**Revising the phonological motivation for splitting the morphology[*]**

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## 1. *Introduction*

It has long been noticed in the literature that many languages show phonological distinctions between inflection and derivation, or between nominal and verbal morphology. The theoretical importance of such empirical differences for drawing dividing lines within morphology is not yet clear; nonetheless, it remains an intriguing issue. In this paper I present examples of phonological distinctions between nominal and verbal inflection where either the former or the latter correlates with the phonology of derived words. My purpose is to show that one does not have to resort to the use of cyclic or any other stratal organization to account for such distinctions, but they can be inferred from differences in the paradigmatic relations holding between words.

The paper is organized as follows. I first present data from the Cushitic language Oromo and the Romance language Catalan showing that in both languages vowel epenthesis appears to be morphologically conditioned. Then I sketch out an optimality-theoretic parallel analysis that offers a solution to the controversy regarding the split of the morphology for phonological reasons and provides evidence for the role of paradigms.

2. *Data*

The first example to be discussed comes from Wellegga Oromo (WO), spoken in the west-central area of Ethiopia (cf. Gragg 1976; Lloret 1988, 1989, 1997). Oromo is a pitch-accent language and dialects differ, among other things, because of the tone system. In WO, pitch and accent are predictable to a great extent from grammatical class and segmental shape, and for this reason they are not usually marked in systematic representations. The segmental phenomena to be discussed in this paper have not been previously related to suprasegmentals but I will later show that they are, and on that ground I will mark tone on the phonetic outputs. The data in (1) illustrate the regular facts of WO with respect to vowel insertion. Oromo does not allow clusters of three consonants. When such clusters would arise through affixation, *i* is inserted between the second and third consonants (for expository reasons, epenthetic vowels appear underlined henceforth). Epenthesis applies without exceptions in verbal inflection and in derivation as well. (The following abbreviations are used: SG = singular, PL = plural, PI = present indicative, CS = causative.)[1]

(1) /a/ 1<sup>st</sup>SG.PI:

| | | | |
|---|---|---|---|
| (1) /a/ 1<sup>st</sup>SG.PI: | tum-a | túmà | "I beat" |
| | arg-a | árgà | "I see" |
| /na/ 1<sup>st</sup>PL.PI: | tum-na | túmnà | "we beat" |
| | arg-na | árgìnà | "we see" |
| /ta/ 2<sup>nd</sup>SG.PI: | tum-ta | túmtà | "you beat" |
| | arg-ta | árgìtà | "you see" |
| /s/ CS (stative verbs): | gog-s-a | gógsà | "I dry" |
| | gudd-s-a | gúddìsà | "I raise (children)" |
| /siis/ CS (active verbs): | tum-siis-a | tùmsíisà | "I make beat" |
| | arg-siis-a | àrgìsíisà | "I show" |
| /tuu/ deverbal: | tum-tuu | tùmtúu | "blacksmith" |
| | danf-tuu | dànfìtúu | "a kind of drink" |

In nominal inflection, there are cases where epenthesis applies as expected (2). (FEM = feminine.)

(2)  /oota/ PL:    sar-oota    sàróotá    "dogs" (cf. SG *sàrée*)

nam-oota    nàmóotá    "men" (cf. SG *námá*)

fard-oota    fàrdóotá    "horses" (cf. SG *fárdá*)

/tuu/ FEM:    diim-tuu    dìimtúu    "red" (cf. MASC *dìmáa*)

obs-tuu    òbsi̱túu    "patient" (cf. MASC *òbsáa*)

The nominative forms, though, never undergo epenthesis in WO, but other arrangements are made to avoid the potential rise of three-consonantal clusters. The examples in (3a) show that in WO the nominative marker /ni/ (sometimes /ti/ in a few feminine nouns) is suffixed to the citation form of a noun ending in a long vowel, where the final high-toned vowel further deletes for independent reasons. (In general, final vowels are very unstable in Oromo, and their realization is related to their quality and tone. For the present purposes, it is sufficient to note that in WO final high-toned *i*'s--like the ones that appear in the nominative marker--are deleted, unless a syllabification problem arises.)[2] The examples in (3b,c) illustrate that when the citation form of a noun ends in a short vowel, this final vowel does not surface in the nominative. The examples in (3c) further show that the nominative marker surfaces with a vowel-initial shape (–*i*) when it appears next to two consonants.[3] (CIT = citation, NOM = nominative.)

(3)  a.  sàrée    "dog.CIT"    sàréen(í)    "dog.NOM"

tùmtúu    "blacksmith.CIT"    tùmtúun(í)    "blacksmith.NOM"

b.  námá    "man.CIT"    námní    "man.NOM"

ìntálá    "girl.CIT"    ìntáltí    "girl.NOM"

c.  fárdá    "horse.CIT"    fárdí    "horse.NOM"

bíyyá    "country.CIT"    bíyyí    "country.NOM"

Surface allomorphy in the shape of the nominative marker avoids vowel insertion in (3c), but this is not the only singularity that the nominative shows. The nominative case is marked on the head noun of the noun phrase, as opposed to the other case markers, which are enclitic suffixes postponed to the noun phrase as a whole (4). (BEN = benefactive.)

