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THE EFFECT OF MONOCONSONANTAL AFFIXES ON SYLLABLE-BASED
PHONOLOGICAL RULES

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Morphological conditioning of phonological rules, including exceptionality based on morphological feature or class, is a well known phenomenon in linguistic studies. When confronted by apparent irregularity of application of a phonological rule, it is satisfying to find a morphological generalization under which to regularize the recalcitrant data. It has proven even more satisfying to systematize the interaction of morphological conditioning of the phonology in a level ordered framework such as is offered by lexical phonology.

However, such a principled framework may in some instances be only an apparent improvement over a simple statement of exceptionality. Indeed, its neatness may lull us into thinking that we have come up with a principled account when in fact we have ignored relevant facts which we should take into consideration in formulating an optimal analysis of a phonological phenomenon.

To present an instance of this, we explore data from the Rätö-Romansh dialect spoken in Bergün, Switzerland, in which certain morphological exceptions to phonological rules may be recognized as non-exceptional if examined in the light of prosodic

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structure. We examine morphological exceptions to two phonological rules noted: 1a) the rule which assigns main stress, and 1b) a rule which velarizes nasals following a stressed Nucleus. Notice that each of these rules refers crucially to prosodic structure, and more specifically to a stressed syllable. We will proceed by describing each of these rules and the morphologically conditioned exceptions to them in turn. We find that the morphological environment in each ends in a monoconsonantal affix, that is, an affix which consists of a single consonant and no vowel. We suggest that such an affix is extrametrical and renders the string under consideration unable to meet the structural description of the rule we are trying to apply to it, namely, either stress assignment or nasal velarization, and thus that the phonetic realization of these forms is not exceptional after all. We conclude by examining the question of what mechanism allows monoconsonantal affixes to be regarded as extrametrical by the phonology.

First, we present the rule of stress assignment.

The language's stress assignment rule may be stated informally as in (2):

- (2) Stress Assignment (Informal)
- a) Stress the final syllable if it is heavy, i.e., if it contains a branching Rime;
 - b) Otherwise, stress the penultimate syllable.

In metrical terms this rule may be expressed as in (3).¹

- (3) Stress Assignment (Metrical Formulation)
- a) Accent a branching Rime.
 - b) Build a single quantity-sensitive left-dominant foot at the right edge of the word.
 - c) Build a right-dominant word tree.

For most of this paper we will refer to the informal version of the rule, although we will return to the metrical version when we formulate the Nasal Velarization rule.

¹ For discussion of metrical treatment of stress, see especially Hayes 1981, 1982, and Hammond 1984.

It often happens that one clause or the other of the rule stated in (2) appears to be violated in the language. There are many instances of apparently irregular stress assignment in which, contrary to clause (a) of the stress rule, a heavy final syllable does not attract stress. We examine instances of this kind of irregularity in two morphological environments, noted in (4):

(4) Exceptions to (2a): stressing of a non-heavy final syllable

- a) in verb forms of several tenses, where the final branching Rime is [-ən] and is unstressed, for example, [čəntən] 'they sing' (not * [čəntán]) and [čəntəgvən] 'they sang' (not * [čəntəgván]); and
- b) in feminine plural nominals, where the final branching Rime is [-əs] and is unstressed, for example, [əmejəs] 'friends (fem.)' (not * [əmijás]).

(An analysis of other instances of non-application of the stress rule to heavy final syllables may be found in Kamprath 1986.)

The other sort of stress rule violation occurs in instances in which, contrary to clause (b) of the stress rule, a non-heavy final syllable *does* attract stress. Such violations occur regularly in certain verb forms noted in (5),

(5) Exceptions to (2b): non-stressing of a heavy final syllable

- a) future tense forms, e.g., [čəntərɔ] 'I will sing'
- b) masculine past participles, e.g., [finí] 'finished', [čəntó] 'sung'
- c) the imperative, e.g., [čəntɛ] 'sing!'

all of which have light final syllables which are nevertheless stressed. It is the future tense forms, such as [čəntərɔ] which will be of interest to us here.

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We assume that the violations exemplified in (5), that is, stressing of a non-heavy final syllable, is due to lexical marking of stress on the morphemes affected; that is, the future morpheme, the past participle morpheme and the imperative morpheme have an accent in underlying representation. Given the data, we believe this analysis to be non-controversial. It is the analysis of the other type of stress violation, illustrated in (4), namely, non-stressing of a heavy final syllable, which is at issue here, and it is to this analysis that we now turn in detail.

