

Paradigmatic and Syntagmatic Relations in Italian Verbal Inflection *

LUIGI BURZIO
Department of Cognitive Science
Johns Hopkins University
Baltimore, MD 21218
USA
burzio@jhu.edu
ph: (410) 516-7214
fax:(410) 516-8020

To appear in: Julie Auger, J. Clancy Clements, and Barbara Vance (eds.), *(Title tba): Selected Proceedings of the 33rd Linguistic Symposium on Romance Languages*, John Benjamins, Amsterdam.

Abstract

This study considers the respective roles of paradigmatic and syntagmatic factors in controlling stem alternations in Italian verbal inflection. It argues that syntagmatic factors, specifically the morpho-phonological environments created by affixes, are crucial in controlling the form of the stem. This view is compared with one put forth in recent work by Pirrelli and Battista, who argue for a strictly paradigmatic view, on which the form of stems is directly determined by the information that defines each paradigm cell –a kind of suppletion. A residue of effects not reducible to strictly syntagmatic factors and correctly noted by Pirrelli and Battista is analyzed by means of Output-to-Output Faithfulness constraints in Optimality Theory.

May 15, 2004

* Versions of this work were presented at the 33rd ‘Linguistic Symposium on Romance Languages’, Indiana University, April 2003, and at the 30th ‘Incontro di Grammatica Generativa’, University of Venice, Italy, February 2004. I am grateful to both audiences for constructive comments. Further improvements in both form and substance were made possible by suggestions kindly conveyed by the editors, and important clarifications owe to comments graciously provided by Vito Pirrelli.

1. Introduction

The shape of verbal stems can be determined in different ways, a representative spectrum of which is given in (1).

| (1) Determining the shape of stems: | Morphology | Phonology |
|---|-------------------|------------|
| a. GO, PAST \Rightarrow <i>went</i> | Suppletive | — |
| b. /permit/-t \Rightarrow permi[r]-ed | Regular | ✓ \pm PU |
| c. /keep/-t \Rightarrow kep-t | Weakly suppletive | ✓+Res. |

PU: /beep/-t \Rightarrow *beep-t* (Paradigm Uniformity in force in large conjugations)

Residue: *keep*, \in separate conjugation C_x

The case of *went* in (1a) illustrates suppletive morphology. Here, the information ‘Past’ singlehandedly determines the form of the verb, Phonology playing no particular role. The case of *permitted* in (1b), illustrates regular morphology. Here, the information ‘Past’ determines the basic form of the affix, with the Phonology plausibly handling the rest. We could say that the morphology supplies a /-t/, and that the phonology then imposes epenthesis as well as voicing, yielding [ɪd]. In American English, the Phonology is also responsible for the flapping of the stem-final /t/ to [ɾ]. This allophonic process notwithstanding, with such morphologically regular items the bulk of the phonology is typically inhibited by ‘Paradigm Uniformity’ effects (Burzio 2002b) which level the form of the stem. In further contrast, the case in (1c) can be regarded as ‘Weakly’ suppletive. On the one hand much of the information required is fully general: morphologically, the affix can be taken to be just the same as that in (1b), and the stem alteration can be straightforwardly attributed to the phonology: closed syllable shortening, induced by the affix. On the other hand, however, there is a residue of lexical information that needs to be provided, so as to distinguish this special case from regular *beep*, which yields *beep[t]*, and not **bept*, in violation of closed syllable shortening. This residue can simply be a specification that *keep* is a member of a special minor conjugation C_x , as indicated in (1). This will exempt it from the Paradigm Uniformity effects which -as I argue below- rule over large conjugations, and are responsible for blocking **bept*.

In this article, I consider Italian verbal inflection in the three minor conjugations in *-ēre*, *-ére*, *-íre* and examine the claim of Pirrelli and Battista (2000) (henceforth ‘P&B’) that stem shapes in these conjugations are determined purely as a function of ‘paradigmatic’ information, so that for instance the present indicative of a verb like *dolere* ‘ail’ in (2) below would simply have four different suppletive forms of the stem: S1-S4, assigned to different cells in the paradigm as indicated. Throughout, S1 - henceforth given in shaded cells for visual ease- will be the stem that also appears in the infinitive (my ‘S1’ is simply ‘S’ in P&B’s original text).

(2) **Pirrelli and Battista (2000):**

A ‘Paradigmatic’
account

| Person: | 1 | 2 | 3 | 4 | 5 | 6 |
|----------------|------|------|----|-------|------|------|
| Affix: | -o | -i | -e | -iámo | -éte | -ono |
| dolere ‘ail’ | dolg | dwol | | dołł | dol | dolg |
| 4 STEMS | S2 | S3 | | S4 | S1 | S2 |

On P&B’s account, the form of the affixes in (2) would be incidental, and would play no (synchronic) role in determining the form of the stem. Reliance on stem indices as in (2) yields paradigmatic effects: cells bearing the same stem index will host identical stems whatever the verb. In contrast to this view, I will argue that stem shapes in these cases are determined largely syntagmatically, with affixes playing a crucial role much as in the case of *kep-t* of (1c) above. At the same time, I will also partly concur with P&B, in recognizing that Paradigm Uniformity effects, and hence paradigmatic relations, are also at work. Crucial to my analysis is the assumption that Lexicon and Grammar do not partition the set of observed phenomena disjunctively. That is, the fact that some phenomenon may have a lexical component to it is not taken here to entail that it must be purely lexical. Rather, it is logically possible and will be argued to be the case, that the grammar –Phonology or Morphology, can work alongside of the lexicon. A special case of this was seen in (1c). The challenge taken up below is identifying a framework in which the attested interactions can be expressed.

The rest of the article is organized as follows. The next section introduces the analytical framework. Section 3 argues for the crucial role of affixes in determining the form of stems in Italian verbal inflection. Section 4 addresses the necessity for paradigmatic relations in addition to syntagmatic ones, arguing that these instantiate types of ‘Output-Output Faithfulness’ in Optimality Theory. Section 5 addresses the total absence of stem alternations in the much larger *-are* conjugation and provides an account of this by which larger class size results in higher-ranked Faithfulness, yielding total Paradigm Uniformity. Section 6 compares Faithfulness constraints with P&B’s coindexing of cells, showing that only the former is consistent with cases in which identity is only partial. Section 7 concludes.

2. OT Constraints and Entailments

The analysis I present below relies on the framework of Burzio (2002a, b, to appear), which is an extension of Optimality Theory (‘OT’: Prince and Smolensky 1993) in a direction that would bring it closer to the architecture of neural nets, to which OT is independently related: Prince and Smolensky (1997). The central tenet of that approach is the hypothesis in (3).

(3) **Representational Entailments Hypothesis (REH):** Representations are sets of entailments. Any representation AB corresponds to the entailments $A \Rightarrow B$, $B \Rightarrow A$.

While a full justification of (3) is beyond the present goals, one critical piece of evidence for it is the fact that the effects attributed to Faithfulness constraints (Input-Output or Output-Output) do not seem definable in terms of a fixed rank, but rather have the

properties of attraction between celestial bodies or magnets: the closer the two representations being compared, the stronger the effect. One example of this is the well-known syndrome called ‘Non-Derived Environment Blocking’. For instance, in Campidanian Sardinian an input /p/ both voices and spirantizes, yielding [β], while an input /b/ fails to spirantize (Burzio 2002a, citing Łubowicz 1998). That is, spirantization of /b/ ‘blocks’ unless the latter /b/ is ‘derived’ (from /p/). The ‘attraction’ characterization of this is that a candidate output with a [b] in it is under stronger attraction by its input if the latter input features the same /b/, but under a weaker attraction if the input has a /p/ instead –the ‘distance’ that weakens the attraction. Unlike spirantization, which can be blocked, voicing is evidently able to overcome even the maximal attraction. The REH (3) can characterize attraction effects as entailment summation. For instance, for a representation $R1 = A, B, C$, negation of C in another representation $R2 = A, B, \neg C$ violates two of the entailments generated by $R1$: $A \Rightarrow C, B \Rightarrow C$. In contrast, if $R2 = A, \neg B, \neg C$ ($R2$ more distant from $R1$), then only one entailment will be violated by $\neg C$: $A \Rightarrow C$. The formerly violated $B \Rightarrow C$ is now satisfied, since B no longer holds. In the Sardinian example, components B and C would stand for voicing and continuancy (spirantization) respectively, and A for the rest of the representation.

The hypothesis in (3) blurs the traditional distinction between representations or lexicon, and the grammar. The reason is that representations are on this view clusters of atomic constraints: the entailments, and hence also a form of grammar. The neural net affinity in (3) is in the fact that entailments and their ranks are analogous to weighted connections between units (if unit A is active, then a connected unit B must also be active). Also, in order for entailments generated by one representation to be at all relevant to other representations in the ways just described, it must be the case that the representations in fact share the same units (A, B , etc.), namely that they are ‘distributed’ over those units, as in neural nets.

