Ramon*, *Ramon-a* and *Ramon-sit-o*, *Ramon-it-a*. These appear to be in the minority.



{ra.to.n-i.t-o, ra.to.n-i.t-a}	*	**!
{ra.ton.-si.t-o, ra.to.n-i.t-a}	*!	

It should be clear that the classical cycle will have serious problems with this example. Since it derives each word in isolation from any other one (except to the extent that one is a substring of the other) it cannot express the contrast between (1b) and (3) in a natural way.<sup>2</sup> More generally, the cycle's success

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<sup>2</sup> A reviewer suggests an alternative that does not require reference to paradigmatic relations but otherwise provides a "clean analysis" of the Spanish data. According to this solution the diminutive suffix is *-(s)itV* whose theme vowel *V* is determined by the gender/number of the diminutive stem. The analysis has the following ingredients. First, the rule of allomorphy states that *-sitV* is chosen after root-final *r* and *n* and *-itV* is chosen elsewhere. Second, the diminutive suffix *-(s)itV* is affixed to a lexeme's root rather than to its stem. Crucially, the final vowels of *libro* 'book' and *korona* 'crown' are exponents of the root while the final *a* of *ratona* is a suffix. Thus, */raton+a/* has internal structure while */libro/*, */korona/* do not. Third, */libro+(s)ito/*, */korona+(s)ita/* require a rule (ordered after the allomorphy rule deleting *s*) to truncate the final vowel of the root. While this analysis "works", its key features seem liabilities rather than assets. First, the rule distributing the allomorphs of the *-(s)it* suffix refers to an arbitrary set of segments. The fact that the paradigmatically related bases *amor*, *limon* end in a consonant and thus share a property in common is just an accident. Second, there is no independent reason to assign the final vowels of *libro*, *korona*, etc. to the root but retain a suffixal analysis for the final vowel of *ratona* (i.e. */raton+a/*). Indeed, it turns out to be a coincidence that the

reflects some of the idiosyncrasies of English morphology, which is poor in inflection and where it does have inflection, the base is typically an independent word with no (overt) affixation and hence can be treated as a substring of the other form(s) of the paradigm.

## 2. Paradigmatic Contrast

In the remainder of this study we examine several cases in which the phonology conspires to ensure that two phonologically distinct members of the paradigm remain phonetically distinct. Contrast constraints of various types have been discussed in the recent generative literature. Let us briefly mention some of them here in order to better situate our use of the notion. Syntagmatic contrast (formalized in terms of the OCP) is a well known determinant of phonological form. Côté (2000) discusses various examples of consonant cluster phonotactics that depend on the nature and degree of phonetic contrast among the elements composing the cluster. Research into underspecification (see Steriade 1995 for a review) showed that a feature's status as marked vs. contrastive can be decisive in determining its phonological behavior (cf. Calabrese 1995). Flemming (1995) points to cases in which the markedness of a segment cannot be determined

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Spanish lexicon has so many feminine "roots" that terminate in the vowel *a* and that exactly the same vowel is assigned as a suffix in feminine *ratona*. Finally, the vowel truncation rule has no independent motivation in the phonology of Spanish. Under the analysis suggested in the text the allomorphs of *-(s)it* are distributed in a phonologically natural fashion and the traditional morphological analysis of [root+suffix+gender/number theme] is uniformly assigned for all words under discussion.

independently from the system in which it occurs, observing for instance that a high central vowel is typically marked in systems that contrast front and back vowels but is the unmarked, expected vowel in columnar systems like Marshallese that contrast vowels for height but not for backness. Yip (1995), Soh (1996), and Kelepir (1997) document cases in which corresponding segments in a Base-Reduplicant structure are required to differ along some phonological dimension such as vowel height or consonantal place. Alderete (1999) argues for parallel cases of "anti-faithfulness" along the Input-Output dimension to mark a morphological contrast: e.g. a switch in vowel length in Dinka to express the singular vs. plural distinction. Various types of "push chains" have also been noted (e.g. Kirchner's (1996) discussion of vowel raising and deletion in Bedouin Arabic). Finally, Crosswhite (1997) documents cases of paradigmatic homophony avoidance in Bulgarian and Russian that are directly relevant to us. In the next section we recapitulate one of her examples and add several of our own to demonstrate the reality of the phenomenon.

### 2.1 Russian Vowel Reduction

Our first example comes from Russian. Most dialects of Russian including the standard one reduce the underlying five vowel system /i,e,u,o,a/ to three /i,u,a/ in unstressed position. When not in the immediate pretonic syllable, nonhigh /a/ is reduced further to schwa. The mapping of vowels is such that unstressed nonhigh vowels appear as high and unround after "soft" (palatalized or palatal) consonants (so-called *ikan'e*) and as nonhigh and unround /a/ elsewhere (so-called *akan'e*).

(6) k'ij            l'úd'i            l'és            n'ós            m'ása

k'ij-á	l'ud'éj	l'isá	n'islá	m'isnój
'cue'	'people'	'forest'	'carried'	'meat'
míj	zúp	stól	ribák	
míjám	zubám	stalá	ribaká	
'mouse'	'tooth'	'table'	'fisherman'	

Reduction is regular in roots and stems where it can lead to neutralization of distinct lexical items; but reduction may be curtailed in inflectional endings. One of the most interesting cases involves the realization of the 3 pl. ending of second conjugation verbs according to the Old Moscow norm of pronunciation. In this variety (described in Jakobson 1948) the normal, etymologically expected inflection *-at* is replaced by *-ut* when it is unstressed instead of by *-it* in accordance with the normal *ikan'e* reduction process. The sample paradigm in (7) (based on Avanesov 1964) illustrates the phenomenon. Verbs such as *govorít'* 'to speak' have stress on the inflection in the present tense and hence take *-át* in the 3 pl. But for verbs such as *kurít'* 'to smoke', where stress remains primarily on the root when the verb is inflected, the expected 3 pl. form *kúr'-it* < /kúr'-at/ is replaced by *kúr'-ut*. Other examples: *ďíj'-ut* 'breathe', *útj'-ut* 'teach', *v'íd'-ut* 'see', *lón'-ut* 'catch'.

(7)    singular        plural            singular        plural

1st	gəvar'-ú	gəvar'-ím	kur'-ú	kúr'-im
2nd	gəvar'-íʃ	gəvar'-ít'ə	kúr'-iʃ	kúr'-it'ə
3rd	gəvar'-ít	gəvar'-át	kúr'-it	*kúr'-it < /kúr'-at/
	'speak'		'smoke'	kúr'-ut

Why is just the 3 pl. ending changed and why is it changed only when it is unstressed? An answer is suggested by looking at the rest of the paradigm of which it is a member. One of the hallmarks of the second conjugation in Russian is that the final consonant of the stem is palatalized or palatal throughout the inflection and hence will be the site of *ikan'e* reduction when the inflectional ending is unstressed. Also, the 3 sg. ending is *-it*: *kúr'-it* 'smokes', *díʃ-it* 'breathes', *útʃ-it* 'teaches', *v'íd-it* 'sees', *lónv-it* 'catches'. It is now easy to see that vowel reduction (*ikan'e*), if given full sway, would realize unstressed /-at/ with a high unround vowel since it follows a palatalized or palatal consonant. The consequence would be a merger of the distinction between the singular and plural forms of the third person for any verb and thus a violation of Paradigm Contrast (see Rebrus and Törkenczy (this volume) for a useful definition) . The [u] that we find instead could be computed by the phonology substituting the only other unstressed vowel that is permitted after a soft consonant (violating faithfulness for [round]). Alternatively, the *-ut* might be recruited from the first conjugation where the regular 3 pl. ending is in fact *-ut* (this is essentially the analysis of Jakobson

1948). Under either analysis the substitution of *-ut* for *-at* must take account of the stress properties of the stem and hence must be part of the input-output computation. Russian stress is a dominant-recessive system with one stress per word (see Halle 1997 for recent discussion). Both stems and suffixes must be marked for one of three categories: stressed, post-stressed, unstressed. Depending on the particular combination of morphemes composing a word, all but one stress is deleted; if the input contains no stress then one is inserted (usually on the initial syllable). Unless one is willing to build the stress calculation into the *-at*  $\approx$  *-ut* allomorphy, the grammar must wait until the proper stress location for the verb has been determined and then resolve the choice between the allomorphs. The tableau in (8) sketches the intended analysis. The Stress constraint abbreviates a battery of constraints that delete and insert stresses to achieve a single stress per word (see Alderete 1999 for a recent OT analysis).