(4) a. Nám-ní    fárdá    ìntálá-af  bít-à
       man-NOM   horse.CIT   girl-BEN    buy-3[rd]SG.PI
       "A man buys a horse for a girl."

   b. Nám-ní    fárdá    ìntálá kán béek-ná-af        bít-à
       man-NOM  horse.CIT girl.CIT that  know-1[st]PL.PI-BEN buy-3[rd]SG.PI
       "A man buys a horse for a girl that we know."

Phrasal enclitic suffixes, like the benefactive in (4), entail lengthening of the last vowel of the noun phrase to which they attach; therefore, they never give rise to consonantal clusters; cf. *ìntálá-af* "for a girl" (4a), *ìntálá kán béekná-af* "for a girl that we know" (4b). The nominative marker, though, looks more like an inflectional suffix, in the sense that it can appear next to the final consonants of the stem of the noun-phrase head to which it attaches; cf. *nám-ní* "man-NOM" (4a,b).

Former analyses make use of different morphological devices to account for the special behavior of the nominative. Some analyses resort to a rich underlying allomorphy (/ti/~/i/ in a few feminine nouns and /ni/~/i/ elsewhere, which are added to a whole citation form ending in a long vowel or to the citation form minus its final short vowel). Another approach is to depart from fewer underlying forms (/ni/ or /ti/ added to the full citation form always) and resort to either monostratal morphologically conditioned ordered rules or cyclic organization to account for the outputs. The former propose final-a deletion and consonant deletion rules restricted to nominative forms, which are ordered among them and with respect to epenthesis. The latter propose insertion of the nominative marker in a

different cycle, where final-a deletion and consonant deletion apply but not epenthesis.

The second example to be discussed comes from the variety of Catalan spoken in Majorca (MC), in the Balearic Islands (cf. Bibiloni 1983; Lloret 2003, 2004). In Catalan, final consonantal clusters that do not satisfy the sonority sequencing principle are repaired through *e* insertion (underlined henceforth). But MC presents a singularity: Epenthesis always takes place in the nominal morphology (5a) as well as in some verbal forms (5b); however, other inflected verbal forms with sonority-increasing endings surface unchanged (6).[4] This is the case in all first-person singular present indicative forms (6a) and in second- and third-person singular present indicative forms of conjugation II and III verbs (6b).[5]

(5)  a.  Ø MASC:

    pont-Ø    pont    "bridge"  (cf. *pont-et*   "small bridge")

    teatr-Ø   teatr<u>e</u>  "theater" (cf. *teatr-al*  "theatrical")

    centr-Ø   centr<u>e</u>  "center"  (cf. *centr-ista* "centrist")

    llibr-Ø   llibr<u>e</u>  "book"   (cf. *llibr-ot*  "big book")

  b.  /ɾ/ infinitive:   di-r     dir     "to say"

                    bat-r    batr<u>e</u>  "to beat"

(6)  a.  Ø 1$^{st}$SG.PI (all conjugations):

    cant-Ø    cant    ['kant]      "I sing"

    idolatr-Ø  idolatr  [ido'latɾ]  "I adore"

    entr-Ø    entr    ['əntɾ]    "I enter"

    obr-Ø    obr    ['ɔpɾ]     "I open"

  b.  /s/ 2$^{nd}$SG.PI, Ø 3$^{rd}$SG.PI (conjugation II-III):

    obr-s     obrs   ['ɔpɾs]    "you open"

    obr-Ø    obr    ['ɔpɾ]     "s/he opens"

As in the WO case, the MC data show a rather puzzling morphophonological phenomenon for which explanations in terms of allomorphy or morphologically conditioned processes are possible. Underlying allomorphy (e.g., *Ø~e* in the masculine forms, *r~re* in the infinitives) does not conform the criterion of minimal redundancy and yet something else has to be said in order to justify the presence of sonority-increasing endings in (6). Another rather controversial account is to posit the existence of a special phonologically empty morph in (6b). In contrast with the other empty morphs (cf. (5a)), this special empty morph would block epenthesis, either because it would only be present in the first level or because it would be considered extrasyllabic. Yet another approach is to resort to Government Phonology and claim that (5) contains phonologically empty nucleus slots, which trigger epenthesis, while (6) contains phonologically empty morphs, which do license the sonority-increasing endings. (For a review of former analyses, see Lloret 2003.)

The proper treatment of morphophonological alternations is an old research question, with well-known arguments in the literature in favor of and against the aforementioned approaches. With respect to the WO and the MC data, if the allomorphical view is preferred, the issue on misapplication of the regular phonology does not arise but it remains unexplained why languages use the form of inflectional morphemes to yield a better syllabification in certain words but not in others. But if the cyclic account is taken into account, it remains as a language-specific stipulation the organization of the morphology in cycles. And if empty morphs with concomitant phonological effects are accepted, it also remains unexplained why they appear in certain cases and not in others. What I propose in this paper is to face the previous data from a different perspective, a perspective in which shape restrictions emerge from surface paradigmatic relations and well-formedness conditions. The analysis is framed within the tenets of Optimality Theory (OT) (Prince & Smolensky 1993).

