Base-Identity and Uniform Exponence: Alternatives to Cyclicity*

Michael Kenstowicz
MIT

1 Introduction

In this paper we discuss systematic phonological similarities between morphologically related words which are unexpected given the general rules or phonotactics of the language (cf. Steriade 1994). The most well-studied cases of this type are 'cyclic' phenomena illustrated by the well-known paradigm in (1) from Chomsky & Halle (1968).

(1) a. còmp[ʃ]nsátion cònd[î]nsátion
     b. còmp[ʃ]nsáte   cònd[_î]nse

The stress contours and gross prosodic structure of *compensation* and *condensation* are identical; yet for certain dialects of English they mysteriously contrast their second syllables as schwa versus [î] despite the fact that these two vowels are largely in complementary distribution elsewhere. The mystery vanishes once the related words in (1b) are brought into the picture; here the two words contrast in familiar ways: *condense* has a full vowel under stress while the corresponding underlying /e/ in *compensate* (cf. comp[_î]nsatory) reduces to schwa in an unstressed syllable. In the standard generative model of grammar the only way in which one word can have a systematic effect on the structure of a morphologically related word is to embed the former in the derivation of the latter. This is of course the classic SPE cycle (Chomsky & Halle 1968) illustrated in (2).
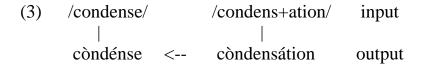
(2) /condense/   /compensate/   cycle-1
     cóndénse   cómpensáte   stress

     cóndéns+ation   cómpensát+ion   cycle-2
     cóndéns+átion   ----------------- stress

cóndénsát[ʃ]n   cómp[ʃ]nsát[ʃ]n   vowel reduction
cóndensáti[ʃ]n   ----------------   stress deletion

On the first cycle stress is assigned to the bases /condense/ and /compensate/. On the second cycle the addition of the /-ation/ and /-ion/ affixes initiates a new round of stress assignment. The vowel reduction rule is then applied; it blocks on the second syllable of <u>condensation</u> because at this point in the derivation this syllable is still stressed. Its stress is removed by a later rule voiding certain clashing stresses to create the virtual minimal pair comp[ʃ]sation vs. cond[î]nsation.

This paper will argue for a more direct analysis of phonological similarities between morphologically related words in terms of a family of constraints requiring phonological identity between words that stand in certain morphological relationships (cf. Benua 1995, Burzio this volume, Kraska 1995, McCarthy 1995, and Steriade 1994). In particular, a constraint of Base-Identity evaluates candidate outputs for one word in terms of their similarity to the morphologically related base from which the word is derived. On this view, cònd[î]nsátion is a better match with the base *condense* than cond[ʃ]nsation is because it has the same vowel quality. The result is a form that violates the constraint that bars full vowels from unstressed syllables. The match with the base is not perfect however, since the stress contour of the base *condense* is not reproduced in the derivative *condensation*. Thus, constraints calling for the elimination of stress clash outweigh any matching effect for Base-Identity.

Constraints requiring similarity between the surface forms of words are transderivational in character (Dudas 1974, Chung 1983). Standard theories assume that the surface form of a word is determined exclusively by its underlying representation; but constraints of the type outlined here imply that the output for a given underlying representation may depend on the form of independent words. This is illustrated schematically in (3). This approach to cyclic effects obviates the need for intermediate representations because comparison is made to the base as an independently occurring word rather than as a stage in the derivation of a complex word; see Benua 1995 who makes the same point.

(3)   /condense/   /condens+ation/   input
         | |
     còndénse   <--   còndensátion   output

The analysis in terms of Base-Identity makes a number of predictions that distinguish it from the analysis in terms of cyclic rule application. First, it predicts that whether a constituent is a cyclic domain will generally depend on its status as an independently occurring word. The evidence for this prediction is well established, as we shall see below. Second, cyclic application predicts that similarity effects should only arise between a derivative and a subconstituent, and that it will always be the derivative that is modified to conform to the subconstituent. On the other hand, if there are constraints that require similarity between words standing in certain morphological relationships, we predict the possibility of a range of such effects. We will argue that this prediction is confirmed. Base-derivative similarities are in fact only a subclass of a broader range of phenomena that also includes paradigm leveling which also results in instances of unexpected similarity between morphologically related words. In a number of crucial cases these similarities cannot be accounted for in terms of cyclic rule application, either because neither word forms a constituent of the other, or because the basic form is modified to correspond to a derived form, rather than vice versa. In our view, both base-derivative similarities as well as paradigm leveling reflect a more general requirement maximizing the similarity in the various exponents of a lexical item.

The rest of this paper is organized as follows. In the first section we review previous approaches to cyclicity in the constraints-based approach of Optimality Theory (Prince & Smolensky 1993) and propose an alternative in terms of the Base-Identity requirement between independent output forms as sketched above. In the second section we discuss a number of cases in which the availability of a constituent of the derivative as an independent word plays a crucial role. We then go on to discuss examples where the similarity effect is sensitive to the gross prosodic structure of the base. The final section reviews similarity effects that do not fall under the rubric of identity to the base as a separate word. For these cases we posit a constraint of Uniform Exponence (Flemming 1995) that evaluates sets of morphologically related words for segmental and prosodic similarity. Various instances of paradigm leveling are analyzed in these terms. The paper closes with an overview of the range of observed of similarity effects.

2 Alignment and cyclicity

Cohn (1989) and Halle & Idsardi (1994) have argued that the Indonesian paradigm in (4a) requires a cycle: stress is first assigned to the stem [bicara]; the result [bicára] is then input to a subsequent application of stress at the word level creating a clash which is resolved by a later rule (4b). Positing the inner cycle accounts for the contrast with the stress contour found on monomorphemic four-syllable forms lacking internal morphological structure such as [bìjaksána]: the latter has two stresses while [bicará+kan] has a single stress.

(4)   a. bicára   'speak'
          bicará+kan   'speak about' bìjaksána 'wise'

       b. [bicara] -> bicára
          [bicára]kan -> bicárá+kan -> bicará+kan

Cohn & McCarthy (1994) and independently Kenstowicz (1994b) show that the Indonesian paradigm in (4) can be analyzed without appeal to a cycle by alignment constraints that call for a coincidence between the prosodic and morphological structure (a point also made by Goldsmith 1993 in the Harmonic Phonology framework). Specifically, a constraint aligning the right edge of the stem with a foot is highly ranked. As shown by the tableau in (5), Align Stem leads to an output s(s's)s that is otherwise egregiously malformed with respect to lower ranked constraints calling for alignment of the left edge of the prosodic word with a foot, Parse-syllable (Parse-s), and leftheaded feet (see Cohn & McCarthy 1994 and Kenstowicz 1994b for extensive discussion).

(5) | /bicara+kan/ | Align-Stem | Align-PW | Parse-s | Head-Left |
      |---|---|---|---|---|
      | $s(s's)s | Ã | * | ** | * |
      | ('ss)('ss) | *! | Ã | Ã | Ã |

However, Kenstowicz (1994b) also points to cases in which alignment is not sufficient to explain a cyclic effect. A typical example is provided by Polish. As shown by the paradigm in (6), Polish has a major stress on the penult whereas preceding material is organized into binary left-headed feet that are aligned from left to right.

(6)   'ss'ss'ss"ss   kònstant`ynopòlitáncyzk
       'ss'ss'sss"ss   kònstant`ynopòlitancz´yka

'ss'ss'ss'ss"ss kònstant`ynopòlitànczykámi

These contours emerge from constraints calling for leftward foot alignment dominated by a requirement that the right edge of the prosodic word coincide with the right edge of a foot. The tableau in (7) demonstrates how these constraints choose the ('ss)('ss)s("ss) candidate for a seven-syllable case.

(7)   /sssssss/   Parse-s   Align-PW-R | Align-Ft-L
     ☞('ss)('ss)s("ss)   *   Ã   #, #ss, #sssss
       ('ss)('ss)('ss)s   *   *!   #, #ss, #ssss

The forms in (8) (from Kraska 1995:104) show that when a monosyllabic proclitic is added, the stress contour at the left edge of the bases [Àmer`ykanína] and [w`y.a.liè.no.wa.né.go] is minimally disturbed in order to ensure that the clitic#base structure starts with a foot (an observation originally due to Rubach & Booij 1985).

