Morphological structure and phonological domains in Spanish denominal derivation

Ricardo Bermúdez-Otero
University of Manchester
www.bermudez-otero.com

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Abstract

In Spanish denominal derivation, the stem formative of the base typically disappears before the derivational suffix: e.g. *man-**o*** 'hand', *man-az-a* 'hand.AUG', ***man-o-az-a*. This pattern can be analysed in two ways: as driven by a morphotactic restriction, or as created by a morphophonological process of stem-final vowel deletion. James Harris and his followers have consistently assumed the former. Stratal OT, however, requires the latter, for otherwise the interaction between diphthongization and depalatalization gives rise to a stratification paradox. Independent morphological evidence provides support for stem-final vowel deletion. Stratal OT emerges from this trial as an empirically adequate, highly restrictive, and heuristically powerful model of grammar.

1. Introduction

In Spanish, nominal words fall into a number of inflectional classes,[1] each characterized by a particular stem formative:[2] thus, *o*-stems bear the formative /-o/, *a*-stems bear the formative /-a/, and *e*-stems bear the formative /-{e/∅}/ (less frequently, /-e/). Together, these three core classes comprise the vast majority of Spanish nouns and adjectives; athematic stems, which lack stem formatives altogether, are comparatively rare.

(1)		SG	PL	gender	gloss
a.	*o*-stems	*libr-**o***	*libr-**o**-s*	M	'book'
		*niñ-**o***	*niñ-**o**-s*	M	'boy'
		*tont-**o***	*tont-**o**-s*	M	'silly'
		*re-**o***	*re-**o**-s*	M/F	'convict'
		*man-**o***	*man-**o**-s*	F	'hand'
b.	*a*-stems	*libr-**a***	*libr-**a**-s*	F	'pound'
		*niñ-**a***	*niñ-**a**-s*	F	'girl'
		*tont-**a***	*tont-**a**-s*	F	'silly'

[1] See Ambadiang (1993: First Part) for a crosstheoretical survey of the literature on the inflectional morphology of Spanish nouns and adjectives. Spanish adverbs are not inflected, but on the basis of their formal properties they may be assigned to the same morphological classes as nouns and adjectives (Harris 1983: §5.1.1 endnote 1, 1985: endnote 2); this point does not affect the argument below.

[2] In the literature, these suffixes go under many labels, including 'word marker', 'class marker', 'class vowel', 'form-class morpheme', 'theme vowel', 'thematic suffix', 'terminal element', and 'desinence': see Ambadiang (1993: §2.2), Harris (1999: note 3). My use of the term 'stem formative' in this context is relatively novel; its rationale will become apparent below.

		*ingles-**a***	*ingles-**a**-s*	F	‘English’
		*pianist-**a***	*pianist-**a**-s*	M/F	‘pianist’
		*problem-**a***	*problem-**a**-s*	M	‘problem’
c.	*e*-stems	*libr-**e***	*libr-**e**-s*	M/F	‘free’
		lápiz-∅	*lápic-**e**-s*	M	‘pencil’
		cruz-∅	*cruc-**e**-s*	F	‘cross’
		*cruc-**e***	*cruc-**e**-s*	M	‘crossing’
		inglés-∅	*ingles-**e**-s*	M	‘English’
		común-∅	*comun-**e**-s*	M/F	‘common’
		*inmun-**e***	*inmun-**e**-s*	M/F	‘immune’
		hindú-∅	*hindú-**e**-s*	M/F	‘Hindu’
		rey-∅	*rey-**e**-s*	M	‘king’
d.	athematic stems	*menú*	*menú-s*	M	‘menus’
		jersey	*jersey-s*	M	‘pullover’
		esnob	*esnob-s*	M/F	‘snob’
		clip	*clip-s*	M	‘paper clip’
		virus	*virus*	M	‘virus’
		brindis	*brindis*	M	‘toast’

Establishing the exact inventory and underlying distribution of nominal stem formatives is a key task for Spanish morphophonology, for it is impossible to analyse the phonotactics or the metrical system of the language without making crucial assumptions about the phonological behaviour of these elements. Discussions of Spanish stress assignment illustrating this link include Harris (1983: 114-116, 1992: 75-76), Oltra-Massuet & Arregi (2005: §3.1), and Roca (1988: 416, 1991: note 11), among many others.

