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A Classless Analysis of Italian Nouns and their Theme-Vowel Alternations

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Abstract

The decompositional, non-lexicalist, approach to word-structure and the theory of roots have proven highly rewarding. One grey area, however, comes from Romance since, rather than roots, the word structure primitive appears to be the stem: root + ‘stem-formative/theme vowel’. Regardless, there have been perspicacious decompositional accounts of Italian, however these are still marred by the large number of morphological/item-specific irregularities, motivating arbitrary noun classes. Additionally, there are roots that do not inflect: consonant-final and vowel-final forms when these are oxytonic or loanwords. Given these irregularities, previous analyses in Italian have included the use of lexical exceptions and class features. We challenge the use of class features in generating the attested patterns (and their exceptions). Instead, we propose a new categorisation of root-shapes, which, when combined with the exponents of nominal inflection, produce the correct surface pairings, as well as the non-alternating forms. In our analysis, there is no diacritic or special marking of lexical exceptions, all forms inflect regularly in accordance to their phonological shape. This requires the innovation of one new mechanism (Inhibition),

but we back it up by showing that it leads to an unexpected beneficial prediction that solves a long-standing problem associated with *Raddoppiamento Sintattico* (RS).

Keywords: Theme vowels, Class features, Distributed morphology, Roots, *Raddoppiamento Sintattico*.

1. Introduction

In recent times, the category of word has rightly been challenged (see for instance the papers in Newell et al. 2017), to the point where it is highly doubtful that it has any coherent cross-linguistic status. In its place, there has been much work on ‘syntax-all-the-way-down’ approaches that decompose words into syntactic trees (Borer 2014; De Belder & van Craenenbroeck 2011; Embick 2010, 2014; Harley 2014). In stark contraposition to non-decompositional ‘lexicalist’ approaches (for one example see Bybee 2003), decompositional analyses to word-structure have been highly fruitful. Framework level hypotheses have been built on this assumption: Distributed Morphology (Halle & Marantz 1993; Harley & Noyer 1998; Embick 2010), Nanosyntax (Starke 2009, 2018; Caha 2009, 2021; Baunaz et al. 2018). Moreover, since Borer (2003, 2005, see also 2014), it has been widely assumed that the terminals of syntactic structure are roots, these terminals are devoid of syntactic and semantic properties.

Extending this approach to Romance implicates decomposing its words all the way down to expose the root, but in these languages the root usually exists in obligatory association with a suffix: *man-* + *-o* ‘hand’ Spanish/Italian. This suffix has been called variably a ‘stem formative’, ‘word marker’, ‘class marker’, ‘class vowel’, ‘form-class morpheme’, ‘theme vowel’, ‘thematic suffix’, ‘terminal element’, and ‘desinence’ see (for Spanish) Bermudez-Otero (2007). Bermudez-Otero (ibid.) opts for ‘stem formative’, whereas any nouns without this affix (e.g. *lapis* ‘pencil’) he refers to as ‘athematic’. In this paper, in analogy to verbs, which in Romance also exist as root + suffix (whereby this suffix determines a root’s inflectional patterning), we refer to ‘stem formatives’ as thematic vowels or theme-vowels (ThV).

These can be observed in (1) where the noun *gatto* [ˈgatːo] ‘cat’ is used as an exemplar. This noun is made of a root, $\sqrt{\text{gat}}$, followed by the theme-vowel. This marker is composed of one unstressed, alternating vowel.

- (1) The paradigm of Italian *gatto* [ˈgatːo] ‘cat’¹
- | | | | |
|----|----------|-------------------------|------|
| a. | [ˈgatːo] | $\sqrt{\text{gat}}$ + o | M.SG |
| b. | [ˈgatːi] | $\sqrt{\text{gat}}$ + i | M.PL |
| c. | [ˈgatːa] | $\sqrt{\text{gat}}$ + a | F.SG |
| d. | [ˈgatːe] | $\sqrt{\text{gat}}$ + e | F.PL |

This root-level decomposition is far from being universally accepted. This is probably not aided by the fact that typically roots have no independent status in Italian

¹ Data are given in IPA transcriptions. Italian stressed vowels lengthen in non-final, open syllables. See Bertinetto & Loporcaro (2005), Chierchia (1988), Larsen (1998), Passino (2008) for analyses. We address this fact in section 4.3, although lengthening of stressed vowels is orthogonal to our proposal. All the alternating vowels are unstressed.

*gat: . Moreover, there have been empirical arguments against such a decomposition in Spanish, a closely related language to Italian. For instance, Bermudez-Otero (2013) claims that a root-decompositional analysis must be erroneous for Spanish (*contra* Oltra-Massuet 1999; Oltra-Massuet & Arregi 2005), and the smallest unit ought to be the stem with its theme vowels intact.

If Bermudez-Otero's argument went through, it would undermine the 'syntax-all-the-way-down' enterprise along with its strictly local determination of conditioned allomorphy (see Embick & Halle 2005). However, Bermudez-Otero's argument is based on a presumptive cyclicity paradox, that a particular syllabification aspect is cyclical. Myler (2015), in turn, shows that this is not the case. Without the paradox, the crucial objection against the root decomposition in Spanish disappears.

Emboldened by this, we propose our own root-level decompositional analysis of Italian and show that this leads to a number of satisfying conceptual and empirical outcomes.

The difficulty of such an approach comes in the treatment of such a bewildering array of irregularities in the alternations. We follow D'Achille & Thornton's (2003) classification and introduce the data on which we build our analysis in (2). Any alternating noun (i.e. a noun changing its shape in the plural with respect to the singular) obligatorily falls into one of these classes, see the column labelled 'alternation', these are called 'declinable' in Dressler & Thornton (1996). Nouns are shown preceded by their corresponding definite article for the sake of clarity.

(2) Noun classes in Italian²

		SG	PL	Alternation		
Class I	a.	[il#'gat:o]	[i#'gat:i]	o > i	M	'cat'
	b.	[la#'ma:no]	[le#'ma:ni]	o > i	F	'hand'
Class II		[la#'sa:la]	[le#'sa:le]	a > e	F	'lounge'
Class III	a.	[l#ele'fante]	[li#ele'fanti]	e > i	M	'elephant'
	b.	[la#'ti:gre]	[le#'ti:gri]	e > i	F	'tiger'
Class IV	a.	[il#'poε:ta]	[i#'poε:ti]	a > i	M	'poet'
	b.	[l(a)#'a:la]	[le#'a:li]	a > i	F	'wing'

The data in (2) shows that it is the final vowel that alternates between the singular and the plural. This vowel is diachronically related with 'theme', that is the final vowel is the reflex of one of the Latin declensions from which the Italian system originated (see Rohlfs 1966 for instance).

Once one accepts decompositionality of data such as those in (1, 2), class features are generally used to formalize the association of a given root to a specific pattern of the unstressed, alternating final vowel. This is because one cannot simply rely on the small number of frequent and animate nouns that undergo the classic Class Ia ~ II alternations: [gat:-o] 'cat-M.SG', [gat:-i] 'cat-M.PL'; [gat:-a] 'cat-F.SG', [gat:-e] 'cat-F.PL'. Other nouns of the same gender, number and general animacy undergo different inflectional patterns: [ele'fant-e] 'elephant-M.SG, Class III.a, (cf. [elefan't-uf:-o] 'cute little elephant') and therefore seem to require further use of class features

² There is also a gender switching class (which corresponds to class V in D'Achille & Thornton's classification): [il#'braf:o] / [le#'braf:a] M > F 'arm', but this is a case apart and does not figure in our analysis, see Acquaviva (2008) for an analysis of lexical plurals.

to justify them, as do other exceptional patterns: -a final masculines: ['poɛ:t-a] ['poɛ:t-i] 'poet-M.SG/PL' (Class IV.a), and the -o final feminine: ['ma:n-o] ['ma:n-i] 'hand-F.SG/PL' (Class I.b) (see Acquaviva 2008, 2009; Faust & Lampitelli 2012; Lampitelli 2010, 2011, 2014; Passino 2009 a.o.).

Within the Autosegmental framework known as Strict CV (Lowenstamm 1996; Scheer 2004), our analysis will show that there is no need for class features in accounting for the alternations of the inflectional markers in the language. We will contribute to the diacritic-free theory of syntax-phonology mapping ('morpho-phonology') (Scheer 2011; 2012).

In our approach, all the alternations, and even the non-alternations, are explained entirely in the phonological component, through the interaction of underlying root-shapes and the exponents of number. Therefore, in our analysis, the category of nominal 'theme vowel' is itself entirely epiphenomenal in Italian. Nouns are built in the syntax, without any syntactic reference to a 'theme vowel'. These are then spelled out along with various exponents, which together coagulate according to regular phonological processes, forming a surface pattern of vocalic alternations.