(8)   ('s # s)s('ss)("ss)   dò Amer`ykanína 'to an American'
       ('s # s)s('ss)s("ss)   dò wy.a.liè.no.wa.né.go 'to an alienated (one)'

The point of interest in the present context is that the remaining feet in the base (in particular the ones grouping the third and fourth syllables [r`y.ka] and [liè.no]) are preserved under cliticization. We assume that the proclitic is incorporated into the prosodic word (Selkirk 1995). Unlike in the case of Indonesian, it is not possible to account for this foot preservation by alignment. Since alternating stress itself arises from ranking Parse-s above Align-Ft (McCarthy & Prince 1993), once the foot at the beginning of the base shifts further to the left to accommodate the clitic, additional syllables in the base are exposed and subject to evaluation by Parse-s. The predicted outcome is thus a fully parsed structure ('s#s)('ss)('ss)("ss). But this is wrong; the correct structure must be ('s#s)s('ss)s("ss) with two syllables left unparsed in the base.

(9)   /s#sssssss/   Parse-s   Align-Ft-L
     *('s#s)('ss)('ss)("ss)   #, #ss, #ssss, #ssssss
       ('s#s)s('ss)s("ss)   *!* #, #sss, #ssssss

A comparable problem arises if the alignment is measured with respect to the inner boundary of the base in the cl#base structure: in a six-syllable base, if

the initial syllable groups with the clitic, the candidate that parses the second and third syllables of the base into a foot --('s#s)('ss)s("ss)--is better aligned with the left edge of the inner boundary than ('s#s)s('ss)("ss) is and hence should be chosen as the winner. But once again this leads to the wrong output.

On the basis of this example and parallel ones from Carib and Shanghai Chinese, Kenstowicz (1994b) concludes that a cycle must be recognized in which the stress contour of the cl#base construction is derived from an intermediate structure consisting of the metrified base alone. Specifically, the base in isolation is evaluated by ranked constraints to produce an optimal metrical structure--('ss)('ss)s("ss) for the seven-syllable case. The result is then submitted in combination with the proclitic to a new round of constraint evaluation. It is proposed that the GEN function be allowed to overwrite structure by cancelling association lines/metrical bracketing to ensure that the left edge of the cl#base structure (presumably the prosodic word) starts with a foot. But the cancellation of structure comes at a cost and will be exploited minimally. Given that Overwrite ranks above Parse-s, the result will be to preserve the noninitial metrical structure of the base; (see Kenstowicz 1994b for details).

Since the base forming the inner cycle is equivalent to the word in isolation while the clitics arise in the phrasal phonology, the cyclic effect found in the Polish cl#base construction could arguably be reduced to a difference in the metrical structure of prosodic words at the Word and the postlexical Phrasal Levels and thus be compatible with a model of phonology that recognizes just a single level between the underlying and phonetic representations.

On the basis of Duanmu's (1995a) metrical analysis of Shanghai Chinese tone sandhi, Kenstowicz (1994b) points to a similar foot preservation effect in Shanghai compounds. First some background. In long monomorphemic stems (derived from loanwords) each syllable has an underlying tone (LH or HL) that can emerge under hyper-articulated speech. In normal speech, however, the tones of the second, fourth, (more generally even-numbered) syllable as well as the final syllable are suppressed. Duanmu shows that the tonal realization is insightfully described by positing a binary left-headed metrical parse in which feet are aligned from left-to-right. The tones of unstressed syllables are deleted while the tones of the stressed syllable are preserved and realized over the two syllables comprising the foot (10a). Thus, in the example for 'California', the HLLH(L) tone pattern reflects the underlying HL and LH tones of the first and third syllables. The low tone on the final syllable arises by default.

(10) a. HL LH LH LH LH   b. HL   HL LH LH LH LH
       HL   LH   HL   LH
        H   L   L H (L)   H   L (L) L H (L)
     (ka-li)-(fo-ni)-ya 'California'   (çi # ka-)li-(fo-ni)-ya 'West Califor.'

In the compound 'West California' the tone at the left edge originates from the first member of the compound /çi/. The left edge of the compound has been organized into a binary foot in order to avoid a stress clash. But as in Polish, the metrical (and hence tonal) pattern of the remaining syllables of 'California' is stable preserving the foot structure of the isolation form. If the binary alternating stress pattern were computed over the entire s#sssss structure we should find three feet paralleling a monomorphemic six-syllable form: ('ss)('ss)('ss). Instead we find a tonal contour that implies a ('ss)s('ss)s metrification that is parallel in essential respects to the Polish case considered above.

In subsequent development of the issues raised in Kenstowicz (1994b) with respect to the cyclicity, Duanmu (1995b) points out that the Shanghai structures are compounds and thus differ from the Polish cl#base constructions in that they can at least in principle be recursively embedded. He offers the paradigm in (11) as evidence.

(11) HL   LH   LH   LH
      thi 'sky'   Nu 'goose'   ya 'wild'   ba? 'white'

              HL   H   L
      ('s#s)   thi#Nu   'swan' =   thi#Nu

             LH   L   H (L)
      ('s#s)s   ya#thi-Nu 'wild swan' =   ya#thi-Nu

            LH   L   (L) (L) H
      ('s#s)ss ba?#ya-thiNu   'white wild swan' (= ba?#ya-thi-Nu)

The word for 'swan' is a compound composed of *thi* [HL] 'sky' plus *Nu* [LH] 'goose'. When compounded the tones of Nu are suppressed reflecting a ('s#s) metrification to avoid a stress clash. The [HL] of thi 'sky' is realized over both syllables: *thi#Nu* [HL]. But *thi#Nu* [HL] can itself form the right branch of another compound with ya [LH] 'wild'. In this case the [HL] tone of the right

conjunct *thi#Nu* 'swan' is suppressed. Crucially, the tone of underlying *Nu* 'goose' is not restored. Rather we find the default L. Finally, it is possible to append ya#[thi-Nu] 'wild swan' as the right branch of a compound with *ba?* [LH] 'white'. And once again, the tones of ya#[thi-Nu] [LH] are suppressed and the tone of *ba?* survives (and is realized by linking the H to the right edge of the domain when the initial syllable contains a voiced onset and a glottalized vowel--see Duanmu 1995b for details).

　　　The Shanghai example suggests that not all cyclic effects can be reduced to a simple two-way Word Level vs. Phrase Level distinction that one might conjecture on the basis of the Polish proclitic construction. It appears that a potentially unlimited number of intermediate stages must be recognized--the hallmark of the traditional cycle (Chomsky & Halle 1968). However, instead of seeing the cyclic effects as a series of minimally transformed input-output relations, we might view the relation in transderivational terms such that the metrification for the [X#Y] structure tries to match the stress contour of the immediate constituents [X] and [Y] considered in isolation. (cf. Burzio 1994, Kraska 1995, McCarthy 1995, and Benua 1995 for similar ideas). More specifically, we suppose that GEN constructs the candidate set for [X#Y] directly from the underlying unmetrified input /X#Y/; a rankable identity constraint is at play that optimizes candidates in which the metrification of [X#Y] matches the metrification of the immediate constituents [X] and [Y].

(12) Base-Identity: Given an input structure [X Y] output candidates
　　　　　　　　are evaluated for how well they match [X] and [Y]
　　　　　　　　if the latter occur as independent words.

Observance of Base-Identity serves to improve the transparency of morphological relationships between words and thus may enhance lexical access. To see how Base-Identity works, let us return to the Polish proclitic construction. As shown in the tableau below, the s#('ss)('ss)s("ss) and ('s)#('ss)('ss)s("ss) candidates match the base perfectly but violate higher ranking constraints that require the left edge of the cl#base construction (presumably the prosodic word) to start with a binary foot. (We indicate the base against which the derived form is being evaluated at the end of the tableau with an ampersand.)

(13) | /s#sssssss/ | Align-PW | Clash | Base-Identity | Parse-s |
|---|---|---|---|---|
| $('s#s)s('ss)s("ss) | | | * | ** |
| s#('ss)('ss)s("ss) | | *! | | * |

('s)#('ss)('ss)s("ss)   *!
('s#s)('ss)('ss)("ss) _____ **! _____ .
&('ss)('ss)s("ss)

But ('s#s)s('ss)s("ss) is more faithful to the metrification of the base than ('s#s)('ss)('ss)("ss) is and emerges the winner so long as evaluation for Base-Identity outranks Parse-s. In the case of Shanghai Chinese, Base-Identity will try to match the metrical structure of each of the constituents of the compound but is outranked by a prohibition against clashing stresses. The paradigm in (11) with multiple embedding of compounds is accounted for if the evaluation for identity proceeds recursively. For example, in ya#[thi#Nu] HL(L) evaluation for identity will be made with respect to the immediate constituents [ya] (HL) with metrical structure ('s) and [thi#Nu] [HL] with metrical structure ('ss). The candidate that matches the immediate constituents perfectly is rejected by high ranking Clash. ('ss)s bests ('ss)('s) on Base-Identity since it has just a single mismatch in stress with respect to the immediate constituents ('s) and ('ss) while ('ss)('s) has two mismatches: a stress is missing from the second syllable *thi* that can be found in the 'ss base [thi#Nu] while a stress is found on the final syllable that cannot be matched with a stress on the final syllable of [thi#Nu].