On the surface, nominal stem formatives seem never to occur before derivational suffixes. This is one of their most salient properties.

(2)

base		derivative		
*man-**o***	‘hand’	*man-az-a*	**man-**o**-az-a*	‘hand.AUG’
*problem-**a***	‘problem’	*problem-ón-∅*	**problem-**a**-ón-∅*	‘problem.AUG’
*nub-**e***	‘cloud’	*nub-os-o*	**nub-**e**-os-o*	‘cloudy’

In principle, there are two possible approaches to the pattern exemplified in (2). Purely morphological analyses posit some sort of morphotactic restriction preventing nominal stem formatives from occurring inside derivational suffixes, as in (3a). In this view, the stem formative of the base is absent from the underlying phonological representation of the derivative, and the morphological structure of the derivative is faithfully reflected in its surface representation.

(3) *Purely morphological analysis of (2)*

a. Morphotactic restriction

* NSF ⟧ DER ⟧ where NSF = nominal stem formative
DER = derivational suffix

b. Phonological derivation

UR	⟦[man] o ⟧	⟦⟦[man] aθ] a ⟧
SR	[má.no]	[ma.ná.θa]
	‘hand’	‘hand.AUG’

In contrast, morphophonological analyses postulate a morphologically sensitive phonological process of deletion applying to unstressed stem-final vowels before vowel-initial suffixes. In (4a) I provide an informal statement of this process; for an optimality-theoretic implementation, see tableau (32) below. Stem-final vowel deletion masks the underlying morphological structure of stem-based derivatives.

(4) *Morphophonological analysis of (2)*

a. Stem-final vowel deletion

$$V \rightarrow \varnothing \; / \; \underset{\sigma_w}{\underset{|}{\_\_}}\; \text{stem}\rrbracket\,\llbracket_{\text{suffix}}\, V \qquad \text{(noniterative)}$$

b. Phonological derivation

UR	⟦ man-o ⟧	⟦⟦ man-o ⟧ aθ-a ⟧
SR	[má.no]	[ma.ná.θa]
	‘hand’	‘hand.AUG’

Following Harris (1983, 1985, 1991, 1992, 1996, 1999), most morphologists working within the generative mainstream have adopted the purely morphological approach in (3), with little or no discussion of the morphophonological alternative outlined in (4): e.g. Oltra-Massuet & Arregi (2005: notes 8, 29, 30, 33, 38, 45),[3] Roca (1990: 135, 1991: 604).

In this chapter, however, I shall reconsider the issue from the viewpoint of Stratal Optimality Theory (StrOT), a version of Optimality Theory (OT) in which morphology-phonology interactions are modelled by means of cyclicity and level segregation, as in Lexical Phonology and Morphology (LPM): see e.g. Bermúdez-Otero (1999, 2003, forthcoming), Bermúdez-Otero & McMahon (2005), Booij (1996), Kiparsky (1998, 2000, 2003), and Orgun (1996), among others. It turns out that, in a highly constrained version of StrOT allowing no more than three phonological levels, the purely morphological analysis of Spanish nominal stem formatives shown in (3) leads to insurmountable difficulties: it creates a *stratification paradox* involving the two well-known phonological phenomena of diphthongization and depalatalization. In consequence, StrOT forces one to countenance the long-neglected morphophonological hypothesis set out in (4). Gratifyingly, this turns out to be the correct alternative: morphological arguments independent from diphthongization and depalatalization consistently favour (4) over (3). This result provides strong support for StrOT, which emerges from the trial as an empirically adequate, highly restrictive, and heuristically powerful model of grammar.