The paper is structured as follows. In section 2, we introduce the theoretical tools used to lay down our analysis; in parallel, we show the basic analyses upon which our proposal is built. We start by introducing Element Theory (Kaye et al. 1985, Backley 2011) and show how this applies to ThV decomposition in Italian that already appears in the literature; then, we discuss the representational make-up of the exponents of morphemes. These are couched within Strict CV phonology (Lowenstamm 1996, Scheer 2004) and are inspired by the typology of spell-out proposed by Bendjaballah & Haiden (2008). We then illustrate how the exponents are parsed into the templatic positions. We conclude this section by problematising class features from the perspective of a modular approach to grammar. Section 3 is devoted to our own proposal: first, the shape of Italian roots is discussed (3.1), then gender (3.2) and stress (3.3) are analyzed. Section 4 explores some predictions as well as advantages of a diacritic-free analysis of nouns inflection: we start with observing the mismatch between ThV and gender in agreement (4.1), then we turn to invariable nouns and show how our proposal accounts for them (4.2). After a brief detour into pluralization (4.3), we show an interesting prediction involving *Raddoppiamento Sintattico* (4.4) that follows from our analysis. Section 5 summarizes our analyses and concludes the paper.

2. Decomposing theme vowels and phi-feature exponents: the theoretical tools

The purpose of this section is twofold. On the one side, we introduce the theoretical tools used to formalize the analysis; on the other, we discuss some specific aspects of previous analyses of Italian nouns. Though the analysis we are presenting in section 3 below crucially assumes empty syllabic positions and floating features/segments (cf. Zimmermann 2017); we will present it in Element Theory (Kaye et al. 1985) and Strict CV (Lowenstamm 1996; Scheer 2004) since these theories are used in work that has been carried out on Italian nouns (see Faust & Lampitelli 2012; Lampitelli 2010, 2011, 2014; Passino 2009 a.o.). We do so to highlight what our proposal adds to our knowledge of the topic, and the morphology of inflection in general.

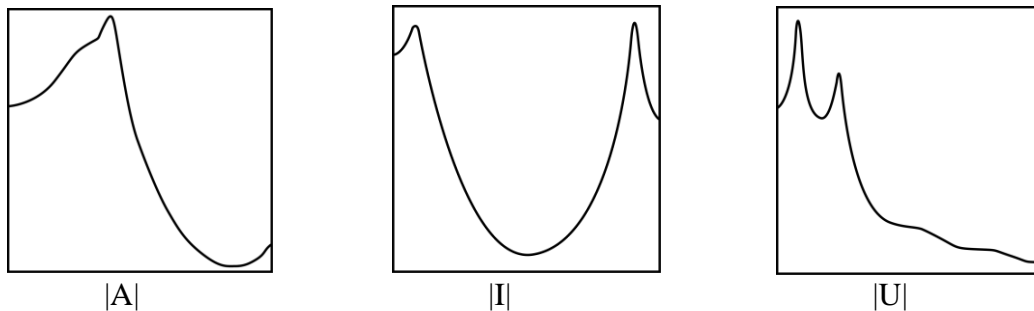
2.1 Element Theory

2.1.1 Internal structure of segments

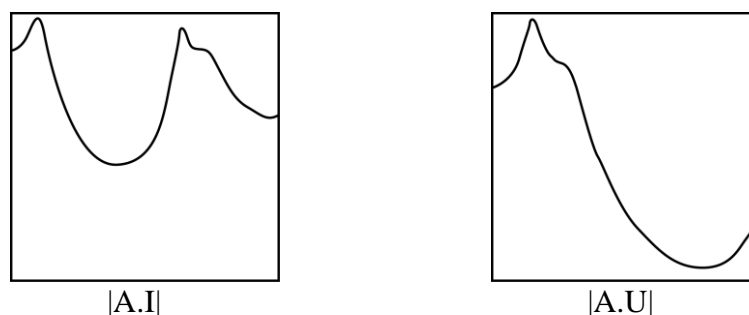
Element Theory (Kaye et al. 1985; Backley 2011; henceforth ET) is a framework of subsegmental features developed in Government Phonology (Charette 1991; Kaye 1990; Kaye et al. 1990) and Strict CV (Lowenstamm 1996; Scheer 2004).

Since all of the discussion revolves around vowels, we will present the background to ET for vowels only. In ET, the features (known as ‘Elements’) are privative and independently interpretable (Harris & Lindsey 1995). Each element corresponds to a distinctive modulation of the carrier signal and a certain spectral shape (ibid.; Harris 2005). The figures in (3) show: |A| = Low F1, |I| = High F2 (‘dip’ in the spectral shape), |U| = Low F1 + F2 (‘rump’ in the spectral shape). These represent the three signatures common to all vowels and they are singularly as some sort of [a, i, u] in the languages of the world. All other vowels are combinations of these (see 4).

(3) Element signatures (Breit 2013, Backley 2011, Harris & Lindsey 1995)



(4) Mid vowels



In stressed positions, Italian has two sets of mid-vowels, they differ for the proportion of A-ness, as shown in (5). In unstressed position, in turn, the vowels [ɛ] and [ɔ] do not appear (see Krämer 2009). In the next subsection, we show the application of ET to ThV in Italian.

(5) Italian vowels and their ET representation

- | | | | | | |
|--------|---|--------|-----|--------|-------|
| a. [i] | I | d. [e] | A.I | f. [ɛ] | A.A.I |
| b. [u] | U | e. [o] | A.U | g. [ɔ] | A.A.U |
| c. [a] | A | | | | |

2.1.2 ThV decomposition

Adopting ET allows for a strikingly simple decompositional analysis of ThV in Italian nouns. Since all elements are independently interpretable, and all vowels are either an element or combinations of elements, ThV can be easily decomposed into one of the sequences in (5). Since each Italian noun inflects with respect to gender (either M or F) and number (SG or PL), each decomposed ThV is the realization of one of the two genders and one of two numbers. Following Passino (2009) and Lampitelli (2010, 2014), the vowel patterns of Italians are decomposed as in (6).

(6) The paradigm of Italian *gatto* ‘cat’

		Root+ThV	phi-features	Elements
a.	[ˈgat:o]	√gat: + o	M.SG	U.A
b.	[ˈgat:i]	√gat: + i	M.PL	I
c.	[ˈgat:a]	√gat: + a	F.SG	A
d.	[ˈgat:e]	√gat: + e	F.PL	A.I

Two generalizations follow from the last column in (6), the one labelled ‘Elements’. First, the element |I| marks plural, it appears in both (6b) and (6d). Second, element |A| is the exponent of feminine, as it appears in both (6c) and (6d). Since masculine singular contains elements |U| and |A|, Passino (2009) and Lampitelli (2010, 2014) both propose to associate the |U| to masculine and |A| to singular. Thus, masculine nouns belonging to class I.a. and feminine nouns of class II are analysed as in (7).

(7) Exponents of phi-features

a. Exponents for number

A	↔	SG
I	↔	PL

b. Class features/gender

U	↔	M	Class I.a
A	↔	F	Class II

According to this analysis, the supposedly irregular a-ending masculine [poˈɛ:ta] ‘poet’ (class IV.a) is actually the solitary regular expression of number, singular (SG) |A|, which then regularly alternates with the sole exponent of the plural (PL): |I|. Thereby creating the ‘irregular’ a-i theme vowel alternation entirely with exponents of number. The contrast with the ‘regular’ class I.a. masculine is shown in (8a) vs (8b).

(8) Class IV.a vs Class I.a. masculine nouns

		Root	Class	Num		
a.	SG	√poet		A	[ˈpoɛ:t-a]	A
	PL	√poet		I	[ˈpoɛ:t-i]	I

b.	SG	√gat:	U	A	['gat:-o]	U.A
	PL	√gat:	U	I	['gat:-i]	U.I ³
c.	SG	√fjor	I	A	['fjo:r-e]	A.I
	PL	√fjor	I	I	['fjo:r-i]	I

In both Passino and Lampitelli's analysis, class features are indeed necessary to distinguish between the three classes shown in (8), for instance (since there are even more exceptional items). Class features are also necessary in Lampitelli (2011), to account for absence of ThV in loanwords such as [film] 'film' or [ra'gu] 'ragout'. Lampitelli (2011, but also 2014) proposes that those nouns displaying an alternating final vowel are lexically associated with a feature that spells out as a templatic CV-unit, labelled CV_{Fin}: this is the site where ThV is realized. In absence of it, no inflection is overt. Thus, elements |U|, |A| remain afloat in (9b,c); see the representation (12) below.

(9) Class 1 vs loans

	Root	CV _{Fin} (+/-)	M	SG		
a.	√gat:	CV _{Fin}	U	A	['gat:o]	U.A
b.	√film		U	A	[film]	*['filmo]
c.	√ragu		U	A	[ra'gu]	*[ra'gu:o]

As we show in section 3, our analysis dispenses with such an ad-hoc feature. Also, in Passino and Lampitelli's analyses, very many exceptional nouns, such as ['ma:no] 'hand' (class I.b), must also be lexically marked as exceptions. As we are about to show, this is not the case in our account.