In addition to reconstructing the notion of Faithfulness in OT (both IO- and OO-) and accounting for the modulating effect of distance on their rank, the REH in (3) can also eliminate a rather obvious redundancy between OO-Faithfulness/ Paradigm Uniformity (PU) constraints proposed in OT, which recapitulate essential facts about morphology, and the morphology itself, in the manner illustrated in (4).

(4) **OO-FAITH/ PU = Morphology**

| | <i>Representations</i> | <i>Entailments</i> | <i>Phenomena: Stem selection and PU</i> |
|----|--|--|--|
| a. | beep beep-ed | $Af_1 \Rightarrow / X \underline{\quad}$ $X = \text{Lex. Categ.}$ | violated by <i>keep/ kep-t</i> |
| b. | prend-o ‘I take’ prend-i ‘you take’ | $Af_1 \Rightarrow / X \underline{\quad}$ $X = / \underline{\quad} Af_2$ | violated by <i>veng-o/ vien-i</i> ‘I come/ you come’ |

Under the REH (3), pairs of representations like *beep/ beep-ed* of (4a) will jointly generate entailments of the form: ‘A certain affix Af_i entails the presence to its left of a form X such that X occurs separately as a specific lexical category (here a verb) in the lexicon’ (see Burzio 2002a for details). Such entailments constitute simultaneously both subcategorization frames for the affix (traditionally part of Morphology) and Output-

Output Faithfulness (OO-FAITH) constraints in OT, imposing that the affixed stem must equal the lexical verb: a type of PU. Such entailments/ constraints are violated by cases like *keep/ kept* as stated in (4a). Turning to (4b), pairs of representations like Italian *prend-o/ prend-i* ‘I take/ you-SG take’ will similarly generate entailments of the form ‘A certain affix Af_1 entails the presence to its left of a form X such that X also occurs in the lexicon followed by a certain other affix Af_2 ’. Such entailments are again simultaneously statements describing the workings of the Morphology and OO-FAITH constraints in OT. Here, they impose uniform exponence of a stem in an inflectional paradigm, and are violated by any alternating stem such as that of *veng-o/ vien-i* ‘I come/ you-SG come’. The REH (3) thus enables representations to condition other representations directly, without the intervention of an extrinsically defined ‘grammar’. The ‘grammatical’ effect is the result of summation of identical entailments across the lexicon. Hence many regularities result on this view from the fact that the fundamental property of representational entailments is to penalize variation.

At the same time as they characterize the pressure for stem leveling or PU, entailments also characterize the pressure for affix leveling or syncretism, as shown in (5).

(5) **Affixal Syncretism** \approx PU

| <i>Representation</i> | <i>Entailments</i> | <i>Phenomenon: Syncretism</i> |
|-----------------------|------------------------------------|---------------------------------------|
| prend-o ‘I take’ | $X \Rightarrow Af_1$ * $X-Af_2$ | violated by <i>prend-i</i> ‘you take’ |

In (5), a representation like Italian *prend-o* will generate an entailment of the form: ‘A certain specific form X must be followed by a specific affix Af_1 ’. This entailment will then be violated by a form like *prend-i*, in which the same stem is followed by a different affix Af_2 . This is taken to be the source of affixal syncretism, as occurs for example in the Italian singular Present Subjunctive *-a/ -a/-a* compared with its indicative counterpart *-o/ -i/ -e*. There is no precedent for an account of syncretism within OT so far as I know, the most popular accounts to date being in terms the ‘Impoverishment’ rules of Distributed Morphology (Halle and Marantz 1993 and refs.), or the rules of ‘Referral’ of Stump (2001 and refs.). On the reasons why syncretism occurs more in ‘marked’ categories (like Subjunctive) than in unmarked ones (Indicative), see Burzio (2002a, b, to appear), Tantalou and Burzio (2003), where this generalization is also derived from the REH. In essence, more marked categories are higher-dimensional –they have a larger number of semantic components to them, producing larger numbers of entailments, and hence greater resistance to variation.

The structure of entailments can also derive Pānini’s principle according to which specific information prevails over more general information, and thus in turn characterize morphological irregularity/ suppletion – a form of specificity. This is illustrated in (6) and (7) below.

(6) **Suppletion by Pānini**

| <i>Representations</i> | <i>Entailments</i> | <i>Phenomenon: Suppletion</i> |
|--|--|---------------------------------|
| <i>went</i> (GO, PAST) <i>-t</i> (PAST) | (GO, PAST) \Rightarrow <i>went</i> (PAST) \Rightarrow <i>-t</i> | Specific \gg General (Pānini) |

Any formal account of suppletion requires that a statement like ‘The Past Tense of GO is expressed by *went*’ prevail over the corresponding more general statement ‘The Past Tense of a verb is expressed by *-t* (or *-ed*)’, which would produce **goed*. The former statement is more specific than the latter because it makes reference to the specific verb GO, rather than just the category ‘verb’. The inherent edge enjoyed by specificity is referred to as Pānini’s principle. The REH (3) can substantiate Pānini’s principle in terms of the fact that more specific information corresponds by definition to higher-dimensional representations, producing a larger number of entailments. For instance, the representation *went* with its correlated semantics ‘GO, PAST’ is higher-dimensional than the representation *-ed* with its semantics ‘PAST’ because it contains the additional component GO –an abbreviation for a complex semantic representation. Hence each of the two competing entailments in (6) effectively stands for a cluster of entailments of different dimensionality. Higher dimensionality provides a competitive advantage as illustrated in (7).

(7) **Deriving Pānini**

| | <i>Representations</i> | <i>Entailments</i> |
|----|------------------------|--|
| a. | A, B, C, D, E | B \Rightarrow A; C \Rightarrow A; D \Rightarrow A; E \Rightarrow A |
| b. | \neg A, B | B \Rightarrow \neg A |

In the five-dimensional representation in (7a), component A is entailed by four other components, and hence four times, whereas in the two-dimensional representation in (7b), its rival \neg A would be entailed only once. Assuming that optimization works by minimizing the number of entailments violated, A will be optimal in (7a) despite violating the one entailment of (7b). We can deploy the schema in (7) over (6) above by taking A and \neg A to represent *went* and *-t* respectively, B to represent the feature PAST, and CDE to represent the complex meaning GO. Other kinds of morphological irregularity, like the ‘Weak suppletion’ of *kept* (1c) will also be characterizable in these general terms. A preliminary account of morphological irregularity along these lines was given in Burzio (2000), where it was argued that morphological irregularity can be attributed to Input-Output Faithfulness (IO-FAITH) dominating over Output-Output Faithfulness (OO-FAITH). This would result in the output [went] being faithful to the input /went/ rather than to other outputs in which the past tense is expressed as [...ed]. The present approach is a follow-up on that earlier analysis, further reducing both types of faithfulness: IO-FAITH and OO-FAITH, to the elementary notion of entailment.

The discussion of morphological irregularity/ suppletion of the preceding paragraph is obviously incomplete as it stands, as it provides no leeway for the regular or general to be asserted over the irregular or specific, failing to account for the fact that cases like *went*, and hence the effects of Pānini’s principle, are relatively confined. The

needed (anti-Pānini) corrective is in the fact that regularities or generalization are by definition multiply instantiated, resulting in the more realistic competition in (8).

(8) **Constraining Pānini**

| | <i>Representations</i> | <i>Entailments</i> |
|----|------------------------|--|
| a. | $n * AB$ | $n * (B \Rightarrow A)$ |
| b. | $\neg A, B, C, D$ | $B \Rightarrow \neg A; C \Rightarrow \neg A; D \Rightarrow \neg A$ |

Given a generalization AB instantiated n times, the number of entailments favoring A will be n , as in (8a), with the potential for a numerical override of the entailments asserting its rival $\neg A$ from the representation in (8b). The latter could of course also be instantiated repeatedly, over time. Hence a full resolution of the competition will require quantifying frequencies of instantiation of both the generalization in (8a) and its potential violator (8b). These are known as ‘type’ and ‘token’ frequency, respectively. While this task is much beyond the present goals, these considerations nonetheless lay the basic groundwork, and will be sufficient for present purposes to express the competition between the morphologically regular –usually interpreted as a manifestation of some ‘grammar’ and the morphologically irregular --usually interpreted as a manifestation of the ‘lexicon’. On the present view, the competition is unsurprising, given that entailments are the common currency for both lexicon and grammar.

An example of how entailments can bridge the divide between grammar and lexicon can be given by considering certain pre-affixal inserts that one finds in the Italian minor conjugations, specifically the inserts *-g-* and *-i-* of (9a, b) respectively.