3. *A correspondence surface-oriented analysis within Optimality Theory*

3.1. *Background of paradigmatic effects in Optimality Theory*

Within OT, two different surface resemblance effects among morphologically related words are distinguished: the ones derived from asymmetric relations (7a) and the ones derived from symmetric relations (7b) (cf., among others, McCarthy 2001). In asymmetric relations, the surface phonology of a form ($\alpha$) can influence the surface phonology of its derived form ($\beta$), but not vice-versa. In symmetric relations, instead, every member ($\alpha$ and $\beta$) can act as the attractor for the other member, with no precedence.

(7)   a.   Asymmetric relation:   $\alpha \rightarrow \beta$
      b.   Symmetric relation:   $\alpha \leftrightarrow \beta$

Symmetric and asymmetric relations are defined in morphological and prosodic terms. Such an approach is highly compatible with the organization of grammar in OT, where prosodic and morphological constraints are part of the same hierarchy. In OT, and specifically in its version of Correspondence Theory (McCarthy & Prince 1995), surface similarities between morphologically related words involve the notion of output-output correspondences (Benua 1997), which derives from the notion of paradigm uniformity in pre-generative linguistics (cf. Kuryłowicz's 1949 work, for instance). This is the line of research that I will pursue next in analyzing the data under study.

3.2. *Wellegga Oromo: An asymmetric relation*

In WO, the first issue to be addressed is why the nominative forms of the citation nouns that end in a long vowel maintain this vowel (8a), while the ones corresponding to citation nouns ending in a short vowel do not (8b), as neither do other inflected and derived words (8c).

(8) a. sàrée "dog" (CIT) sàréen (NOM)

    b. námá "man" (CIT) námní (NOM)

       fárdá "horse" (CIT) fárdí (NOM)

    c. sar-čča sàríččá "the dog" nam-čča nàmíččá "the man"

       arg-na árgìnà "we see" arg-ta árgìtá "you see"

       gudd-s-a gúddìsà "I raise" danf-tuu dànfìtúu "a drink"

I will work on the assumption that the nominative marker--as all other case markers (cf. (4))--is always attached to the full citation form, which is a freestanding word, while other suffixes are attached to the root, which is a bound form (see Figure 1). If this is so, there must be an independent reason for the deletion of the final short vowel in (8b). It is clear from the data that the cause is not phonotactical. I argue below that the reason is prosodically grounded and that it is also responsible for the deletion of the consonant of the nominative marker and the failure of epenthesis in the nominative forms of (8b).
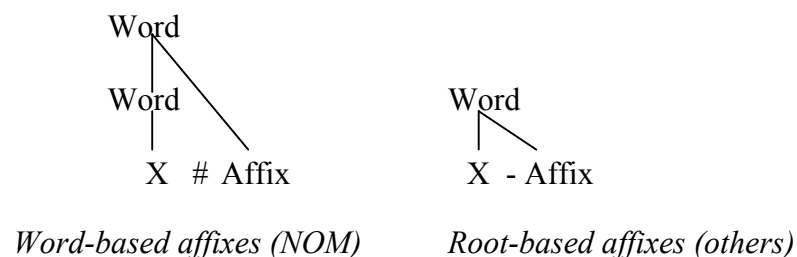


Figure 1: Word-based and root-based affixes

To account for the regular phonology of WO, it is sufficient to appeal to the markedness constraints *CCC (against three-consonantal

clusters), which is categorical in Oromo, and *í# (against word-final high-toned [i]),[6] and to the input-output (IO) faithfulness constraints IO-DEP(ENDENCE) (against epenthesis) and IO-MAX(IMALITY) (against deletion). To account for the special behavior of the nominative forms, we have to resort to output-output faithfulness constraints. In WO, the paradigmatic relation that holds between a case-marked form and its citation form is asymmetrical, in the sense that there is a base and this base imposes its characteristics on its morphologically related form ($\alpha \rightarrow \beta$) (cf., among others, Burzio 1994, McCarthy 1995, Kenstowicz 1996, Benua 1997). Here and in the rest of the paper, I crucially use the notion of base provided by Kager (1999a,b) in order to restrict the number of possible base relations: The base is a freestanding output form (i.e., a word) that contains a subset of the grammatical features of the derived form. (From here on, I will identify this specific notion of base by using small capitals, i.e. BASE.)[7] In WO, the morphological relation of a nominative form--or any other case-marked form--with respect to its citation form is included in this definition. The morphologically related forms that involve root-based affixes do not match the first criterion; they have no BASE and thus the BASE-oriented constraint is irrelevant for candidate selection. The relevant prosodic BASE-oriented constraint is the following:

(9) ID(ENTITY)-BA(SE): Let $\alpha$ be a segment in the base, and $\beta$ be a correspondent of $\alpha$ in the affixed form. If $\alpha$ is a segment of the *prominent syllable*, then $\beta$ is a segment of the prominent syllable.

