How optimal is Italian stress?

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0. Introduction

In this paper, an optimality-theoretic (cf. Prince and Smolensky 1993) account of stress in Italian will be presented and discussed.[1] Italian stress has been studied intensively in the framework of metrical phonology. Previous analyses of Italian stress have been proposed, among others, by Sluyters (1990) and DiFabio and Burzio (1994). Our main reason for devoting again attention to Italian stress is the fact that the Italian stress system contains a number of aspects which are particularly interesting from the viewpoint of Optimality theory (cf. Prince and Smolensky 1993).

Optimality theory assumes a universal set of constraints, specified by Universal Grammar. These constraints, then, are hierarchically ranked on a language-specific basis. Furthermore, there are two functions, called GEN and EVAL. The former GENerates for each input the possible candidate outputs. The latter EVALuates the possible output candidates and imposes a ranking on the candidates according to how well they satisfy the hierarchically ranked constraints. The candidate which best satisfies the constraint hierarchy is evaluated as the most optimal one. The role of phonological rules has thus been entirely subsumed by the constraint hierarchy (for more details see Prince and Smolensky 1993).

Why, now, is Italian stress interesting from the viewpoint of Optimality theory? Given the central assumption of Optimality theory that there is one candidate which is the most optimal one, more than one output from a single input (optionality) is evidently not an expected result. This is precisely what characterizes Italian stress: main stress as well as secondary stress have a number of optional realizations. This paper explores possible ways in which these facts can be described within the framework of Optimality theory.[2]
More specifically, it will be argued that the optional realizations of stress in Italian should not be accounted for in terms of optional re-ranking of constraints, a strategy that comes to mind immediately, but rather that lexical marking of optional or exceptional patterns is inevitably.

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[1] I would like to thank the participants of the LIN-meeting for their valuable comments.

[2] Harry van der Hulst rightly pointed out that, in general, reasons for adopting novel theoretical approaches are twofold. Either it enables a better understanding of the facts or it enables a better understanding of theoretical issues. The latter constitutes the aim of this paper.

This paper is organized as follows. In section 1, we will briefly present the main facts of Italian stress and the analysis proposed in Sluyters (1990). Section 2 briefly discusses the DiFabio-Burzio (1994) account, and, finally, section 3 presents an account in terms of Optimality theory. Section 4 summarizes the main results of this paper.

1. Italian stress

In Italian, apart from cases of final stress which will be discussed below, main stress can be on the penultimate syllable or on the antepenultimate syllable. If the prefinal syllable is heavy, stress is generally on the penult. According to Sluyters (1990:80) only a few lexical entries ignore prefinal heavy syllables by antepenulti- mately stressing them, and, more importantly, loan words (the examples given are italianized toponyms) have stress on prefinal heavy syllables, even if in the source language the stress pattern is different.

Final stress in Italian occurs in a set of well-defined environments, listed in (1).

(1)   a) on word-final heavy syllables (VC, no underlying long vowels)

      b) on vowel-final stems which do not undergo inflection

      c) on stressed monosyllables

Final stress in environment (1a) is not obligatory. Penultimate and antepenul- timate stress are also possible. A number of environment (1a) words have both patterns. For instance, besides *festivál* 'festival', *féstival* is also possible. Some examples of stress in environment (1b) are : *peró* 'however' *virtú* 'virtue' and *colibrí* 'hummingbird.' Final stress in environment (1b) is not exceptionless. Some cases of vowel-final, non-inflected stems which have nevertheless no final stress are, for instance, *rósa* 'pink' and *vióla* 'purple'. Examples of final stress in (1c) include: *gás* 'gas' *dí* 'day' and *blú* 'blue.'