(9) **Competition of pre-affixal inserts *-g-*, *-i-***

- a. val-g-o ... val-g-ono ‘I am valued ... they are valued’
(salire, divellere, svellere, cogliere, togliere, scegliere, venire, rimanere, tenere, spegnere)
- b. vol-i-o ... vol-i-ono \Rightarrow voľo (voglio) ... voľono (vogliono) ‘I want ... they want’
(piacere, tacere, giacere, solere, dovere)

Such inserts occur in the Present Indicative in persons 1 and 6 with the verbs listed in (9a, b) respectively and perhaps a few others. The insert *-i-* is not observable directly but rather only via the palatalization and/ or gemination effects it produces. The process whereby the context iV produces palatalization/ gemination of the preceding consonant is the one insightfully analyzed in Schein and Steriade (1986). In the present framework, the entailments generated by individual representations are assumed to undergo summation when they are identical, giving rise to higher-order entailments, like those that were listed in (4) and (5) above. In the case of (9a, b) such entailments would have roughly the forms in (10a, b), respectively.

- (10) **Entailments as ‘Grammar’:**
- a. $/l/\text{ñ}/n/\text{ñ}- _ -o \Rightarrow g$
- b. $/l/k/v- _ -o \Rightarrow i$

Each of the statements in (10) reads: ‘the environment on the left of the arrow entails in it the presence of the element on the right of the arrow’. The environment in (10a) is clearly amenable to simplification in terms of distinctive features (sonorant coronal other than *r*), whereas the one in (10b) is a bit more heterogeneous. The two statements in (10) are each equivalent to some piece of grammatical machinery –some kind of ‘readjustment’ rule. However, by themselves such statements are insufficient to fully predict the outcome, because of both exceptions (cf. expected *piak-i-o* \Rightarrow *piaččo* ‘I please’, vs. unexpected *konduk-o*, not **konduččo* ‘I conduct’) and mutual conflicts. In particular, stems ending in *l* are targeted by both of (10a, b). This will require the cooperation of entailments that are specific to individual representations, such as the ones in (11), which draw the needed distinction between *val-ere* and *vol-ere* – a purely ‘lexical’ distinction.

- (11) **Entailments as ‘Lexicon’:**
- a. val- __ -o \Rightarrow g
 - b. vol- __ -o \Rightarrow i

Note that while the item-specific statements in (11) may now *seem* sufficient, they in fact are not, since they fail to express the fact that the stems that select for these inserts tend to end in certain specific consonants. The statements in (10) are thus also needed alongside of those in (11) to express the relevant generalizations. Both types of statements result from the entailments generated by specific representations and their summation. An overall account will feature further summation, with the entailments of (11) being added to those of (10) and thus breaking the tie in either direction: (11a) or (11b). In addition to this, however, there are also full ‘Pāninian’ overrides of the entailments in (10): the pattern ‘...duk-’ being a general exception to (10b).

In sum, we find that morphological phenomena often have a hybrid character: on the one hand not totally random, and hence not amenable to a purely lexical analysis, while at the same time being not totally regular, and hence not suitable for a purely grammatical analysis either. The case of English *keep/kept* in (1c) and that of Italian pre-suffixal inserts *-g-*, *-i-* are examples of such hybrid phenomena –what I have referred to as ‘Weak Suppletion’. The frequent way in which ‘lexicon’ and ‘grammar’ thus appear to be finely interspersed suggests that, contrary to mainstream generative tradition, these two concepts do not correspond to discrete components of the language faculty, but are rather carved out of the same set of primitives. The REH (3) supplies those primitives in the form of the representational entailments.

3. The Syntagmatic Role of Affixes

In this section I defend the relatively traditional view that affixes play a crucial role in conditioning the form of their stems against P&B’s claim that the stem form is purely a function of the paradigm cell in which it appears.

Interestingly, in the introductory part of their work, P&B give an assessment which seems much in line with the present one:

- (12) ‘...the two dimensions [paradigmatic, and syntagmatic (LB)] turn out to be interlocked in a complex way, to define a *grammatical continuum* ...’ (P&B,

p.307).

Given that P&B's notion 'paradigmatic' is used to refer to as type of suppletion as I indicated in connection with (2) above, while the notion 'syntagmatic' refers to grammatical type of interaction, (12) seems a close re-statement of my own conclusions in the previous section. In formulating their actual analysis, however, P&B seem to take a different position, suggesting a sharp separation between lexicon and grammar:

- (13) '...all alternating stem roots which are not accountable in terms of exceptionless phonological rules of Italian are to be considered as independent **B[asic] S[tems]** in Aronoff's sense.' (P&B, p.323)

Unlike the statement in (12), the one in (13) seems to exclude lexical-phonological hybrids. Other work by the same authors reveals that there is in fact no contradiction between the two statements. In particular, Pirrelli (2002) outlines a conception similar in spirit to the present one in seeing a continuum of possibilities, but crucially different on the particulars of what defines the continuum. In that conception, there is a competition between syntagmatic factors, which presumably define calculations from a unique input to a unique output, e.g.: /ven-iamo/ \Rightarrow [veniamo], and paradigmatic factors, which define both identity of forms: [veng-o] = [veng-ono] (same stem) and differences: [ven-iamo] \neq [veng-o] (different stems). This characterization is the one echoed in P&B's statement in (12). In the present system, however, the competition is not merely between syntagmatic and paradigmatic factors, but rather three-way: IO-FAITH (Lexicon); MARKEDNESS (Phonology); OO-FAITH (Morphology). In P&B's conception, the paradigmatic dimension seems closely tied to the notion of lexicon. In contrast, in the present one, paradigmatic relations are rather subsumed under Morphology: part of the grammar, though emergent from the Lexicon via entailment summation. The multiplicity of correspondence among paradigm cells given by P&B's coindexing follows here from transitivity of the notion of identity. If, as a result of the entailments, X must equal Y in $X-Af_1/Y-Af_2$ (no stem allomorphy), and if at the same time X must also equal Z of some $Z-Af_3$, then Y must also equal Z by transitivity. This is the source of 'Multiple Correspondence' in the sense of Burzio (1998) – a by-product of a Morphology based on the OT notion of (OO)-Faithfulness, though not of a Morphology that was based on traditional re-write operations. Hence the statement in (12) parallels the present position that there is a Morphology-Lexicon competition with a continuum of outcomes, while the statement in (13) does not parallel the present position that there is comparable competition between Phonology and the rest: Morphology or Lexicon. But there is no contradiction between the two statements. Rather it is just that the Phonology is not factored into P&B's system of fine-grained interactions. Instead, it is regarded as an alien element whose character is already known in advance: it only works in an 'exceptionless' way, and herein lies the disagreement. In what follows I will argue that the position in (13) is not tenable empirically, as it misses crucial 'syntagmatic' regularities of the phonological kind. Before undertaking that task, however, we consider the P&B analysis in more detail.

The main feature of P&B's analysis is an attempt to characterize inter-paradigmatic relations in terms of rules that re-index cells. Their re-indexing schema for

the Present Indicative is given in (14).

| | | |
|---|---------------------------|-------------------------------|
| (14) P&B's Re-indexing schema: | S3 ⇒ S1 | Stipulation: * S4 ⇒ S3 |
| | S3 ⇒ S2 ⇒ S1 | |
| | S4 ⇒ S2 | |
| | S4 ⇒ S1 | |

The rules in (14) would make it possible to characterize simpler paradigms from more complex ones in the ways that we will see below. Each rule states that all the cells that are occupied by a stem S_n in the paradigm of some verb may, with some other verb, collapse with the cells occupied by stem S_m , where m is a smaller number than n . The input to the re-indexing rules in (14) is the four-stem paradigm structure in (2) above, from which simpler paradigm structures would be derivable by such re-indexing. P&B note, however, that the re-indexing 'S4 ⇒ S3' (extend stem 3 to the cells formerly occupied by stem 4) is conspicuously unattested, a fact that for them requires the stipulation indicated in the right-hand box in (14).

We note first that while this approach may seem interesting, its explanatory power is in any event limited, since it is true by definition that a simpler paradigm is relatable to a more complex one by simplification. All such power would reside in the restricted format of the rules, in which all re-indexing is downward. Even this asset is questionable, given that the schema itself is the main reason for assigning specific indices to the various stems. Be that as it may, in the rest of the discussion I will rather focus on the fact that the schema in (14) is inadequate empirically, since it directly predicts non-existent paradigms, in contrast to the syntagmatic approach that correctly excludes them.