(8)	/kur'-at/	<u>Stress</u>	<u>Ikan'e</u>	<u>PC</u>	<u>Faith [round]</u>
	kúr'at		*!		
	kur'át	*!			
->	kúr'ut				*
	kúr'it			*!	
_____					
	cf. kúr'it 'he smokes'				

## 2.2 Bulgarian Vowel Reduction.

Like Russian, Bulgarian has a mobile stress which shuttles between the stem and the desinence in a lexically determined class of stems. Bulgarian also has vowel reduction. Crosswhite (1997) calls attention to Stojkov's (1963) discussion of the Trigrad dialect that is particularly relevant here. In this dialect unstressed /o/ reduces to [a]: *dóžd*, *daždóm* 'rain'. The reduction is largely automatic in stems but is inhibited to various degrees in inflectional endings. One of the more striking instances of the phenomenon involves neuter nouns. According to Stojkov (1963:16-17) "In the case of neuter nouns, it has to be noted that reduction to "a" is found only when there is no homophony in the forms for singular and plural...when there is homophony the reduction to "a" is not found".<sup>3</sup> Stojkov illustrates with the examples in (9). In (9a) the neuter singular suffix /-o/ is reduced to [a] while reduction is blocked in (9b).

(9)	a.	<u>sg. /-o/</u>	<u>pl. /-a/</u>	
		kapít-a	kapit-á	'hoe'
		kláb-a	klab-á	'ball of thread'
		pér-a	per-á	'feather'
		rébr-a	rebr-á	'rib'

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<sup>3</sup> Thanks to Roumyana Izvorski and Olga Vaysman for help with the translation.

b.	zörn-o	zörn-a	'grain, seed'
	pétal-o	pétal-a	'horseshoe'
	blág-o	blág-a	'blessing'
	cigaríl-o	cigaríl-a	'cigarette'

The difference systematically correlates with the mobility of stress. Nouns that reduce the *-o* also shift the stress to the ending in the plural (9a); nouns that block reduction maintain fixed stress on the stem in both the singular and the plural (9b). The generalization is thus that reduction of *-o* is blocked by Paradigm Contrast (PC) if it would lead to phonological merger of the singular and the plural forms. Reduction (penalizing unstressed [o]) is possible in (9a) because the singular and plural are distinguished by the shift of stress.

(10)	/zörn-o/	<u>PC</u>	<u>Reduction</u>
->	zörn-o		*
	zörn-a	*!	
	_____		
	cf. zörn-a (pl.)		

	/kapít-o/	<u>PC</u>	<u>Reduction</u>
	kapít-o		*!
->	kapít-a		
	_____		



cf. kapit-á (pl.)

### 2.3 *Chi-Mwi:ni Perfect.*

Our next example of paradigmatic contrast comes from Kisseberth and Abasheikh's (1974) discussion of the phenomenon in the Bantu language Chi-Mwi:ni. It concerns the perfect and applied forms of the verb. The perfect is marked by a suffix /-i:l/ while the applied (benefactive) is marked by /-i:l/. The vowel of the perfect suffix originates historically from a super-high *i* that triggered various changes in the stem before merging with the simple high vowel of the applied. We follow Kisseberth and Abasheikh in assuming that the processes have been morphologized. The high vowels of these suffixes lower to mid when the root contains a mid vowel by a process found in many other Bantu languages. The flapped lateral of the applied suffix (transcribed here as *ɺ*) changes to plain before the perfect suffix whose lateral in turn harmonizes with that of the preceding applied suffix: /stem-iɺ -i:l -e/ -> /stem-il-i:l -e/ -> /stem-il-i:l-e/.

(11)		<u>infinitive</u>	<u>perfect</u>	
	base	x-so:m-a	som-e:l-e	'read'
	appl.	x-som-eɺ -a	som-eɺ-e:l-e	
	base	x-kom-a	kom-e:l-e	'arrive'

appl.	x-kom-el -a	kom-el-e:l-e	
base	x-ko:d-a	kod-e:l -e	'talk'
appl.	x-ko:d-el -a	kod-el-e:l-e	

We invoke two adhoc constraints for these morphophonemic changes: \* i:l / \_\_\_ perf bars the flapped lateral before the perfect suffix while Lateral Harmony requires successive laterals to agree in apicality. If these constraints dominate faithfulness for [distributed] then the appropriate changes can be implemented.

(12)	<u>/-i:l -i:l/</u>	<u>* i:l/ perf</u>	<u>Lateral Harmony</u>	<u>Faith-[distr]</u>
	ɫ ɫ	*		
	l ɫ		*	*
	ɫ l	*	*	*
->	l l			**

With this background, we can now turn to the matters of interest. Several morphophonemic changes are relevant to the discussion. First, the perfect suffix *-i:l* regularly “mutates” the final consonant of the stem with concomitant shortening of the suffixal vowel: labials and velars are replaced with palatals and coronal stops spirantize.

(13)	<u>infintive</u>	<u>perfect</u>
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base	x-su:k-a	su:sh-ił-e	'plait'
appl.	x-su:k-ił-a	suk-il-i:l-e	
base	x-kokot-a	kokos-eł-e	'drag on ground'
appl.	x-kokot-eł-a	kokot-el-e:l-e	
base	x-pa:nd-a	pa:nz-ił-e	'climb'
appl.	x-pa:nd-ił-a	pand-il-i:l-e	

Thus in the perfect form *kokos-eł-e* from /kokot-i:ł-e/ the /t/ has mutated to /s/ and the vowel of the perfect suffix /-i:ł/ is shortened and lowered to mid and thus appears as /-eł/. The perfect form is still distinct from the applied because the latter does not mutate the final consonant of the stem; also the final vowels are distinct. In the applied perfect /kokot-ił-i:l-e/ -> *kokot-el-e:l-e* the vowel length of the perfect suffix is retained since it does not immediately follow a mutation site. Both suffixes lower their vowels as a function of the mid vowel of the root. Finally, the lateral of the applied suffix switches to plain /l/ before the perfect suffix whose lateral in turn harmonizes with the preceding base.<sup>4</sup>

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<sup>4</sup> Chi-Mwi:ni also shortens long vowels that fall outside of a three-syllable window computed at the right edge of the phrase by the Latin Stress Rule (Selkirk 1986). This accounts for the shortening of the root vowels of /so:m-/ , /ko:d-/ , /su:k-/ , and /pa:nd-/.

The language has another morphophonemic process Kisseberth and Abasheikh term “Ablaut” which avoids three successive laterals by deleting the middle one and contracting the resultant vowel sequence. The process is restricted to certain morphological contexts and reflects the imbrication phenomenon discussed by Bastin (1983) and Hyman (1994). The perfect verbs in (14) illustrate.

(14)	<u>infinitive</u>	<u>perfect</u>	
	x-puɫ-a	puɫ -i:l-e	'shell corn'
		< /puɫ-i:l-e/	
	ku-la:l-a	le:l-e	'sleep'
		< /la:l-i:l-e/	

We can now turn to the items of interest. Stems ending in the flapped lateral /ɫ/ mutate to /z/ in perfect; they also avoid three successive liquids in the applied perfect, as expected (15)<sup>5</sup>.

(15)	<u>infinitive</u>	<u>perfect</u>
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<sup>5</sup> Kisseberth and Abasheikh posit a rule that turns the flapped lateral to plain before the applied suffix; the lateral of the suffix then harmonizes with the lateral of the stem.

base	ku-mo:l-a	mo:z-eł-e	'shave'
appl.	ku-mo:l-el-a	mol-e:l-e	< /mol-eł-e:l-e/
base	x-pe:l-a	pe:z-eł-e	'sweep'
appl.	x-pe:l-el-a	pel-e:l-e	< /peł-eł-e:l-e/

Thus, /mo:l-i:l-e/ surfaces as *mo:z-eł-e* by mutation and shortening of the perfect suffix's vowel; the suffixal vowel also agrees in height with the root vowel. But stems ending in plain /l/ do not mutate in perfect (16). We have *sul-i:l-e* not *suz-il-e*.