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[3] To be precise, Oltra-Massuet & Arregi (2005: note 8) assert that nominal stem formatives do indeed occur inside derivational suffixes but are phonologically null in that environment. Instead of (3a), therefore, Oltra-Massuet and Arregi would assume something along the lines of the following:

(i) $\text{NSF} \rightarrow /\text{-}\varnothing/ \; / \; \_\_ \rrbracket\,\text{DER}\,\rrbracket$

For my purposes, this qualification is immaterial: my contention below will be that phonologically nonnull nominal stem formatives do occur inside derivational suffixation.

The chapter is organized as follows. Section 1 introduces the key principles of StrOT and shows how their application to Spanish requires the postulation of a morphophonological process of stem-final vowel deletion. In section 3, I examine and refute Harris's arguments for the purely morphological analysis of nominal stem formatives: section 3.1 shows that stem-final vowel deletion is motivated independently by the behaviour of verb stems; section 3.2 examines denominal derivation with consonant-initial suffixes; and section 3.3 adduces new evidence to disprove the claim that, in words such as *virus* 'virus' and *brindis* 'toast', the final /Vs/ string is an exotic 'word marker' (cf. (1d)). Section 4 comments on the significance of our results.

2. The view from Stratal Optimality Theory

2.1. Principles

StrOT aims to solve the problem of phonological misapplication in OT assuming no correspondence relationships other than input-output faithfulness; it therefore rejects both output-output correspondence (e.g. Benua 1997) and sympathy (McCarthy 1999). In addition, StrOT generates nonparadigmatic opacity by the same means as cyclic effects (Bermúdez-Otero 2003: §8; Bermúdez-Otero & McMahon 2005: §3.2). The theory relies on three basic concepts: those of domain, cycle, and level (Bermúdez-Otero forthcoming: ch. 2).

Phonology may be thought of as a function $\mathcal{P}$ mapping input representations onto the corresponding outputs. In OT, $\mathcal{P}$ is modelled as a pass through GEN and EVAL:

(5) $\mathcal{P}(x) = \mathcal{E}val(\mathcal{G}en(x))$

In StrOT, however, $\mathcal{P}$ applies recursively: certain constituents in the morphosyntactic structure of a linguistic expression (or, alternatively, certain operations in its morphosyntactic derivation) define domains for $\mathcal{P}$: each such domain provides the input for an application of $\mathcal{P}$. Bermúdez-Otero (forthcoming: ch. 2) argues that the relationship between grammatical structure and phonological domains is in fact one of simplification: each phonological domain is exactly coextensive with some grammatical constituent, but not every grammatical constituent defines a phonological domain (cf. Inkelas 1990, Orgun 1996).[4] Within the nested hierarchy of phonological domains associated with any linguistic expression, $\mathcal{P}$ applies cyclically in the sense of Chomsky & Halle (1968: 15). However, domains associated with different types of grammatical constituent (or, alternatively, with different types of grammatical operation) may invoke different rankings of CON: it is in this sense that domains are said to belong to different 'levels'. Thus, for example, if a linguistic expression *e* has the domain structure shown in (6a), where the subscript indices denote the level to which each domain belongs, the surface representation of *e* will be specified by the composite function (6b).

(6) a. $e = [_c\,[_b\,[_a\,x]]\,[_b\,[_a\,y]\,z]]$

b. $\mathcal{P}(e) = \mathcal{E}val_c(\mathcal{G}en(\,\mathcal{E}val_b(\mathcal{G}en(\,\mathcal{E}val_a(\mathcal{G}en(x))\,))), \mathcal{E}val_b(\mathcal{G}en(\,\mathcal{E}val_a(\mathcal{G}en(y))), z))\,))$

In principle, this theoretical programme could be implemented in several ways. Bermúdez-Otero (forthcoming) is primarily concerned with providing a highly restrictive version of StrOT that will curb the complexity of opacity effects and facilitate the acquisition of