I begin by considering the four-stem paradigm of (2) above from which others would be derived in the P&B analysis. This paradigm is repeated in (15), with an outline of the syntagmatic analysis on the left-hand side of the table. (Shaded cells = stem of infinitive = S1).

| | | | | | | | |
|--|------------------------|------|------|----|-------|------|------|
| (15) 4 stems = 3 syntagmatic factors | Person: | 1 | 2 | 3 | 4 | 5 | 6 |
| | Affix: | -o | -i | -e | -iámo | -éte | -ono |
| | P&B's stems | S2 | S3 | | S4 | S1 | S2 |
| | dol-ére 'ail' | dolg | dwol | | doĥ | dol | dolg |
| a. Stem stress | | ✓ | ✓ | ✓ | | | ✓ |
| b. -g- insert | | ✓ | | | | | ✓ |
| c. Palatalization/ Gemination before <i>iV</i> | | | | | ✓ | | |

In a syntagmatic analysis, the fact that the paradigm in (15) attested with *dolere* consists of four sub-paradigms will require at least three differentiating factors, each splitting the paradigm into two. The actual factors are listed in (15a, b, c). One is stress (15a), and its role in the diphthongization $o \Rightarrow wo$. Consider here that the stem is stressed in persons 1, 2, 3, 6, in turn reflecting the fact that the affixes bear stress only in persons 4 and 5. In Italian, stress is partly lexicalized and inflectional affixes take priority over stems in controlling it (Burzio 1998). However, diphthongization only occurs in persons 2 and 3

(P&B's S3), because (in Italian, as opposed to Spanish) an open syllable is also required in addition to stress, persons 1 and 6 having closed syllables. The second factor at work (15b) is the *-g-* insert discussed earlier, which, by creating the just noted closed syllables, thus distinguishes person 1, 6 from 2, 3, and hence P&B's S2 from S3. The third factor (15c) is palatalization and/ or gemination before the sequence *iV*, also discussed above in connection with the *-i-* insert. Such an environment occurs only in person 4, where the affix is responsible for creating it, whence S4. Person 5 is unaffected by any of these factors, leaving the stem in the same (unstressed) environment as the infinitive, whence stem S1 in that person.

From the syntagmatic point of view just outlined, we will now expect simpler paradigms whenever one of the factors in (15) is inoperative or appropriately changed. This is true of each of the three-stem cases in (16)-(18) below, which are alternatively handled by P&B's re-indexing rules reported below in each case.

| | | | | | | | |
|--|----------------------------|----|-----|----|-------|------|------|
| (16) 3 stems = 2 syntagmatic factors | Person: | 1 | 2 | 3 | 4 | 5 | 6 |
| | Affix: | -o | -i | -e | -iámo | -éte | -ono |
| | P&B's re-indexing: S3 → S2 | | S2 | | S4 | S1 | S2 |
| | dov-ére 'have to' | | dev | | dobb | dov | dev |
| a. Stem stress | | ✓ | ✓ | ✓ | | | ✓ |
| b. Palatalization/ Gemination before <i>iV</i> | | | | ✓ | | | |

The verb in (16) is not one of those that insert *-g-*, which were given in (9) above. With that factor removed, the separation between persons 1, 6 and the other persons with unstressed affixes: 2, 3, will disappear, corresponding to removal of the separation between P&B's S2 and S3 of (15) as if the re-indexing rule in (16) had applied. The other two factors, listed in (16a, b) continue to play the same role as in (15), although their effects are now slightly different. Here stress controls the *e/o* variation: *e* labializes to *o* before labials, though not in stressed positions, which are notoriously more resilient to change. As for (16b), it is a general fact about labials that they do not palatalize where other consonants do. Hence only gemination occurs. However, fairly generally *v* only finds *bb* as its geminate counterpart in Italian (historically, singleton *b* but not geminate *bb* spirantized intervocally). To be sure, some of these alternations are of limited productivity --a point correctly made by P&B, but in the present framework this does not disqualify them from having a syntagmatic basis *along* with some lexical basis, as we saw in the discussion of the inserts of (9) above. That is, in the present context, lexical entailments can be recruited to assist an otherwise weak phonological effect, without making the alternation purely lexical, a point that I return to in Sect. 5 below.

In the next case (17) below, the *-g-* insert is re-instated, but the palatalization/ gemination is suppressed, as the stem-final *n* does not participate in this process. Some lexical control, here inhibitory, may again be involved.

| | | | | | | | |
|---|----------------------------|------|------|----|-------|------|------|
| (17) 3 stems = 2 syntagmatic factors | Person: | 1 | 2 | 3 | 4 | 5 | 6 |
| | Affix: | -o | -i | -e | -iámo | -íte | -ono |
| | P&B's re-indexing: S4 ⇒ S1 | S2 | S3 | | S1 | | S2 |
| | ven-íre 'come' | veng | vyen | | ven | | veng |
| a. Stem stress | | ✓ | ✓ | ✓ | | | ✓ |
| b. -g- insert | | ✓ | | | | | ✓ |

In (17), stem stress and -g- insert jointly control diphthongization (in this case, $e \Rightarrow ye$) much as in (15) above, but the effect that sets person 4 apart from 5: palatalization/ gemination, is lacking, as /n/ is not affected. This is correctly describable by means of P&B's re-indexing rule in (17). A third logical possibility, consisting of only a -g- insert and palatalization/ gemination without any stress-induced effects appears not to be instantiated. This possibility would put persons 2, 3 and 5 together, and would be describable by P&B's rule 'S3⇒S1' of (14) above. We take this to be an accidental gap. Since this discrepancy does not distinguish the two approaches, it will not affect the rest of the discussion.

Yet another logical possibility captured by both approaches is instantiated in (18).

| | | | | | | | |
|--|----------------------------|------|------|----|-------|------|------|
| (18) 3 stems = 2 syntagmatic factors | Person: | 1 | 2 | 3 | 4 | 5 | 6 |
| | Affix: | -o | -i | -e | -iámo | -íte | -ono |
| | P&B's re-indexing: S4 ⇒ S2 | S2 | S3 | | S2 | S1 | S2 |
| | solere 'to be used to' | sołł | swol | | sołł | sol | sołł |
| a. Stem stress | | ✓ | ✓ | ✓ | | | ✓ |
| b. -i- insert + Palat./ Gemination before iV | | ✓ | | | ✓ | | ✓ |

This case is exactly like the one in (15) above, except that here the insert is -i- instead of -g-. As a result of this, persons 1, 6, which receive the insert, become palatalizing/ geminating environments just like person 4 in which the i is part of the affix, whence the same stem S2 in those three persons, as described by P&B's re-indexing. Because gemination creates closed syllables just like the -g- insert, the distribution of diphthongization in (18): S3, is the same as that of (15). As in the latter case, S1 has no diphthong because it is unstressed.

Alongside of the above paradigms that are consistent with both approaches, however, the following three-stem paradigms do not exist as predicted only by the syntagmatic approach. The question marks in (19) are to convey the hypothetical nature of such verbs.

(19) **Non-existent 3 stem paradigms**

a. If 1, 6 = 5, then no insert, then 1, 6 = 2, 3

b. If 2, 3 ≠ 5 (must be stress) and 2, 3 = 4 (no pal/ gem), then 4 = 5

| Person: | 1 | 2 | 3 | 4 | 5 | 6 |
|-----------------|-------|-------|----|-------|-----------|-------|
| Affix: | -o | -i | -e | -iámo | -éte/-íte | -ono |
| S2 ⇒ S1 | S1 | S3 | | S4 | S1 | |
| *?ol-ere/ -ire | ?ol | ?wol | | ?oĥ | ?ol | |
| *S4 ⇒ S3 | S2 | S3 | | | S1 | S2 |
| *??ol-ere/ -ire | ??olg | ??wol | | | ??ol | ??olg |

The non-existent paradigm in (19a) is straightforwardly derivable from the P&B re-indexing rule given. Although this rule has not been utilized so far, we will see below that it cannot be eliminated from the schema in (14). This therefore constitutes an incorrect prediction. The syntagmatic account is straightforward, as given synoptically on the left-hand side in (19a): In order for the stem of persons 1 and 6 to equal that of person 5, there must not be an insert, but then persons 1, 6 cannot be separated from persons 2, 3 as in (19a) by any of the available factors: all of 1, 2, 3, 6 are unstressed environments. We see below that one more potential factor needs to be recognized, involving palatalization before front vowels. Yet the latter factor will be of no help in (19a), since it will only place persons 2, 3 with 5 incorrectly (while 4 might differ by gemination). Hence paradigm (19a), allowed by P&B's re-indexing, is correctly excluded by the syntagmatic analysis.

The non-existent paradigm in (19b) is banned by P&B's stipulation that the re-indexing rule needed is absent from the schema, as was shown in (14) above. But the syntagmatic approach is again superior as it requires no such stipulation: if the stems of persons 2, 3 differ from that of person 5, it can only be because stress is the relevant factor. Stress, however, cannot distinguish persons 4 and 5 as in (19b). The only such distinction can be drawn by palatalization/ gemination, but that in turn cannot be involved, since it would also separate 2, 3 from 4 incorrectly. Hence (19b) is also correctly excluded. Note that palatalization before front vowels ((20b') below) would provide again no recourse, since it would group 2, 3, 5 together, also incorrectly.

We now turn to two-stem paradigms. In P&B's system, these require two re-indexing rules. In the syntagmatic approach, these will follow from the presence of a single differentiating factor. I begin again with the cases that are correctly predicted by both systems, given in (20).