(14) /ya#thi#Nu/	Clash	Base-Ident	|	Faithfulness
('s)('ss)	*!	Ã		*
$('ss)s	Ã	*		**
('ss)('s)	Ã	**!		*
&('s),('ss)				

If evaluation proceeded with respect to the underlying input forms, a ('s#s)('s) structure preserving the underlying [LH] tone of *Nu* should be found instead. While many cases of cyclic stress can be subsumed under Base-Identity, not all can; cf. the discussion of Indonesian in Kenstowicz (1995).

3 Base-Identity: the effect of the isolation form

One of the properties that distinguishes the Base-Identity constraint (12) from the cycle is that identity effects will come into play only to the extent that the immediate constituents composing the complex structure constitute independently occurring outputs over which the identity constraint can be computed. This is a stronger requirement than the one imposed by the

classical cycle where the cyclic domain need not constitute a separate lexical item; Kiparsky's (1982) notion of a "lexical item" was an attempt to express this restriction. To the extent that cyclic effects are "word based" we have evidence for (12). In this section we look at three cases where the presence or absence of the immediate constituents composing a complex word as an independent word has a palpable effect.

3.1 Italian s-voicing

In northern varieties of Italian [s] and [z] are in complementary distribution with the voiced variant appearing intervocalically. Nespor & Vogel (1986: 126ff) postulate the rule in (15a) that voices /s/ when it is flanked by vowels belonging to the same phonological word. This rule accounts for the voicing of /s/ morpheme internally (15b) as well as before inflectional and derivational suffixes (15c). Clitics, however, must lie outside the phonological word to which they are attached (15d).

(15) a. /s/ -> [+voice] / [... V __ V ...]$_\omega$
      b. a[z]ola 'button hole', a[z]ilo 'nursery school'
      c. ca[z]-a 'house' ca[z]-ina dimin.
      d. lo [s]apevo 'I knew it', telefonati#[s]i 'having called each other'

Nespor & Vogel note certain complications at the prefix boundary which are tabulated in (16).

(16) a. di[z]-onesto 'dishonest', di[z]-uguale 'unequal'
      b. a-[s]ociale 'asocial', bi-[s]essuale 'bisexual', ri-[s]uonare 'to ring
         again', pre-[s]entire 'to hear in advance'
      c. re-[z]istenza 'resistance', pre-[z]entire 'to have a presentiment'

Voicing regularly occurs when the /s/ precedes the boundary (16a) but is suspended in such cases as *a-sociale* (16b) when /s/ follows the juncture. Complicating matters further is the fact that voicing does occur after the boundary when a prefix such as [re-] "is affixed to a stem that is not an independent word" (16c). Under Nespor & Vogel's analysis, the relevant analytic variable is whether or not the flanking vowels belong to the same phonological word. Hence they implicitly invoke the constraint that the left edge of the stem constitutes the left edge of a phonological word if the stem is itself a grammatical word. This distinction accounts for the contrast between

(16b) and (16c). However, the regular voicing of prefix-final /s/ in (16a) remains mysterious under this analysis. Nespor & Vogel try to connect it with the fact that [dis-] ends in a consonant and the idea that consonant-final phonological words are marked structures that are avoided in Italian by combining them with the following stem into a single phonological word. (See Peperkamp 1994 for a similar constraints-based analysis.) While it is true that native noun stems are inflected with a final vowel, Italian speakers cope with many loanwords that lack a vowel inflection such as *bus, bar*, *hotel*, *rebus*. When such consonant-final words are augmented with a suffix, voicing of /s/ is regularly inhibited: bu[s]-ino, rebu[s]-ino.   In many cases the final consonant is geminated blocking voicing (perhaps reflecting an abstract mora or skeletal position; cf. Burzio 1987).   But if /s/ fails to voice in the phonological word /bus/, why doesn't the same effect carry over to the prefix /dis-/? We believe the answer to this question lies in Nespor & Vogel's observation that the contrast between re-[z]istenza and a-[s]ociale is to be explained by the fact that the stem is an independent word in the latter but not in the former. We propose to express this idea directly in the form of the Base-Identity constraint (12). Specifically, the constraint against intervocalic /s/ is dominated by Base-Identity. On this scenario, identity will be defined and /s/-voicing blocked only to the extent that the immediate constituents composing the derived structure occur as independent words.

(17)

	Base-Identity	*VsV
$di[z]-onesto	Ã	Ã
di[s]-onesto	Ã	*!
$a-[s]ociale	Ã	*
a-[z]ociale	*!	Ã
& sociale		

Thus, voicing applies in di[z]-onesto, re-[z]istenza, and ca[z]-a because there are no independently occurring words *dis*, *sistenza*, *cas* to which these immediate constituents can be compared.Voicing is blocked in *a-sociale* and *bi-sessuale* in virtue of the independently occurring *sociale* and *sessuale*.

3.2 Korean cluster simplification and default accent

The availability of the immediate constituents of [X Y] as independent words [X] and [Y] explains a couple of puzzling asymmetries between nouns

and verbs in the phonology of Korean. Korean syllables tolerate no clustering of consonants in the onset or the coda. Stems ending in an underlying cluster simplify the cluster when followed by a consonant-initial inflection (and for nouns in the citation form where the case suffix has been dropped).

(18) /kaps/ 'price'   /Eps/   'not have'
      kap   citation form   ----   no citation form
      kaps-i nominative   Eps-Ess-E past-informal
      kap-k'wa   'price and ...'Ep-t'a nonpast-formal

      /talk/   'chicken'   /palk/ 'be bright'
       tak   citation form   ----   no citation form
       talk-i nominative   palk-Ess-E past-informal
       tak-k'wa   'chicken and...'   pak-t'a   nonpast-formal

Thus, the stem /kaps/ 'price' deletes /s/ before the consonant-initial conjunctive suffix /kwa/ as well as in the isolation form; the underlying consonant emerges before a vowel-initial suffix such as the nominative /-i/. The verb stem /Eps/ shows similar behavior losing its final /s/ before a consonant-initial suffix and parsing the consonant before a vowel. Verbs must always have an inflection and so it is not possible to cite the stem in isolation (a fact of some importance as we see momentarily). In the /lk/ cluster of /talk/ 'chicken' and /palk/ 'be bright', it is the liquid that drops.

We account for the cluster simplification in OT terms by ranking the constraint blocking complex onsets and codas over the faithfulness constraint Parse-C that requires any consonant in the input to appear in the corresponding output (Kenstowicz 1994a and Iverson & Lee 1994).

(19)

/kaps/	*Complex	|	Parse-C
$kap<s>	Ã		*!
kaps	*	Ã	

/kaps+i/	*Complex	|	Parse-C
$kap.si	Ã		Ã
ka.p<s>i	Ã		*!

The datum of interest in the present context is that the younger generation of Seoul speakers have generalized the cluster simplification

process in nouns to apply before vowel-initial inflections. But crucially cluster simplification is never generalized in the verb.

(20) /kaps/ 'price'   /Eps/   'not have'
     kap   citation form   -----   no citation form
     kap-i   nominative   Eps-Ess-E (*Ep-Ess-E)
     kap-k'wa   'price and ...'Ep-t'a nonpast-formal

     /talk/   'chicken'   /palk/ 'be bright'
     tak   citation form   ----   no citation form
     tak-i   nominative   palk-Ess-E (*pak-Ess-E)
     tak-k'wa   'chicken and...'   pak-t'a   nonpast-formal

Thus, while /kaps+i/ surfaces as [kapi] with deletion of the /s/, /Eps+Ess+E/ can never be realized as *[Ep+Ess+E].

We can account for this asymmetry straightforwardly if the younger generation ranks Base-Identity above Parse-C. In other words, it is more important for the output of /kaps+i/ to resemble the output form of /kaps/ than to resemble the underlying input form.