The constraint ID-BA states that the segments of the prominent syllable of the BASE must have a correspondent in the prominent syllable of the morphologically related form. It is out of the scope of this paper to analyze the full pitch-accent system of Oromo. For the present purposes, it is sufficient to note that in WO, in nouns, where the ID-BA constraint is

relevant, the prominent syllable is identified as the high-toned syllable and it is always predictable. When there is more than one high-toned syllable, the prominent syllable is the stressed one (in nouns the stress falls in the penultimate syllable). Regarding pitch assignment, the generalization is that when the surface form of the noun ends in a long vowel or in a short vowel followed by a consonant, only this last syllable bears high tone. When the noun ends in a short vowel, the last two syllables are high.

The ranking *CCC, ID-BA » *í# » IO-MAX » IO-DEP accounts for the WO facts. Tableaux 1-5 illustrate this ranking at work. For expository reasons, prominent syllables appear in boldface in the tableaux below, and only candidates with the right prominent syllable are taken into account. This implies that highly ranked prosodic constraints regarding tone and stress placement will previously discard candidates with the wrong assignment of prominence. For example, in Tableau 1 the nominative form has as its BASE the citation form *námá*, with the prominent syllable *ná* (in *námá* both syllables bear a high tone; therefore, prominence is decided on the basis of stress, which falls on the penultimate). Candidates (a) and (b) are eliminated because they violate ID-BA. (Note that candidate (a) would end up having high tones on the last two syllables because the last one ends in a short vowel; therefore, prominence is on the penultimate. Candidate (b) instead would end up having a high tone on the last syllable only, because it ends in a consonant; therefore, prominence is on the last.) Candidate (c) has the final vowel of the BASE deleted, but it appears in a non-prominent position. Thus, it does not violate ID-BA, and it wins although it violates *í# and IO-MAX.[8]

| nama#ni "man#NOM" BASE: **ná**má | *CCC | ID-BA | *í# | IO-MAX | IO-DEP |
|---|---|---|---|---|---|
| a. nà**má**ní | | *! | * | | |
| b. nà**mán** | | *! | | * | |
| ☞ c. **nám**ní | | | * | * | |

Tableau 1: *Nominative form of a noun ending in -CV*

Tableau 2 illustrates the case of nouns with a BASE ending in a long vowel. Candidate (a), which satisfies ID-BA, is eliminated because it violates *í#. Candidate (c), with the long vowel of the prominent syllable of the BASE deleted, is discarded because it violates ID-BA. Thus, candidate (b) is the optimal one.

| saree#ni "dog#NOM" BASE: sàrée | *CCC | ID-BA | *í# | IO-MAX | IO-DEP |
|---|---|---|---|---|---|
| a. sàréení | | | *! | | |
| ☞ b. sàréen | | | | * | |
| c. sární | | *! | * | ** | |

Tableau 2: *Nominative form of a noun ending in –CVV*

In Tableau 3, candidate (c) is eliminated because it violates *CCC. All other candidates, except (f), are discarded because they violate ID-BA. Note especially the case of (e), which complies with the regular phonology of WO with respect to *í# and vowel insertion to destroy three-consonantal clusters. This candidate is nevertheless eliminated because it violates ID-BA.

| farda#ni "horse#NOM" BASE: fárdá | *CCC | ID-BA | *í# | IO-MAX | IO-DEP |
|---|---|---|---|---|---|
| a. fàrdání | | *! | * | | |
| b. fàrdán | | *! | | * | |
| c. fárdní | *! | | * | * | |
| d. fàrdíní | | *! | * | * | * |
| e. fàrdín | | *! | | ** | * |
| ☞ f. fárdí | | | * | ** | |

Tableau 3: *Nominative form of a noun ending in -CCV*

In Tableaux 4-5, the ID-BA constraint is inactive because these are root-affixed forms, which have no BASE. In both cases, candidate (b), with vowel insertion, wins because IO-MAX is ranked above IO-DEP.

| arg-na "see-1stPL.PI" BASE: ---- | *CCC | ID-BA | *í# | IO-MAX | IO-DEP |
|---|---|---|---|---|---|
| a. árgnà | *! | | | | |
| ☞ b. árgìnà | | | | | * |
| c. árgà | | | | *! | |

Tableau 4: *Verbal inflected form from a stem in -CC and a suffix in C-*

| nam-čča "man-DEF" BASE: ---- | *CCC | ID-BA | *í# | IO-MAX | IO-DEP |
|---|---|---|---|---|---|
| a. námččá | *! | | | | |
| ☞ b. nàmíččá | | | | | * |
| c. námčá | | | | *! | |

Tableau 5: *Derived form from a stem in -C and a suffix in CC-*

## 3.3. *Majorcan Catalan: A symmetric relation*

In MC, the main issue to be addressed is why epenthesis fails to apply in present indicative forms without vocalic suffix (10a), whereas sonority-driven epenthesis takes place in other verbal forms (10b) as well as in nominals (10c).[9]

    (10)   a.     entr-Ø     entr     "I enter"

             b.     bat-r     batr<u>e</u>     "to beat"

             c.     centr-Ø     centr<u>e</u>     "center (MASC)"

The relevant constraints here are SON(ORITY) SEQ(UENCING) (complex onsets rise in sonority and complex codas fall in sonority) and IO-DEP. As shown in (11), in a one-by-one analysis of the words there is no means to explain both cases. For the regular cases of (11a) the sonority constraint must be ranked higher than IO-DEP, but for the exceptional cases of (11b) the opposite ranking is needed.