Secondary stress in Italian can be realized in two possible ways. Examples illustrating these possibilities are given in (2).
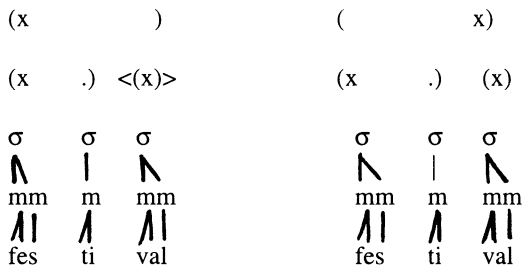
(2)   *èlettrìcitá*   or   *elèttricitá*   'electricity'
      còmunìcazióne   or   *comùnicazióne*   'communication'
      càrattèrizzábile or   *caràtterizzábile* 'characterizable'

Let us now, after this summary of the main facts of Italian stress, briefly recapitulate the analysis proposed by Sluyters (1990). In order to capture the quantity-sensitivity of Italian main stress, Sluyters (1990:82) proposes a non-

iterative quantity-sensitive left-dominant foot construction rule. Stress contrasts between phonologically and morphologically identical forms, such as, for example, *corníce* 'cornice' *cálice* 'chalice' show, on the one hand, that extrametricality is needed, and, on the other hand, that extrametricality cannot be predicted. In order to account for such forms, Sluyters assumes that final moras are idiosyncratically marked as being extrametrical.

The cases of final stress are handled in the following way. Final stress in the environment (1a) is accounted for by assuming optional final foot extrametricality (indicated by angled brackets), as illustrated in (3).

(3) a *féstival*   (final Foot EM) b *festivál*   (no final Foot EM)

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    (x            )                    (            x)

    (x      .)  <(x)>                  (x      .)  (x)

    σ      σ    σ                      σ      σ    σ
    ∧      |    ∧                      ∧      |    ∧
    mm     m    mm                     mm     m    mm
    ∧|     ∧    ∧|                     ∧|     ∧    ∧|
    fes    ti   val                    fes    ti   val
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The optional marking of the final foot as being extrametrical, followed by the construction of a quantity-sensitive left-dominant foot, supplemented by the End rule final, yields the two possible realizations of *festival*.

The cases of final stress in environment (1b) are accounted for by idiosyncratically marking certain stems as not undergoing inflection and by using this mark to lexically assign final stress. Monosyllables (1c) are stressed by the main stress rule, and, if monomoraic, receive an empty C-slot, by a rule which provides empty C-slots to a stressed light, monosyllabic foot. Hence, forms like *blú* and *peró* are treated on a par: both are provided with an empty C-position.[3]

Finally, the two variable ways of realizing secondary stress are accounted for by optional deletion of cyclically assigned feet followed by the left-to-right assignment of syllabic trochees. If deletion takes place, the left-hand forms in (2) are generated, and if deletion does not take place, the main stress assigned on an earlier cycle (compare *caráttere*, *eléttrico* and *commúnico*) surfaces as secondary stress.

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[3] Evidence for treating them alike is based on their identical behavior with respect to gemination and epenthesis. The implications of final stress in Italian for catalexis theory (cf. Kiparsky 1993) will not be discussed here, but see Jacobs (1994).

In this section, we have briefly presented the main facts of Italian stress and the analysis proposed by Sluyters (1990). Before turning to an optimality-theoretic account of stress in Italian, we will first briefly discuss a recent proposal by DiFabio and Burzio (1994).

2. *DiFabio and Burzio*

DiFabio and Burzio (1994) note that in English weak stress preservation (that is, preservation of main stem stress as secondary stress in word-formation) is possible only under limited conditions. They observe that the resulting foot must be either binary or ternary with a light second syllable. Examples are given in (4).

(4)   a   (σσ)   *medícinal*   *me(dìci)nálity*
      b   (σLσ)   *persónify*   *per(sònifi)cátion*
      c   *(σHσ)   *cómpensàte*   **(cómpensa)tòry*
                                     com(pénsa)tòry

In previous analyses, contrasts such as the ones in (4) have been accounted for by cyclic application of stress and stress erasure of some earlier stresses on higher cycles. Burzio and DiFabio (1994) propose a different approach. Stress is present in underlying representations instead of assigned by rule, and contrasts such as the ones in (4) are accounted for by considering metrical theory as, what they call, a stress "checking", rather than a stress "assigning" device, based on a small inventory of possible feet (binary/ternary). If stress is present in the underlying representation, they argue, then if affixes are added the underlying stress pattern will remain intact as long as it conforms to general metrical well-formedness principles. As a consequence, cases like (4) are not the result of a special mode of rule application, but follow directly from the lexical representation of stress. In order to formalize this, DiFabio and Burzio propose a unifying principle of accentual stability (5).