(21)

/kaps+i/	*Complex	Base-Identity	Parse-C
kap.si	Ã	*!	Ã
$ka.p\<s\>i	Ã	Ã	*
&kap			

/Eps+Ess+o/	*Complex	Base-Identity	Parse-C
$Ep.sEss.o	Ã	Ã	Ã
Ep.\<s\>Ess.o	Ã	Ã	*!

Since Korean verbs always require an inflection there is no independently occurring output form of the stem to which the verb stem in /Eps+Ess+E/ can be compared and so the identity constraint is vacuously satisfied. The Parse-C constraint demanding faithfulness to the underlying form will then choose the candidate that preserves the cluster (21).[1]

Under an analysis without transderivational identity constraints the analysis of Korean cluster simplification becomes quite cumbersome (Baek 1994). Essentially, the noun stem must be isolated for a special level of evaluation in which the *Complex >> Parse-C ranking is imposed to derive an output that is then submitted to a further round of evaluation when an

inflection is added (so that a prevocalic consonant surviving cluster simplification surfaces as an onset to /i/: [ka.p<s>i]). We know that it is the *Complex >> Parse-C ranking that is at play because the same pattern of cluster simplification is at work prevocalically as that found in the isolation form: /talk+i/ 'chicken' nom. surfaces as *taki* by deleting the liquid comparable to the bare form *tak* 'chicken'.

A further complication is that it is only the cluster simplification that operates at this special level. Korean has a number of other constraints that are sensitive to the syllable coda such as the ban on aspirated consonants. None of them hold before vowel-initial inflections for the younger generation: for example, /ip^h/ 'leaf' is *ip, i.p^h -i*. If cluster simplification in /kaps+i/ -> [ka.p<s>i] arises from ranking Base-Identity above Parse-C, then it can also be ranked with other constraints--in particular, faithfulness for the feature aspiration will dominate Base-Identity.

(22) /ip^h/ *C^h]$_\sigma$ | Faith-asp | Base-Identity

$ip	Ã	*	Ã
ip^h	*!	Ã	Ã

/ip^h+i/   *C^h]$_\sigma$ | Faith-asp | Base-Identity

$i.p^{h}i	Ã	Ã	*	
i.pi		Ã	*!	Ã
&ip				

The apparent restriction of Base-Identity to cluster simplification thus follows from the normal mechanism of constraint ranking--no special level is required. Rather one word must be evaluated in terms of its similarity to a related word--the isolation form.

The Northern Kyungsang dialect of Korean displays another asymmetry between nouns and verbs that makes sense as analogy to the isolation form imposed by Base-Identity. Following the analysis of Chung (1991), stems fall into three accentual classes: fixed H ádIl 'son', a spreading H táncí 'jug', and a default class in which H falls on the penultimate syllable (or the final syllable in the isolation form). As shown by the paradigm in (23a), the default H surfaces on the suffix in [sul-ch"ElEm] (transcribed here as ") it remains there when more suffixes are inserted. Thus, the penultimate accent of [sul-ch"ElEm] is carried over to the remaining forms of the paradigm built by

suffixation.

(23) sul-c"ElEm   'like wine'
      sul-ch"ElEm-man   'like only wine'
      sul-ch"ElEm-i   'like wine' nominative
      sul-ch"ElEm-man-i   'like only wine' nominative

We can achieve this effect by ranking Base-Identity >> Default-H.

(24) /sul+c^{h}ElEm+man/   Base-Identity | Default-H
      $sulc^h"ElEmman   Ã   *
       sulc^{h}El"Emman   *!   Ã
      &sulc^h"ElEm

In verbs on the other hand, the default accent always goes to the penult of the entire form.

(25) mút-t'a   'to bury'
      mut-k'ét-t'a   'will bury' formal
      mut-k'et-s'umní-ta 'will bury' honorific formal

The reason is that any verb requires a final suffix marking mood (the so-called "verbal ending"). Thus, when [mut-k'et-s'umní-ta] is analyzed by Base-Identity into its immediate constituents [mut-ket-sumni]+ta, there is no independently occurring word [mut-ket-sumni] that can serve as the base for analogical extension of accent comparable to the way that [sul-ch"ElEm-man] is parsed into the independently occurring word [sul-ch"ElEm] (and [-man]). The identity constraint is thus vacuously satisfied and penultimate accent for the entire form can be imposed.

(26) /mut+ket+sumni+ta/   Base-Id | Default-H
      $mutk'ets'umníta   Ã   Ã
       mutk'éts'umnita   Ã   *!

3.3 Transfer from Prominence

In this section we review a couple of examples in which the evaluation for identity must single out the stressed syllable of the base as the locus of

transfer; (see also McCarthy 1995 for an example of the phenomenon from Rotuman). One of the classic data sets motivating a cycle is due to Brame (1974) from Palestinian Arabic.

(27) a. kátab   'he wrote'   fíhim   'he understood'
         kátabit   'she wrote   fíhmit 'she understood'
         katábna   'we wrote'   fhímna   'we understood'
     b. kátab#u   'he wrote it m.' fíhm#u   'he understood him'
         katáb#ha   'he wrote it f.' fihím#na   'he understood us'

The paradigms in (27a) illustrate the generalizations that stress is found on the penult if heavy and otherwise on the antepenult as well as the syncope of unstressed high vowels in nonfinal open syllables. The paradigm in (27b) shows the effect of object clitics added to the 3sg.m. verb bases [fihim] and [katab]. The object clitics count for stress (*katáb#ha* 'he wrote it f.') and induce syncope (*fíhm#u* 'he understood him'). But mysteriously syncope is systematically suspended in the first syllable of the [CiCiC] stem when the stress is displaced to the penult by an object clitic: *fihím#na* 'he understood him' (cf. *fhím+na* 'we understood'). Brame's explanation for this effect was of course to postulate a cycle comparable to the SPE account of the lack of vowel reduction in cònd[e]nsátion in comparison to còmp[f]nsátion.

(28)   first cycle: /fihim/
                       fíhim   stress
                       ------ syncope
       second cycle: fíhim#na
                       fíhím#na   stress
                  ----------syncope
                       fihím#na   destressing

At the point where the syncope rule applies the first syllable of *fihím#na* has a stress carried over from the first cycle: [fíhím#na]. This stress blocks the application of syncope and is removed by a subsequent rule deleting nonfinal stresses.
        In spite of the elegance of the cyclic analysis there are several questions it leaves unanswered. First, why is there no cycle on the root [fihim] before the subject suffixes are added? This would block syncope on the initial syllable of [CiCiC] roots regardless of the affixes that follow. Brame notes that "What stands out about ...examples of cyclic application of stress is the

fact that the string constituting the first cycle itself shows up elsewhere as an independent phonetic word sequence"(1974:55). This point of course follows precisely if the cyclic effect arises from matching the immediate constituents of the derivative with independent words as called for by the Base-Identity Constraint. Our analysis of *fihím#na* is shown by the tableau in (29). The constraints governing stress are ranked above Base-Identity and force stress to fall on the heavy penult; the winning candidate thus fails to match the stress of the base thereby earning one violation mark for Base-Identity. But Base-Identity ranks above the constraint banning unstressed short high vowels from open syllables. The upshot is to favor [fihím#na] over [fhím#na]. The former receives two violations for Base-Identity because of the double mismatch in stress while the latter is assessed an additional violation because it syncopates the initial syllable.

(29)   /fihim#na/   Stress | Base-Identity | *„i]$_\sigma$
       \$fihím#na   Ã   *   *
        fhím#na   Ã   **!   Ã
        fíhim#na   *!   Ã   Ã
        &fíhim

It should be noted that in /fihim+na/ -> *fhím-na* 'we understood' the immediate constituent [fihim] is the root 'understood'. There is no identity effect from the word *fíhim* because the latter means 'he understood' and hence is not an immediate constituent of /fihim+na/ 'we understood'. The situation is thus not comparable to Korean /kaps/ 'price' which is an immediate constituent of *kaps-i* 'price' nominative.

     Another question the cyclic analysis leaves unanswered is why when multiple stresses are assigned under the cycle it is the rightmost one that survives. On our analysis this follows necessarily because stress is assigned only once, to the rightmost heavy syllable. No deletion of stress is required. Rather the inhibitory effects of stress on syncope are communicated through the Base-Identity constraint that evaluates one word in virtue of its correspondence to another word. However, this raises an important point. If Base-Identity ranks above *„i]$_\sigma$ then how can we derive *fíhm#u* from /fihim#u/? Base-Identity will incorrectly favor the candidate that leaves both vowels of the stem intact as it provides a better match with the base.