    (11)   a.   Inputs:   centr "center"    bat-r "to beat"

                 Outputs:   centr<u>e</u>           batr<u>e</u>    (SONSEQ » IO-DEP)

           b.   Input:    entr  "I enter"

                 Output:   entr                     (IO-DEP » SONSEQ)

My claim is that verbal forms like *entr* respect the ranking in (11a), but epenthesis is suspended due to surface leveling effects enhanced through symmetric correspondence relations (α ↔ β).[10] It is crucial to note that the verbal inflected forms which are now being dealt with cannot be related

under BASE Identity (the asymmetric paradigmatic relation that stood in the case-marked Oromo forms), because they do not satisfy the criteria for BASE-hood that were previously mentioned. In particular, verbal forms like *entr* "I enter" are not compositionally related to the other inflected forms because of a conflict of inflectional features (e.g., *entr* vs. *entr-es*: 1$^{st}$ vs. 2$^{nd}$ singular present indicative). The symmetric correspondence analysis that I propose instead goes in line with the findings of the Optimal Paradigms (OP) model of the interaction of phonology with inflectional morphology (McCarthy 2001). The central premises of OP are the following (McCarthy 2001:5):

a. Candidates consist of entire inflectional paradigms.

b. Markedness and input-output faithfulness constraints evaluate all members of the candidate paradigm. The violation-marks incurred by each paradigm member are added to those incurred by all the members.

c. The stem (shared lexeme) in each paradigm member is in correspondence relation $\Re_{OP}$ with the stem in every other paradigm member. (That is, for every candidate paradigm P there is a relation $\Re_{OP}$ on PxP.)

d. There is a set of output-output faithfulness constraints on the $\Re_{OP}$ correspondence relation.

The stems that stand in a $\Re_{OP}$ correspondence relation are in the output because this model establishes output-output correspondences. Thus, OP faithfulness constraints evaluate the surface form of the stem of each paradigm member with respect to the surface form of the stem of every other paradigm member to minimize differences. The surface forms of the stem (i.e., the output stems) are prosodized stems (PStem); they are the output string of segments that follows/precedes the inflectional affixes. As

shown in Figure 2, whether the input stem (i.e., the underlying form of a morphological stem, MStem) loses (a) or adds (b) a segment in the phonetic form, the output string of segments that precedes the inflectional suffix (i.e., the PStem) is the point of departure of OP relations. (This distinction between MStem and PStem is also defended in Itô and Mester 1997 for composition and in Downing 1999 for truncation.)
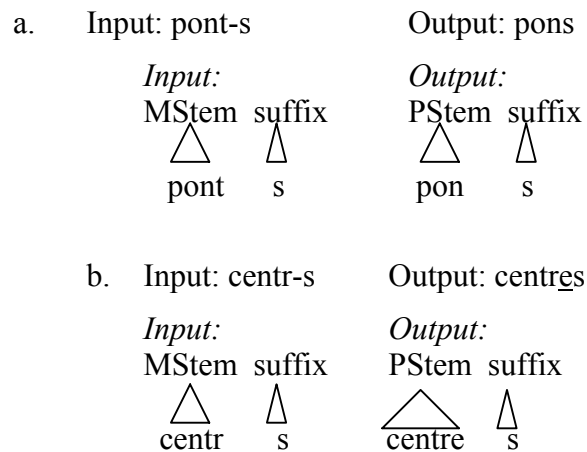
a.   Input: pont-s          Output: pons

*Input:*          *Output:*
MStem  suffix     PStem  suffix
△      △          △      △
pont    s          pon    s

b.   Input: centr-s          Output: centr<u>e</u>s

*Input:*          *Output:*
MStem  suffix     PStem  suffix
△      △          △      △
centr    s          centr<u>e</u>   s

Figure 2: *(*Input*) MStems and (output) PStems*

The OP constraint that is relevant for the present purpose is OP-DEP, which controls alternations in the output stems with respect to insertion. The ranking OP-DEP, SONSEQ » IO-DEP is sufficient background for analyzing the forms under study. (In the tableaux, the right margin of the output stems standing in correspondence relation is marked with the symbol ']'.) In Tableau 6, the sonority constraint, which evaluates each paradigm by summing up the violation incurred by each of its members, assigns one violation to the paradigm candidate in (a) because of the shape of its first person (*entr*). But the paradigm candidate in (b), with epenthesis in the first person to satisfy the sonority requirement, violates the OP-DEP constraint many times: OP-DEP scores one violation for each pair of forms within the paradigm with respect to insertion and the correspondence relation is fully

symmetric. Thus, there is one violation for the pair *entre] ℜOP entr]es*, another one for the pair *entre] ℜOP entr]a*, and so on.[11] At this point, candidates (a) and (b) fare even; that is, as bad is not to satisfy the sonority constraint as not to satisfy the paradigmatic requirement. In this situation, the IO-DEP constraint favors candidate (a), the one that also satisfies OP-DEP.