[4] It is vital not to confuse *phonological domains*, which are arguments of $\mathcal{P}$, with *prosodic units* such as ω, φ, I, or U, which are constituents of phonological representations: see Bermúdez-Otero (forthcoming: ch. 2). Booij & Rubach (1984) draw the same elementary distinction using the terms 'morphological domain' vs 'prosodic domain'.

opaque interactions. This is best achieved in two ways: by limiting the number of phonological levels within the grammar, and by constraining the ascription of grammatical categories to phonological levels. Therefore, following a long tradition of research both within and outside LPM, Bermúdez-Otero (forthcoming) adopts the hypothesis that, universally, grammars distinguish just three phonological levels: the stem level (SL), the word level (WL), and the phrase level (PL); see also Kiparsky (1998, 2000, 2003). Within this version of StrOT, the relationship between morphological constructions and phonological levels is regulated by principles that refer to three key morphological categories: root, stem, and word. In brief, a stem is defined as a form that can provide the base for an inflectional operation; roots cannot be inflected without first undergoing root-to-stem conversion (overtly or covertly), whereas words are fully inflected (i.e. syntactically free).

(7) *Morphological categories*

	inflectable?	fully inflected?
root		
stem	✓	
word	(✓)	✓

On this basis, the grammar is set up in such a way as to enforce the following correspondences between grammatical constructions and phonological domains (for detailed discussion, see Bermúdez-Otero forthcoming: ch. 2):

(8) a. Roots do not define phonological domains.

b. A phonological domain associated with an operation of root-to-stem derivation must be stem-level.

c. Every morphological word defines a word-level domain.

d. The highest phrasal category in the linguistic expression defines a phrase-level domain.

In terms of learnability, this austere implementation of StrOT enjoys significant advantages. First, the phonological domain structure of linguistic expressions remains relatively simple; there is no proliferation of cycles (cf. Orgun 1996). Secondly, learners with access to the grammatical structure of linguistic expressions can easily discover their phonological domain structure.

2.2. A stratification paradox?

However, if scholars like Harris, Roca, and Oltra-Massuet and Arregi are right in their view of Spanish nominal stem formatives, then the StrOT model I have just outlined proves *too* austere, for, in a system with no more than three phonological levels, positing underlying representations along the lines of (3b) leads to a stratification paradox. The problem arises over the stratal ascription of two well-known phonological phenomena: so-called ‘diphthongization’ and ‘depalatalization’. For the sake of convenience I shall retain these traditional labels here, although, as we shall see presently, in neither case does a phonological process derive surface alternants synchronically from a common underlier.

2.2.1. Diphthongization

So-called ‘diphthongization’ affects a sizable but idiosyncratic set of lexical items that display an alternation between the diphthongs /je, we/ and the mid vowels /e, o/: the diphthongs appear in tonic syllables, the mid vowels elsewhere. See Cole (1995: §6.2) for a survey of LPM analyses, and Eddington (2004: §6.1) for a summary of psycholinguistic approaches.

(9) a. Alternating items

[**jé**r-o]	‘iron’	[**e**r-éɾ-o]	‘blacksmith’
[p**wé**ɾt-a]	‘door’	[p**o**ɾt-éɾ-o]	‘doorman’
[d**jé**nt-e]	‘tooth’	[d**e**nt-ál-∅]	‘dental’
[m**wé**ɾt-e]	‘death’	[m**o**ɾt-ál-∅]	‘mortal’
[θ**jé**ɣ-o]	‘blind’	[θ**e**ɣ-eðá^{ð}-∅]	‘blindness’
[n**wé**β-o]	‘new’	[n**o**β-eðá^{ð}-∅]	‘novelty’

b. Nonalternating items

[θ**é**st-a]	‘basket’	[θ**e**st-éɾ-o]	‘basket weaver’
[p**ó**θ-o]	‘well’	[p**o**θ-éɾ-o]	‘well digger’
[a^{k}θið**é**nt-e]	‘accident’	[a^{k}θið**e**nt-ál-∅]	‘accidental’
[k**ó**ɾ-o]	‘chorus’	[k**o**ɾ-ál-∅]	‘choral’
[t**é**ɾk-o]	‘stubborn’	[t**e**ɾk-eðá^{ð}-∅]	‘stubbornness’
[m**ó**θ-o]	‘young’	[m**o**θ-eðá^{ð}-∅]	‘youth’