2.2 Strict CV

2.2.1 Make up of representations

Since our account is framed in Strict CV (Lowenstamm 1996; Scheer 2004), we will offer a brief explanation of its working assumptions for the unfamiliar reader.

Strict CV, an offspring of Government Phonology (Kaye et al. 1990; Charette 1991, henceforth GP), is an autosegmental framework where representations are composed of two main tiers: a melodic tier (holding elements and segments) and a skeletal tier (syllable structure positions). The skeletal tier is made up of strictly alternating C and V slots and the two tiers are connected by association lines.

The specific model of the interface between phonology and morphosyntax that we follow is inspired by seminal work by Lowenstamm (2008). Within this framework, Bendjaballah & Haiden (2008), and later Faust et al. (2018), propose that Vocabulary Items can come in any of the following configurations.

³ Front rounded vowels do not result from mixing M and PL because |U| and |I| are not allowed to combine in Italian representations, as is independently attested by the inventory. In this case, |U| is understood to be suppressed (Passino 2009; Lampitelli 2010).

- (10) Shapes of exponents (Bendjaballah & Haiden 2008; Faust *et al.* 2018)
- | | | | |
|------------------|-------------|----------|------------------|
| a. Fixed | b. Floating | c. Empty | d. Unfixed |
| C V | | C V | C V |
| | | | |
| α β | α | | α β |

The configurations in (10b-d) follow directly from the independence of tiers and the idea that association lines have become independent objects of representation (cf. van Oostendorp 2006; Zimmermann 2017).

Exponents can come in one of these configurations (or any combination thereof). As we will see in more detail, phi-features such as those from (7) are represented as floating segments, the configuration shown in (10b), whereas roots are largely composed of the configuration in (10a), but they also contain floating features (misattributed to class), and the last CV-unit of the root which ends up hosting the alternations called ThV is of the type shown in (10c). We show how these exponents are computed in the following subsection.

2.2.2 Parsing

We now introduce the procedural side of the framework, its “parsing”. In this system, as a consequence of assuming autosegmental representations, parsing is mediated through the skeleton; any feature or segment that wishes to be phonetically interpreted must associate to it (for a recent overview of the role of the skeleton see Scheer (2022)). This is most easily demonstrated by segment-zero alternations in French: [p(ə)ti] ‘small.M.SG’ vs. [p(ə)titami] ‘boyfriend.M.SG’ cf. [nɛt] ‘clean.M.SG’.

The M.SG of the French token for ‘small’, [p(ə)ti], ends in a vowel but unpredictably alternates with a [t] in certain positions. Since the quality of the alternating consonant is unpredictable, /t/ must be underlying and part of the root. However, it does not appear in the M.SG form. French has no rule of final t-deletion, as is shown by the M.SG form of the adjective ‘clean’ [nɛt]. Therefore, there has to be a way to encode the ‘fixed’ /t/ of ‘clean’ and the alternating /t/ of ‘small’. This can be insightfully done representationally by appealing to the notion of floating segments (for non-Strict CV precursors see Hyman 1985; Encrevé 1988; Charette 1991; Tranel 1996).

These consonants that alternate with zero are analysed as ‘floating segments’, they have the configuration shown in (10b). Though they are underlyingly part of a root, they do not have their own skeletal position within that root: /p(ə)ti<t>/. As such, they can only be interpreted if they can get some “syllabic support” (Hyman 1985:58), that is, attachment to the skeleton. As shown in (11), the floating /t/ (11a) docks onto an available C position when the adjective is followed by a vowel-initial word, as in (11b): *peti*[t]. When no C-position is available, this consonant remains afloat and is unpronounced: *peti*[Ø].

Furthermore, as shown in (11c), the root-final floating /t/ can surface if the root is affixed by an exponent made entirely of skeletal positions, such as the feminine in French, the configuration shown earlier in (11c): [p(ə)tit] ‘small.F.SG’ (Charette 1991; Fathi & Lowenstamm 2016).

(11) Floating segment hypothesis⁴a. UR $\sqrt{p\text{ə}ti\langle t \rangle}$ [p(ə)ti] ‘small-M.SG’

C	V	C	V	
p		t	i	t

b. $\sqrt{p\text{ə}ti\langle t \rangle} + \text{ami}$ [p(ə)titami] ‘boyfriend.M.SG’

C	V	C	V	+	C	V	C	V
p		t	i	t	a	m	i	

c. $\sqrt{p\text{ə}ti\langle t \rangle} + \text{CV}$ ‘F.SG’ = [p(ə)tit] ‘small.F.SG’

C	V	C	V	+	C	V
p		t	i	t		

Similarly, in Lampitelli’s (2014) analysis of ThV, M \Leftrightarrow |U| as well as SG \Leftrightarrow |A| remain afloat in nouns that do not select for CV_{Fin}. This is illustrated by [ra’gu] ‘ragout.M.SG’ (cf. 9c) in (12).

(12) Floating elements in Italian

Root		ThV	M	SG	
C	V	C	V		
r	a	g	u	+	U A = [ra’gu] *[ra’gu:o]

According to Lampitelli, this representation accounts for the fact that the form *[ra’gu:o] is never possible: neither |U| nor |A| have any available positions to associate with.

In the next subsection, we illustrate how empty positions are interpreted and silenced the model we adopt in this paper.

2.2.3 Interpreting empty positions

In Strict CV, as in GP, it is standardly assumed that empty positions can remain phonetically uninterpreted if they are labelled as such in the course of the derivation, according to the following conditions in (13a-b).

(13) Silencing of empty positions

a. Domain-Final Parameter (DFP) (based on Kaye 1990)

Domain-final empty V slots are silenced (receive no phonetic interpretation)

C	V	C	<u>V</u>
x	y	z	

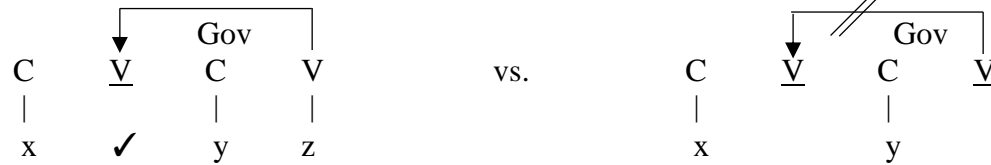
⁴ Association lines added by the computation (linking) are shown as dotted, underlying ones are shown as solid.

b. Gov(ernment) (based on Charette 1991)

An empty V-slot can be silenced by Gov *iff* it is followed by a V-slot that is not itself silenced.

[xyz]

*[xy] [xəy]



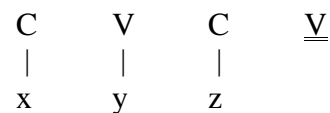
Empty positions that are not silenced must be phonetically interpreted according to the Empty Category Principle (Kaye 1990, henceforth ECP).

As we saw in (2.2.2), un-silenced empty positions readily accept floating material, and floating segments link to empty positions (Encrevé 1988; Charette 1991). However, floating segments can never link to silenced positions; this includes Final Empty Nuclei (FEN) in languages where the Domain Final Parameter is active (13a), and all governed positions (13b). This condition originates in Scheer's (1997: 80) analysis of vowel-zero alternations in Czech (cf. a summary in Scheer 2004: 90). The reasoning was then extended to consonants, which remain afloat under government (Scheer 2000: 151ff.). Since then, this condition is taken as a universal and it has been extended to various other analyses (Pagliano 2003; Scheer 2016; Faust et al. 2018; Barillot et al. 2018; Ulfsbjorninn 2020; Lahrouchi & Ulfsbjorninn 2022).⁵

In addition to these, there is one further silencing condition that also stops any floating material linking to the V-slot, we call it: 'inhibition'. This condition is shown in (14), it underlyingly marks empty positions as phonetically uninterpretable. The representation of inhibited V-slots is shown throughout the paper with a double underline: V.

(14) Inhibition

Empty V-slots can be marked as phonetically uninterpretable in UR



Inhibition is a new theoretical device. This 'inhibited' status, as opposed to 'silenced by DFP and Government', is a necessity to account for the data from our perspective. Theoretically, it may have its underpinnings in Encrevé's (1988) distinction of 'pointed' vs. 'pointless' onsets, which have a long tradition in GP-approaches to phonology as well as recent papers (Charette 2003; Faust 2015; Faust et al. 2018; Ulfsbjorninn 2021; Lahrouchi & Ulfsbjorninn 2022). Charette (1991, 2003) illustrates that pointed onsets require Government, whereas empty onsets are effectively invisible as empty categories (i.e. they do not require explicit silencing to comply with the ECP). However, even in Standard GP, empty V-slots did not have

⁵ The relationship of empty positions and floating structure is not dissimilar to Nevins' (2010) notion of 'neediness' and D'Alessandro & van Oostendorp's (2016, 2020) attraction/repulsion in Magnetic Grammar. What we describe in (14) is lexical inhibition, the same outcome as what happens derivationally, but lexically as part of the UR.

this pointed/pointless distinction, and were always subject to the ECP. Recently, Baturay-Meral & van Oostendorp (to appear) have proposed the utility of a pointedness distinction in nuclei also (equitable to a pointed vs. pointless V-Slot in Strict CV). It is possible, therefore, that the Inhibited empty V-slots referred to in this paper are simply those empty V-slots without a point. This would make sense of the two characteristics of these V-slots: nothing floating can link to them (explaining the lack of inflection) and they cannot be spread into (explaining the lack of vowel lengthening in RS contexts).