| entr "enter" | OP-DEP | SONSEQ | IO-DEP |
|---|---|---|---|
| ☞a. <entr], entr]es, entr]a…> | | * | |
| b. <entre], entr]es, entr]a…> | many * | | *! |

Tableau 6: *Paradigm candidates for* entr- *"enter" (1)*

A further candidate should be taken into consideration here: A paradigm like <entre], entre]es, entre]a…>, with overapplication of epenthesis in order to satisfy the OP constraint (cf. candidate (c) in Tableau 7). This candidate is discarded because it violates the markedness constraint *AA (against unstressed *ee/ea* sequences), which is top-ranked because AA sequences are always prohibited in MC.[12] That is, overapplication of epenthesis to homogenize paradigms is blocked by more important markedness considerations. In Tableau 7, candidate (c), which satisfies OP-DEP, is eliminated because many forms violate *AA, namely, all the inflected forms that display *e/a* initial suffixes.

| entr "enter" | *AA | OP-DEP | SONSEQ | IO-DEP |
|---|---|---|---|---|
| ☞a. <entr], entr]es, entr]a…> | | | * | |
| b. <entre], entr]es, entr]a…> | | many * | | *! |
| c. <entre], entre]es, entre]a…> | many *! | | | many * |

Tableau 7: *Paradigm candidates for* entr- *"enter" (2)*

Tableau 8 illustrates the case of a verb with no syllabic problems in the finite forms but with syllabic problems in the infinitive (from an input *bat-r*). Candidate (b), with epenthesis in the infinitive (*bat]re*), wins because

it does not violate the OP constraint since in the infinitive the epenthetic vowel (i.e., the final vowel) is not part of the output stem.

| bat "beat" | *AA | OP-DEP | SONSEQ | IO-DEP |
|---|---|---|---|---|
| a. <bat], bat͡s, bat]…bat]r> | | | *! | |
| ☞b. < bat], bat͡s, bat]…bat]r<u>e</u>> | | | | * |

Tableau 8: *Paradigm candidates for* bat- *"beat"*

Finally, Tableau 9 illustrates a case of nominal inflection. Candidate (b), with epenthesis in both forms, wins because it does not violate OP-DEP since both members of the paradigm contain a vowel to satisfy the sonority constraint.[13]

| centr "center" | *AA | OP-DEP | SONSEQ | IO-DEP |
|---|---|---|---|---|
| a. <centr], centr]s> | | | *, *! | |
| ☞b. <centr<u>e</u>], centr<u>e</u>]s> | | | | *, * |

Tableau 9: Paradigm candidates for centr- "center"

## 4. *Conclusion*

In the OT theories of surface resemblance among morphologically related words, the distinction between asymmetric (base-oriented) relations and symmetric (not base-oriented) relations is relevant. Asymmetric relations are organized hierarchically and the point of departure of the morphological operation involved is a 'base', which, according to Kager (1999a,b), is a freestanding output form that contains a subset of the grammatical features of the morphologically related word (i.e., the BASE). Inflected forms cannot be related on asymmetric basis when the two criteria for BASE-hood are not satisfied. In this case, instead, they are related symmetrically, and each form of the inflectional paradigm can act as an attractor for the others. What stands in symmetric correspondence is the constant part of each form (i.e., the stem). But since the correspondence relation targets outputs (surface

resemblance), it relates the surface realizations of the morphological stems (i.e., the PSTEM).

In OT, morphological constraints and prosodic constraints determine the type of operation that emerges in the outputs. There is no need to make a morphological distinction between free stems and bound stems; rather this derives from the way in which a morphological category maps onto a prosodic category (12a) or onto another morphological category (12b). The point of departure of a morphological operation can be a freestanding output form (which is a word, a prosodic category, as in (12a)), or a bound form (which is another morphological category, as in (12b)). BASE-Identity constraints can only be active in the first case. However, what decides the kind of relation to surface is not only the kind of morpho-prosodic mapping introduced through constraints but also the arrangement of the grammatical features (if they are a subset of the grammatical features of the morphologically related word or not). And, according to the OT tenets, languages ultimately make significant use of the constraints depending on their relative ranking, which is language-specific.[14]

(12)  a.  MCAT = PCAT:  MStem = PrWd (a freestanding form)
      b.  MCAT = MCAT: MStem = Root (a bound form)

Asymmetric and symmetric relations cannot be exclusively derived from the distinction between derivation and inflection (as it is suggested by several authors; cf. Kager 1999b, McCarthy 2001), since there exist, for instance, BASE-oriented operations in inflection as well. For example, in WO most adjectives have a plural in –*oota* but many also form a plural by reduplicating the first syllable and geminating the first consonant of the adjective (e.g., *gùddóotá* and *gùggùddáa* are the plural forms of *gùddáa* "big.MASC"). Reduplication is also used to derive iterative actions in verbs (e.g., *k'álà* "I slaughter", *k'ák'k'álà* "I slaughter repeatedly"), and in both cases the point of departure of reduplication is a BASE.

On the whole, this view of the facts shows that noncyclic alternatives are available within the correspondence OT theory and provides support for the claim that paradigms play a role in the linguistic organization of languages (in line with the findings of many other scholars).