(16)	<u>infinitive</u>	<u>perfect</u>	
base	x-su:l-a	sul-i:l-e	'want'
appl.	x-su:l-il-a	sul-il-i:l-e	
		*sul-i:l-e	
base	x-kal-a	kal-i:l-e	'press'
appl.	x-kal-il-a	kal-il-i:l-e	
		*kal-i:l-e	
base	x-komel-a	komel-e:l-e	'look'
appl.	x-komel-el-a	komel-el-e:l-e	
		*komel-e:l-e	

The descriptive generalization of interest is that in the perfect of the applied form verbs ending in plain /-l/ systematically fail to "ablaut" and instead surface with three laterals in a row. Thus, we have *sul-il-i:l-e* 'want' instead of *\*sul-i:l-e*. Why is the otherwise regular process of liquid deletion (ablaut) suspended here? The answer, as Kisseberth and Abasheikh observe, is that if these verbs did ablaut the resultant form would be the same as the basic perfect. This is evident from examination of the paradigms in (16).

The generalization is thus that mutation of the flapped /ʎ/ to *z* in the verbs of (15) such as *mo:z-el-e* renders the simple perfect form sufficiently distinct so that lateral deletion (ablaut) can apply in the applied perfect to produce a form that would be identical to the corresponding simple perfect if the latter had not undergone mutation. If the constraint against paradigm merger (PC) outranks lateral deletion (Ablaut) then the correct output is derived.

(17)	/sul-ił-i:l-e/	<u>PC</u>	<u>Ablaut</u>
->	sulili:le		*
	suli:le	*!	
	_____		
	cf. suli:le (perfect)		
	/mol-ił-i:l-e/	<u>PC</u>	<u>Ablaut</u>
	molele:le		*!

-> mole:le

---

cf. mo:zele (perfect)

The validity of this analysis is confirmed by stems (many of them Arabic loans) that end in the flapped lateral /ɺ/ but exceptionally fail to mutate in the perfect (18). Consider the following paradigms.

(18)	<u>infinitive</u>	<u>perfect</u>	
base	x-sajiɺ-a	sajiɺ-i:le	'record'
appl.	x-sajiɺ-il-a	sajiɺ-il-i:l-e	
		*sajiɺ-i:l-e	
base	x-qa:Tiɺ-a	qaTiɺ-i:l-e	'kill'
appl.	x-qaTiɺ-il-a	qaTiɺ-il-i:l-e	
		*qaTiɺ-i:l-e	

They also fail to ablaut in the applied perfect since if they did the result would be identical to the basic perfect. Thus, while the regular verbs in (15) such as *ku-mo:l-a* mutate in the perfect (*mo:z-eɺ-e*) and ablaut in the applied perfect (*mol-e:l-e* < /mol-eɺ-e:ɺ-e/), the irregular verbs of (18) such as *x-sajiɺ-a* are exceptions to

mutation (cf. perfect *sajil-i:l-e*); the latter fact explains the corresponding absence of ablaut in the applied perfect form *sajil-il-i:l-e* (\**sajil-i:l-e*).

In sum, a regular morphophonemic process (avoid three successive laterals in the applied perfect) is blocked just in case the output would be identical to the output of the corresponding simple perfect. Like the Russian and Bulgarian cases in which the suspension of vowel reduction depends on the stress properties of the root, the decision whether or not to suspend ablaut in Chi-Mwi:ni depends on the application of another process (“mutation”). It would be difficult to maintain that the phenomenon is merely the residue of some earlier historical change and not part of the active synchronic phonology.

#### *2.4 The Arabic Perfect*

As observed by Mitchell (1993), the 3 sg. feminine of the perfect inflection of the verb in many modern Arabic dialects is the site of several phonological quirks.

The various allomorphic substitutions, stress shifts, and gemination can be understood as maneuvers the language makes to block the syncope of the suffixal vowel which otherwise would merge this form of the paradigm with the 1 sg. and 2 sg. masculine. (See Heath 1987:289, 293 for similar observations for the Moroccan dialect). In what follows we review the evidence cited by Mitchell as well as data from some other dialects.



Consider first paradigms in (19) for canonical *CaCCaC* and *CeCeC* stems /*ʕallam*/ ‘teach’ and /*semeʕ*/ ‘hear’ in the Damascus dialect.<sup>6</sup>

(19)	1 sg.	ʕallám-t	sméʕ-t
	2 sg. m.	ʕallám-t	sméʕ-t
	2 sg. f.	ʕallám-ti	sméʕ-ti
	3 sg. m.	ʕállam	sémeʕ
	3 sg. f.	ʕállam-et	sémʕ-et
	1 pl.	ʕallám-na	sméʕ-na
	2 pl.	ʕallám-tu	sméʕ-tu
	3 pl.	ʕállam-u	sémʕ-u

These paradigms exemplify two of the major processes that are the linchpin for the phonological structure of most colloquial Arabic dialects: stress and syncope. First, stress is assigned within a three-syllable window at the right edge of the word (essentially following the Latin Stress Rule): stress appears on the rightmost heavy syllable (long vowel or closed with final CVC counting as light) and otherwise on the (ante)penult. Second, schwa (transcribed here as /e/) is deleted from an unstressed open syllable. Thus when the suffix begins with a consonant, stress is drawn to the closed penult and the initial schwa of the *CeCeC* stem syncopates. For example, /*semeʕ-na*/ appears as *sméʕ-na*. But when the suffix starts with a vowel, stress appears on the first syllable and the second stem vowel is elided instead: /*semeʕ-u*/ → *sémʕ-u*. Both schwas surface in the 3 sg. masc.

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<sup>6</sup> Thanks to Jean-Michel Tarrier for confirming these data.

/sɛmɛ9/ → *séme9*: the first because it is stressed and the second because the syllable is closed.

The constraints in (20) will be active in the analysis.

- (20) a. Foot-Form: metrical feet are bimoraic trochees (Hayes 1985)  
 b. Non-Finality: penalize a foot aligned with the right edge of the Prosodic Word (Prince and Smolensky 1993)  
 c. Lapse: penalize a sequence of two unparsed syllables (Selkirk 1984)  
 d. \*e. : penalize an unstressed syllable-final schwa

The Lapse constraint is demoted below Non-Finality. This retracts the bimoraic foot from the right edge of the word.

(21)	/9allam-u/	<u>Ft-F</u>	*e.	<u>Non-Fin</u>	<u>Lapse</u>
->	(9ál)lamu				*
	(9áll)amu	*!			
	9al(lámu)			*!	
	/sɛmɛ9-u/	<u>Ft-F</u>	*e.	<u>Non-Fin</u>	<u>Lapse</u>
	(séme)9u		*!		
->	(sém)9u				
	se(mé9u)		*!	*	
	s(mé9u)			*!	

	/seme9-na/	<u>Ft-F</u>	*e.	<u>Non-Fin</u>	<u>Lapse</u>
	se(mé9)na		*!		
->	s(mé9)na				

The paradigms in (22) show the 3 sg. bases *9állam* ‘he taught’ and *9állam-et* ‘she taught’ and the 1 sg. *9allám-t* ‘I taught’ amplified with the suffixes marking object inflection.