The mechanism of Inhibition does not only have a role in solving the problems of the Italian inflectional system, which are the focus of our paper, but it also helps solve an apparently unrelated long-standing problem of Italian morpho-phonology: why Raddoppiamento Sintattico is expressed with consonant gemination rather than vowel lengthening (see 4.4 below). This is important because it shows that in our analysis inhibition is not merely a notational variant for a diacritic saying ‘do not inflect’, rather it reflects the fact that some V-slots are simply not phonologically available to phonological linking/spreading.

The next subsection focuses on problematising class features.

2.3 Why are class features a problem?

Before turning to our proposal, we ought to elucidate the inherent problem that class features pose for a Minimalist architecture of language.

We contend that those working toward the ideals of the Minimalist program ought to seek the elimination of class features wherever possible.

The Minimalist conception of language is the pairing of meaning and form through the single generative engine of syntax (Merge) (Chomsky 2005). Distributed Morphology (Halle & Marantz 1993, 1994; Embick 2010; henceforth DM) and the Minimalist Program (Chomsky 1995), set the scene for a fully modular, feed-forward architecture of the grammar, where information is shipped in a universal manner across the components of the grammar. Consequently, *a priori* there can be no look-ahead or tampering (going back). This has been previously formulated as the *Strict Cycle Condition* (Chomsky 1973) and *Strict Cyclicity* (Kiparsky 1985). A variant of *Strict Cyclicity* appears for phonology in Kaye (1995). This concept was reworked into syntax as the *Phase Impenetrability Condition* (Chomsky 1999, 2001), and Kaye (1995) was reworked in light of ‘phase theory’ in the syntax-phonology interface (Newell 2008; Scheer 2011, 2012; D’Alessandro & Scheer 2015).

Being modular, each component of the grammar should only have access to its own information and each module has its own vocabulary of features (Scheer 2020). The syntactic and phonological forms are related to each other by a mapping between components (Bobaljik 2017). The mapping between syntax and phonology, operates via a procedural step referred to as ‘vocabulary insertion’ (Halle & Marantz 1993, 1994), where all the features and outputs of computation of one component are translated, ‘spelled out’, into the features of the next component.

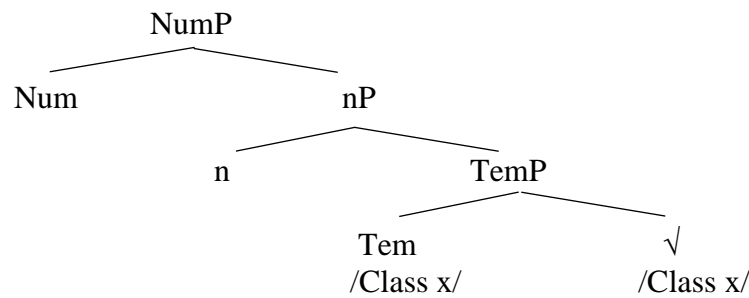
Consequently, there are no phonological features in the syntax, just as there should be no non-phonological features in the phonology. In addition to roots (pure encyclopedic meaning; Borer 2003, 2005), the features of syntax ought to be restricted to those related to number, person, gender, animacy, definiteness etc. Syntax should not contain heads or features that only serve the purpose of providing phonological interpretation later in the derivation. Whereas the features of phonology should be

limited to those governing externalization and the computations of each component must be fully within that component.

It follows from this Minimalist conception of language, as “[...] an optimal solution to legibility conditions” (Chomsky 2000) that the vocabulary of each component should be not only module specific but also *module appropriate*. The Class features required for analyzing Italian nominal inflection (including in Lampitelli (2011, 2014)) are not appropriate to this architecture because they are neither features of meaning, nor are they visible to the syntax (Acquaviva 2008), nor are they features of phonological computation, or phonetic interpretation. They are nothing but derivational/selectional diacritics that arbitrarily ensure that the ‘right’ elements come together in the vocabulary insertion.

An analysis of Italian inflection that uses both class features and a syntactic head that has neither a semantic contribution nor visibility within syntax is Faust & Lampitelli (2012). This paper introduces a thematic head in the syntax (Temp in (15) below), and it uses a class-based analysis to obtain the right selection between Root and ThV.

(15) Nominal structure (Faust & Lampitelli 2012)



As already intimated, the disadvantage of this system is threefold. Firstly, it must postulate a syntactic head: Temp whose identity is purely morpho-phonological and it has no independent syntactic or semantic function. It contains no true syntactic features, instead it acts only to introduce a piece of phonological structure to the spell out (cf. CV_{Fin} as mentioned above in section 2.1.2). Secondly, Temp’s head can be present or absent depending on the lexical item that it is merging with; for instance, it is arbitrarily absent in consonant-final loanwords such as [film] ‘film’. This is particularly problematic because it does not offer any explanation for the fact that (surface) C-final forms take no inflection. In this model, (surface) C-final forms lack Temp and so cannot host phi-features, but there is no explanation for why or how they are permitted not to have Temp. Moreover, there is no phonological connection made between consonant-final loanwords (e.g. [‘film] ‘film’) and stressed vowel-final forms ([ra’gu] ‘ragout’), for instance: why they should both lack Tem? Thirdly, the system still needs to use class features, like the other accounts mentioned above, to match each Root to the right Temp head. Here again, Temp and class features are acting for a purely surface teleological reason: to get the right answer/pairings.

(16) Class feature as a diacritic

n ⇔	-[o] / Class I.b.	[‘ma:n-o]	‘hand (F)’
	-[a] / Class II	[‘sa:l-a]	‘living room (F)’

As we will show, if the causes of the class alternations can insightfully, or at least unobtrusively, be reanalysed as phonological aspects of the roots themselves, one can entirely eschew the use of class features and the TempP, leading a more modular overall analysis free of diacritics.

3 Diacritic-free morpho-phonology

The analysis we propose builds on the analytic achievements of Passino (2009) and Lampitelli (2010, 2011, 2014) further developing their decompositional approach. The novelty of current proposal is its considerable uniformity, while maintaining strict modularity.

Unlike Faust & Lampitelli (2012) all nouns are syntactically identical regardless of their phonological shape, and class features are abolished from this dataset, which acts as a ready explanation for class never being used as syntactic feature in Italian (Acquaviva 2008).

Moreover, all alternations and all the variation in root-behaviour is derived by the phonology in a unified manner, there are no morphologically exceptional classes. Not even loanwords are exceptional, in our analysis they can be fully integrated into the same derivation as native nouns. Surface distinctions between ‘classes’ can be reanalysed as phonological differences in underlying root shapes. We start with introducing the shape of Italian roots.

3.1 Root shapes

Faust & Lampitelli (2012), Lampitelli (2010, 2011, 2014) conclude from their decompositional analysis that there are stems ending in a morphological object, the ‘thematic site’: (CV_{Fin}), which can contain either |I|, |U| or |A|, or be a fully empty CV. Furthermore, they claim that some roots (such as [vir'tu] ‘virtue’ or [ˈfilm] ‘film’) simply have no thematic site (that is no CV_{Fin}). In our reanalysis, we will take the benefits of the above analyses without their limitations.

We propose that the underlying form of all native roots in Italian ends in a CV, which is phonologically weak. Modifying the original idea of Lampitelli (2011), we argue that the behaviour of Italian roots is all due to the shape of the last CV of the root (labelled CV_{Fin} for the readers’ convenience). Being nothing more than the last CV of the root, CV_{Fin} is a phonological object, its presence does not depend on a lexical/syntactic feature (contra *ibid.*).

Most Italian roots (practically all native ones) meet the conditions stated in (17) which together generate the typical alternations and prosodic shapes of words. The condition in (17a) holds for very many Italian roots, but exceptions to it can exist, especially in recent loanwords (these are treated in section 4.2). The condition in (17b), however, holds uniformly in Italian (this will be discussed further in section 3.3).

(17) Conditions on the last CV in Italian

$$C \quad V^{n+1} \quad C_{Fin} \quad V_{Fin}$$

- a. V_{Fin} must either be empty or have one floating element: |I, U, A|
- b. V_{Fin} cannot be marked for lexical stress

In the tables below are the full extent of possible root endings for Italian nouns that conform to the conditions in (17) (effectively all native roots). These underlying root shapes, in combination with the exponents of number (listed in 7a), give rise to the full set of classes presented in (2) (the invariant classes are discussed next). In Table 1, ‘seg’ stands for ‘filled with a segment’, floating elements are shown in angle-brackets: <A>.