(20) **Attested 2-stem paradigms**

a. Stress: 1, 2, 3, 6

b. -g- insert: 1, 6

b'. Palataliz.: 2, 3, 4, 5

c. -i-; Pal./ Gem.: 1, 6, 4

| Person: | 1 | 2 | 3 | 4 | 5 | 6 |
|--------------------|-------|-------|-------|-------|-----------|-------|
| Affix: | -o | -i | -e | -iámo | -éte/-íte | -ono |
| S3 ⇒ S2, S4 ⇒ S1 | S2 | | | S1 | | S2 |
| sed-ére 'sit' | syed | | | sed | | syed |
| S4 ⇒ S1, S3 ⇒ S1 | S2 | S1 | | | | S2 |
| val-ére 'be worth' | valg | val | | | | valg |
| krésc-ere 'grow' | kresk | krešš | | | | kresk |
| S4 ⇒ S2, S3 ⇒ S1 | S2 | S1 | S2 | S1 | S2 | |
| piač-ére 'please' | piačč | piač | piačč | piač | piačč | |

While these follow from P&B's pairs of re-indexing rules given above each verb, the syntagmatic accounts are also straightforward as indicated in each case. Case (20a) is like (17) above without the *-g-* insert, which produced closed syllables in persons 1, 6. Without it, diphthongization will now occur in all stressed stems: S2. Cases (20b, b') have identical paradigms but for different reasons. In (20b), the *-g-* insert separates persons 1, 6: S2, from all others. In (20b') palatalization before front vowels separates all other persons: S1, from 1, 6. The gemination generally induced by the person 4 affix fails to produce a separation in this case, because simple palatalization of the cluster *sk* also yields geminate *šš*. In (20c), an *-i-* insert in persons 1, 6 produces the same geminating environment as in person 4 (as in (18) above): S2. The other persons feature a singleton palatal before a front vowel, just like the infinitive: S1.

In contrast to those in (20), the following two-stem paradigms are unattested, however.

| (21) Non-existent 2 stem paradigms | Person: | 1 | 2 | 3 | 4 | 5 | 6 |
|--|----------------|------|------|----|-------|-----------|------|
| | Affix: | -o | -i | -e | -iámo | -éte/-ite | -ono |
| a. If 4≠5 (Gemin./ Palat.), then 2, 3≠4 | S4 ⇒S2, S3 ⇒S2 | | S2 | | | S1 | S2 |
| | *?ol-ere/ -ire | | ?oľ | | | ?ol | ?oľ |
| b. If 1≠2, then either (ins.) 6≠4, 5; or (Pal.) 2, 3 = 5 | S4 ⇒S1, S2 ⇒S1 | S1 | S3 | | S1 | | |
| | *?inč-ere/ ire | ?ink | ?inč | | ?ink | | |

Such paradigms can be directly generated by P&B's pairs of rules given in each case. From the syntagmatic point of view, their non-existence is again obvious. In the case of (21a), the needed distinction between persons 4 and 5 can only be produced by palatalization/ gemination before *iV* in person 4. But the latter is never extendable to persons 2, 3 as required in (21a), only to person 1, 6 via the *-i-* insert (as in (20c) above). In the case of (21b), there are only two ways to produce the necessary separation of person 1 from 2, 3. Either via an insert (pers. 1, 6), in which case person 6 will also have to differ from 4, 5, incorrectly; or via palatalization before front vowels (as in (20b') above), in which case persons 2, 3 will have to equal at least 4 (5 could geminate in addition), also incorrectly. Hence both paradigms are correctly excluded by the syntagmatic analysis.

In sum, P&B's re-indexing rules that take no account of the environment created by affixes generate several unattested present indicative paradigms in addition to requiring the stipulation in (14). In contrast, a syntagmatic analysis along traditional lines that takes the form of stems to be derivable from the environment created by the affixes and the pre-affixal inserts will correctly exclude such paradigms and require no stipulation, while also accounting for all attested paradigms. We have seen that in many cases this requires that the lexicon play a role in promoting the specific phonological process, however, since the latter is not fully productive in the language.

An even stronger argument for the role of affixes than the one just given is provided by the observation that when affixes level, so do stems. This observation can be made by comparing the Present Indicative, which was reviewed above, with the Present Subjunctive, as in (22).

| (22) Indicative vs. Subjunctive | Person: | 1 | 2 | 3 | 4 | 5 | 6 |
|--|------------------|-------|----|----|-------|-----------|-------|
| Subpara.: {1, 6}, {2, 3}, {4}, {5} | Pres. Indic. | -o | -i | -e | -iámo | -éte/-íte | -ono |
| Subpara: {1, 2, 3, 6}, {4, 5} | Pres. Subj. | -a | -a | -a | -iámo | -iáte | -ano |
| | 2 Stems | S2 | | | S1 | | S2 |
| a. Stress: {1, 2, 3, 6} | sed-ére 'sit' | sied | | | sed | | sied |
| b. Palatn./ Gemin.: {4, 5} | krésc-ere 'grow' | kresk | | | krešš | | kresk |
| c. -g- insert: {1, 2, 3, 6} | ven-íre 'come' | veng | | | ven | | veng |

In (22), the top two rows compare the Present Indicative and Present Subjunctive affixal paradigms. The Subjunctive is more leveled compared with the Indicative –a case of the affixal syncretism that was briefly discussed earlier: (5) above. Consider in particular that the Present Indicative affixes create a maximum of four different environments for the stem as follows: i) stressed and followed by a back vowel as in persons 1, 6; ii) stressed and followed by a front vowel as in persons 2, 3; iii) unstressed and followed by *iV* as in person 4; iv) unstressed and followed by a simple front vowel as in person 5. From the present point of view this is the exact reason why the Present Indicative has a maximum of four different stems: the four subparadigms given on the left in (22). The above argument was that from P&B's point of view this exact relationship between affixes and stems is a sheer coincidence. The Subjunctive adds considerably to the degree of coincidence and hence to the strength of the argument, as I discuss next.

Unlike their indicative counterparts, the six subjunctive affixes create only two different environments for stems: i) stressed and followed by a back vowel, as in persons 1, 2, 3, 6; and ii) unstressed and followed by *iV*, as in persons 4, 5. We can thus correctly predict that the Present Subjunctive will exhibit a maximum of two stems: the two subparadigms given on the left in (22). In particular, we predict that any of the three differentiating factors that we considered above: stress, palatalization/ gemination, -g- insert, will split the paradigm in exactly the same way, precisely as in (22a, b, c) respectively. Note that the environment for insertion of -g- and (as we see next) -i- of (10) above needs to be generalized to a following back vowel from just [o], but this is straightforward. For the P&B analysis, these precise correlations are indeed inexplicable, since these are all just 'basic stems': (13) above, not cases of surface allomorphy.

Consider now also the leveling from two stems to just one in the Subjunctive, illustrated in (23).

| (23) Leveling the Subjunctive | Person: | 1 | 2 | 3 | 4 | 5 | 6 |
|--------------------------------------|-------------|-------|----|----|-------|-------|------|
| Subpara: {1, 2, 3, 6}, {4, 5} | Pres. Subj. | -a | -a | -a | -iámo | -iáte | -ano |
| | ??S1 ⇒ S2 | S2 | | | | | |
| a. -i- insert: {1, 2, 3, 6} = {4, 5} | piač-ére | piačč | | | | | |
| | S2 ⇒ S1 | S1 | | | | | |
| b. None of the above: | prénd-ere | prend | | | | | |

There are two possibilities for leveling. One arises when -i- is inserted, as with the verb in (23a) (which was listed in (9b)). Such insertion, now occurring in persons 1, 2, 3, 6 because the affixes create the same environment for insertion, will make the environment

of the latter persons identical to the environment of persons 4, 5, namely the environment ‘*iV*’, resulting in uniform palatalization/ gemination throughout, as in (23a). In terms of re-indexing rules, the one that would be required here is one that would actually falsify P&B’s own schema if extended to the Subjunctive. The reason is that the stem *piačč* of the subjunctive is not the one of the infinitive (*piač-ére*) and hence cannot be S1 on P&B’s criteria, but must rather be S2. Thus, in order for the simpler paradigm in (23a) to be derived from the more complex one of (23a, b, c) similarly to P&B’s derivation of indicative paradigms, re-indexing must go from S1 to S2, contrary to (14) above.

The second type of leveling, illustrated in (23b), occurs when (just as in the indicative), the verb is not prone to any of the effects of (22a-c)-(23a). The stem of the infinitive will then occur throughout. The re-indexing rule needed in this case is ‘S2 ⇒S1’. This is in line with P&B’s schema in (14). Recall, however, that this was one of the rules that produced unattested paradigms in the indicative as in both of (19a) and (21b) above. The effect in (23b) now indicates that such a rule cannot simply be dropped from the schema in (14), thus confirming its problematic nature.