I assume that alternating items have two lexically listed allomorphs, whereas nonalternating items have a single underlying representation:

(10) a. Alternating items

/p$\left\{\begin{matrix}\text{o}\\\text{we}\end{matrix}\right\}$ɾt-a/

‘door’

b. Nonalternating items

/poθ-o/

‘well’

In this view, diphthongization involves phonological selection between listed allomorphs (Kager 1996; Mascaró 1996; McCarthy 2002: 152-5, 183-4): the phonological constraint hierarchy preserves the quality of input vowels, but, when given the choice, favours diphthongs in tonic syllables and monophthongs elsewhere. This effect is illustrated in tableau (11), where I use TONIC→DIPHTHONGAL as an informal label for whatever context-sensitive markedness constraints favour diphthongs in tonic syllables, whilst *DIPHTHONG is a context-free markedness constraint requiring pure vowels.

(11)

morphology	phonology		IDENT	TONIC→ DIPHTHONGAL	*DIPHTHONG
	input	output			
⟦p{o/we}ɾt-a⟧	/poɾt-a/	[pwéɾ.ta]	*!		*
		[póɾ.ta]		*!	
	/pweɾt-a/ ☜	[pwéɾ.ta] ☜			*
		[póɾ.ta]	*!	*	
⟦⟦p{o/we}ɾt-a⟧eɾ-o⟧	/poɾt-a-eɾ-o/ ☜	[pweɾ.té.ɾo]	*!	(*)	*!
		[poɾ.té.ɾo] ☜		(*)	
	/pweɾt-a-eɾ-o/	[pweɾ.té.ɾo]		(*)	*!
		[poɾ.té.ɾo]	*!	(*)	

For our present purposes, the crucial point is that the selection of the diphthongal allomorph under primary stress overapplies in the presence of certain stress-attracting affixes, such as superlative *-ísim-o* and the so-called 'evaluative' suffixes, i.e. diminutive -(*ec*)*it-o*, augmentative *-az-o*, etc.

(12) a. Base [b**wé**n-o] 'good'

b. Normal nonapplication [b**o**n-dáᵟ-∅] 'goodness'

c. Overapplication [b**we**n-ísim-o] 'best'
[b**we**n-áθ-o] 'good.AUG'
[b**we**n-(eθ)ít-o] 'good.DIM'[5]

In StrOT, the overapplication effect in (12c) shows that the domain of diphthongization excludes superlative *-ísim-o* as well as the evaluative suffixes. Accordingly, we must infer that diphthongization is a stem-level process; that suffixes such as *-er-o*, *-al-∅*, and -(*i*)*dad-∅* are stem-level; and that superlative *-ísim-o* and the evaluative suffixes are word-level.[6]

(13)

	portero	*puertecita*
domain structure	⟦WL ⟦SL p{o/we}ɾt-a-eɾ-o ⟧⟧	⟦WL ⟦SL p{o/we}ɾt-a ⟧ it-a ⟧⟧
SL (Diphthongization)	poɾ.té.ɾo	pwéɾ.ta
WL	poɾ.té.ɾo	pweɾ.tí.ta
	'doorman'	'door.DIM'

[5] There is variation between *buen-**ecit**-o* and *buen-**it**-o* depending on dialectal and stylistic factors.

[6] Certain suffixes, notably *-ist-a*, exhibit symptoms of dual level membership: e.g. [k**wé**nt-o] 'tale' ~ [k**o**nt-á-ɾ] 'to tell' ~ [k**we**nt-íst-a] 'fabulist', vs [d**jé**nt-e] 'tooth' ~ [d**e**nt-ál-∅] 'dental' ~ [d**e**nt-íst-a] 'dentist'; see Eddington (2004: 104). *Pace* Eddington, however, dual level membership is not a problem for StrOT: a suffix may be able to attach at both the stem level and the word level subject only to constraint (8b), whereby a root cannot be the base of a word-level construction. For further discussion of dual level membership, see Giegerich (1999).