The forms in Table 1 show CV_{Fin} with a final filled C and a V-position associated with floating |I|, |U|, or |A|. The forms in Table 2, in turn, are the ones with an empty C-slot but whose final V-slot has a floating |I|, |U|, or |A|. In section 4.1 and 4.2 below, we explore the consequences of the hypothesis that roots (Table 1. vs. Table 2) end in floating Elements, and show that our account is on the right track. The forms in Table 3 are the ones that have filled C-slots but empty final V-slots, the one on the left ends in a simple empty V-slot, but the other ends in an inhibited C-slot. This leads to a major surface contrast when the phi-features for number are inserted. Lastly, Table 4 contains forms with a wholly empty final CV_{Fin}. In the leftmost example, we see the form with a simple empty final V-slot, this is compared to the version of the same type with an inhibited V-slot.

The inventory of roots in Italian is sketched in the following tables⁶

Table 1. C filled, V associated with floating |I|, |U|, or |A|

Final CV Shape	C V seg <I>	C V seg <U>	C V seg <A>
Alternation	e > i	o > i	a > e
Example	[ele'fante] (M) [ti:gre] (F)	['gat:o] (M) ['ma:no] (F)	-- ['sa:la] (F)
Gloss	elephant, tiger	cat, hand	--, living room

Table 2. C empty, V associated with floating |I|, |U|, or |A|

Final CV Shape	C V <I>	C V <U>	C V <A>
Alternation	e > i	o > i	a > e
Example	['bu:e] (M) --	['ne:o] (M) --	-- [ma're:a] (F)
Gloss	ox, --	mole (on skin), --	--, tide

⁶ A few more shapes will be shown later to complete the inventory, but these constitute the great majority of Italian roots. To avoid any confusion to readers unfamiliar with the theory, note that ET has autonomous interpretation of elements, a simplex feature can be interpreted as a full vowel (see Harris & Lindsey 1995).

Table 3. C filled, V empty vs. inhibited

	Empty	Inhibited
Final CV Shape	C V seg	C <u>V</u> seg
Alternation	a > i	
Example	[po'ɛ:ta] (M) ['a:la] (F)	['gɔlf] (M) ['gɔlf] (F)
Gloss	poet, wing	golf (sport), golf (car)

Table 4. C and V empty vs. inhibited

	Empty	Inhibited
Final CV Shape	C V	C <u>V</u>
Alternation	a > i	
Example	[an'drɛ:a] (M) --	[ra'gu] (M) [vir'tu] (F)
Gloss	Andrea, --	ragout, virtue

Given the typology of roots above, the theme vowel surface alternations (shown back in 2) all follow, as does the behavior of consonant final forms and oxytonic forms, such as ['film] 'film' and [ra'gu] 'ragout'.

Before we show how to derive the non-alternating noun classes, it is important that we take a brief detour to talk about a potentially controversial handling of 'gender' in Italian nouns.

3.2 Roots and gender

Stated in ET decompositional terms, |U| (which is present in [o]) is generally taken to mark the masculine for Class I.a. ['gat:o] 'cat' (see Passino (2009) and Lampitelli's (2010, 2014) in (7b). Similarly, |A| is taken to mark feminine as in ['sa:la] 'living room'. As already mentioned, this is a highly sanitised description that excludes exceptions, such as Class III.a. [ele'fante] (M.SG) 'elephant', Class IV.a. [po'ɛ:ta] (M.SG) 'poet', Class III.b. ['ti:gre] (F.SG) 'tiger', and invariable nouns such as ['kri:zi] (F.SG) 'crisis' for instance.

Taking into account all of Italian's nouns (rather than just 'regular ones'), the correct statement is that there is no phonological exponent that *must* mark gender in all the alternating cases; for any generalisation there is at least one important exception. This is not the case with number, however, as shown in the previous section.

Despite the small set of animate common nouns that still are 'transparent' for gender, ['gat:o] (M) 'tom (cat)', ['gat:a] (F) 'queen (cat)', in modern Italian we claim that nouns never actually expone gender in Italian (unlike function words, clitics and pronouns).

The majority of nouns (even common animates) cannot have their ThV altered so as to make the root 'masculine' or 'feminine': ['anatra] *['anatro] 'duck (M)', ['tɔtano]* ['tɔtana] 'European flying squid (F)'. That is to say that the gender is synchronically frozen, to the point where it can be a minimal contrast for encyclopaedic content: ['pan:o] 'cloth' vs. ['pan:a] 'cream', ['pen:o] 'wheelie' vs. ['pen:a] 'pen', ['pa:lo] 'pole' vs. ['pa:la] 'spade'.

To take these facts into account, we propose to include what is typically taken to be the ‘gender exponent’ into the root itself. This is similar to Lampitelli’s (2011) hypothesis according to which roots are associated with an element: $\sqrt{\text{gat}}$: + |U| ‘cat’, $\sqrt{\text{sal}}$ + |A| ‘living room’, etc. But we depart from Lampitelli’s proposal because in our account, what appears to be a gender exponent is encoded phonologically in the representation of the root. In Lampitelli’s analysis, gender is the result of the syntactic relation between the category-defining head n and its complement, the root. For us it is now largely a phonological fact about what occupies the last CV of the root.

In our analysis, the shape of nouns results from the phonological shape of the root. This is illustrated by the examples in (18) and (19). In (18a) and (18b), the derivation of [‘pa:lo] ‘pole’ is shown: since this root ends in floating |U|, SG |A| fuses with it, and the ThV surfaces as [o]. In [‘pa:la] ‘spade’, in turn, the root ends in floating |A| (18a). With the suffixation of the SG exponent |A|, a sequence of two adjacent identical elements is created. We argue that only one of these associates with V_{Fin} and surfaces as [a] (18b).⁷

- (18) The derivation of [‘pa:lo] ‘pole’
- a. /pal<U>/ + |A| SG
 C V C_{Fin} V_{Fin} +
 | | |
 p a l U A
- b. [‘pa:lo] ‘pole’
 C V C_{Fin} V_{Fin} +
 | | |
 p a l U A
- (19) The derivation of [‘pa:la] ‘spade’
- a. /pal<A>/ + |A| SG
 C V C_{Fin} V_{Fin} +
 | | |
 p a l A A
- b. [‘pa:la] ‘spade’
 C V C V +
 | | |
 p a l A A

In the analyses discussed in the literature, |U| is generally taken to be the exponent of M, whereas |A| expones F. In our analysis, in turn, gender in nouns is unrelated to any exponents on the noun root itself, (for more on this topic, see Baggio & Sudo (2022) and Kučerová (2018) for recent analyses).⁸

We complete the picture of the representation of roots in the following subsection while discussing the assignment of stress.

⁷ For [‘pa:la] ‘spade’, there are two identical Elements seeking to associate with V_{Fin} .

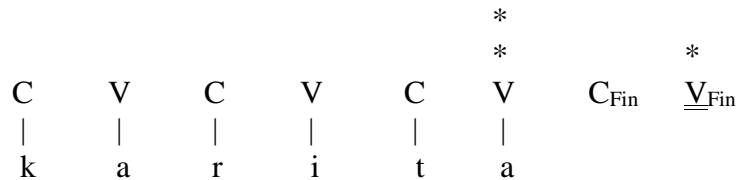
⁸ However, $M \Leftrightarrow |U|$, $F \Leftrightarrow |A|$ are gender exponents concatenated on functional items (diminutive affixes, determiners, possessives, etc...). Adjectival roots are also exempt from being explicitly marked for gender, hinting that this is a root vs. affix difference in Italian. We do not have space to expand on this here, but will do so in future work.

3.3 A note on stress

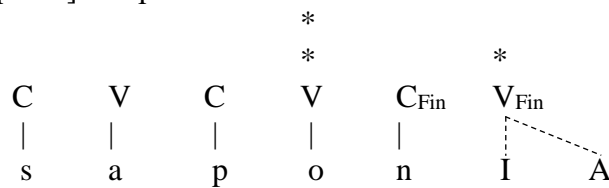
Depending on the analysis, the Italian stress system is either entirely underlyingly/lexically determined (within a three-syllable window Krämer (2009)), or it must at least have extensive lexical stress marking. Stress can fall on either the antepenultimate, penultimate or ultima: [ˈpɛ(:)kora] ‘sheep’, [saˈpo:ne] ‘soap’, [kariˈta] ‘charity’.⁹ For more phonological and phonetic detail of Italian stress see Bertinetto (1981); Bafile (1996, 1999); D’Imperio & Rosenthal (1999); Canalis & Garrapa (2012). We propose that oxytones in Italian end in a final empty CV, which is also the trigger of RS (cf. Passino (2013) and section (4.4)). This representation has an interesting additional consequence to the analysis of Italian, namely: stress can never be fully right aligned. Even in words with final stress, the actual V-slot bearing the stress is the penultimate one (see (20)). The asterisk ‘*’ indicates those V-positions that are active prosodically (for more on Strict CV Metrics see Faust & Ulfsbjorninn (2018)).