(30)   /fihim#u/   Stress | Base-Identity | *„i]$_\sigma$

*fíhimu	Ã	Ã	*
fíhmu	Ã	*	Ã
&fíhim			

This example shows that the requirement of base-identity cannot be formulated as a single constraint. We need to be able to pinpoint particular aspects of the base that are susceptible to matching effects. One generalization that stands out in the Palestinian example and many others is that it is stressed vowels that are especially susceptible to matching effects. Compare Brame's (1974:55) remark that "the most convincing of cyclic phonological rules appear...to be those involved in assigning primary stress". The primary stressed syllable is of course the head of the prosodic word and presumably one of the most salient aspects of a word's phonetic profile. Our suggestion is that identity with respect to certain salient positions in the base such as the stress peak, the syllable peak, and the left and right edges of the base may be ranked higher than the requirement of complete identity. In Palestinian Arabic, only identity with respect to the contents of the stressed syllable of the base is ranked above *„i]σ, so vowels which are unstressed in the base can be deleted.

(31)

/fihim#u/	Stress	Base-Identity: V	*i]σ
$fíhmu	Ã	Ã	Ã
fíhimu	Ã	Ã	*!
&fíhim			

3.4 Dutch Lengthening

Dutch provides another example of transfer via the stressed syllable.[2] Booij (1995a, this volume) discusses a rule of the nonnative sector of the vocabulary that lengthens a vowel in the final syllable of the stem when a vowel-initial suffix follows. Vowel length is reflected in the change of quality from [ø], [Y], and [Î] to [o], [y], and [e].

(32)

dóct[ø]r	'doctor'	doct[o:]r-áat	'doctorate'
cóns[Y]l	'council'	cons[y:]l-áir	'consular'
kán[ø]n	'canon'	kan[o:]n-íek	'canonical'
álcoh[ø]l	'alcohol'	alcoh[ó:]l-icus	'alcoholic'
álfab[Î]t	'alphabet'	alfab[é:]t-isch	'alphabetic'

The forms in (33) such as kan[ø]nn-íer show a stem-final pretonic vowel that is not lengthened. They systematically differ from the items in (32) in that the corresponding vowel in the base is stressed: kan['ø]n.

(33) kan['ø]n   'gun'   kan[ø]nn-íer 'gun man'
      kart['ø]n   'cardboard' kart[ø]nn-áge   'cardboard manufacture'
      tromp[_Î]t   'trumpet'   tromp[Î]tt-íst   'trumpeter'
      bl['ø]k 'block'   bl[ø]kk-éer   'to block'

Booij argues that these cases require a cycle in which stress is assigned to the base and then the vowel lengthening rule is applied under the condition that the vowel be unstressed. The lengthened vowel may then attract stress to itself, as in *alcohólicus*.

(34)   first cycle: /trompÎt/   /alcohøl/
                       tromp_Ît   álcohøl   stress
       second cycle: tromp_Ît+ist   álcohøl+icus
                       -----------   álcoho:l+icus   lengthening
                       tromp_Ît+íst álcohó:l+icus   stress
                       trompÎt+íst   alcohó:l+icus   stress deletion

        From our perspective the constraint requiring a stem-final vowel to be long is dominated by a constraint that matches the head of the prosodic word of the base with the corresponding vowel in the derived structure. Lengthening is free to hold sway just in case the stem-final syllable corresponds to an unstressed syllable in the base. These constraints apply regardless of the stress of the actual output form. It is the stress of the corresponding base that is the determining factor (necessitating a cycle in the derivational model). Thus, lengthening is blocked in [trompÎt+íst] because the head syllable of the prosodic word of the corresponding base tromp[_Î]t contains an [_Î] which must be matched in the suffixed form. In the case of [alcohól+icus] the candidate with the lengthened vowel is the winner since its correspondent in the base álcoh[ø]l is not located under the head of the prosodic word and hence is not subject to any matching requirement.

(35)   /trompÎt+ist/   Stress | Base-Iden: v | *„vC+V
       $trompÎt+íst   Ã   Ã   *
        trompe:t+íst   Ã   *!   Ã

&tromp[_Î]t

/alcohøl+icus/	Stress	Base-Iden: V	*„ᴠC+V
$alcohó:l+icus	Ã	Ã	Ã
alcoh'øl+icus	Ã	Ã	*!
&álcohøl			

Matching effects with respect to stress often show up in the formation of hypocoristics. Thus, in English the peak of the prosodic word typically is the anchor for the bimoraic syllable that forms the core of the hypocoristic: *Elízabeth -> Liz*; *Rebécca -> Becky*; *Eugéne -> Gene* (the left edge being the other option: *Penélope -> Penny*). In other languages hypocoristics are formed at one edge of the base regardless of stress (e.g. Spanish, cf. Prieto 1992), or take account of both stress and an edge location (e.g. Catalan, cf. Cabré & Kenstowicz 1995). We conjecture that constraints referring to these edge positions will play a role comparable to stress in dominating the Base-Identity constraint that calls for complete identity.

4 Uniform Exponence

If cyclic rule application were the mechanism that accounted for the type of similarities between morphologically related words discussed in the previous section then we would expect that such effects should only arise between a derivative and a subconstituent. On the other hand, if there are constraints like Base-Identity that require similarity between words in certain morphological relationships, we predict the possibility of a range of such effects. This prediction is confirmed by the existence of paradigm leveling (Flemming 1995). Paradigm leveling results in instances of unexpected similarity between morphologically related words which cannot always be accounted for in terms of cyclic rule application, either because neither word forms a constituent of the other, or because the basic form is modified to correspond to the derived form, rather than vice versa.

In this section we examine various instances of paradigm leveling. We suggest that these cases exemplify a general constraint imposing uniform exponence on the realization of a lexical item (cf. the "anti-allomorphy" of Burzio 1995). Once again, some of these cases can be described in terms of the cycle in the derivational model while others are not susceptible to such an interpretation.

4.1 S-aspiration in Spanish

In many Spanish dialects /s/ is realized as [h] in the syllable coda. The constraint against /s/-codas gives rise to alternations such as those in (36).

(36)   /mes/   /des-/
        meh   'month'   deh-calzar   'unshoe'
        mes-eh   pl.   de.h-e.cho   'refuse'

The realization of /des+calzar/ as [deh]calzar requires that the constraint against /s/ in the coda dominate the faithfulness constraint that calls for an /s/ in the input to correspond to an [s] in the output.

(37) | /des+calzar/ | *s]$_\sigma$ | Faith-/s/ |
        |---|---|---|
        | $deh.calzar | Ã | * |
        | des.calzar | *! | Ã |

The point of interest in (36) is to account for the fact that /des-/ is realized as /deh-/ before a vowel-initial stem even though the final consonant of the prefix is syllabified as onset with the following vowel: [de.he.cho]. For these cases, Harris (1993) proposes a Level-II cycle for the prefix along with a special "closure condition" on the stem blocking the (re)syllabification of the prefix-final consonant to onset until the postlexical stratum.

For this case the Base-Identity constraint (12) cannot be invoked because the prefix /des-/ does not appear as an independent word. Rather we suggest that the candidates for the prevocalic allomorph of the prefix are evaluated so as to minimize allomorphic differences in the realization of the /des-/ morpheme itself.

(38) Uniform Exponence: minimize the differences in the realization of a
                lexical item (morpheme, stem, affix, word.)

Depending on where Uniform Exponence (UE) is ranked among the other constraints we derive different effects. For the case of /des-/, UE must rank above the constraint Faith-/s/ that calls for the realization of input /s/ as [s]. However, it must be dominated by Onset because the prefix-final consonant takes on different prosodic guises as coda or onset depending on whether or not a vowel follows.

(39) /des+echo/ Onset | *s]$_\sigma$ UE-/des/ | Faith-/s/
      $de.he.cho   Ã   Ã   Ã   *
       de.se.cho   Ã   Ã   *!   Ã
       deh.e.cho   *!   Ã   Ã   *

Thus, on this analysis /des+echo/ -> [de.he.cho] does not reflect the aspiration of a coda-/s/ that is later resyllabified into the onset but rather the imposition of a uniformity condition minimizing variation in the realization of the prefix /des-/ itself. As shown by the plural /mes+es/ -> [mes.eh], the stem /mes/ is not subject to a comparable minimization with respect to s-aspiration. Therefore, the Uniform Exponence constraint must be specific to the prefix /des-/.[3]

4.2 Swiss German Umlaut

One of the classic examples of paradigm leveling involves the distribution of umlaut (the feature [-back]) with respect to a process lowering /o/ to [ø] before certain coronal consonants in Swiss German dialects (Kiparsky 1968, 1971; Robinson 1976). In the Schaffhausen dialect we find the data of (40). The prohibition againt precoronal /o/ evident in (40a) induces the alternations among [o], [ö], and [ø] seen in (40b). In this dialect a constraint barring [o] (but not [ö], cf. böd*ƒ*) before coronals dominates the faithfulness constraint requiring input /o/ to have the output correspondent [o].