**REFERENCES**

Benua, Laura. 1997. *Transderivational Identity: Phonological Relations between Words*. Ph.D. dissertation, University of Massachusetts, Amherst.

Bibiloni, Gabriel. 1983. *La llengua dels mallorquins. Anàlisi sociolingüística*. Ph.D. dissertation, Universitat de Barcelona.

Burzio, Luigi. 1994. "Metrical Consistency". *Language Computations* ed. by Eric Sven Ristad, 93-125. Providence, Richmond: American Mathematical Society.

Downing, Laura J. 1999. "Verbal reduplication in three Bantu languages". *The Prosody-Morphology Interface* ed. by René Kager, Harry van der Hulst & Wim Zonneveld, 62-89. Cambridge: Cambridge University Press.

Gragg, Gene. 1976. "Oromo of Wellegga". *The Non-Semitic Languages of Ethiopia* ed. by Lionel Bender, 166-195. East Lansing: Michigan State University Press.

Itô, Junko & Armin Mester. 1997. "Correspondence and Compositionality: The Ga-gyō variation in Japanese phonology". *Derivations and Constraints in Phonology* ed. by Iggy Roca, 419-462. New York: Oxford University Press.

Kager, René. 1999a. "Surface Opacity of Metrical Structure in Optimality Theory". *The Derivational Residue in Phonological Optimality Theory* ed. by Ben Hermans & Marc van Oostendorp, 207-245. Amsterdam & Philadelphia: John Benjamins.

---------. 1999b. *Optimality Theory*. Cambridge: Cambridge University Press.

Kenstowicz, Michael. 1994. "Syllabification in Chuckchee: A constraints-based analysis". *Proceedings of the Formal Linguistic Society of Mid America 4* ed. by Alice Davidson, Nicole Maier, Glaucia Silva, & Wan

Su Yan, 161-181. Iowa City: Department of Linguistics, University of Iowa.

---------. 1996. "Base-Identity and Uniform Exponence: Alternatives to Cyclicity". *Current Trends in Phonology: Models and methods* ed. by Jacques Durand & Bernard Laks, 363-393. Paris-X & Salford: European Studies Research Institute.

Kuryłowicz, Jerzy. 1949. "La nature des procès dits 'analogiques'". *Acta Linguistica* 5. 121-138.

Lehiste, Ilse. 1970. *Suprasegmentals*. Cambridge, Mass.: The MIT Press.

Lloret, Maria-Rosa. 1988. *Gemination and vowel length in Oromo morphophonology*. Ph.D. dissertation, Indiana University, Bloomington.

---------. 1989. "Final Vowels and Grammatical Marking in Oromo". *Current Approaches to African Linguistics*, vol. 5 ed. by Paul Newman & Robert B. Botne, 73-83. Foris: Dordrecht

---------. 1997. "Oromo Phonology". *Phonologies of Asia and Africa* ed. by Alan S. Kaye, vol. 1, 493-519. Winona Lake, Ind.: Eisenbrauns.

---------. 2002. "Estructura sil·làbica". *Gramàtica del català contemporani* ed. by Joan Solà, Maria-Rosa Lloret, Joan Mascaró, & Manuel Pérez Saldanya, vol. I, 195-249. Barcelona: Empúries.

---------. 2003. "On the function of emptiness". *Silexicales 3. Les unités morphologiques* ed. by Bernard Fradin, Georgette Dal, Françoise Kerleroux, Nabil Hathout, Marc Plénat, & Michel Roché, 108-117. Villeneuve d'Ascq: Université de Lille 3.

----------. 2004. "The phonological role of paradigms: The case of insular Catalan". *Contemporary Approaches to Romance Linguistics* ed. by Julie Auger, Clancy Clements, & Barbara Vance, 275-297. Amsterdam & Philadelphia: John Benjamins, 2004. (Available online at: http://rucs.rutgers.edu/roa.html, ROA No. 646)

Major, Roy C. 1992. "Stress and rhythm in Brazilian Portuguese*". Romance Linguistics: The Portuguese Context* ed. by Donald P. Mancedo & Dale A. Koike, 3-30. Westport: Bergin and Garvey.

McCarthy, John J. 1995. "Extensions of Faithfulness: Rotuman revisited". Ms., University of Massachusetts, Amherst. (Available online at: http://rucs.rutgers.edu/roa.html, ROA No. 110)

----------. 2001. "Optimal Paradigms" (Available online at: http://rucs.rutgers.edu/roa.html, ROA No. 485). To appear in *Paradigms in Phonological Theory* ed. by Laura J. Downing, Tracy A. Hall, & Ralf Raffelsiefen. Oxford: Blackwell, 2004.

McCarthy, John J. & Alan Prince. 1994. "The emergence of the unmarked: Optimality in Prosodic Morphology". *Proceedings of the North East Linguistic Society 24* ed. by Mercè González, 333-379. Amherst, Mass.: Graduate Linguistic Student Association.

----------. 1995. "Faithfulness and Reduplicative Identity". *University of Massachusetts Occasional Papers in Linguistics* ed. by Jill Beckman, Laura Walsh Dickey, & Suzanne Urbanczyk, vol. 18, 249-384. Amherst, Mass.: GLSA.