(20) Oxytones and paroxytones are both stressed on penultimate underlying V

a. [kariˈta] ‘charity’



b. [saˈpo:ne] ‘soap’



This condition is not an uncommon one. Expressed in Strict CV terms, it amounts to saying that a stressed V-slot must always have at least a weak/empty CV that follows it, like an empty dependent in a foot (Harris & Gussmann 2002; Charette 2008; Hermans & Torres-Tamarit 2016). This condition may be formalized as follows:

(21) Stress condition in Italian

V-slot marked with stress must precede a V-slot ... V* → V

This CV after stress can be either underlying or supplied by the grammar, as proposed by Larsen (1998). Assuming the latter, it is not inserted after stress where there is already an empty CV such as in closed syllables or finally in oxytones. In other words, no CV is inserted either in [ˈkarta] */kaCVrta/ ‘paper’, or in [triˈbu] */tribuCVCV/ ‘tribe’.

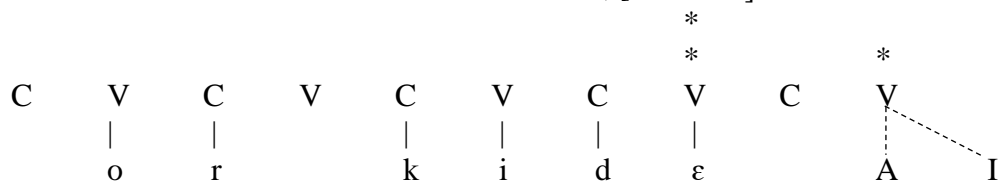
Crucially, since on our account ThV are not affixes, but an emergent biproduct of floating exponents linking to the last V of the root (V_{Fin}), and V_{Fin} can never be

⁹ Note that, according to Bertinetto & Loporcaro (2005), only open syllables in paroxytones are systematically lengthened, whereas those in oxytones are never lengthened. As for proparoxytones, there is variation in lengthening.

lexically stressed, it follows without stipulation that ThVs can never be stressed (see (20b) above.)

Oxytonic roots necessarily end in a fully empty final CV with an inhibited V_{Fin} making them invariant in the plural. In our analysis, oxytones are structurally very similar to vowel final roots (those with empty C_{Fin} slot), since these also must end in a final empty CV. However, unlike oxytones, their final V-slot is not inhibited. Since these roots have a non-inhibited final V-slot, their V_{Fin} will accept floating material, as such, the forms will surface with final unstressed ThVs: [ma'rɛ:a] vs. [ma'rɛ:e] 'tide(s)', [orki'dɛ:a] vs. [orki'dɛ:e] 'orchid(s)'. The latter example is shown in (22) beneath.

(22) V-final root stress and theme vowel formation, [orki'dɛ:e] 'orchids'



Moreover, if the root's V-final has no floating element, one obtains: /an'drɛCV/ [an'drɛ:a] vs. [an'drɛ:i] 'Proper name, Surname' (cf. *poeta* – *poeti* 'poet/poets').¹⁰

The next section explores some predictions as well as further issues raised by our proposal.

4 Predictions and further issues

4.1 No class effect anywhere else in the morpho-syntax

As discussed in section 2.3, the purpose of class features is exclusively to obtain the right pairings between root and ThV. Once the lexical part of the theme vowel is revised as part of the root, the need for the class feature is eliminated, they are not needed elsewhere in the grammar.

Consider the agreement system and the role of suffixes in nouns as in (23). The Class III.a. noun, [ele'fante] 'elephant' triggers ThV=[o] when suffixed with diminutive or when in agreement with an adjective (23a). The same situation holds for a Class IV.a noun, [po'ɛ:ta] 'poet': it selects for regular M agreement both with the diminutive and the adjective (23b). Lastly consider the feminine, Class I.b, the ThV is 'irregularly' =[o], but its agreement with the diminutive and adjective is still regular.

(23) Irregular nouns have regular agreement

- a. [ele'fante (M)] (Class III.a.) [elefan't-i:n-o]
 [elefan'ti: no ka'ri: no]
 *[elefan't-i:n-e ka'ri: ne]
 elephant.DIM cute-DIM
 'cute little elephant'

¹⁰ In response to an anonymous reviewer's comment, note that, although proper names usually do not inflect in the language, purported plural forms such as [an'drɛ:i] or [ma'ri:e] (cf. [ma'ri:a] 'Mary') are morphologically well-formed. For those speakers who do not accept the form *[an'drɛ:i], the form [an'drɛ:a] would pattern with ['la:ma] (see section 4.2 below).

b. [po'ɛ:ta (M)] (Class IV.a)	[poe't-i:n-o] [poe'ti:no bra'vi:no] *[poe't-i:n-a bra'vi:na] poet.DIM good-DIM 'not so good poet'
c. ['ma:no (F)] (Class I.b)	['man-i:n-a] ['bɛl:a 'ma:no] *['man-i:n-o] *['bɛl:o 'ma:no] beautiful/hand.DIM 'beautiful hand'

The irregular aspect of class is only visible immediately adjacent to the root, as already noted by Lampitelli (2010). What this new account offers is the natural explanation for this fact. It follows in our analysis because 'class' is actually a phonological 'irregularity/fact' of the root itself, so it only surfaces in that root-final position (it has no grammatical existence). This irregularity is therefore neutralised by any affix that overwrites the final vowel of the root.¹¹

In (24a), we show the diminutive form [elefan'ti:no] 'elephant cub': class III.a. nouns have roots with final Element |I| (see Table 1). The diminutive suffix, in turn, selects for M=|U| and SG=|A| (the default options). The root's element |I| is overwritten by /in/ (the dotted arrow), and does not participate in ThV appearing right to the suffix. Crucially, element |I| does not fuse with <i> in the suffix, as we discuss below.

Similarly, in (24b), [poe'ti:no] is derived straightforwardly since class IV.a roots have no final element (see Table 4). Finally, the example (24c), [pal:'i:na] 'little ball' (cf. ['pal:a] 'ball', class II), shows that the underlying element of the root, |A| in this case, does not fuse with the following <i> of the diminutive suffix /<i>n-/; if this were the case, we would expect the following form *[pal:'e:na].

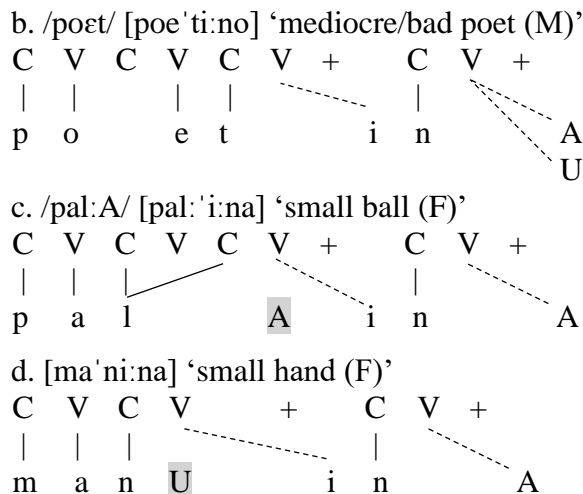
The highly irregular a-ending masculine ['ma:no] 'hand.F.SG' is shown to regularise by these means in (24d), its final Floating |U| of the root 'hand', is overwritten by the floating <i> of the diminutive, and then concatenated (through syntactic agreement) with the feminine exponent, |A|, thereby eliminating the irregular aspect of this root's 'gender': [ma'ni:na] 'little hand' (cf. ['ma:no] 'hand.F.SG'). We conclude that overwriting does apply to any underlying final floating element of the root (elements that are left uninterpreted are shown greyshaded).

(24) Root + diminutive + φ (A ⇔ SG, U ⇔ M, A ⇔ F)

a. /elefantI/ [elefan'ti:no] 'elephant cub (M)'

C	V	C	V	C	V	C	V	C	V	+	C	V	+
e	l	e	f	a	n	t	I		i	n			
													A
													U

¹¹ The mechanism (referred to as 'overwriting' cf. Newell 2021) consists of the deletion of the leftmost of two adjacent floating segments that compete for association to a single slot in the template (Ulfsbjorninn 2021). For our purpose here, it should suffice to show that this mechanism is triggered by exponents that begin with floating vowels (as in Newell 2021's analysis of English Level 1 vs Level 2 suffixes). They link in the way shown in (24), eliminating the irregular aspect of the class.



There is no case in Italian where the special class feature of the ThV is visible anywhere except for immediately adjacent to the root. This fact follows if the irregular aspects of theme vowels are wholly explained by the phonological shape of the final V-slot of roots and this position is overwritten by another exponent.