Unstressed Final Heavy Syllables

Final heavy syllables in third person plural verb forms, such as [čáŋtən] 'sings', and plural nominal forms such as [əméjəs] 'friends (fem.)', are immune to the application of the stress rule. Two possible accounts of this, noted in (6), suggest themselves:

(6) Possible motivation for non-application of stress in [čáŋtən] and [əméjəs]

- a) relative ordering of stress and affixation, and
- b) extrametricality, whereby a peripheral segment is considered extrametrical if it is "overlooked" or ignored by the rule which assigns metrical structure.

(See Hayes 1981, 1982, and Harris 1983 for further discussion of stress and extrametricality).

The first alternative is readily seen to be untenable. If stress is ordered before verbal affixation, then the stem will get the stress. The verbal inflection is then affixed, and, since, as we have argued elsewhere (see Kamprath 1986), stress applies only once per level, the affix will not be stressed. This analysis might work for plural nominals, such as [əméjəs] 'friends (fem.)'. However, it could not work for inflected verb forms, such as [čáŋtən] 'sings'. Harris, 1983, has argued that the domain of stress application for Spanish is the word, not the stem. This appears also to be the case for Rätö-Romansh. Hence, since no word has been formed until after affixation has taken place (in the case of the verb form), stress must follow affixation, and thus the

final heavy syllable will be stressed, incorrectly yielding *[čəntáj].

An appeal to extrametricality will produce the correct results for both forms. If the final consonant in [čáŋtən] and [əméjəs] is extrametrical, then the stress rule will not "see" that consonant and will therefore interpret the final syllable as light. The result of that interpretation is stress placement on the penult, which is the correct result.

However, it is not immediately apparent what is to be considered the motivation for the extrametricality of that final segment. If each of the two morphemes, the verbal pluralizing morpheme [n] and the nominal pluralizing morpheme [s], is lexically marked as extrametrical, then we have achieved a level of generality beyond that of lexically marking every instance of these segments. We could perhaps go a step further in trying to capture generality by marking all pluralizing affixes as extrametrical. However, these formulations do not capture the fact that all the affixes in question are *phonologically* similar: they are all vowelless, monoconsonantal, and [+cor]. Given that fact, it is plausible that their semantics is irrelevant to their phonological behavior. Lexical marking of extrametricality which may in fact be phonologically motivated obscures the phonological regularity and lumps extrametricality in such forms together with extrametricality which has no phonological basis or a different phonological basis. This dialect is full of instances of apparent stress irregularity of other sorts, noted in (7):

(7) Types of stress violation in Bergüner-Romansh

a) sonority based extrametricality which triggers epenthesis and yields a heavy but unstressed final syllable, e.g, ([dóbəl] 'double')

b) heavy unstressed final syllables not based on sonority, such as we have been discussing for [čáŋtən] and [əméjəs]

c) stressed light final syllables which are stressed for individual lexical items ([brinɛ]), and

d) stressed light final syllables which are irregularly but predictably stressed on a given morpheme

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([čəntəɾɔ] 'I will sing', [čəntó] 'sung', and [čəntɛ] 'sing!')

We argue that there are different accounts for each of these sorts of stress irregularity and thus that it behooves us to isolate a motivation for extrametricality in each instance in which it appears to be the agent of stress irregularity. It is the cases in (7b) which we address here, claiming that they are not irregularly stressed after all.

We examine a number of possible phonological motivations for extrametricality of the final consonant in [čəntən] and [əméjəs], as listed in (8):

(8) Possible phonological motivations for extrametricality of final C:

- a) Coronals are extrametrical.
- b) Peripheral consonants outside a stem are extrametrical.
- c) Peripheral consonants in inflectional affixes are extrametrical.
- d) Monoconsonantal, vowelless affixes are extrametrical.

Let us begin with a): Coronals are extrametrical. It is well known that the behavior of coronals in syllable structure may be different from that of non-coronals. For example, in English, it is only coronals that can appear as the final member of a sequence of four segments in a Rime. *Joust* is a possible word, but **jousp* is not; *joint* is, but **joinck* is not; *psyched* is, but **saikp* is not. In both the verbs ([čəntən]) and the nominals ([əméjəs]), the final segment is [+cor]. However, there are many other forms in the language in which the final segment is [+cor] but which do not exhibit the stress pattern of [čəntən] and [əméjəs]. For example, the diminutive suffix [-ət] also ends in a coronal, yet it attracts stress, e.g., [lajət], not *[lájət]. Therefore, we reject the coronal account.

b) Peripheral consonants outside a stem are extrametrical. This is Harris's (1983) proposal for accounting for similar apparent stress rule violations among nominals in Spanish. It could also account for the stress facts of [(čənt) ən] and [[(əméj)] əs] (where

parentheses mark off the stem). However, in the augmentative and diminutive affixes [-uŋ] and [-ɛt], the peripheral consonants lie outside the stem, e.g., [[(om)] úŋ], [[(laj)] ɛt]. Yet these consonants must not be extrametrical because the final heavy syllables of which they are a part *do* attract stress. If we modify the restriction to say that peripheral consonants *outside* the stem but *inside* the innermost prosodic word are extrametrical, then [[(om)] uŋ] and [[(laj)] ɛt] correctly do not have extrametrical final consonants. However, neither does [[(əmej)] əs], which, like [(ʔaŋt) ən], should.