(5)   ACCENTUAL STABILITY; Morphemes maintain fixed accentual
         properties in word-formation

Principle (5) can be violated because it is subordinate to general conditions of metrical well-formedness (possible feet, possible extrametrical syllables). In (4c), the principle of accentual stability is violated, because the foot that would result if the morpheme *compensate* would maintain its accentual properties is not (a ternary with a heavy second syllable) a possible foot. In (4a) and (4b), on the other hand, the resulting feet after word-formation are perfectly acceptable.

DiFabio and Burzio claim that, if the principle in (5) is violated, languages have the choice of either suppressing the morpheme or remetrifying, that is,

restressing it. The English example in (4c) constitutes a case of remetrifying. An example of morpheme suppression in Italian is given in (6).

(6) *fin-ísc-o*   'I finish'
     fin-ísc-i   'you finish'
     fin-ísc-e   'he finishes'
     fin -iámo   'we finish'
     fin -íte   'you finish'
     fin-ísc-ono   'they finish'

In (6) the present tense forms of the verb *finire* 'to finish' are listed. The absence of the infix *-isc* in the first and second persons plural follows from the requirement of accentual stability. DiFabio and Burzio propose that the morpheme *-isc* is stressed underlyingly. Because main stress on the first and second persons plural is lexically represented on the syllable next to *-isc*, surfacing of the infix would result in a stress clash. Given that their framework does not allow for monosyllabic feet, but only for binary and ternary ones, as mentioned above, principle (5) has to be violated and the morpheme *-isc* is suppressed.

Returning to Italian, the secondary stress facts can be analyzed as follows. The cases of secondary stress which show the preservation of main stress (that is, the left-hand forms in 2) would follow from principle (5) and be present underlyingly, whereas non-preservation could be thought of as optional remetrifying.

In this section, we have briefly discussed the way in which the variable realizations of secondary stress in Italian could be analyzed in the account proposed by DiFabio and Burzio (1994). In the next section, we will discuss a possible way of accounting for the Italian facts within the framework of Optimality theory.

3. An Optimality theory account of Italian stress

Let us start with a possible way of dealing with the variable realizations of secondary stress, and consider first the left-hand forms in (2). McCarthy and Prince (forthcoming) propose a unified theory (called Generalized Alignment) to account for the different ways in which constituent-edges are referred to in phonology and morphology. Basically a Generalized Alignment requirement means that an edge (R/L) of a prosodic or morphological constituent must coincide with an edge (R/L) of another prosodic or morphological constituent. For Italian the generalized alignment instructions in (7) will yield the secondary stress patterns illustrated in the left-hand forms in (2) that in previous analyzed were derived by foot deletion followed by left-to-right syllabic trochee assignment (Sluyters 1990) or optional remetrifying (DiFabio and Burzio 1994).

(7)   a   Align-PrWd: Align (PrWd, R, Ft, R)

       b   Align-Ft: Align (Ft, L, PrWd, L)

According to (7a) the right-edge of any Prosodic Word must be aligned with the right-edge of a foot, and according to (7b) the left-edge of any foot must be aligned with the left-edge of a Prosodic Word. In Optimality theory, as mentioned above, constraints may be violated, depending on the ranking of other constraints. If the constraint Parse-σ (parse syllables into feet) >> (dominates) the constraint Align-Ft 'iterative' footing obtains. If the ranking is reversed, 'non-iterative' footing results, and a single foot will be erected at the left-edge (cf. McCarthy and Prince forthcoming). This is illustrated in, respectively, (8a) and (8b) for *caratterizzábile*, where we have abstracted away from main stress, and where ☞ points to the optimal candidate and where ! points to crucial constraint satisfaction failure.

(8)   a   Parse-σ   >>   Align (Ft, L, PrWd, L)

	Candidates	Parse-σ	Align
i ☞	*càrattèrizzábile* (σ σ)(σ σ)		*
ii	*càratterizzábile* (σ σ)	*!	

       b   Align (Ft, L, PrWd, L)   >>   Parse-σ

	Candidates	Align	Parse-σ
i	*càrattèrizzábile* (σ σ)(σ σ)	*!	
ii ☞	*càratterizzábile* (σ σ)		*

Given the higher ranking of the constraint Parse-σ in (8a), a violation of the constraint Align (the second foot in 8ai) is evaluated as more optimal than a violation of the constraint Parse-σ (the third and fourth syllable in 8aii). The constraint ranking in (8a) thus derives 'iterative' footing. A reversal of the constraint ranking, as in (8b), entails that a violation of the constraint Parse-σ (the

third and fourth syllable in 8bii) is evaluated as more optimal than a violation of the constraint Align (the second foot in 8bi).