In conclusion, paradigmatic relations are at least insufficient and syntagmatic relations are thus necessary to deal with stem alternations in the Italian minor conjugations. We have seen that such alternations are substantially predictable from the form of the affixes, modulo some lexical and other specific information like (11) above and the singleton *v/* geminate *bb* correlation of (16). In contrast, P&B’s ‘suppletive’ analysis enriched with the re-indexing schema in (14) both treats a complex set of stem-affix correlations as accidental and incorrectly generates a number of unattested paradigms.

4. Rescuing Paradigmatic Relations

The above arguments notwithstanding, P&B are correct in pointing to the need for paradigmatic relations in at least two types of cases, in addition to a third one that will be discussed in Sect. 6 below. The first case is illustrated in (24).

| | | | | |
|---|--------|------------------------|--------------------|---------------------------------|
| (24) Past Participles have the same stem as their Infinitives: | Affix: | Inf.: <i>-ere/-ire</i> | Part.: <i>-uto</i> | Syntagmatic Predictions: |
| | P&B: | S1 | | |
| | a. | krešš | | *kresk-uto |
| | b. | ven | | *ven-g-uto |

As indicated in (24), past participles do not follow the predictions of the strictly syntagmatic analysis, but rather have stems that are identical to that of the infinitive. Remember that in the case of *kréšš-ere* (crescere) ‘grow’ (24a), palatalization is attributed to the presence of a front vowel: (22b), (20b’) above. The back vowel *u* of the participial affix should therefore yield **kresk-uto*, incorrectly. Similarly, in the case of *ven-ire* ‘come’ (24b), the back vowel of the participle should trigger insertion of *-g-*, as with the back vowels of (22c) or (17) above, also incorrectly. In the P&B framework, past participles can simply be assigned the same stem as the infinitive S1, as indicated in (24), affixes playing no role. In the present framework, along with syntagmatic relations, paradigmatic ones can be expressed in terms of the Paradigm Uniformity of (4) above, a form of OO-Faithfulness. The participle of (24a) can then be analyzed as in (25):

| (25) | Infin.: [krešš-]; In: /kresk-uto/ | PALATALIZE | OO-FAITH (Infin.) | IO-FAITH |
|------|------------------------------------|------------|-------------------|----------|
| a. | kreskuto | | * | |
| b. | ☞ kreššuto | | | * |

In (25), the PALATALIZE constraint must dominate IO-FAITH to induce palatalization in the infinitive and the other cases discussed earlier. If OO-FAITH relating a participle to its infinitive also dominated IO-FAITH, then candidate (b) will be optimal as desired.² The question is of course why should OO-FAITH be higher-ranked in the case of participle-infinitive pairs than in other cases, where stems vary freely. While a fully principled answer to this question must await further work, we note that there is independent evidence that participles are in strong correspondence with their infinitives, shown by paradigms like (26), analyzed in Burzio (1998, 2003).

| | | | |
|------|---------------------------------------|---------------------------------------|--|
| (26) | a. <i>vinc-ere</i> <i>win-INF.</i> | b. <i>vín-t-o</i> <i>won-PART.</i> | c. <i>vìnc-it-óre</i> <i>winner</i> |
|------|---------------------------------------|---------------------------------------|--|

Many verbs whose infinitive ends in unstressed *-ere* have syncopated participles like the one in (26), where the participial affix is *-t-* instead of regular *-út-*. In the work cited, I follow DiFabio (1990) in taking such syncopes to occur so as to allow the participle to be accentually faithful to the infinitive, avoiding the stress-shift that non-syncopated *-út-* would cause, while derivatives like (26c) are faithful to both of (26a, b) as I discuss below. This evidence is parallel to that of (24): the material preceding a participial affix must be identical to the material preceding the infinitival affix. However, unlike the correspondence of (24), that of (26a, b) cannot be expressed by P&B's coindexing, given the misidentity *vìnc/vín(t)*. In contrast, such the facts are consistent with OO-FAITH, assuming that undominated constraints on syllable structure rule out **vìnc.to* for (26b). Further evidence favoring OT's faithfulness over indexing is considered in Sect. 6 below. Also relevant is the fact that certain nominal derivatives like the one in (26c) take both

² The use of IO-FAITH as in (25) requires a brief comment given the fact that the present framework rejects the notion of 'Underlying Representation'. Without UR, surface allomorphs can benefit from independent inputs. When allomorphy is suppletive, two surface allomorphs [A], [B] result from separate inputs /A/, /B/ under the ranking IO-FAITH >> OO-FAITH (discussion of (6) above). When allomorphy is not suppletive, two surface allomorphs [A], [A'] which are either identical or differ predictably, result from some input /A/ and the ranking OO-FAITH >> IO-FAITH. Discordant inputs /A/, /B/ are still entertainable as before (Richness of the Base), but their effects will be suppressed by dominant OO-FAITH. The issue of which surface allomorph, [A] or [A'], may receive the input /A/ under these circumstances may be indeterminate, but this is of no particular consequence. In this light, the IO-FAITH of (25) is then to be construed as abbreviating the joint effects of some input /kresk-/ 'grow' of indeterminate affiliation over the paradigm, and a set of OO-FAITH relations to the surface allomorphs that instantiate that input. The gist of (25) is that the specific OO-FAITH to the stem of the infinitive outranks the more general effect just described as IO-FAITH.

the participle and the infinitive as their bases simultaneously --the ‘Multiple Correspondence’ alluded to earlier. The link to the participle is shown by the fact that the *-it-* of (26c) is an allomorph of the *-t-* of (26b), while the link to the infinitive is shown by the consonant *c* ([č]), not present in the participle. If (26c) is in correspondence with both (26a, b), then (26b) will be in correspondence with (26a), by the transitivity inherent in the present system. P&B’s coindexing will be ineffective in this case as well: the complex stem *vinc-it-* is neither in perfect correspondence with *vinc-* of (26a) nor with *vin-t-* of (26b) --only in *partial* correspondence with both.

The second case requiring paradigmatic relations involves a substandard variety of Italian (a working class idiolect, so far as I am aware) in which the present subjunctive affixes *-a*, *-ano* of (22) above are replaced by *-i*, *-ino*, respectively. As P&B note, this switch does not affect the form of the stem, contrary to the strictly syntagmatic predictions, as indicated in (27).

(27) **Substandard affixes
leave stems unaffected**


| | | |
|--------|---|-------------------------------------|
| Affix: | Substd. <i>-i</i> ; <i>-ino</i> for <i>-a</i> ; <i>-ano</i> | Syntagmatic Predictions: |
| P&B: | S2, like pers. 1, 6 of Indic. | |
| a. | veng | *vyen-ino |
| b. | kresk | *krešš-ino |

Syntagmatically, the front vowel of the affix in (27a, b) should trigger just the same behavior as the front vowels of the indicative, respectively: no insertion of *-g-*, with consequent diphthongization as in (17) above *vyen-i*, hence **vyen-ino*; and palatalization as in (20b’) above *krešš-i*, hence **krešš-ino*. In contrast, in P&B’s system, in which affixes play no role, the stem may remain the same S2 as in the standard idiolect.

To make sense of this phenomenon from the present perspective, consider that the substandard subjunctive affixes instantiate a type of syncretism in which the affixes of the more numerous *-áre* conjugation are extended to the minor conjugations in *-ere*, *-éere*, *-íre*, as shown in (28).

| | | | | | | | |
|------|--------------------|------------------------------------|----|----|-------|-------|------|
| (28) | Conjugation | Present Subjunctive affixes | | | | | |
| | | 1 | 2 | 3 | 4 | 5 | 6 |
| a. | <i>-áre</i> | -i | -i | -i | -iámo | -iáte | -ino |
| b. | Minor, Substandard | -i | -i | -i | -iámo | -iáte | -ino |
| c. | Minor, Standard | -a | -a | -a | -iámo | -iáte | -ano |

The trans-conjugational syncretism of (28a, b) is somewhat similar to the one already observable in persons 1-3 of each conjugation and discussed earlier. Like the former, it follows from entailment satisfaction, though space limitations preclude a full discussion of this here. Note as well that the standard affixes are themselves trans-conjugationally syncretic in various ways already: by being the same across the three minor conjugations: (28c), and by being the same in persons 4 and 5 for all conjugations. The phenomenon of (27a) can be accounted for from this general point of view along the lines of (29), where ‘SYNCR(ETIZE)’ encapsulates the factors that lead to syncretism: in practice imposing the affixes of the ‘major’-*are* conjugation on verbs like *ven-ire*.

| (29) OO-F: [veng-] (1, 6 Indic.) IO-F: /ven-ano/ | SYNC: {-i, ...-ino} | OO-FAITH (1, 6 Indic.) | -g- → / __ [+back] | IO-FAITH |
|---|------------------------|---------------------------|-----------------------|----------|
| a. veng-ano | * | | | |
| b. vyen-ino | | * | | * |
| c.  veng-ino | | | * | * |

In (29), candidate (a) is the correct form for the standard idiolect. It satisfies IO-FAITH since both stem and affix match the input (pace fn.2). It also satisfies the distributional requirement for the *-g-* insert: before back vowels only. In addition, it satisfies OO-FAITH of its stem to the stem of persons 1, 6 of the Present Indicative. More accurately, though, it contributes to the *emergence* of such constraint, by the entailments it generates. In the standard variety, the identical stems in *veng-ono* (6, Indic.), *veng-ano* (6, Subjunct.) follow syntagmatically: the back vowel of both affixes. Identity relations -however they arise- generate entailments that make them self-sustaining by the schema in (4b) above (and more detailed discussion in Burzio, to appear). Candidate (a) thus only violates SYNC: a pressure to simplify the affixal system ultimately also akin to OO-FAITH. It wins in the standard variety, where SYNC is ranked below IO-FAITH, but loses in the substandard variety where that ranking is reversed. Candidate (b) complies with SYNC and shows regular application of *-g-* insertion: not before front vowels, and consequent regular diphthongization. It thus violates IO-FAITH for both stem and affix. It is excluded by the violation of OO-FAITH as its stem does not correspond to [veng-] of persons 1, 6, Present Indicative. Candidate (c) thus wins despite the overapplication of *-g-* insertion and the unfaithful affix.