The two alternatives just rejected are both invalid by virtue of a difference between inflectional and derivational affixes. Let us then propose c): Peripheral consonants in inflectional affixes are extrametrical. This appears to be the case for both [ʔaŋtən] and for [əmejəs], in both of which the final consonant is inflectional. This formulation does not affect [omuŋ] and [lajɛt], because the affixes there are derivational. It is furthermore irrelevant to the stress application in the future tense forms such as [ʔəntərən]. These forms contain inflectional affixes, but we argue that their stress is marked underlyingly on the morpheme [ɔ], thus blocking subsequent application of the stress rule.

However, formalization of such a restriction referring to inflectional vs. derivational affixes is not straightforward. There is no bracketing distinction between inflectional and derivational affixes. In principle either kind of affix may adjoin to either a stem, e.g., [(ʔaŋt) ən]_{infl}, and [(sənti) mɛŋt]_{deriv} 'sentiment' (<-- [səntekr] 'feel' + [-mɛŋt]), or to a word, e.g., [[(ʔəntər)] ən]_{infl}, and [[(om)] uŋ]_{deriv}. Furthermore, it is not possible to distinguish derivational from inflectional affixes by level ordering in this language: we have argued elsewhere (Kamprath 1986) that both inflectional affixation (e.g., verbal [n] and plural /-s/) and derivational affixation (e.g., [-uŋ] and [-ɛt]) may occur on the same level, that is, on level two.

A fourth possible motivation for extrametricality of final consonants in [ʔaŋtən] and [əmejəs] we propose

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as d): Monoconsonantal, that is, vowelless, affixes are extrametrical. In both [čáŋtən] and [əmejəs] the segments following the stem are two separate morphemes. We have argued elsewhere that, in [čáŋtən], [ə] is the reduced form of the class vowel /a/, and that [n] is the person/number marker. Similarly, in [əméjəs], [ə] is the reduced form of the feminine marker /a/ and [s] is the plural morpheme.

Thus we argue to adopt this account of the fact that the final heavy syllables in inflected forms such as [čáŋtən] and [əmejəs] do not attract stress: their final syllable is interpreted as light by the stress rule, because the final consonant, being a monoconsonantal affix, is extrametrical.

We will return below to an examination of why it is that monoconsonantal affixes function as extrametrical. But first we present the other phenomenon at issue here, namely the non-application of the Velarization rule to nasals in certain verbal forms.

Velarization of Post-Tonic Nasals

Following a stressed vowel, a [+cor] nasal is realized as [+hi, -cor]. We formulate the Nasal Velarization rule as presented in (9).

(9) Nasal Velarization

$$\begin{array}{rcl}
 & & \text{N} \\
 & & | \\
 [+nas & \text{-->} & [+hi / [x \quad x \quad x \quad \dots]] \\
 +cor] & & \text{-cor] } \Sigma \quad | \\
 & & \text{[___]}
 \end{array}$$

This rule states that velarization applies to a non-labial nasal which is syllabified in the foot, of which there is only one per word, and that on the right end of the word. Thus it applies to the nasal in the examples in (10):

- (10) [sɨ́nér] '(to) signal' vs. [séŋə] 'signals' and [seŋ]
 '(I) signal': [+hi, +cor]
 [finí] 'finished (pp)' vs. [féŋə] 'finishes' and
 [feŋ] : [-hi, +cor]

[fimér] '(to) smoke' vs. [fémə] 'smokes' (not
*[féŋə]): [-cor]

In [séŋə] 'signals' and [seŋ] '(I) signal', the nasal must be underlyingly specified as [+hi, +cor] because of its realization as [ɲ] in the unstressed alternant [siɲér] '(to) signal'. Rule (9) likewise applies to the nasal in [féŋə] 'finishes' and [feŋ] (I) 'finish', which must be underlyingly specified as [-hi, +cor] because of its realization as [n] in the unstressed alternant [finí] 'finished (pp)'. The rule does not apply to [-cor] nasals, e.g., [fimér] '(to) smoke' ~ [fémə] 'smokes' (not *[féŋə]).

Non-Application of the Velarization Rule in Future Tense Forms

However, the Nasal Velarization rule does not apply to [+cor] nasals following the final stressed vowel in certain future tense forms. We present the future tense paradigm in (11).