Superlative *-ísim-o* behaves as a stem-level suffix in a few learnèd words typical of highly formal registers: e.g. [b**o**n-ísim-o] 'best', alongside colloquial [b**we**n-ísim-o]; [n**o**β-ísim-o] 'newest', alongside [n**we**β-ísim-o]; etc. In addition, augmentative *-ach-o* is exceptional among the evaluative suffixes by being typically stem-level: e.g. [k**o**ɾp-átʃ-o] 'body.AUG', cf. [k**wé**ɾp-o] 'body'; [f**o**ɾt-atʃ-ón-∅] 'strong.AUG.AUG', cf. [f**wé**ɾt-e] 'strong'; etc.

2.2.2. Depalatalization

It has long been known that Spanish does not tolerate palatal consonants in domain-final position (Alonso 1945: 96-97). In this chapter the term 'depalatalization' will refer to this phonotactic restriction. The precise nature of the markedness constraint responsible for it need not concern us here: for our purposes, it will suffice to refer to it as CODACOND.

(14)	a. Palatal in onset position		b. Nonpalatal in domain-final position	
	[deʂ.ðe.**ɲ**áɾ]	'to disdain'	[deʂ.ðé**n**]	'disdain (N)'
	[doɳ.θé.**ʎ**a]	'lass'	[doɳ.θé**l**]	'lad'

The literature on the subject is abundant: for Harris's last statement on the subject, see Harris (1999); for a recent optimality-theoretic treatment, see Lloret & Mascaró (2005).

It should be noted that, synchronically, the alternants shown in (14) are not derived from a common underlier (*pace* Lloret & Mascaró 2005). Psycholinguistic experimentation indicates that these alternations are unproductive: native speakers fail to extend them to neologisms (Pensado Ruíz 1997; Eddington 2004: §3.4). This conclusion agrees well with the internal evidence. Observe that, as far as their morphology is concerned, *desdén*-∅ and *doncel*-∅ are perfectly ordinary *e*-stem nouns, as shown by their plural forms: *desden*-***e***-*s*, *doncel*-***e***-*s*; see (1c). After illegal domain-final sequences, however, singular *e*-stem nouns select the /-e/ allomorph of the stem formative; the /-∅/ allomorph appears only after permissible domain-final strings (Harris 1999; Bermúdez-Otero forthcoming: ch. 4).[7] By implication, no singular *e*-stem noun or adjective ends in a sequence that is forbidden domain-finally in the core vocabulary: if the /-e/ formative is absent in that environment, then it is also absent in the plural, showing the stem to be athematic rather than a member of the *e*-class. Examples include partially assimilated loans such as sg. *cli*[p] 'paper clip' ~ pl. *clip*-*s*, not **clip*-*e*-*s*. There is thus an altogether natural and predictable relationship of implication between phonological markedness and morphological structure in Spanish nominal morphology: speakers know tacitly that, if a singular noun or adjective is phonotactically deviant, then it cannot belong to one of the core native stem classes and must consequently be athematic.[8] However, this entails that a hypothetical *e*-stem noun derived from the root /desdeɲ-/ would surface as **desde*[ɲ]-*e*, not *desdé*[n]-∅: see tableau (15).[9] Synchronically, therefore, the alternation between the verb *desdeñ*-*a*-*r* and the noun *desdén*-∅ is suppletive.

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[7] As we saw in §1, there is a minority of *e*-stem nouns that display the /-e/ allomorph in the singular even after a legal domain-final sequence: e.g. *cru*[θ]-***e***, *inmu*[n]-***e***; see (1c). In these nouns, the underlying representation of the stem formative is /-e/, rather than the more frequent /-{e/∅}/.