(40) a. ops 'fruit', tob*ƒ*l 'ravine', bog*ƒ* 'bow'
        røss 'horse', bød*f* 'floor', trøtt*ƒ* 'sidewalk', børn 'horn'

    b. bog*ƒ* 'bow' bög*ƒ*   'bows'
       bød*ƒ* 'floor' böd*ƒ*   'floors'

The item of interest is the fact that in the Kesswil dialect (41) lowering is extended to umlauted /o/: b<u>ød</u>*f* 'floors'. But /ö/ is replaced by /ø/ in Kesswil only in stems that have /ø/ in a related allomorph of the inflectional paradigm. Words like <u>plötsli</u> 'suddenly' and <u>fröss</u> 'frog' which are not paradigmatically related to non-umlauted forms do not undergo Lowering. Thus, lowering has not simply generalized to apply to front /ö/ before coronals.

(41) bog*ƒ*   'bow' bög*ƒ*   'bows'

bødf   'floor' bødf   'floors'

We may account for this case in terms of the constraint of Uniform Exponence. The dialect change of [bödf] to [bødf] reflects minimization of allomorphy so that the stem vowel has a more uniform realization through the inflectional paradigm. In effect, [+low] is assigned to the [-back] vowel of [bødf] pl. in order to match the [+low] feature required on the [+back] /o/ before a coronal in [bødf] sg. However, as in the Spanish example, Uniform Exponence is not an absolute requirement in Swiss German. Otherwise umlaut would either be blocked in the plural or else carried over to the singular. Evidently, faithfulness to the feature [back] dominates UE. Our tableau indicates that both the singular and plural forms are evaluated in parallel since Uniform Exponence evaluates the entire paradigm for similarity.

(42)

/bodf, bödf/	*[o]Coron	Faith-[back]	UE	Faith-[low]
$bødf, bødf	Ã	Ã	*	**
bødf, bødf Ã	*!	Ã	**	
bødf, bödf Ã	Ã	**!	*	
bodf, bödf *!	Ã	*	Ã	
/plötsli/				
$plötsli Ã	Ã	Ã	Ã	
pløtsli Ã	Ã	Ã	*!	

Thus, the major difference between the Schaffhausen and Kesswil dialects in the present context concerns the ranking of Uniform Exponence with respect to Faithfulness for [low]. In Schaffhausen where Faith-[low] dominates Uniform Exponence, it is more important to be faithful to the input form and realize the [-low] of the underlying /o/ at the expense of introducing greater disparity in the realization of the root vowel through the singular-plural paradigm. In Kesswil where Uniform Exponence dominates Faith-[low], allomorphic variation in the root vowel is minimized at the cost of fidelity to the underlying form. Since on this analysis the lowering of /ö/ arises from adherence to Uniform Exponence, there is no specific constraint against precoronal [ö]; there is thus no reason to depart from a faithful rendering of the underlying root vocalism in *plötsli*.[4]

4.3 Latin rhotacism

Another classic case of leveling in the inflectional paradigm comes from Latin where intervocalic /s/ is replaced by [r] (Kiparsky 1971; see also Anderson's (1985:54) discussion of Saussure's interpretation of this example): *o:s* nom. sg., *o:r-is* gen. sg. 'mouth'.[5] Rhotacism also applies in the nominative singular of third declension nouns in spite of the fact that the intervocalic environment is not present (43). The related adjectival forms show that the final consonants of these roots is /s/. Rhotacism is expected in the genitive singular where a vowel-initial suffix is added to the root. However, rhotacism occurs in the nominative singular too even though underlying /s/ is not intervocalic. This pattern of over-application is regular (with some systematic exceptions discussed below).

(43) <u>nom.sg.</u>   <u>gen.sg.</u>
      honor hono:r-is   'honor'   cf.   hones-tus   'honest'
      arbor arbo:r-is   'tree'   arbus-tus   'wooded'
      angor ango:r-is   'constriction'angus-tus   'tight'

The explanation for the over-application of rhotacism, proposed by Kiparsky (1971), is that it produces a consistent final consonant for the stem throughout the nominal paradigm, eliminating an allomorph with final [s]. This scenario corresponds to the historical development: the earlier nominative singular form was [hono:s]. An analysis of these facts in terms of cyclic rule application is not possible: none of the words in which the intervocalic environment for rhotacism holds is a subconstituent of the nominative singular so the over-application of rhotacism cannot be explained by application on an earlier cycle.

The analysis adopted here is that rhotacism applies in the nominative singular due to the constraint of Uniform-Exponence that requires the stem to receive a consistent realization through the paradigm. Evidently, the leveling was restricted to nominal paradigms. In fact, it is found in just the third declension but only because stems in other declensions are generally vowel-final, so suffixation cannot produce rhotacism alternations in the stem. The leveling follows from the constraint ranking in which Uniform Exponence (Nominal) and the ban on intervocalic [s] dominate Faith-/s/. Once again the schematic tableau (44) is intended to show the entire inflectional paradigm indicating that sets of words built from the same nominal stem are evaluated in parallel for their similarity.

(44) /hono:s, hono:s-is, UE(N)   *VsV | Faith-/s/
       hono:s-em, .../

	UE(N)	*VsV	Faith-/s/
$honor hono:r-is hono:r-em	Ã	Ã	***...
honos hono:r-is hono:r-em	*!	Ã	**...
honos hono:s-is hono:s-em	Ã	*!*...	Ã

The paradigm with leveling of [r] is the winner: *VsV >> Faith-/s/ forces rhotacism in the intervocalic contexts eliminating the third candidate; and UE(N) >> Faith-/s/ forces the over-application of rhotacism in the nominative singular in order to maximize the similarity of the stem realizations through the nominal paradigm. Given that the constraint imposing uniformity is restricted to the nominal paradigm, leveling does not extend to the adjectival form [hones-tus].

Of the two main classes of [s]-final stems in Latin, masculines in [-o:s] and neuters in [-us], only the former underwent leveling (Maniet 1975:41, Hammond 1976:91). Stems in [-us] such as *tempus* nom. sg., *tempor-is* gen. sg. 'time', were not leveled to *[tempur]. We could account for this fact by restricting UE to masculine noun stems, but it seems likely that the basis of the restriction is actually phonological. High vowels were subject to lowering before [r] as shown by the lowering of /u/ to [o] in *tempor-is* from /tempus+is/ by rhotacism and lowering (Redenbarger 1974). Assuming a constraint against high vowels followed by [r], the lack of rhotacism in the nominative singular of the neuters can be accounted for by embedding the ranking *[+high] [r] >> Faith-/u/ between *VsV and UE(N) as schematized in (45).

(45) /tempus, tempus+is,.../   *VsV | *[+high] r | Faith-/u | UE(N)

	*VsV	*[+high] r	Faith-/u	UE(N)
$tempus, tempor-is,...	Ã	Ã	*	**
tempus, tempus-is,...	*!	Ã	Ã	Ã
tempur, tempur-is,...	Ã	*!*	Ã	Ã

tempor, tempor-is,...	Ã	Ã	**!	Ã

The rhotacism constraint outranks *[+high] [r] so rhotacism is not blocked by high vowels, but *[+high] [r] and Faith-/u/ outrank UE(N) so leveling is prevented from extending lowering as well as rhotacism to the nominative singular.[6]

   A second set of systematic exceptions is monosyllabic roots such as *o:s* nom.sg., *or-is* gen.sg. 'mouth'. Kiparsky (1974) suggests that rhotacism is not extended to the nominative singular due to the general absence of monosyllabic stems in [-or]. While it is not clear how to express this restriction, whatever constraint(s) are responsible must rank above UE(N).

4.4 Polish raising

   In the examples discussed so far, the allomorph that is generalized through the paradigm can be determined solely by ranking UE with respect to the relevant faithfulness constraints. We close with an example in which this situation does not obtain. A particular member of the inflectional paradigm must explicitly be recognized as the model to which the other members of the paradigm are adjusted. Our example comes from the [o]Å[u] alternation in Polish and is based on descriptive generalizations in Gussmann (1980); the basic insight and relevance of the example in the present context is due to Kraska (1995).