In order to get the order main stress first, followed by secondary stress, we need to assume that the constraint Nonfinality (The head foot of the PrWd must not be final) must >> Align-PrWd, and, that these two constraints dominate the constraints Parse-σ >> Align-Ft.[4]

Summarizing thus far: in order to derive the correct stressing of the left-hand forms in (2), the constraint ranking for Italian must be as follows:

Nonfinality >> Align-PrWd >> Parse-σ >> Align-FT.[5]

Let us now, before considering the right-hand forms of (2), concentrate on the cases of final stress. Let us start with the cases of final stress in (1c). Because of final stress in monosyllables such as *gás*, we know that the constraint Nonfinality can be violated. As for Latin (see Prince and Smolensky 1993), this can be accounted for by assuming that the constraint Lx≈Pr (A member of the morphological category MCat corresponds to a PrWd) dominates >> Nonfinality (see Prince and Smolensky 1993 for a more detailed account).

Stress on light monosyllables (not existing in Latin) can be accounted for in a similar way, that is, we must place the constraint Fill-μ low in the hierarchy. Prince and Smolensky (1993:51) propose that GEN can generate unfilled moras under compulsion of higher-ranked constraints, that is, the constraint FtBin (according to which feet should be binary). They assume that unfilled moras are interpreted in the output, at least in Latin, as "continuations of a tautosylabic vowel (Prince and Smolensky 1993:51)". Although this is clearly not what happens in Italian, the output form, however, does not violate FtBin, given that an empty mora has been added by GEN.[6]

Let us now look at the other cases of final stress, that is final stress in polysyllables (1a) and (1b). Given the constraints so far, *vírtu*, *péro* and *cólibri* would be much better candidates. If these forms would surface with the foot structure *(vír)tu*, *(péro)* and *(cóli)bri*, the feet would be bimoraic trochees, and

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[4] Given that a constraint-tableau is rather space-consuming, we will not illustrate every ranking that will be assumed.

[5] In order to account for the stress contrasts discussed above, such as, for example, *cornice* 'cornice' *cálice* 'chalice' which in previous analyses have been accounted for by assuming that final moras are idiosyncratically marked as being extrametrical, we must assume optional re-ranking of the constraints Nonfinality and Align-PrWd. If Align-PrWd dominates the constraint Nonfinality, penult stress will obtain (the *cornice* cases), and, if Nonfinality dominates Align-PrWd, antepenultimate stress results (the *cálice* cases).

[6] Notice that this is exactly paralel to the empty C-position posited in Sluyters' account. For the fact that this empty C-position cannot be reduced to catalexis see Jacobs (1994). The generalization captured in Sluyters' account (that gemination occurs after word-final stressed light feet and in case of stressed light feet that occur in the course of the derivation) cannot be expressed in catalexis theory. Limitations of space prevent me from discussing this in detail.

therefore, these forms would neither violate the constraint FtBin, nor the constraint RhType (T) (stating that the foot used is trochaic). Furthermore, apart from *péro* (consisting of only two light syllables), these forms would also not violate the constraint Nonfinality. Moreover, if Nonfinality, as assumed for Latin (see Prince and Smolensky 1993), holds for the head foot as well as for the head syllable, then *péro* would be much better than actual *peró*.

In conclusion, what we observe then in Italian is that the constraint Nonfinality can be violated under compulsion of higher-ranked constraints, as in the case of *gás* and *blú*, but also, as in the case of final stress in vowel-final polysyllables without the compulsion of any higher-ranked constraints (the cases in 1b). Similarly, it can (but in this case optionally) be violated in cases of final stress on -VC final nouns (the cases of 1a), such as *festivál*.