(22)	<u>object</u>	<u>9állam</u>	<u>9állam-et</u>	<u>9allám-t</u>
	1 sg.	9allám#ni	9allam-ét#ni	9allám-t#ni
	2 sg. m.	9állam#ak	9allam-ét#ak	9allám-t#ak
	2 sg. f.	9állam#ek	9allam-ét#ek	9allám-t#ek
	3 sg. m.	9állam#o	9allam-ét#o	9allám-t#o
	3 sg. f.	9allám#(h)a	9allam-ét#(h)a	9allám-t#(h)a
	1 pl.	9allám#na	9allam-ét#na	9allám-t#na
	2 pl.	9allám#kom	9allam-ét#kom	9allám-t#kom
	3 pl.	9allám#(h)om	9allam-ét#(h)om	9allám-t#(h)om
		‘he taught pro’	‘she taught pro’	‘I taught pro’

The object suffixes are incorporated into the three-syllable stress window and hence shift the accent on the base in accord with the stress rule. What is of interest here is the 3 sg. fem. base /9allam-et/ ‘she taught’. When the object suffix starts with a consonant it closes the final syllable of the base to create a heavy syllable that attracts the stress (e.g. *9allam-ét#ni* ‘she taught me’). What is anomalous is the shift of stress when the suffix begins with a vowel (e.g. *9allam-ét#o* ‘she

taught him'). A HLLL sequence (H = heavy, L = light) should produce antepenultimate stress with syncope of the suffixal vowel: /9allam-et#o/ -> /9allám-et#o/ -> \*9allám-t#o. But such an input-output mapping would merge this form of the paradigm with the 1 sg./2 sg. masc. /9allam-t#o/ -> 9allám-t#o. Hence, the otherwise unmotivated stress shift. If the constraint of Paradigm Contrast is ranked above Non-Finality, then syncope of the suffixal vowel is blocked and the suffixed 3 sg. fem. form remains distinct from the 1 sg. form at the cost of an otherwise anomalous violation of antepenultimate stress.

(23)	/9allam-et#o/		PC	*e.	Non-Fin
	9al(lámet)o			*!	
	9al(lám)to		*!		
->	9alla(méto)				*
	cf. 9allámto 'I taught him'				

How strong is the evidence that paradigmatic contrast is the best explanation for the anomalous stress of *9allam-ét#o*? Let us consider some alternatives. The first relevant observation is that stress always precedes the object suffix when *9állam-et* is the base. This might lead one to suspect a boundary accent along the lines of Latin *lí:mina* 'thresholds' but *li:miná-que* 'and the thresholds', as in the analysis of Mester (1994). But then we expect uniform stress on the /9allam/ base. However, this is not found, as shown by the first paradigm in (22). (cf. the Banias dialect where this development has apparently

occurred (Ali-Adra 1999)). We might preserve the idea of columnar stress but restrict it to subject suffixes. In fact, the other, vowel-final suffixes lengthen their vowels before any object suffix and so they attract stress via the regular rules: /*ʔallam-na#ha/* -> *ʔallam-náa#ha* ‘we taught her’. But other data indicate that this is not the right analysis for the data in (22).

First, Measure-I verbs of the shape *CaCaC* and Hollow verbs of the shape *CaaC* have the expected phonology with stress retained on the verb stem and syncope of the suffixal vowel before a vowel-initial object inflection. They thus behave differently from *CaCCaC* stems. To show this we first consult the paradigms of the simple perfect bases in (24).

(24)	1 sg.	Daráb-t	ʃúf-t
	2 sg. m.	Daráb-t	ʃúf-t
	2 sg. f.	Daráb-ti	ʃúf-ti
	3 sg. m.	Dárab	ʃáaf
	3 sg. f.	Dárb-et	ʃáaf-et
	1 pl.	Daráb-na	ʃúf-na
	2 pl.	Daráb-tu	ʃúf-tu
	3 pl.	Dárab-u	ʃáaf-u
		‘hit’	‘see’

The Damascus dialect in general preserves underlying /a/ in an unstressed open syllable (the defining trait of a so-called “differential” dialect (Cantineau 1939)).

The one context where *a* drops out by a special rule is in the 3 sg. fem: cf. *Dárb-et* (< /Darab-et/) ‘she hit’ vs. *Dárab-u* ‘they hit’. In Hollow verbs such as *ʃáaf* ‘see’,

the root vowel changes to high in the first and second persons. The upshot is that the 3 sg. fem. and 1 sg. forms are distinct in Measure-1 and Hollow verbs: *Dárb-et* vs. *Daráb-t* and *ǰáaf-et* vs. *ǰúf-t*. When we turn to the behavior of *Dárb-et* and *ǰáaf-et* under object inflection (25), we find that the regular phonology returns. (The raised schwa in *Dár<sup>e</sup>b-t#ak* is an epenthetic vowel inserted to break up clusters of three successive consonants.)

(25)	<u>object</u>	<u>Dárb-et</u>	<u>ǰáaf-et</u>
	1 sg.	Darb-ét#ni	ǰaaf-ét#ni
	2 sg. m.	Dár <sup>e</sup> b-t#ak	ǰáaf-t#ak
	2 sg. f.	Dár <sup>e</sup> b-t#ek	ǰáaf-t#ek
	3 sg. m.	Dár <sup>e</sup> b-t#o	ǰáaf-t#o
	3 sg. f.	Darb-ét#(h)a	ǰaaf-ét#(h)a
	1 pl.	Darb-ét#na	ǰaaf-ét#na
	2 pl.	Darb-ét#kon	ǰaaf-ét#kon
	3 pl.	Darb-ét#(h)on	ǰaaf-ét#(h)on

As expected, stress shifts to the *-et* suffix before a consonant-initial object inflection that closes the stem-final syllable. But stress remains on the verbal root before vowel-initial inflections accompanied by syncope of the suffixal vowel: /Darab-et#o/ -> *Dár<sup>e</sup>b-t#o* and /ǰaaf-et#o/ -> *ǰáaf-t#o*. This regular phonology stands in sharp contrast to the quirky stress of *ǰallam-ét#o*. Such contrasting behavior is explained by paradigm structure. Regular antepenultimate stress and

syncope will merge the 3 sg. fem. and 1/2 sg. masc. forms of *CaCCaC* verbs such as *9allam* before a vowel-initial object suffix. Quirky stress blocks this merger.

Quirky stress does not arise in the Measure 1 *CaCaC* and the *CaaC* Hollow verbs because the normal phonology does not lead to paradigm merger with these bases.

(26)	/Darab-et#o/	<u>PC</u>	*e.	<u>Non-Fin</u>
	(Dár)betó		*!	
->	(Dár <sup>e</sup> b)to			
	Dar(béto)			*

cf. Darábto 'I hit him'

	/Jaaf-et#o/	<u>PC</u>	*e.	<u>Non-Fin</u>
	(Jáa)feto		*!	
->	(Jáaf)to			
	Jaa(féto)			*!

cf. Jáfúto 'I saw him'

Another relevant point, also observed by Mitchell (1993), concerns the behavior of feminine nominals, including participles. Participles inflect for gender and number but not for person agreement with the subject: *Dáareb* 'hitting' m.sg.,

*Dáarb-a* ‘hitting’ f.sg., and *Daarb-ín* pl. The paradigms in (27) show the participles combined with object suffixes.

(27)	<u>object</u>	<u>Dáareb</u>	<u>Dáarb-a</u>	<u>Daarb-ín</u>
	1 sg.	Daaré <b>b</b> #ni	Daarb-é <b>t</b> #ni	Daarb-í <b>n</b> #ni
	2 sg. m.	Dáarb#ak	Dáar <sup>e</sup> b-t#ak	Daarb-í <b>n</b> #ak
	2 sg. f.	Dáarb#ek	Dáar <sup>e</sup> b-t#ek	Daarb-í <b>n</b> #ek
	3 sg. m.	Dáarb#o	Dáar <sup>e</sup> b-t#o	Daarb-í <b>n</b> #o
	3 sg. f.	Daaré <b>b</b> ##(h)a	Daarb-é <b>t</b> ##(h)a	Daarb-í <b>n</b> ##(h)a
	1 pl.	Daaré <b>b</b> #na	Daarb-é <b>t</b> #na	Daarb-í <b>n</b> #na
	2 pl.	Daaré <b>b</b> #kon	Daarb-é <b>t</b> ##kon	Daarb-í <b>n</b> #kon
	3 pl.	Daaré <b>b</b> ##(h)on	Daarb-é <b>t</b> ##(h)on	Daarb-í <b>n</b> ##(h)on

The singular feminine suffix /-a/ takes the allomorph /-et/ when followed by a pronominal suffix or a governed NP—the so-called *iDafa* or Construct State construction: *Dáarb-a* ‘her hitting’ but *Daarb-ét#ni* ‘her hitting me’, *Dáarb-it Fariid* ‘her hitting Fariid’. This construct suffix is equivalent in underlying shape to the 3 sg. feminine suffix of the perfect: /-et/. Both share the formal features [+fem, -pl]. But the phonological behavior of the construct suffix is quite different—it is essentially regular. Before consonant-initial object suffixes the construct state suffix is stressed while before the vowel-initial ones it syncopates—regardless of the shape of the preceding stem: cf. /Daareb-et#o/ ->



*Dáar<sup>e</sup>b-t#o* ‘her hitting him’ vs. /*9allam-et#o*/ -> *9allam-ét#o* ‘she taught him’.<sup>7</sup>

Why this difference in the behavior of the same suffix in essentially the same phonological context? The notion of paradigmatic contrast provides an attractive explanation. There is no other member of the participial paradigm competing for the same phonetic output. Hence the regular phonology can have its way.