   In the nominal inflection of Polish /o/ is raised to [u] before the "zero" case suffixes provided by the so called weak yers--i.e. the nominative singular masculine and genitive plural feminine and neuter. Yers are vowels that delete unless the following syllable contains a yer, in which case they are pronounced ("vocalized" in traditional terminology).

(46) /doÓl/ 'hole' /krow/ 'cow'   /pol/ 'field'
        masc.   fem.   neut.

		masc.	fem.	neut.
sg.	n.	duÓl -<Y>	krow-a	pol-e
	g.	doÓl-u	krow-y	pol-a
	d.	doÓl-owi	krow-ie	pol-u
	a.	duÓl -<Y>	krow-˜e	pol-e
	i.	doÓl-em	krow-õ	pol-em
	l.	dol-e	krow-ie	pol-u
pl.	n.	doÓl-y	krow-y	pol-a
	g.	doÓl-ów	kruw-<Y>	pul-<Y>
	d.	doÓl-om	krow-om	pol-om

a. doÓl-y	krow-y	pol-a
i. doÓl-ami	krow-ami	pol-ami
l. doÓl-ach	krow-ach	pol-ach

Informally, we express the constraint of raising as *[o]C<Y>. The item of interest is the behavior of /o/ before the diminutive suffix /-Yk/. Since it contains a yer, the diminutive alternates between [-ek] (if a yer follows) and [-<Y>k] (i.e. [-k] if a nonyer vowel appears in the following syllable). Raising of /o/ before the diminutive is regular for feminine and neuter nouns (cf. [kruw-<Y>k-a] and [pul-<Y>k-o]) but is mysteriously suspended for masculines (cf. [doÓl-<Y>k-a]). Also, raising does apply before the "vocalized" yer in the genitive plural of feminine and neuter nouns (cf. [kruw-ek-<Y>], [pul-ek-<Y>]) but not the nominative singular masculine ((cf. [doÓl-ek-<Y>]).

(47)   masc.   fem.   neut.
sg. n. doÓl-ek-<Y>   kruw-<Y>k-a   pul-<Y>k-o
    g. doÓl-<Y>k-a kruw-<Y>k-i   pul-<Y>k-a
    d. doÓl-<Y>k-owi   kruw-<Y>c-e   pul-<Y>k-u
    a. doÓl-<Y>k-e   kruw-<Y>k-˜e   pul-<Y>k-o
    i. doÓl-<Y>k-iem   kruw-<Y>k-õ   pul-<Y>k-iem
    l. doÓl-<Y>k-u   kruw-<Y>c-e   pul-<Y>k-u

pl. n. doÓl-<Y>k-i kruw-<Y>k-i   pul-<Y>k-a
    g. doÓl-<Y>k-ów   kruw-ek-<Y>   pul-ek-<Y>
    d. doÓl-<Y>k-om   kruw-<Y>k-om   pul-<Y>k-om
    a. doÓl-<Y>k-i   kruw-<Y>k-i   pul-<Y>k-a
    i. doÓl-<Y>k-ami   kruw-<Y>k-ami   pul-<Y>k-ami
    l. doÓl-<Y>k-ach   kruw-<Y>k-ach   pul-<Y>k-ach

There is thus both over- and under-application. Raising occurs where it shouldn't (before a vocalized yer in the genitive plural feminine and neuter) and fails to apply where it should (throughout the oblique cases of the masculine). The cycle is obviously of no help here since masculine genitive singular [doÓl-<Y>k-a] and feminine nominative singular [kruw-<Y>k-a] arise from comparable underlying structures of the form /CoC+Yk+a/. The generalization clearly is that there is leveling through the diminutive paradigm: masculine nouns have [o] while feminine and neuters have the raised [u]. However, simply ranking Uniform Exponence above *oC<Y> is not sufficient

to determine whether it is the raised allomorph or the nonraised one that is generalized. This is clear from the tableau in (48) where Uniform Exponence eliminates the paradigm with an alternating stem vowel but fails to discriminate between the remaining two candidates. No consistent ranking can be established between *oC+Y and Faith-/o/ that determines the correct output for both the masculine and the feminine nouns.

(48)

/doÓl+Yk+Y, /doÓl +Yk+a/	UE	*oC+Y	Faith-/o/
doÓlek<Y>, doÓl <Y>k-a	Ã	*	Ã
duÓlek<Y>, duÓl <Y>k-a	Ã	Ã	**
doÓlek<Y>, duÓl <Y>k-a	*!	Ã	*

/krow+Yk+Y, krow+Yk+a/			
krowek<Y>, krow<Y>ka	Ã	*	Ã
kruwek<Y>, kruw<Y>ka	Ã	Ã	**
krowek<Y>, kruw<Y>ka	*!	Ã	*

Rather, one particular allomorph in the paradigm--the nominative singular --is generalized through the rest of the paradigm. This leads to over-application in the case of [kruw-ek-<Y>] and to under-application in the case of [doÓl-<Y>k-a]. In order to generalize the nominative singular allomorphs we must rank UE above both *oC<Y> to allow [doÓl-<Y>k-a] as well as above Faithfulness-/o/ to allow [kruw-ek-<Y>]. We show the special status of the nominative singular in the tableaux by the ampersand. In plays much the same role as the isolation form in the case of Base-Identity.

(49)

/doÓl +Yk+a/	UE	*oC<Y>	Faith-/o/
$doÓl -<Y>k-a	Ã	Ã	Ã
duÓl -<Y>k-a	*!	Ã	*!
&doÓl -ek-<Y>			

/krow+Yk+Y/	UE	*oC<Y>	Faith-/o/
krow-ek-<Y>	*!	*!	Ã
$kruw-ek-<Y>	Ã	Ã	*
&kruw-<Y>k-a			

A similar pattern of paradigm leveling occurs in Spanish (Harris 1973) where the indicative stem of the verb is maintained in the subjunctive, leading to over- as well as to under-application of velar softening. In both the Polish

and Spanish cases, the stem that is generalized is the one that is found in a morphological category that is commonly regarded as unmarked (cf. Bybee 1985:50ff.).

5 Summary & Conclusion

In this paper we have proposed expanding the role of faithfulness in Optimality Theory by introducing transderivational constraints in which the candidates for one output are evaluated with respect to their similarity to morphologically related outputs. Two general constraint types evaluating for similarity were distinguished. The Base-Identity constraint (12) is relevant to situations in which one word is an immediate constituent of a larger derivative structure. These similarity relations are treated in the derivational model as the byproduct of cyclic rule application while Base-Identity sees the phonological connection more directly as an explicit comparison of separate outputs. We saw that the two positions are often distinguishable depending on whether or not the immediate constituents composing the derived structure exist as independent output forms (Italian [s]-voicing, Korean cluster simplification)--a distinction that can only be stipulated in an ad hoc fashion in the derivational model by calling on different levels. We also saw that evaluation for base-identity may single out particular aspects of the base as relevant for the similarity evaluation. In Palestinian Arabic and Dutch, it is the contents of the syllable bearing main stress in the base that must be matched in the derivative; comparable syllables outside the main stress are not subject to matching effects. To accommodate such cases we proposed to decompose Base-Identity into separately rankable subconstraints comparable to the way in which the original OT faithfulness constraints for input-output relations have been broken down into a family of subconstraints. It is a task for future research to determine the precise nature of the decomposition and the extent to which it mimics input-output faithfulness.

Because it enforces similarity between different realizations of the stem in contexts that lie outside the relevant phonotactic, the Base-Identity constraint can be considered a subcase of Uniform Exponence which evaluates the various realizations of a morpheme for similarity to one another. In most of the cases of paradigm leveling studied here the allomorph that is generalized is determined by ranking Uniform Exponence with the relevant

faithfulness constraint. For example, in Latin *VsV and Uniform Exponence dominate faithfulness to /s/ forcing the generalization of [r] in the inflectional paradigm of third declension nouns such as *honor*. But as we saw in the discussion of Polish diminutives, sometimes ranking with the appropriate faithfulness constraint fails to determine which stem allomorph serves as the prototype. Base-Identity has a similar status. For example, in the Italian case of intervocalic /s/-voicing, either {sociale, a-sociale} or {[z]ociale, a-[z]ociale} will satisfy Uniform Exponence. Base-Identity ensures that leveling is directed towards the isolation form of the stem. Thus, in this case as well as the Polish diminutives a directionality effect is observed: one of the allomorphs must be singled out as the model to which the others are adjusted. How to subsume Base-Identity under Uniform Exponence and still account for the directionality effect remains a task for future research.