Prince, Alan & Paul Smolensky. 1993. *Optimality Theory: Constraint Interaction in Generative Grammar*. New Brunswick, New Jersey: Rutgers University Center for Cognitive Science. Technical report RuCCS-TR-2.

Stroomer, Harry. 1987. *A Comparative Study of Three Southern Oromo Dialects of Kenya*. Hamburg: Helmut Buske.

**NOTES**

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[1]In the examples, a high or low tone over a long vowel will only be marked on the first vowel.

[2]That *i* is part of the underlying representation of the nominative marker is proven, among other reasons, by the fact that when it bears a low tone it is overtly realized. This is the case, for example, in copula constructions, which impose a low tone on the last syllable of the sentence: *sàrée* "dog.CIT", *fìrá* "friend.CIT", *sàréen fìrà* "a dog is a friend", and crucially *sàréenì* "a dog is". This *i~Ø* tonal-depending alternation is found elsewhere in WO: *àfúr* "4", *àfúrì* "it is a 4"; *ìlkáan* "tooth", *ìlkáanì* "it is a tooth" (cf. Lloret 1988, 1989.)

[3]Some Oromo dialects show regular epenthesis in a few cases; e.g., *biyyi̱tii* in the Boraana southern dialect, where the feminine nominative marker is /tii/ (cf. Stroomer 1987).

[4]In (5a), underlying forms without the final stem vowels are posited on the basis that the vocalic contacts that would arise through suffixation do appear in other words. Here are some examples: *teatre* ([te'atɾə]), *teatr-al* and not *\*teatre-al*, which would contain the same stressed *ea* sequence; *ate-a* "atheist-FEM" and *ate-ista* "atheistic", but *centre*, *centr-ista*, and not *\*centre-ista*, which would contain the same stressed *ei* ([ə'i]) sequence. For further details on the syllable structure of Catalan, see Lloret (2002).

[5]For simplicity, in the MC examples I use the orthographic notation unless otherwise specified. It is worth noting, though, that Catalan devoices word-final obstruents and shows vowel reduction in unstressed position. In MC, low and mid front vowels (*a* and *e*) merge as schwa; epenthetic *e* is [ə]. For discussion on the onset/coda position of these odd consonantal endings according to their phonological behavior, see Lloret (2004).

[6]The constraint *\*í# is grounded on the less prominent character of close, high-toned unstressed final vowels. In a more thorough analysis, deletion of final vowels would be derived from the interaction of FINAL-C ("Every prosodic word ends in a consonant", McCarthy & Prince 1994) with more specific MAX constraints regarding the properties of speech sounds. (Correlation between suprasegmentals and vowel height and position of vowels in words is well established in the literature; see, among others, Lehiste 1970, Major 1992.)

[7]Note that although Kager's (1999a,b) definition of base is a stipulation not forced by the theory, it clearly restricts the problem of arbitrariness

concerning language-specific stipulations on the organization of morphology (in cyclic views) or language-specific base-correspondence stipulations (in parallel OT accounts using too-broad definitions of base). In essence, the same stipulations could be added to any cyclic approach.

[8]In the tableaux, candidates with deletion or insertion of segments that alter morphological integrity (such as *náaní*, from /nama#ni/) are ignored. This type of candidates would be discarded through the high ranking of IO-CONTIGUITY ("The portion of $S_2$ standing in correspondence forms a contiguous string ("No intrusion")", McCarthy & Prince 1995; see also Kenstowicz 1994).

[9]In OT, Richness of the Base provides two possible inputs, one with the final vowel and one without it. Lexicon Optimization would choose the input with the final vowel, and no issue on misapplication of epenthesis would arise. But Minimal Redundancy would favor the input without the final vowel, which demands an explanation for the failure of epenthesis. The latter is the relevant case to discuss here. (Cf. Prince & Smolensky 1993.)

[10]The analysis that I present in this section is motivated and explained in further detail in Lloret (2004).

[11]There are many more such violations once the whole paradigm is considered; here, I informally score many violations of OP-DEP. Note also that their symmetric counterparts (i.e., *entr]es* ℜOP *entre̲]*, *entr]a* ℜOP *entre̲]*, and so on) incur OP-MAX violations, which are not considered for expository reasons. (Cf. Lloret 2004.)

[12]Recall from note 5 that in MC unstressed *e* and *a* are realized as schwa due to vowel reduction. Therefore, *AA stands, in fact, for *[əə] sequences.

[13]In Catalan, singular/plural forms can also be related through the asymmetric correspondence relation, because they do satisfy the two criteria for BASE-hood. That is, the plural is always formed over freestanding output forms (i.e., the singular words) and it is possible to analyze the singular forms as being not marked for the number category. Under this view, nominal inflected forms would undergo ID-BA (singular → plural), which do the two candidates in Tableau 9 satisfy.

[14]In the WO inflected forms under study, for example, no effect of the OP constraints has been discovered; thus, we should assume for now that they are low-ranked. On the role of BASE-Identity constraints in MC within nominal inflection, see note 13 and Lloret (2004).