The analysis in (29) embodies the uncontroversial claim that speakers form a mental grammar that is maximally consistent with the data to which they are exposed. It also embodies the further claim, inherent in the REH (3) above, that whatever identity relations have a statistical presence in the data, also have *-ipso-facto-* a grammatical status, expressible as faithfulness constraints in the OT formalism. The substandard variety in question constitutes a type of language change from the standard, which must therefore have provided the input data. The fact that the substandard maintains the same paradigmatic relations as the standard means that paradigmatic relations enter into the mental computation: P&B's point. In the present system, unlike in P&B's, the fact that syntagmatic relations do not obtain in this case (cf. inappropriate *-g-* insert) does not mean, however, that they do not exist, but rather only that they are outranked. The evidence for the present ontology rather than P&B's is that the syntagmatic relations violated in (29) are necessary elsewhere, as was shown above. Standard and substandard varieties must therefore differ by their constraint rankings. The account of *kresk-ino* (27b) would be fundamentally similar to that of *venghino* (27a) given in (29).

In sum, the present system has the resources to express both syntagmatic and paradigmatic relations. These relations are often in competition, the former demanding stem alternations, while the latter aim to prevent them. The present analysis has defended the claim that in the minor conjugations syntagmatic relations distinctly have the upper hand, paradigmatic effects arising only in some special cases. We see next that, in the *-are* conjugation, the tables are turned.

5. Why Weak-Suppletion does not extend to large classes.

In contrast to what I have been calling the three ‘minor’ conjugations, the conjugation in *-are*, more numerous than the others by orders of magnitude, is totally leveled, featuring the same stem as the infinitive throughout, with very few exceptions. The P&B account describes this fact by postulating application of all re-indexing rules in this conjugation, resulting in the single S1. Obviously, this provides little explanation. The entailment-based approach, on the other hand, can capture the correlation between leveling and class size by way of the fact that entailment summation automatically assigns the appropriate statistical weight to grammatical effects. When class size reaches a certain threshold, any alternation that has a lexical component in it will be swamped by grammatical pressures.

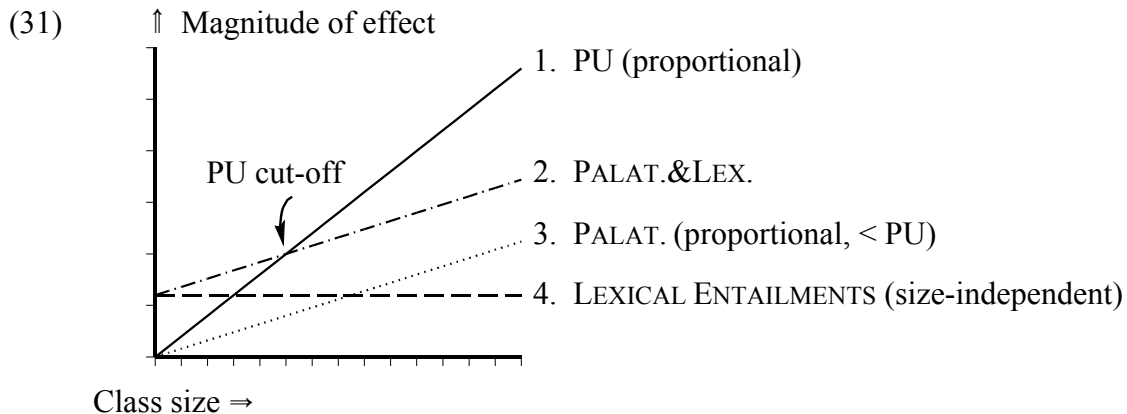
I illustrate this point with the case of palatalization/ gemination before *iV*. In the minor conjugations, such effect is under lexical control, as shown in (30a, a’), but in the *-are* conjugation, it is totally absent, as in (30b).

| (30) | PALAT. | PU | LEXICAL ENTAILMENTS |
|--|--------|----|---------------------------|
| a. sol-ete/ so h -iamo ‘you-PL./ we are used to’ | | * | so __-iamo ⇒ h |
| a’. val-ete/ val-iamo ‘you-PL./ we are worth’ | * | | va __-iamo ⇒ l |
| b. vol-ate/ vol-iamo ‘you-PL./ we fly’ | * | | vo __-iamo ⇒ l |

The reason palatalization obtains in (30a) in violation of PU is taken to be the summation of the purely phonological effect PALAT. (imposing assimilation to a following glide. See Schein and Steriade 1986) and the concurring lexical effect favoring this outcome: the entailments generated by this specific surface representation. This is parallel to the hybrid account of the pre-suffixal inserts in (10) and (11) above. The entailments that represent one specific lexical item can be construed as instantiating IO-FAITH in OT. The latter IO-FAITH becomes applicable to individual surface forms (here, *so~~h~~-iamo* is being faithful to itself) upon the demise of the ‘Underlying Representation’, which would rather require surface allomorphs like *sol-/ so~~h~~-* to have a *common* input (Burzio 2000, et seq.). The unifying effect of UR is reproduced here by the OO-FAITH/ PU constraints, as discussed earlier. The critical contribution of the LEXICAL ENTAILMENTS in (30) is shown by the variation: verbs that would lack such entailments are left unpalatalized: (30a’). At the same time, the contribution of the Phonology: PALAT. is shown by the fact that palatalization is not randomly distributed: it is never found before affixes that do not instantiate the relevant environment *__iV*.

Turning to class size, each of the two grammatical effects, PALAT. and PU, can be viewed as having magnitudes that are proportional to it. Consider that any set of stem of random shape will feature two roughly proportional subsets, one ending in *l*, like *vol-are* ‘fly’, the other not, like *am-are* ‘love’. The latter subset will then yield the entailment summation that results in PU, i.e. each and every case like *am-ate/ am-iamo* will generate an entailment that *X* be identical in *X-ate/ X-iamo* pairs. Correspondingly, the former subset, assuming hypothetically that palatalization would apply, will similarly generate entailments that *l/ ~~h~~* alternate in *...l-ate/ ...~~h~~-iamo*, thereby boosting the rank of PALAT. of

(30). Hence class size maintains proportionality of the two conflicting effects. However, we know that the effect of PALAT. is by itself weaker than PU, since it fails in the absence of lexical assistance: (30a'). The crucial point is that, unlike the grammatical effects, the lexical effect cannot itself match the proportionality to class size, by its very definition: it pertains to lexical singletons. No matter how large a class, there will never be more than just one verb *volare* 'fly'. The interaction of effects can be diagrammed as in (31).



In (31), lines 1 and 3 represent the proportionality of PU and PALAT. just discussed, respectively, with the latter having a smaller magnitude than the former. Line 4 represents the lexical effect, unrelated to class size. Palatalization succeeds when the summation of 4 and 3, given by line 2, exceeds the magnitude of PU. This obtains only for small classes. The intersection of lines 1 and 2 identifies the class size above which alternations will be inhibited by PU: the cut-off point.

In sum, P&B are correct that stem alternations in the minor conjugations have a substantial lexical component as in their quote in (13) above, since this is in fact the reason why they do not generalize to the larger *-are* conjugation. I have argued, however, that this does not disqualify such alternations from also having a substantial syntagmatic/phonological component, and that the latter is responsible for much of the distribution. In the present framework, unlike in P&B's, the lexical component is independent of the paradigmatic one: PU, and only the latter is sensitive to class size, while the former -by definition- is not. This is the reason why large classes are substantially uniform, and free of lexical effects – a prediction that cannot be reproduced by P&B's mere coindexing.

6. On the difference between Faithfulness and Indexing

While there is a certain affinity between the OO-FAITH relations of the present proposal and P&B's cell indexing, there is also an important difference already touched upon above. In OT, faithfulness constraints -like others- are violable. Indices, on the other hand, are only either the same or not. The data I discuss next further reveal the superiority of faithfulness in this regard.