(11) Future Tense

čəntəɾɔ	čəntəɾɔn
čəntəɾɔsəs	čəntəɾɔsəs
čəntəɾɔ	čəntəɾɔn

Stress in these forms invariably falls on the future morpheme [ɔ], whether or not the conditions of the stress rule presented in (2) are met, namely stress the final syllable if heavy, and otherwise stress the penult. We argue that stress in the future paradigm must be lexically marked: that is, the future morpheme [ɔ] is underlyingly accented. The inapplicability of the velarization rule to the final nasal in the first and third persons plural is, we argue, related to the inapplicability of the stress rule in the instances mentioned above, that is, verb forms such as [čáŋtən] 'they sing' and plural nominals such as [əméjəs] 'friends'. We suggest that what [čáŋtən], which apparently violates the stress rule, and [čəntəɾɔn],

which apparently violates the nasal velarization rule, have in common is that the final consonant in each is a monoconsonantal affix. Material preceding the affix consists of stem and class vowel (i.e., $\acute{c}a\eta t + a$) in the case of $[\acute{c}a\eta t\acute{o}n]$, and stem and future morpheme (i.e., $\acute{c}a\eta t\acute{e}r + \upsilon$) in the case of $[\acute{c}a\eta t\acute{e}r\acute{o}n]$; in both forms the monoconsonantal affix is the third person plural morpheme. We propose that it is the fact that these final consonants are monoconsonantal affixes that renders them extrametrical. The relevance of this proposition to the inapplicability of the velarization rule in $[\acute{c}a\eta t\acute{e}r\acute{o}n]$ is this: the velarization rule refers to material following a Nucleus in strong position in a foot. Since the nasal in question, being extrametrical, is not a part of metrical structure, the rule is not applicable to it. Notice that the extrametricality of the /n/ also prevents it from rendering heavy the final syllable in the word. Thus the stress rule cannot apply to stress that syllable. The final syllable gets stress despite the fact that it is not heavy, however, because stress in the future tense is lexically specified, a stipulation that is necessary throughout the future paradigm not only to account for stress in forms ending in extrametrical consonants, such as $[\acute{c}a\eta t\acute{e}r\acute{o}n]$, but also to account for stress in the other persons, all of which are stressed contrary to what the stress rule would predict.

So we conclude that monoconsonantal, vowelless affixes are extrametrical. But how explanatory is such a statement? What makes them extrametrical? Are they lexically marked as extrametrical? Or is there a more general phonological principle that forces their extrametricality? In the instance of $[\acute{c}a\eta t\acute{o}n]$ and $[\acute{a}m\acute{e}j\acute{a}s]$, extrametricality is not a matter of constraints on syllable structure, such as sonority or Rime length. In both these forms and in the future forms where velarization does not apply to the final nasal, we would expect Coda formation to apply and stress and velarization to apply in the final heavy-syllable environment. It appears, however, that the Coda formation rule does not apply. Rather, we argue that these final consonants syllabify post-lexically by stray adjunction. What is the signal to the phonology not to apply Coda formation to these forms lexically? Is it that they have a little feature on them that says [-lexical syllabification]? If so, is that any better than just marking the segments extrametrical? Is it

that syllabification applies cyclically but not "last cyclically", that is, before the last affixation just in case that affixation involves a monoconsonantal affix? It may be the case that we need to stipulate that in this language, syllabification rules apply on every cycle, but that Nucleus formation feeds Coda formation. That is, on a given cycle, Coda formation may not apply unless Nucleus formation has applied on that cycle. This is our tentative proposal, pending investigation of other languages in which vowelless affixes occasion odd or non-application of phonological rules. Evidence for a special status for vowelless affixes would have to indicate that a vowelless affix does not syllabify as it would if there were a vowel in it. We would look for such evidence in:

a) instances in which an epenthesis rule applies before a monoconsonantal affix even if preceded in a vowel in another morpheme (Juliette Levin has suggested to me that this is instantiated in Klamath.);

b) instances in which a segmental rule affecting the quality of a vowel in a closed syllable does not apply when the segment which apparently closes the syllable is a monoconsonantal affix;

c) instances in which a rule which applies to a syllabified segment does not apply when the segment is a monoconsonantal affix, such as appears to be the case in the non-application of the Nasal Velarization rule in this study;

d) instances in which minimal pairs arise on the basis of monomorphemic vs. bimorphemic bracketing. English supplies examples of this kind of evidence: notice the difference in vowel length between pleas and please, rays and raise, pried and pride, whys and wise, towed and toad.

We leave the resolution of the status of monoconsonantal affixes to further research, but argue that they may be operative in more instances of apparent morphological exceptions to phonological rules than has been apparent heretofore.

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