Dialect variation provides a couple of further arguments in favor of this explanation. First, the 3 sg. feminine augmented with vowel-initial object suffixes is the site of various consonant geminations and vowel substitutions across the Arabic dialects. We mention a couple of cases here. In the Damouri dialect of Lebanon (Haddad 1983) the /t/ of the feminine perfect suffix is geminated before a vowel: *sakar-ít#ni* ‘she intoxicated me’ vs. *sakar-ítt#ak* ‘she intoxicated you m. sg.’ And in the Syrian coastal dialect of Baniyas (Ali-Adra 1999) the vowel is lengthened: /*ba9at-it#ni*/ -> *ba9t-ít#ni* ‘she sent me’ but /*ba9at-it#ik*/ -> *ba9t-íit#ik* ‘she sent you fem.’ In neither Damouri nor Baniyas are these lengthening processes extended to the feminine construct suffix in nominals.<sup>8</sup> More generally, they are different ways of achieving the same end—paradigmatic contrast.

Another point worth making is that the 3 sg. fem. allomorphy looks to its right. Sensitivity to a vocalic versus consonantal distinction in the immediate context is perhaps the most common factor distributing allomorphs (cf. English *a*

<sup>7</sup> See McCarthy (1980) for complications cited in Cowell (1964).

<sup>8</sup> In Baniyas it appears that lengthening of /-it/ to /-iit/ before vowel-initial suffixes has been generalized to all verbs regardless of the shape of the preceding stem—presumably an effect of paradigmatic uniformity.

$\approx an$ , French  $le \approx l'$ , Korean  $-i \approx -ka$ ). But the rule typically looks inward towards the stem (Carstairs 1987) so that prefixal allomorphy is determined by the right-hand context and suffixal allomorphy by the left-hand context. The Arabic case is different. The shape of the 3 sg. fem. suffix depends on the following context (as does the  $-a$  vs.  $-et$  of the feminine nominal suffix). Hence, it is not a typical case of affixal allomorphy that falls under Carstairs's Generalization. Rather, it is controlled by Paradigmatic Contrast.

Finally, Mitchell (1993) observes that the phonologically unmotivated stress shift found in the 3 sg. feminine perfect is conspicuously absent from the Palestinian dialects where the suffix retains the low-vowel of Classical Arabic: *fahhám-at#ak* 'she explained to you', *HalHál-at#uh* 'she loosened it'. Since there is no general syncope of /a/ in Palestinian, there is no threat of paradigmatic merger and hence no reason for quirky stress or gemination.

### *2.5 North African Arabic Dialects*

In this section we present the results of an informal survey of several modern colloquial Arabic dialects of North Africa to see to what extent they reflect and/or preserve the quirky phonology motivated by the preservation of paradigm contrast

as discussed in 2.4.<sup>9</sup> All the dialects studied here enforce a ban against short high vowels or schwa in unstressed open syllables (chiefly by syncope). They also all encode the 3 sg. feminine perfect suffix with a syncopatable vowel (schwa or /i/). The major result of the survey is that every dialect manifests traces of the quirky phonology seen in the Damascus dialect. The dialects fall into three main types. The first--represented by Oujda Morocco--shows the Damascene pattern with quirky phonology blocking syncope in Measure 1 and Measure 2 verbs while regular phonology asserts itself in Hollow verbs. The other two dialect types generalize the quirky phonology in different ways.

### 2.5.1 *Oujda*

The perception of stress in Moroccan Arabic is quite subtle and largely remains a question for future research. Fortunately, the location of accent does not bear on the general points we wish to make and so we do not attempt to transcribe it here. In our transcriptions schwa is indicated by *e*; we abstract away from the coloring induced by neighboring consonants. In (28) we see the perfect tense paradigm for the reflex of a Measure 1 verb. An exceptionless ban on open-syllable schwa

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<sup>9</sup> The survey was conducted in the spring of 2001 while the author was a Visiting Scholar at the Institut de Linguistique et Phonétique Générales et Appliquées in Paris. I wish to thank Fatiha Abdulaziz, Nassira Betar, Samira Boumelassa, Mohamed Elmedlaoui, Abdi Fassi-Fehri, Lilia Ould-Younes, Karim Shoul, Abderrazzak Tourabi, Mohamed Yeou, and Chakir Zeroual,

accounts for the realization of *CeCeC* as *CCeC*. This constraint is also responsible for the syllable reshuffling found in the stem when the following suffix starts with a vowel.

(28)	1 sg.	rfed-t	‘carry’
	2 sg. m.	rfed-t	
	2sg. f.	rfed-ti	
	3sg. m.	rfed	
	3 sg. f.	refd-et	
	1 pl.	rfed-na	
	2 pl.	rfed-tu	
	3 pl.	refd-u	

The paradigms in (29) show the 3 sg. masculine, 3 sg. feminine and 1 sg. bases amplified by the object suffixes.

(29)	<u>base</u>	<u>rfed</u>	<u>refd-et</u>	<u>rfed-t</u>
	1 sg.	rfed#ni	refd-et#ni	rfed-t#ni
	2 sg.	refd#ek	refd-at#ek	rfed-t#ek
	3 sg.m.	refd#u	refd-at#u	rfed-t#u
	3 sg.f.	rfed#ha	refd-et#ha	rfed-t#ha
	1 pl.	rfed#na	refd-et#na	rfed-t#na
	2 pl.	rfed#kum	refd-et#kum	rfed-t#kum
	3 pl.	rfed#hum	refd-et#hum	rfed-t#hum

'he carried pro' 'she carried pro' 'I carried pro'

The first relevant observation is that the *CCeC* stem appears as *CeCC* before the vowel-initial object suffixes *#ek* and *#u*. The object suffixes thus syncopate the base just as the subject suffixes do. Second, the 3 sg. feminine suffix *-et* is changed to *-at* when the following object suffix begins with a vowel: *refd-at#ek* 'she carried you', *refd-at#u* 'she carried him'. We can understand this allomorphy as a maneuver the grammar makes to block the reshuffling of the stem's syllable structure that would otherwise obtain in order to adhere to the ban against open syllable schwa. Such an output would be identical to the 1 sg. In other words, the normal phonology should transform /*refed-et#u*/ into *rfed-t#u*. But this shape is identical to the 1 sg. form *rfed-t#u* 'I carried him'. Replacing *-et* by *-at* blocks syncope and keeps the 3 sg. fem. and the 1 sg. forms phonologically distinct.

The same analysis carries over to the Measure 2 paradigm represented by *beddel* 'change' in (30). Once again *-et* becomes *-at* before a vowel: *beddl-at#u* 'she changed him'. If this change did not occur then /*beddel-et#u*/ would be realized as *beddel-t#u* and merge with the 1 sg.

(30)	<u>base</u>	<u>beddel</u>	<u>beddl-et</u>	<u>beddel-t</u>
	3 sg. m.	beddl#u	beddl-at#u	beddel-t#u
	3 sg. f.	beddel#ha	beddl-et#ha	beddel-t#ha
		'he changed pro'	'she changed pro'	'I changed pro'

Crucially, in Hollow verbs such as /ʃaf/ ‘see’ (31) the root vowel ablauts to schwa in the first and second person forms. Consequently, the verb stem takes a different shape from that of the third person. When a vowel-initial object clitic is appended to /ʃaf-et/ ‘she saw’, the schwa of the suffix *-et* syncopates: /ʃaf-t#u/ ‘she saw him’. No allomorphic change in the suffix is needed to keep /ʃaf-t#u/ ‘she saw him’ distinct from /ʃef-t#u/ ‘I saw him’.