Consider the parallelism between the forms of the participle and those of preterit in (32).

| (32) | Infinitive | Particip. | Preterit, 1, 3, 6 | Other verbs: |
|------|----------------------|------------------|--------------------------|---|
| a. | chiúdere 'close' | chiú-S-o | chiú-S -i/-e/-ero | accludere, attendere, chiudere, correre, corrodere, decidere, prendere, ridere, scendere, sospendere, |
| b. | muóv-ere 'move' | móS-S-o | móS-S -i/-e/-ero | connettere, discutere, imprimere, muovere, riflettere, |
| c. | céd-ere 'give up' | ced-út-o | ced-étt-i/-e/-ero | battere, cedere, credere, premere, ricevere, ripetere, vendere, ... |

As P&B note, when the participle employs the special allomorph *-s-* as in (32a), so does the preterit in its persons 1, 3, 6. This contrasts with the pattern in (32c), where both use their respective regular allomorphs. The parallelism endures when gemination occurs as in (32b), despite the relatively idiosyncratic nature of the latter effect. P&B conclude that in (32a, b) participle and persons 1, 3, 6 of the preterit simply use the same stem: their S5. Persons 2, 4, 5 feature affixes *-ésti*, *-émmo*, *-éste*, respectively, and the stem of the infinitive (PB's S1), e.g. *chiud-ésti* –a point to which I return below.

In addition to the relationship between participle and preterit that P&B note, however, there is also one between the participle and the infinitive, which was highlighted in (26) above. The participial allomorph *-s-* of (32a, b) is very much like the allomorph *-t-* of (26b) above *vin-t-o* and occurs *only* in the unstressed *-ere* (i.e. stem-stressed) conjugation. As with *-t-*, the reduced participial form *-s-* is attributable to the pressure to maintain the stem stress in the participle, the full form *-út-* causing a stress shift instead, as in (32c) (Burzio 1998, 2003). The choice between *-s-* and *-t-* is only weakly predictable from the stem form, and is -like other characteristics of the minor conjugations- partly idiosyncratic. The choice between regular allomorph *-út-* (32c) and accentual consistency (32a, b), (26b) is itself also under lexical control (Burzio 1998, 2003).

The accentual consistency of infinitive-participle pairs is in the present system a form of OO-FAITH, but -as noted above- not one that could be expressed by cell coindexing, since the two stems: *vinc-/vin(t)-* of (26) above, and now also *chiud-*, *chius-* of (21a) are segmentally different. Since such partial consistency cannot be expressed in P&B's system, the fact that both participial allomorphs *-t-* and *-s-* only occur in the conjugation that has stem-stressed infinitives can also not be captured. In addition to these difficulties, the *-t-/s-* variation of participles now reveals the inadequacy of the cell indexing account of (32) even further, as shown in (33).

| (33) | Infinitive | Particip. | Preterit, 1, 3, 6 | Other verbs: |
|------|----------------------|------------------|--------------------------|---|
| a. | vínc-ere 'win' | vín-T-o | vín-S -i/-e/-ero | cogliere, estinguere, fingere, giungere, nascondere, presumere, sorgere, torcere, vincere, volgere, ... |
| b. | scrív-ere 'write' | scríT-T-o | scríS-S -i/-e/-ero | condurre, correggere, eleggere, erigere, infliggere, scrivere |

What (33) shows is that the pattern of (32a, b) where gemination in the participle is reproduced in the preterit continues to hold even when the participial allomorph is *-t-*, but the preterit allomorph is *-s-*. Thus the relationship between preterit and participle is much like the one between participle and infinitive: an OO-FAITH relationship that is satisfied to the extent that other constraints permit, and not one governed by a binary choice between same or different indices. Concretely, the preterits in (33) can be accounted for by the OT ranking in (34).

(34) **Partial Grammar for the Preterit:** **-t-* Preterit >> OO-FAITH (Participle)

The dominant constraint in (34) is simply a statement of morphological fact: the preterit does not have a *-t-* allomorph. Comparable statements will also exclude unstressed allomorphs of the inflectional affixes for persons 2, 4, 5: *-ésti*, *-émmo*, *-éste*, respectively, which also break the correspondence with the participle as noted earlier. This is in contrast with the allomorphy of persons 1, 3, 6 shown in (32): stressed *-étti*, *-étte*, *-éttero* alternating with unstressed *-i*, *-e*, *-ero*. The stressed allomorphs also exist in the variants: *-éi*, *-é*, *-érono*, incidentally to the present discussion. When the participle uses allomorph *-t-* as in (33), the preterit will still be expected to remain faithful to it to the extent possible, namely accentually or prosodically, as indeed it does, by employing unstressed 1, 3, 6 inflections after *-s-*. Again, P&B's coindexing will not capture such partial identity, and will therefore fail to account for the parallelism in (32) and its obvious relationship to the one in (33).

7. Conclusions

I have argued that in Italian verbal inflection Lexicon, Phonology and Morphology can interact in very fine-grained ways. While Phonology and Morphology give rise to 'syntagmatic' effects: surface allomorphs being conditioned by their immediate environments, such effects are under some lexical control. Yet the lexicon proves insufficient by itself, as much of the distribution is correctly captured only in syntagmatic terms.

In the extended Optimality Theory framework that incorporates the Representational Entailments Hypothesis, such interactions results from entailment summation: while either grammatical or lexical entailments may be insufficient individually, they may nonetheless be sufficient when they join forces. Entailment summation is not only the basis for such conjunctive effects, but also for constraint ranking in OT more generally. We have seen that with large classes Paradigm Uniformity effects overwhelm lexical effects, thus blocking any alternation that has a lexical basis. This is because, with larger classes, entailment summation yields larger totals.

Pirrelli and Battista (2000) are correct in highlighting the role of paradigmatic relations, but fail to factor in the Phonology, responsible for many of the syntagmatic ones. In addition, their use of coindexation to express the paradigmatic relations is out of character with their violable nature, correctly expressed by OT constraints and their underlying entailments.

References

Burzio, Luigi (1998) 'Multiple Correspondence', *Lingua* 103, 79-109.

- Burzio, Luigi (2000) 'Cycles, Non-Derived-Environment Blocking, and Correspondence,' in Joost Dekkers, Frank van der Leeuw and Jeroen van de Weijer, eds. *Optimality Theory: Phonology, Syntax, and Acquisition*. Oxford University Press, 47-87.
- Burzio, Luigi (2002a) 'Surface-to-Surface Morphology: when your Representations turn into Constraints' in P. Boucher (ed.) *Many Morphologies*, Cascadilla Press. 142-177.
- Burzio, Luigi (2002b) 'Missing Players: Phonology and the Past-tense Debate,' *Lingua* 112, 157-199.
- Burzio, Luigi (to appear) 'Sources of Paradigm Uniformity', in Laura J. Downing, T. A. Hall, Renate Raffelsiefen, eds. *Paradigms in Phonological Theory*. Oxford: Oxford University Press.
- Burzio, Luigi (2003) 'Output-to-Output Faithfulness: the Italian Connection', *Lingue e Linguaggio* 1, 69-104.
- DiFabio, Elvira (1990) *The Morphology of the Verbal Infix /-isk-/ in Italian and in Romance*. Ph.D. Dissertation, Harvard.
- Halle, Morris, and Alec Marantz (1993) 'Distributed Morphology,' in Kenneth Hale and Samuel J. Keyser, eds. *The View from Building 20: Essays in Linguistics in Honor of Sylvain Bromberger*. MIT Press, 111-176.
- Łubowicz, Anna (1998) 'Derived Environment Effects in OT', ROA #: 239-0198.
- Pirrelli, Vito and Battista, Marco (2000) 'The paradigmatic dimension of stem allomorphy in Italian verb inflection', *Rivista di Linguistica*, 12, 2, pp. 307-380.
- Pirrelli, Vito (2002) 'Per un superamento della dicotomia lessico-grammatica. Aspetti di composizionalità "debole" nel linguaggio', in E. Ferrario, V. Pulcini (a cura di) *La lessicografia bilingue tra presente e avvenire*, Edizioni Mercurio, Vercelli, pp. 187-204.
- Prince, Alan, and Paul Smolensky (1993) *Optimality Theory: Constraint Interaction in Generative Grammar*. Report no. RuCCS-TR-2. New Brunswick: Rutgers University Center for Cognitive Science. To appear from Blackwell.
- Prince, Alan, and Paul Smolensky (1997) 'Optimality: from Neural Networks to Universal Grammar,' *Science*, 275, 1604-1610.
- Schein, Barry and Donca Steriade (1986) 'On Geminates,' *Linguistic Inquiry* 17, 691-744.
- Stump, Gregory (2001) *Inflectional Morphology: a Theory of Paradigm Structure*, Cambridge University Press.
- Tantalou, Niki and Luigi Burzio (2003) 'Modern Greek Accent and Faithfulness Constraints in OT', ms. Johns Hopkins University.