A possible solution that comes to mind immediately would be: **optional** re-ranking of constraints for some forms (in which final stress is optional), like *festivál* and **obligatory** re-ranking for other forms (in which final stress is obligatory), like *colibrí* or *virtú*. A constraint ranking that could work for these cases of final stress would be the following: assume RhType (I) (the foot used is iambic) instead of (T) trochaic) and that the constraint Align-PrWd dominates the constraint Nonfinality. For *virtú*, we need to make sure that the constraint WSP (Heavy syllables are prominent in foot structure and on the grid) is dominated by Align-PrWd. Furthermore, the constraint Fill-μ must be low-ranked. The tableau in (9) shows how this works for *colibrí* and *virtú* (the topmost constraint FtBin is not included).

(9)

Candidates	RhT(I)	Lx≈PR	Al.PrWd	WSP	Fill-μ	Nonfin
☞ [vir(tú[]μ)]				*	*	*
[(vír)tu]			*!			
[(vírtu)]	*!					*
[(virtú)]	*!			*		*

[(cóli)bri]	*!		*			
☞ [co(librí)]						*
[(colí)bri]			*!			
[co(líbri)]	*!					*

The ranking in (9) must then be assumed to be obligatory for words like *virtú* and *colibrí* (that is, the cases of obligatory final stress in 1b), but optional for cases of final stress in words ending in -VC, such as *festivál*, that is, the cases of optional final stress in (1a). Although the proposed solution works technically, it is clear that it still does not offer a way of accounting for the cases of 'stress preservation' that is, the right-hand forms in (2).

Up until now, in order to describe the cases of optional and obligatory stress in Italian, we have only used constraints that are motivated in Prince and Smolensky (1993), and which are assumed to be part of Universal Grammar. In order to account for the right-hand forms in (2) (the 'stress-preserving' cases) we are forced to introduce additional constraints. As a logical counterpart for the constraint Nonfinality, we might propose a constraint Noninitiality, stating that a foot must not be initial. If this constraint would dominate the constraint demanding feet to be left-aligned to left-edge of the Prosodic Word, that is, the constraint Align-Ft discussed above, secondary stress will skip the initial syllable, and the right-hand forms in (2) could in this way be accounted for. Although a constraint ranking Noninitiality (dominating) >> Align-Ft works technically, it is also unmotivated, as it seems to require an ad hoc, otherwise unmotivated, constraint (Noninitiality). Furthermore, one of the essential aspects of Optimality theory is that in principle it must be possible to state all constraints on the output. Therefore, it seems to be questionable anyway to have different sets of constraints for different sets of inputs.

A possible way of dealing with the optional realization of secondary stress, and one that it is more in spirit of an account along the lines of DiFabio and Burzio, consists of lexically representing these realizations of stress (that is, in the input). This means that for the cases that do not show preservation effects (the left-hand forms in 2) the input is free of underlying stress, and can be analyzed along the lines of the constraint ranking in (8a), whereas in the cases that do show stress-preservation effects (the right-hand forms in 2) stress is present underlyingly. It has to be assumed then that GEN can add further structure to underlyingly stressed forms, but that GEN cannot alter the lexical information. Moreover, it is clear that once this is accepted as a possible way of dealing with optional realizations of stress, nothing prevents us from describing the other cases of final stress (whether obligatory 1b or optional 1c) along the same lines.

In this section, we have discussed how the cases of optional realization of stress in Italian, can be accounted for in Optimality theory. It has been argued that optional constraint re-ranking can be made to work technically, but does not yield satisfactory results. Rather, lexical marking of optional or exceptional stress patterns has been shown to be inevitably.

4. Summary

In this paper, we have discussed the cases of optional realization of stress in Italian: optional final main stress and optional realization of secondary stress. In the Optimality theoretic account of Italian stress, it was shown that the realization of stress cannot be entirely deduced on the basis of only the output by positing one single hierarchy of constraints. It has been argued that, rather than assuming for some forms optional and for others obligatory re-ranking of constraints, the accentual stability phenomena, as well as the cases of final stress, can best be accounted for by lexical representation of optional and exceptional stress patterns.

In a way, this comes close to the approach advocated by DiFabio and Burzio (1994), except that they would postulate stress in the underlying representation of all forms, which is excluded in Optimality theory.

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