(31)	<u>base</u>	<u>ʃaf</u>	<u>ʃaf-et</u>	<u>ʃef-t</u>
	3 sg. m.	ʃaf#u	ʃaf-t#u	ʃef-t#u
	3 sg. f.	ʃaf#ha	ʃaf-et#ha	ʃef-t#ha
		‘he saw pro’	‘she saw pro’	‘I saw pro’

The tableaux in (32) summarize the proposed analysis. The constraint of Paradigm Contrast rises above faithfulness in vowel height (Ident-[low]) allowing an otherwise unmotivated lowering of the schwa in the suffix.

(32)	/refed-et#u/	<u>*e.</u>	<u>PC</u>	<u>Ident-[low]</u>
	rfedetu	*!*		
	refdetu	*!		
	rfedtu		*!	
->	rfedatu			*
	_____			

cf. rfedtu 'I carried him'

/ʃaf-et#u/	*e.	PC	Ident-[low]
ʃafetu	*!		
-> ʃaftu			
ʃafatu			*!

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cf. ʃef-t#u 'I saw him'

Essentially the same patterns of data are found in the Algiers and Oran dialects of Algeria. In these dialects *-et* is replaced by *-at* before a vowel but this process is blocked in the Hollow verbs.<sup>10</sup>

### 2.5.2 Other Dialects

If paradigmatic contrast is not invoked to explain the quirky phonology seen in the Oujda and Damascus dialects then one is faced with a rather complex pattern

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<sup>10</sup>Two other Moroccan dialects in the survey also block syncope of *-et* except in the Hollow verbs; but they employ different blocking mechanisms. In Fez the strategy is to geminate the consonant (*ʒellem*, *ʒellm#u*; *ʒellm-et*, *ʒellm-ett#u*; *ʃaf-et*, *ʃaf-t#u*) while in Taroudent there is no repair: the schwa simply remains in an open syllable (*ʒellem*, *ʒellm#u*; *ʒellm-et*, *ʒellm-et#u*; *ʃaf-et*, *ʃaf-t#u*).

of allomorphy--one which depends on both the preceding and the following contexts. In effect, the *-et* suffix is modified if a vowel follows but this change is overridden if the preceding root is Hollow. What we find in other North African dialects is a redistribution of the allomorphs for the 3 sg. feminine suffix. The patterns of redistribution can be described in terms of whether reference to the preceding or to the following context is dropped.

First we consider simplification on the left. Here reference to the Hollow verb is dropped with the result that the quirky phonology is generalized to all types of verb stem. But reference to the following context is still required, at least in those dialects where the repair chosen allows a distinction to be made. The Djerba dialect of Tunisia falls into this class (33). Here the repair is the same allomorphic replacement of *-et* by *-at* found in Oujda. But it is extended to the Hollow verbs: *ʃaf-at#u* ‘she saw him’. However, it still only applies before the vowel-initial suffixes: *ʃaf-et#ha* ‘she saw her’.

(33)	1 sg.	ðreb-t ‘hit’
	2. sg. f.	ðreb-ti
	3 sg. m.	ðreb
	3 sg. f.	ðerb-et
	1 pl.	ðreb-na
	2 pl.	ðreb-tu
	3 pl.	ðerb-u



<u>base</u>	<u>ðreb</u>	<u>ðerb-et</u>
3 sg. m.	ðerb#u	ðerb-at#u
3 sg. f.	ðreb#ha	ðerb-et#ha
	‘he hit pro’	‘she hit pro’

3 sg. m.	9ellem ‘teach’
3 sg. f.	9ellm-et
1 sg.	9ellem-t

<u>base</u>	<u>9ellem</u>	<u>9ellm-et</u>
3 sg. m.	9ellm#u	9ellm-at#u
3 sg. f.	9ellem#ha	9ellm-et#ha
	‘he taught pro’	‘she taught pro’

3 sg. m.	ʃaf ‘see’
3 sg. f.	ʃaf-et
1 sg.	ʃef-t

<u>base</u>	<u>ʃaf</u>	<u>ʃaf-et</u>
3 sg. m.	ʃaf#u	ʃaf-at#u
3 sg. f.	ʃaf#ha	ʃaf-et#ha

‘he saw pro’ ‘she saw pro’

The second and probably better known exemplar of this general pattern is Cairene Arabic. In this dialect the repair is to shift the stress, as in Damascus. In Cairene Arabic unstressed high vowels are barred from a VC\_\_CV context via syncope. Thus a Measure 1 verb such as *fihim* ‘understand’ loses its medial vowel before a vowel-initial suffix.

(34)	1 sg.	fihím-t ‘understand’
	2 sg. m.	fihím-t
	2 sg. f.	fihím-ti
	3 sg. m.	fíhim
	3 sg. f.	fíhm-it
	1 pl.	fihím-na
	2 pl.	fihím-tu
	3 pl.	fíhm-u

The 3 sg. feminine perfect suffix *-it* is thus expected to syncope its vowel before another vowel. But this change is blocked by shifting the stress to the suffix. In Cairene Arabic this stress shift has been generalized to all verbs and gives rise to the irregular stress pattern noted by Mitchell (1960), Broselow (1976), and Welden (1980), among others. In (35) we cite a few forms from Welden 1980.

- (35) Dárab-it        'she hit'  
 Darab-ít#ik     'she hit you f.'  
 Darab-ít#ha     'she hit her'
- ?ísta?bíl-it     'she received'  
 ?ísta?bil-ít#ak 'she received you m.'  
 ?ísta?bil-ít#ha 'she received her'
- ʃáaf-it           'she saw'  
 ʃaaf-ít#ak       'she saw you m.'  
 ʃaaf-ít#ni       'she saw me'
- ráma             'she threw'  
 ram-ít#u         'she threw it m.'  
 ram-ít#ha        'she threw it f.'

The second type of simplification of the 3 sg. feminine allomorphy process drops reference to the following context. The Casablanca dialect of Morocco exemplifies this pattern (36).

(36)

<u>base</u>	<u>rfed</u>	<u>refd-at</u>	<u>rfed-t</u>
3 sg. m.	refd#u	refd-at#u	rfed-t#u
3 sg. f.	rfed#ha	refd-at#ha	rfed-t#ha
	‘he carried pro’	‘she carried pro’	‘I carried pro’

<u>base</u>	<u>9ellem</u>	<u>9ellm-at</u>	<u>9ellem-t</u>
3 sg. m.	9ellm#u	9ellm-at#u	9ellem-t#u
3 sg. f.	9ellem#ha	9ellm-at#ha	9ellem-t#ha
	‘he taught pro’	‘she taught pro’	‘I taught pro’

<u>base</u>	<u>ʃaf</u>	<u>ʃaf-t</u>	<u>ʃef-t</u>
3 sg. m.	ʃaf#u	ʃaf-t#u	ʃef-t#u
3 sg. f.	ʃaf#ha	ʃaf-t#ha	ʃef-t#ha
	‘he saw pro’	‘she saw pro’	‘I saw pro’

Casablanca continues to draw a distinction between Hollow verbs like *ʃaf* and the rest; but it no longer cares about what follows. The result is that the quirky allomorph *-at* has been extended to the bare form (as well as to consonant-initial object clitics). The Hollow verbs have simplified *-et* to *-t*.

In sum, the simplifications in the Djerba, Cairene, and Casablanca dialects suggest that Paradigmatic Contrast has been lost (or demoted) as the determining factor in the allomorphy in these dialects. In no case is the quirky allomorph extended to the nominal participles, however, indicating that the analogical spread is restricted to the verbal inflectional paradigm.

Perhaps the best-known appeal to homonym avoidance is the example due to Gilliéron discussed in Bloomfield (1933) from certain southern French dialects where the word for ‘cock’ /gal/ mysteriously drops out. Gilliéron noted that this happens precisely in dialects that changed final /l/ to /t/. If the sound change applied to this lexeme, it would merge with /gat/ ‘cat’. To avoid this homophony, the lexical item is dropped from the language.