NOTES

[*]   Thanks to Luigi Burzio, Jacques Durand, Tom Green, James Harris, Morris Halle, and Hyang-Sook Sohn for helpful comments and criticisms. Special thanks to Edward Flemming for discussion of the issues raised in this paper, particularly the idea of connecting cyclicity with paradigm leveling.

[1]   While it is possible that younger speakers have restructured the input representation the Base-Identity constraint explains why verb stems may terminate in a CC cluster while noun stems systematically fail to do so.

[2]   Thanks to Moira Yip for this observation.

[3]   Harris (1993) states that for the dialects under discussion underlying /s/ is the only source for [h]. This fact motivates the underlying representation /des-/ even if it is uniformly realized as [deh]. James Harris (personal communication) also reports that for certain aspirating dialects prevocalic /des-/ has alternative realizations as [des] or [deh]. This variation might be characterized by saying that the constraint imposing uniform exponence is ranked equivalently with Faith-/s/. The result is that the [des-] and [deh-] candidates receive an equivalent number of violations marks and hence neither one is eliminated at the expense of the other.

[4]   As Kiparsky originally showed, the dialect difference can also be analyzed in terms of ordered rules: in Schaffhausen Umlaut precedes and bleeds [o] -> [ø] while in Kesswil [o] -> [ø] precedes and counterbleeds Umlaut.

[5]   The analysis of Latin in this section is due to Edward Flemming in cooperation with Donca Steriade.

[6]   A few forms in -us did undergo leveling such as *augur* 'augur' (cf. *augus-tus* 'august') and *robur* 'oak' (cf. *robus-tus* 'robust').

REFERENCES

Anderson, Stephen (1985). *Phonology in the twentieth century.* Chicago: University of Chicago Press.

Baek, Yoo-Kyung (1994). Intermediate representation in Optimality Theory. Ms, MIT.

Benua, Laura (1995). Identity effects in morphological truncation. Jill Beckman, Laura Walsh Dickey & Suzanne Urbanczyk, eds. Papers in optimality theory. *University of Massachusetts Occasional Papers in Linguistics* 18. 77-136.

Booij, Geert (1995a). *The phonology of Dutch.* Oxford: Oxford University Press.

Booij, Geert (this volume). Lexical phonology and the derivational residue.

Brame, Michael (1974). The cycle in phonology: stress Palestinian, Maltese, and Spanish. *Linguistic Inquiry* 5. 39-60.

Burzio, Luigi (1987). English stress. *Certamen phonologicum.* P.M. Bertinetto & M. Loporcaro, eds. Papers from the 1987 Cortona Phonology Meeting. Torino: Rosenberg & Sellier. 153-76.

Burzio, Luigi (1994). *Principles of English stress.* Cambridge: Cambridge University Press.

Burzio, Luigi (this volume). Surface constraints versus underlying representations.

Bybee, Joan (1985). *Morphology: a study of the relation between meaning and form.* Typological Studies in Language 9. Amsterdam: John Benjamins.

Cabré, Teresa & Michael Kenstowicz (1995). Prosodic trapping in Catalan. *Linguistic Inquiry* 26. 694-705

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

Chung, Sandra (1983). Transderivational relationships in Chamarro phonology. *Language* 59. 35-66.

Chung, Younghee (1991). *The lexical tone system of North Kyungsang Korean.* Ohio State Ph.D. dissertation.

Cohn, Abigail (1989). Stress in Indonesian and bracketing paradoxes. *Natural Language & Linguistic Theory* 7. 167-216.

Cohn, Abigail & John McCarthy (1994). Alignment and parallelism in Indonesian phonology. Ms, University of Massachusetts, Amherst.

Duanmu, San (1995a). Metrical and tonal phonology of compounds in two Chinese dialects. *Language* 71. 225-259.

Duanmu, San (1995b). Alignment and the cycle. Ms., University of Michigan, Ann Arbor.

Dudas, Karen (1974). A case of functional phonological opacity: Javanese elative formation. *Studies in the Linguistic Sciences* 4,2. 91-111.

Flemming, Edward (1995). The analysis of contrast and comparative constraints in

       phonology. MIT Phonology Circle lecture.

Goldsmith, John (1993). Local modelling in phonology. S. Davis, ed. *Connectionism: theory and practice.* Oxford: Oxford University Press. 229-46.

Gussmann, Edmund (1980). *Studies in abstract phonology*. Cambridge: MIT Press.

Halle, Morris & William Idsardi (1994). A reanalysis of English stress. *MIT Working Papers in Linguistics* 21. 1-9.

Hammond, Mason (1976). *Latin: A Historical and Linguistic Handbook.* Cambridge, Ma.: Harvard University Press.

Harris, James (1973). On the order of certain rules in Spanish. S. Anderson & P. Kiparsky, eds. *A Festschrift for Morris Halle.* New York: Holt. 59-76.

Harris, James (1983). *Syllable structure and stress in Spanish*. Cambridge, Ma.: MIT Press.

Harris, James (1993). The integrity of prosodic constituents and the domain of syllabification rules in Spanish and Catalan. K. Hale & J. Keyser, eds. *The view from Building 20*. Cambridge, Ma.: MIT Press. 177-93

Iverson, Gregory & Shinsook Lee (1994). Variation as optimality in Korean cluster reduction. Eastern States Conference of Linguistics.

Kenstowicz, Michael. (1994a). Syllabification in Chukchee: a constraints-based analysis. *Formal Linguistics Society of the Midwest* 4. 160-81.

Kenstowicz, Michael (1994b). Cyclic vs. noncyclic constraint evaluation. *MIT Working Papers in Linguistics* 21. 9-37. Revised version to appear in *Phonology* 12.3 (1995).

Kiparsky, Paul (1968). Linguistic universals and language change. E. Bach & R. Harms, eds. *Universals in Linguistic Theory*. New York: Holt.

Kiparsky, Paul (1971). Historical linguistics. W. Dingwall, ed. *A Survey of Linguistic Science.* College Park: University of Maryland.

Kiparsky, Paul (1974). On the evaluation measure. Papers from the Parasession on Natural Phonology. Chicago: Chicago Linguistics Society. 328-37.

Kiparsky, Paul (1982). From cyclic to lexical phonology. H. van der Hulst & N. Smith, eds. *The Structure of Phonological Representations* (part I). Dordrecht: Foris. 131-76.

Kraska, Iwona (1994). *The phonology of stress in Polish.* Ph.D. dissertation, University   of Illinois, Urbana, Ill.

Maniet, Albert (1975). *La phonétique historique du Latin dans le cadres de language indo-européenes.* Paris: Editions Klincksieck.

McCarthy, John (1995). Extensions of faithfulness: Rotuman revisited. Ms, University of Massachusetts, Amherst.

McCarthy, John & Alan Prince (1993). *Yearbook of Morphology 1993.* 79-153.

McCarthy, John & Alan Prince (1995). Faithfulness and reduplicative identity. Jill Beckman, Laura Walsh Dickey & Suzanne Urbanczyk, eds. Papers in optimality theory. *University of Massachusetts Occasional Papers in Linguistics* 18. 249-384.

Nespor, Marina & Irene Vogel (1986). *Prosodic Phonology*. Dordrecht: Foris.

Peperkamp, Sharon (1995). Prosodic constraints in the derivational morphology of Italian. *Yearbook of Morphology 1994.*

Prieto, Pilar (1992). Truncation processes in Spanish. *Studies in the Linguistic Sciences* 22,1: 143-58.

Prince, Alan & Paul Smolensky (1993). *Optimality theory: constraint interaction in generative grammar.* Ms., Rutgers University, New Brunswick, and University of Colorado, Boulder. To appear, Cambridge, Ma: MIT Press.

Redenbarger, Wayne (1976). Vowel lowering and i-epenthesis in Classical Latin. Marta Luján & Fritz Hensey, eds. *Current Studies in Romance Linguistics*. Washington, D.C.: Georgetown University Press. 1-13.

Robinson, Orrin (1976). A 'scattered' rule in Swiss German. *Language* 52. 148-62.

Rubach, Jerzy & Geert Booij (1985). A grid theory of Polish stress. *Lingua* 66. 281-319.

Selkirk, Elizabeth (1995).The prosodic structure of function words. Jill Beckman, Laura Walsh Dickey & Suzanne Urbanczyk, eds. Papers in optimality theory. *University of Massachusetts Occasional Papers in Linguistics* 18.439-470.

Steriade, Donca (1994). Class notes from UCLA seminar on Lexical Phonology.