4.2 Invariable nouns

We have already mentioned nouns that do not pluralise, such as [ˈfilm] ‘film’, [raˈgu] ‘ragout’, [kariˈta] ‘charity’, etc. These are consonant-final and final stressed vowel roots, and they do not have overt plural marking at all (25a-b).

(25) Roots not taking plurals

a. Final stressed vowels	
[ˈre]	‘king’
[raˈgu]	‘ragout’
[virˈtu]	‘virtue’
[tʃiˈt:a]	‘city’
[faˈlɔ]	‘bonfire’

b. C-final roots

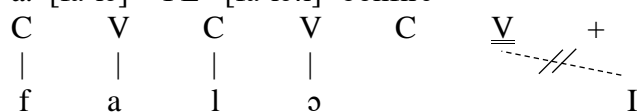
[ˈfilm]	‘film’
[ˈpiknik]	but also [pikˈnik] ‘picnic’
[ˈgɑs]	‘gas’

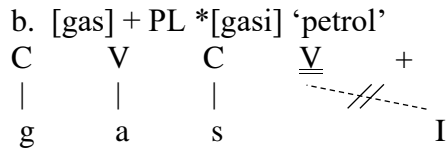
In earlier analyses, these forms have been proposed to actually block plural insertion (Passino 2009), then “a mixture of semantic, pragmatic, and phonological reasons (sub-minimal stem)” are adduced to explain it (ibid.). In other analyses, loanword exceptionality is invoked (Faust & Lampitelli 2012; Lampitelli 2014).

In the current analysis, this identical behaviour is modelled with the same phonological explanation. These roots form a phonologically defined natural class and that explains their rejection of phi-features (26a-b). Their final V-slot is inhibited and therefore cannot accept floating material (see Table 4-ii).

(26) Final stressed vowels and C-final roots

a. [faˈlɔ] + PL *[faˈlɔ:i] ‘bonfire’





In both (26a) and (26b), plural [I] is disallowed from associating with V because this position is inhibited. The plural exponent thus remains afloat (appearing to delete), and the position remains empty and phonetically uninterpreted.

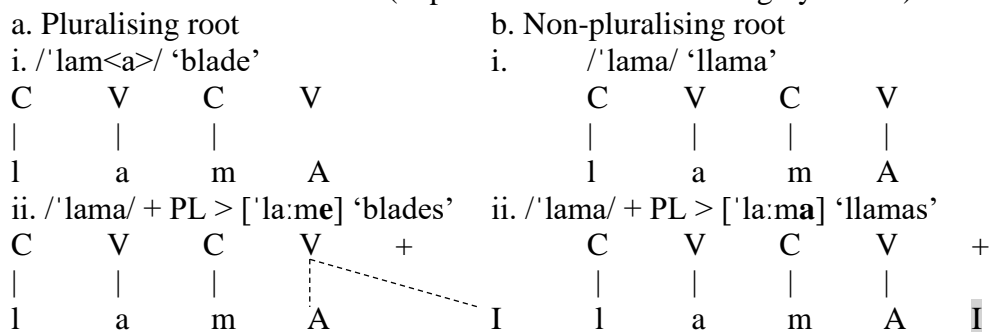
There is, in fact, another set of roots that, despite ending in non-stressed vowels, also do not end up with plural marking. The roots that behave this way are shown in (27) beneath. They can end in any vowel (recall, Italian has five unstressed vowels: [a, i, u, e, o].)

(27) Non-pluralising unstressed vowel-final roots (based on Passino (2009))

- a. ['la:ma] ‘llama’
- b. ['kɔ:bra] ‘cobra’
- c. [uku'le:le] ‘ukelele’
- d. ['tɔ:fu] ‘tofu’
- e. ['maŋgo] ‘mango’
- f. ['dɔ:do] ‘dodo’
- g. [sa'fa:ri] ‘safari’
- h. [bi'ki:ni] ‘bikini’

The difference between the roots of nouns in (27) and those of nouns displaying an alternating ThV (those in 2) naturally follows from our analysis. Recall, from (Table 1 and 2), that the roots that pluralise end in empty V-slots sitting above *floating* |A|, |I| or |U|. Roots in (27), in turn, end in a fixed, lexically-associated vowel and therefore cannot be overwritten. This difference is shown in (28) beneath.¹² Notice that floating elements only link into positions that are empty in the UR (28a-ii). In (28b-ii), in turn, the final V-position is inaccessible to additional elements.

(28) Unstressed vowel-final roots (unpronounced elements are greyshaded)



Before turning to plural formation in the next section, it is worth mentioning that roots that do not end with a final stressed vowel do not cause *Raddoppiamento Sintattico* (RS): ['kɔ:bra#'ne:ro] ‘black cobra’, but not *['kɔ:bra'n:e:ro]. This is an

¹² The reader is reminded that number features are |A| ⇔ SG, |I| ⇔ PL (Passino 2009; Lampitelli 2010).

additional piece of evidence in favour of absence of a wholly empty CV_{Fin} in their representation (unlike forms in 27, which do trigger RS: [ra'gu'b:wɔ:no] ‘good ragout’.) We address RS below in section (4.4).

4.3 A note on plural formation

The generalization that drives the morphological number pattern is that the floating element exponents of Num cannot attach to either filled (as in (28b-ii) above) or inhibited positions (as in (26a,b) above). What these types of positions have in common is presumably that they are not ‘needy’ (perhaps because they are unpointed (Baturay-Meral & van Oostendorp (to appear)). This blocking is shown beneath in (29).

- (29) a. \sqrt{C} filled, V inhibited + PL (type Table 3-ii)
- | | | | | | | | |
|---|---|---|---|---|----------|---|---|
| C | V | C | V | C | <u>V</u> | + | |
| | | | | | | | I |
| f | i | l | | m | | | |
- b. \sqrt{C} empty, V inhibited + PL (type Table 4-ii)
- | | | | | | | | |
|---|---|---|---|---|----------|---|---|
| C | V | C | V | C | <u>V</u> | + | |
| | | | | | | | I |
| f | a | l | ɔ | | | | |
- c. \sqrt{C} filled, V filled + PL (type discussed in section 4.3)
- | | | | | | |
|---|---|---|---|---|---|
| C | V | C | V | + | |
| | | | | | I |
| t | ɔ | f | u | | |

This goes toward explaining another (native) source of non-alternating forms. Those which result from truncations. Our model actually provides an explanation of why recent truncations are always invariant in inflection.

Amongst feminines, there are: [awto-'mɔ:bile] ‘car’, [foto-gra'fi:a] ‘photograph/y’, [radjo-gra'fi:a] ‘X-rays’, and for the masculines there is [pjano-'fɔrte] ‘piano’, [mitra-ʎ:a'to:re] ‘assault rifle’.

This is explicable in our account, not as irregularities that arbitrarily cannot receive a theme suffix (*pace* Faust & Lampitelli 2012), but as items that originally had final floating features in the last CV of their root (Tables 1 and 2), but which were relexicalised through truncation, resulting in their final V-slot having fixed melody. These therefore behave as final V-slots do in loanwords such as ['maŋgo] ‘mango’ (27). This is shown repeated in (30d), because they share the same phonological shape.

(30) Truncated fixed roots

- a. Long form [awto-'mɔ:bile] ‘car’
- | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| C | V | C | V | C | V | C | V | C | V | C | V |
| | | | | | | | | | | | |
| a | w | | | t | o | m | ɔ | b | i | l | I |
- b. Truncated form ['awto] ‘car’
- | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| C | V | C | V | C | V | C | V | C | V | | |
| | | | | | | | | | | | |
| a | w | | | t | o | m | ɔ | b | i | l | I |

c. UR of historically truncated item (with fixed final V-slot)

C	V	C	V	C	V
	a	w		t	o

d. cf. ['mango] 'mango'

C	V	C	V	C	V
m	a	ŋ		g	o

The ability of plural exponent |I| to associate with a V-slot does not only depend on the availability of such a position, but also on its status. If the V-slot is inhibited, the plural cannot be realized.

In the next section, we show how the inhibited status of final V-slots in C-final loanwords and roots with final stress predicts unexpected consonantal lengthening in RS.

4.4 A note on *Raddoppiamento Sintattico*

In previous sections, we explained the lack of inflection with certain root-shapes by appealing to the inhibited status of their final vowel. As mentioned, inhibition is a new mechanism and one which we use to account for the morphological patterning. However, as we illustrate in this section, its application leads to a positive prediction. It leads to a solution to a previously unanswered question related to the phenomenon of RS.

RS is an external sandhi process whereby a consonant gemination arises across a morpheme boundary (Vogel 1982; Chierchia 1983-1986).¹³ RS occurs in many Italo-Romance languages of Italy. But also in the Standard Italian of these same speakers. Here we show it in Standard Italian as it is spoken in Tuscany.