The examples discussed in this paper are quite different. First, they are susceptible to a purely formal and precise definition. Paradigm Contrast penalizes an input-output mapping that converges on another derivation within the same inflectional paradigm: words sharing the same base and differing in formal (inflectional) features. Second, it is not plausible to attribute the cases reviewed here to factors of language use. The latter might make sense for certain kinds of paradigm gaps. To take another example from Arabic, in the Makan dialect dative clitics consisting of the preposition *-l* plus a pronoun may be attached to the verb, where they shorten a final CVVC syllable: *ʃaaf* ‘he saw’, *ʃaaf#l-u* ‘he saw for him’.<sup>11</sup> Participles may also host these clitics, with the results indicated in (37).

(37) sg. masc.      maktuub                      maktub#l-u

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<sup>11</sup> I thank Rawiah Kabrah for these data. Shortening is not triggered by a direct object clitic even though a phonologically parallel VVCCV cluster is created: *ʃaaf#ni* ‘he saw me’. Evidently, there is rebracketing of verb#l-pro to verb-l#pro to create the CVVC-C# sequence that triggers shortening. See Lahiri 2000 for discussion of comparable rebracketings in Bengali and Germanic.

sg. fem.	maktuub-a	maktuub-at#l-u
pl. masc.	maktuub-iin	maktuub-in#l-u
pl. fem.	maktuub-aat	?
	‘written’	‘written to X’

The feminine /-a/ takes the construct form /-at/ under suffixation. While the dative #l-u attaches easily to the masculine plural *maktuub-iin* with shortening of the vowel to give *maktuub-in#l-u*, speakers resist constructing the corresponding feminine plural form. Why? Closed-syllable shortening would produce a form identical to the singular *maktuub-at#lu*. In this case one might say that a pragmatic maxim (“Be Clear”) explains the speaker’s reluctance to complete the attachment and hence that the phenomenon is a matter of language use rather than language structure. But this kind of explanation is not plausible for the Arabic feminine perfects discussed in this section because the grammar intervenes to calculate a minimally different output that avoids the ambiguity but is otherwise not available.

### 3. Summary and Conclusion

In this paper we have reviewed several examples from the contemporary and traditional literature that argue for systematic phonological relations between members of a paradigm that do not satisfy the containment relation of the cycle.

Specifically, the output form assigned to a given word depends crucially on a related word in the paradigm that cannot plausibly be treated as an intermediate stage in the derivation. Phenomena of this form are expected if Output-Output faithfulness relations are present in the grammar. But they are surprising from a cyclic point of view in which one word is derived essentially in isolation from its kin.

Although the number of examples in our survey is small, let us see what generalizations can be drawn. First, the phonological processes which are avoided can be either morphophonemic (Chi-Mwi:ni) or phonological (Russian, Bulgarian, Arabic). Second, the repair strategies are also varied and include allomorphy (Russian), blocking (Bulgarian, Chi-Mwi:ni), and recourse to auxiliary repair processes (Arabic gemination and stress shift). Third, our corpus supports the traditional notion of inflectional paradigm: words sharing the same stem and differing in the exponence of the formal features of gender, number, person, and tense/aspect. Avoidance of homophony for words sharing the same inflection but different stems appears to be much more sporadic and less systematic when it does occur. In both Russian and Bulgarian vowel reduction in stems is automatic and may lead to homophony: cf. Russian *m'átʃ*, *m'itʃ-í* 'ball' and *m'étʃ*, *m'itʃ-í* 'sword' or *l'és*, *l'is-á* 'forest' and *l'ís*, *l'is-á* 'fox'. For Chi-Mwi:ni, Kisseberth and Abasheikh report that mutation in the perfect may create homophonous forms. The process is apparently blocked for a few lexical items. For example, *x-tu:nd-a* 'pick off' and *x-tu:Ng-a* 'compose' share the mutated perfect *tu:nz-it-e* while *x-pa:mb-a* 'decorate' unexpectedly fails to mutate in the

perfect, evidently because the expected mutated form *pa:nz-il-e* belongs exclusively to *x-pa:nd-a* 'climb'. Fourth, words displaying the uniformity and contrast effects are neighbors in paradigmatic space and differ by just a single morphological (formal) feature: Spanish (gender class), Russian and Bulgarian (singular vs. plural), Arabic (third vs. first person), and Chi-Mwi:ni (benefactive vs. nonbenefactive). This suggests that the search space over which paradigmatic contrast is defined is sharply circumscribed and well defined. Fifth, only the Chi-Mwi:ni example conforms to “Base Priority” (Benua 1997) in the sense that it is the morphologically derived form (the applied perfect) that accommodates to the more basic source (the simple perfect). In the Russian, Bulgarian, and Arabic examples the site of quirky phonology has the same stem+affix structure as its paradigmatic neighbor and thus neither one is contained in the other. Furthermore, in the Bulgarian and Arabic examples it is the semantically unmarked singular or third person form that changes. Finally, even in Chi-Mwi:ni Base Priority is of no real use. We must wait until the Word Level cycle in which the perfect inflection has been added in order to perform lateral deletion (ablaut). Ablaut takes place in *pel-e:l-e* from /pe:l-il-i:le/ because the simple perfect /pe:l-i:l-e/ mutates to *pe:z-el-e*. But the latter computation is not a stage in the derivation of the former comparable to *condense* as a stage in the derivation of *condensation*. Once again the generalization is that the phonology strives to maintain paradigmatic contrast. Sixth, in all of our examples it is the member of the paradigm that the phonology threatens with merger that is also the site of repair. Contrast could be maintained by letting the phonology have its way but alter the paradigmatically related form--



a type of chain shift. It remains to be seen if cases of this nature can be documented (see Gussenhoven 2000:230 for mention of a possible example from the Central Hessian dialect of German). Also, in each case the phonology strives to keep to exponentially distinct input forms from merging. It remains to be seen if the phonology ever conspires to drive apart two phonologically identical input forms in order to express a paradigmatic distinction (e.g. different treatments of the plural and possessive suffixes in /-s/ in English or the 1 sg. vs. 2 sg. m. /-t/ of Arabic).

A crucial task for future research is to develop appropriate analytic tools and grammatical formalisms that allow phenomena such as paradigmatic uniformity and contrast to be productively studied and the resultant generalizations to be perspicuously expressed. Generative grammar has focused on the study of individual words and sentences isolated from the rest of the lexicon and the phonetic and semantic/pragmatic modules. This idealization has been tremendously productive. But there is growing evidence that it is also too severe. Aspects of grammatical form are sensitive to contextual factors. Exactly how and where is a task for future research.

## **References**

Aguero-Bautista, Calixto. (1998). Cyclic and identity effects in Spanish diminutives and augmentatives. Unpublished Phonology Generals paper, MIT.

- Alderete, John. (1999). *Morphologically Governed Accent in Optimality Theory*. Doctoral dissertation, University of Massachusetts, Amherst.
- Ali Adra, Mohamed. (1999). *Identity effects and opacity in Syrian Arabic: an optimality theory analysis*. Urbana, Il: University of Illinois Ph.D. dissertation.
- Avanesov, R.I. (1964). *Proiznoshenie russkogo literaturnogo jazyka..* Moscow.
- Bastin, Yvonne (1983). *La finale –ide et l'imbrication en Bantou*. Tervuren: Musé Royale de l'Afrique Centrale.
- Benua, Laura (1997). *Transderivational Identity: Phonological Relations between Words*. Amherst: University of Massachusetts Ph.D. dissertation.
- Bloomfield, Leonard (1933). *Language*. New York: Holt.
- Booij, Geert. (1996). Lexical phonology and the derivational residue. In Jacques Durand and Bernard Laks (eds.), *Current Trends in Phonology: Models and Methods*. European Studies Research Institute and University of Salford. 69-96.
- Broselow, Ellen. (1976). *The Phonology of Egyptian Arabic*. Amherst: University of Massachusetts Ph.D. dissertation.
- Burzio, Luigi (1996). Surface constraints vs. underlying representations. In Jacques Durand and Bernard Laks (eds.), *Current Trends in Phonology: Models and Methods*. European Studies Research Institute and University of Salford. 123-42.
- Burzio, Luigi. (1998). Multiple correspondence. *Lingua* 103: 79-109.

- Calabrese, Andrea. (1995). A constraint-based theory of phonological markedness and simplification procedures. *Linguistic Inquiry* 26: 373-464.
- Cantineau, Jean. (1939). Remarques sur les parlers de sédentaires syro-libano-palestiniens. *Bulletin de la Société de Linguistique de Paris* 40: 80-88.
- Carstairs, Andrew. (1987). *Allomorphy in Inflection*. London: Croom Helm.
- Chomsky, Noam and Morris Halle. (1968). *The Sound Pattern of English*. New York: Harper and Row.
- Chung, Sandra. (1983). Transderivational relations in Chamorro phonology. *Language* 59: 35-66.
- Cole, Jennifer. (1995). The cycle in phonology. In John Goldsmith (ed.), *The Handbook of Phonology*. Cambridge, Ma.: Blackwell, pp. 70-113.
- Côté, Marie-Hélène. (2000). *Consonant Cluster Phonotactics: a Perceptual Approach*. Cambridge: MIT Ph.D. Dissertation.
- Cowell, Mark. (1964). *A Reference Grammar of Syrian Arabic*. Washington: Georgetown University Press.
- Crosswhite, Katherine. (1997). Intra-paradigmatic homophony avoidance in two dialects of Slavic. Unpublished ms., UCLA.
- Crosswhite, Katherine (1998). Segmental vs. prosodic correspondence in Chamorro. *Phonology* 15, 281-316.
- Crowhurst, Megan J. (1992). Diminutives and augmentatives in Mexican Spanish: a prosodic analysis. *Phonology* 9.221-253.
- Elordieta, Gorra, and Maria Carreira (1996). An Optimality theoretic analysis of Spanish diminutives. *Chicago Linguistic Society* 32: Papers

- from the Main Session, 49-60. Chicago: Chicago Linguistic Society.
- Flemming, Edward. (1995). *Auditory Representations in Phonology*. Los Angeles: UCLA Ph.D. dissertation.
- Goldsmith, John. (1993). Harmonic phonology. In John Goldsmith, (ed.), *The Last Phonological Rule*. Chicago: University of Chicago Press. 21-60.
- Gussenhoven, Carlos. (2000). The origin and development of the Central Franconian tone contrast. In Aditi Lahiri (ed.), *Analogy, Levelling, and Markedness*. Berlin: Mouton de Gruyter, pp. 215-260.
- Haddad, Ghasan. (1983). *Problems and Issues in the Phonology of Lebanese Arabic*. Urbana: University of Illinois Ph.D. dissertation.
- Halle, Morris. (1997). On syllables and accent in Indo-European. *Language* 73, 275-313.
- Harris, James W. (1994). The OCP, Prosodic Morphology and Sonoran Spanish diminutives: a reply to Crowhurst. *Phonology* 11.179-190.
- Hayes, Bruce. (1985). Iambic and trochaic rhythm in stress rules. *Berkeley Linguistics Society* 13, 429-46.
- Heath, Jeffrey. (1987). *Ablaut and Ambiguity: Phonology of a Moroccan Arabic Dialect*. Albany: State University of New York Press.
- Hyman, Larry (1994). Cyclic phonology and morphology in CiBemba. In Jennifer Cole and Charles Kisseberth, eds. *Perspectives in Phonology*. Stanford: CSLI Publications, 81-112.
- Itô, Junko and Armin Mester (1997) Correspondence and compositionality: the

- ga-gyo variation in Japanese phonology. Iggy Roca, ed. *Derivations and Constraints in Phonology*. Oxford: Clarendon Press. 419-462.
- Jakobson, Roman. (1948). Russian Conjugation. *Word* 4, 155-167.
- Kager, René (1999). *Optimality Theory*. Cambridge: Cambridge University Press.
- Kelepir, Meltem. 1997. To be or not to be faithful. Unpublished Phonology Generals paper, MIT
- Kenstowicz, Michael. (1995). Cyclic versus non-cyclic constraint evaluation. *Phonology* 12. 397-436.
- Kenstowicz, Michael. (1996). Base-identity and uniform exponence: alternatives to cyclicity. In Jacques Durand and Bernard Laks (eds.), *Current Trends in Phonology: Models and Methods*. European Studies Research Institute and University of Salford. pp. 363-393.
- Kiparsky, Paul. (1982). Lexical phonology and morphology. In S.-I. Yang, (ed.), *Linguistics in the Morning Calm*. Seoul: Hanshin. pp. 3-91.
- Kiparsky, Paul. (1985). Some consequences of lexical phonology. *Phonology Yearbook* 2: 83-138.
- Kiparsky, Paul. (1999). Opacity and cyclicity. *The Linguistic Review* 17: 351-66.
- Kirchener, Robert. (1996). Synchronic chain shifts in optimality theory. *Linguistic Inquiry* 27: 341-50.
- Kisseberth, Charles and Mohammad I. Abasheikh. (1974). A case of systematic avoidance of homonyms. *Studies in the Linguistic Sciences* 4,1: 107-24.

- Kraska-Szlenk, Iwona. (1995). *The Phonology of Stress in Polish*. Urbana: University of Illinois Ph.D. dissertation.
- Lahiri, Aditi. (2000). Hierarchical restructuring in the creation of verbal morphology in Bengali and Germanic: evidence from phonology. In Aditi Lahiri, ed. *Analogy, Levelling, Markedness*. Berlin: Mouton. 71-124.
- Lahiri, Aditi and Elan Dresher. (1982). Diachronic and synchronic implications of declension shifts. *The Linguistic Review* 3: 141-63.
- Mascaró, Joan (1996). External allomorphy as emergence of the unmarked. In Jacques Durand and Bernard Laks (eds.), *Current Trends in Phonology: Models and Methods*. European Studies Research Institute and University of Salford. 473-84.
- McCarthy, John. (1980). A note on the accentuation of Damascene Arabic. *Studies in the Linguistic Sciences* 10,2: 77-98.
- McCarthy, John. (2002). Optimal paradigms. Ms., University of Massachusetts, Amherst.
- Mester, Armin. (1994). The quantitative trochee in Latin. *Natural Language and Linguistic Theory* 11.
- Mitchell, T.F. (1960). Prominence and syllabification in Arabic. *Bulletin of the School of Oriental and African Studies* 23: 369-389.
- Mitchell, T. F. (1993). *Pronouncing Arabic 2*. Oxford: Clarendon Press.
- Prince, Alan and Paul Smolensky. (1993). *Optimality Theory: Constraint Interaction in Generative Grammar*. Report no. RuCCS-TR-2. New

- Brunswick, NJ: Rutgers University Center for Cognitive Science.
- Raffelsiefen, Renate. (1995). Conditions for stability: the case of schwa in German. *Theorie des Lexikons* no. 69. Düsseldorf: Heinrich Heine Universität
- Rubach, Jerzy. (2000). Glide and glottal stop insertion in Slavic languages: a DOT analysis. *Linguistic Inquiry* 31: 271-317.
- Selkirk, Elizabeth.(1984). *Phonology and Syntax*. Cambridge, MA: MIT Press.
- Selkirk, Elizabeth. (1986). On derived domains in sentence phonology. *Phonology Yearbook* 3:371-405.
- Soh, Hooi-Ling. (1996). Vowel-changing reduplication in Malay. Ms, MIT.
- Steriade, Donca (1995). Underspecification and markedness. In John Goldsmith (ed.), *The Handbook of Phonological Theory*. Cambridge, Ma.: Blackwell, pp. 114-174.
- Steriade, Donca (2000). Paradigm uniformity and the phonetics-phonology boundary. Michael Broe and Janet Pierrehumbert, eds. *Papers in Laboratory Phonology V: Acquisition and the Lexicon*. Cambridge: Cambridge University Press. 313-334.
- Stojkov, Stojko. (1963). Akane v govora na c. trigrad, devinksko. *Bulgarski Ezik* 13,1: 8-21.
- Welden, Ann. (1980). Stress in Cairo Arabic. *Studies in the Linguistic Sciences* 10,2: 99-120.
- Yip, Moira. 1995. Repetition and its Avoidance: The case of Javanese. K. Suzuki and D. Elzinga, eds., *Proceedings of South Western Optimality*

Theory Workshop;1995 Arizona Phonology Conference vol 5:  
University of Arizona, Department of Linguistics Coyote Papers.  
Tucson AZ: pp. 238-262.