- (31) a. /kaf:'ε + 'fred:o/ [kaf:'ε f:'red:o] 'cold coffee'
 b. /fa'lo + pjemon'te:ze/ [fa'lo p:jemon'te:ze] 'Piemontese bonfire'
 c. /'sta + 'male/ ['sta m:'a:le] '(s)he is ill'
 d. /'kwalke + tak:'ino/ ['kwalke t:ak:'i:no] 'some turkey'

Depending on the area of Italy, RS can be lexically and grammatically triggered/inhibited. In the variant we are describing, the trigger is largely phonological. This phonological RS has received important attention in several work (Saltarelli 1983, 2003; Kaye et al. 1990; Kaye 1992; Sluyters 1990; Larsen 1998; Passino 2013; Repetti 1991; Russo 2007, 2013, 2019). Its phonological rule is shown beneath (Loporcaro 2001:271).

- (32) Phonological RS
 C → C: / 'V#__

¹³ In some dialects at least, it is claimed that morpho-syntactic factors condition the process (Napoli & Nespor 1979; Nespor & Vogel 1986, Kaisse 1985), though the precise details are disputed (Agostiniani 1992; Loporcaro 1997; Absalom & Hajek 2005).

Loporcaro’s analysis attributes RS to a Stress-to-Weight (Prince 1990) effect, whereby a stressed syllable gains weight. Passino (2013) provides a Strict CV analysis that relates phonological RS to the empty status of a final CV.

The unanswered question, however, is why should RS trigger consonant lengthening rather than vowel-lengthening?¹⁴ Vowel lengthening is the usual phonological ‘repair’ to Stress-to-Weight violations: the loan from Spanish, *avocado* ‘avocado (SG/PL)’, is realized with vowel lengthening: [‘avoka:do].¹⁵ In addition, consider a CVCV loanword that surfaces in Italian with lengthening: CV:CV, [‘na:to] ‘NATO’. As we mentioned, in addition to loanword repair, Italian enforces this strategy to all stressed open syllables. In Strict CV terms, Stress-to-Weight insufficiencies are satisfied by the insertion of an empty CV (Larsen 1998), but this CV is filled by vowel lengthening, never consonant gemination *[nat:o] for [‘na:to].¹⁶

This is quite mysterious, but it is automatically resolved in our framework, because the triggers of RS are always fully empty CV_{Fin} with an inhibited final V-slot (see 28 above).

The root’s final inhibited V-slot does not accept any material to either link to it (in inflection), or spread to it, via vowel lengthening to repair a Stress-to-Weight violation. In other words, we automatically explain why in order for a CV to be an RS trigger, it must have a phonologically inaccessible V-slot, and why it likewise resists inflection.

With the V-slot inaccessible to spreading, Italian repairs Stress-to-Weight in this context by spreading the consonant of the following word into the empty C-slot of the CV_{Fin}, thereby producing consonant gemination across the morpheme-boundary.

(33) RS in Strict CV

a. /fa'lo + 'madʒiko/ ‘magical bonfire’, UR with final inhibited V-slot

C	V	C	V	C	<u>V</u>	+C	V	C	V	C	V
f	a	l	o			m	a	dʒ	i	k	o

b. Vowel lengthening is prohibited *[fa'lo: 'madʒiko]

C	V	C	V	C	<u>V</u>	+C	V	C	V	C	V
					X						
f	a	l	o			m	a	dʒ	i	k	o

¹⁴ A reviewer points out that there have been some reports of some speakers lengthening vowels in RS contexts. Due to its rarity, it is not clear to us what its status is (phonetic, prepausal etc...) (Camilli 1965:145–146, Absalom et al. 2002:7). In this context, vowel lengthening is certainly very rare compared with consonant gemination, and even if it is optionally rarely attested, it does not undo the main question of this section (which our paper solves) which is: why is consonant lengthening generated at all in response to Stress-to-Weight in Italian, given that this is not its synchronic repair mechanism.

¹⁵ There is also a special repair of C-final loanwords by consonant gemination [‘rək:e] ‘rock (music)’, however, this is specific to other varieties and conditions (Passino 2008).

¹⁶ Note that vowel lengthening is blocked in word-final position [ʃit:‘a] ‘city’, *[ʃit:‘a:]. Crucially, when oxytonic nouns are followed by a consonant-initial and unstressed syllable, as in [ʃit:‘a] ‘city’ + [pu‘li:ta] ‘clean’, RS occurs: [ʃit:‘ap:u‘li:ta] ‘clean city’.

c. Consonant gemination fills the empty CV [fa'lo m:'adziko]

C	V	C	V	C	<u>V</u>	+C	V	C	V	C	V
f	a	l	o			m	a	dʒ	i	k	o

We can see above that: /fa'loCV_{Fin}/ will trigger RS and simultaneously it explains why these items are never inflected for number: SG/PL. We can now turn to the conclusion.

5. Conclusion

The analysis presented in this paper proposes a novel account of Italian noun roots. We have drawn a representational solution to the issue of ThV with respect to gender, number, and other aspects such as stress and *Raddoppiamento Sintattico*. We have unified all of this under a single representation of each type of root, defined by what (if anything) sits beneath, or fills, the last C and V slot of the root. We summarize below each of these configurations.

We start with nouns with V_{Fin} associated with a floating Element: |U|, |A|, or |I|. These are shown in the following tables. For each type, C_{Fin} may be filled with a segment (seg), or empty (∅). These are the nouns falling into Table 1 and Table 2 above, namely those nouns in which ThV alternates between SG and PL. We have shown these root shapes appearing in each gender that they are attested in.

Table 5. Roots with final floating element |U|

U-Roots	M/F	C _{Fin}	V _{Fin}	SG	PL	Exemplars
	M	seg	U	o	i	[ˈgat:o] ‘cat’
	F	seg	U	o	i	[ˈma:no] ‘hand’
	M	∅	U	o	i	[ˈnɛ:o] ‘mole’

Table 6. Roots with final floating element |A|

A-Roots	M/F	C _{Fin}	V _{Fin}	SG	PL	Exemplars
	F	seg	A	a	e	[ˈsa:la] ‘living room’
	F	∅	A	a	e	[maˈrɛ:a] ‘tide’

Table 7. Roots with final floating element |I|

I-Roots	M/F	C _{Fin}	V _{Fin}	SG	PL	Exemplars
	M	seg	I	e	i	[eleˈfante] ‘elephant’
	F	seg	I	e	i	[ˈti:gre] ‘tiger’
	M	∅	I	e	i	[ˈbu:e] ¹⁷ ‘ox’

¹⁷ The plural form of [ˈbu:-e] triggers allomorphy of the root: [bwɔ:-i] ‘oxen’. We could not find more nouns belonging to group of I-roots.

The second set consists of roots with empty V_{Fin} which can be either inhibited, or not. In Table 8, we present nouns in which V_{Fin} is empty but not inhibited, whereas in table Table 9, we illustrate nouns in which V_{Fin} is inhibited.

Table 8. Roots with empty V_{Fin}

Irregular 'a-i'	M/F	C_{Fin}	V_{Fin}	SG	PL	Exemplars
	M	seg	∅	a	i	[po'ɛ:ta] 'poet
	F	seg	∅	a	i	['a:la] 'wing'
	M	∅	∅	a	i	[an'drɛ:a] 'Andrea'

Table 9. Roots with inhibited V_{Fin}

	M/F	C_{Fin}	V_{Fin}	SG	PL	Exemplars
C-final loans	M	seg	Inhibited	none	none	['gɔlf] 'golf (sport)'
	F	seg	Inhibited	none	none	['gɔlf] 'golf (car)'
Oxytones	M	∅	Inhibited	none	none	[fa'lɔ] 'bonfire'
	F	∅	Inhibited	none	none	[vir'tu] 'virtue'

Finally, there are nouns ending in an unstressed vowel that crucially does not alternate in the PL. We have analyzed these nouns as having a final vowel lexically associated (Fixed) to the V-slot in the root. These nouns are invariable, see the table below.

Table 10. Roots with final vowel lexically fixed (invariable nouns)

Invariable nouns	M/F	C_{Fin}	V_{Fin}	Exemplars
	M	seg	Fixed	['la:ma] 'llama
	M	seg	Fixed	['kɔ:bra] 'cobra'
	M	seg	Fixed	['tɔ:fu] 'tofu'
	F	seg	Fixed	['awto] 'car'

Overall, our analysis unifies the complex patterns of inflection of Italian nouns under a single mechanism. Any distinction that can be observed at the surface level results, in our account, from the phonological representation of the root. This includes all apparent 'exceptions' and 'loanwords'. From a general linguistics perspective, the most important outcome of this work is twofold (a) in Italian we do not need noun class features – this automatically explains their absence from the syntax. (b) there is no such thing as a 'theme vowel' in the language, rather that is just a surface pattern of alternations driven by the root shapes as they interact with the exponents they are concatenated with; theme vowels in Italian are entirely emergent. It will be interesting to see to what extent other theme-vowel languages can be reanalysed using the same mechanisms.

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