[8] In Peninsular Spanish the only exception to this generalization is *vals*-∅ ~ *vals*-***e***-*s* 'waltz', plus a tiny handful of nouns ending in /x/, on which see Alonso (1945: footnote 4). Notoriously, the Real Academia de la Lengua has misunderstood this simple fact and throws its prescriptive authority behind artificial creations such as *álbu*[m]-∅ ~ *álbu*[m]-*e*-*s*, though without much success: in the playground one consistently hears either *álbu*[n]-∅ ~ *álbu*[n]-*e*-*s* or *álbu*[m] ~ *álbu*[m]-*s*.

[9] The tableau omits the effects of phrase-level allophonic processes. FINAL-C is the well-known constraint requiring prosodic words to end in a consonant (McCarthy 1993: 176).

(15)

morphology	**phonology**		MAX-V	DEP-V	CODACOND	IDENT-Place	FINAL-C
	input	**output**					
actual UR ⟦ desden-{e/∅} ⟧	/desden-e/	[des.dé.ne]					*!
		[des.déɲ]	*!		*	*	
		[des.dén]	*!				
	/desden-∅/ ☜	[des.dé.ne]		*!			*
		[des.déɲ]			*!	*	
		[des.dén] ☜					
counterfactual UR ⟦ desdeɲ-{e/∅} ⟧	/desdeɲ-e/ 💣	[des.dé.ɲe] 💣					*
		[des.déɲ]	*!		*		
		[des.dén]	*!			*	
	/desdeɲ-∅/	[des.dé.ɲe]		*!			*
		[des.déɲ]			*!		
		[des.dén]				*!	

Of course, even if the alternations in (14) are lexically listed rather than synchronically derived, depalatalization remains perfectly robust as a principle of allomorph selection and as a static phonotactic restriction, as shown by the evidence of loan adaptation.

In the present context, the interest of depalatalization lies in the fact that it applies not only in phrase-level and word-level domains, but also in sublexical domains which can be proved to be stem-level. The crucial piece of evidence is this: word-final consonants never have palatal alternants before word-level suffixes such as augmentative *-az-o* or diminutive -(*ec*)*it-o*.

(16) a. Base

[doɲ̟.θé**l**] ‘lad’

[pjé**l**] ‘leather’

b. Word-level derivative

[doɲ̟.θe.**l**í.to] *[doɲ̟.θe.ʎí.to]

[pje.**l**(e.θ)í.ta] *[pje.ʎ(e.θ)í.ta][10]

However, if palatals were permitted domain-finally at the stem level, then this type of alternation would be possible. Consider, for example, the derivation of the singular and the diminutive singular forms of a hypothetical *e*-stem noun /kantiʎ-{e/∅}/.[11] With depalatalization active only at the word level, the result would be an impossible alternation between [kan.tíl] and [kan.ti.ʎí.to].

[10] Cf. [peʎ-éx-o] ‘hide’, [peʎ-íθ-a] ‘fleece jacket’. These forms are highly revealing, as the absence of diphthongization in the root-vowel independently confirms that they are stem-level constructions: see §2.2.1.

[11] Richness of the Base prevents us from stipulating that such nouns do not exist.

(17)

	SG	DIM.SG
a. *Incorrect derivation*		
domain structure	⟦WL ⟦SL kantiʎ-{e/∅} ⟧⟧	⟦WL ⟦SL kantiʎ-{e/∅} ⟧ it-o ⟧
SL (no depalatalization)	kan.tíʎ	kan.tíʎ
WL (depalatalization)	kan.tí**l**	kan.ti.**ʎ**í.to
a. *Correct derivation*		
domain structure	⟦WL ⟦SL kantiʎ-{e/∅} ⟧⟧	⟦WL ⟦SL kantiʎ-{e/∅} ⟧ it-o ⟧
SL (depalatalization)	kan.tí.ʎe	kan.tí.ʎe
WL (depalatalization)	kan.tí.**ʎ**e	kan.ti.**ʎ**í.to

We must conclude that palatals are banned domain-finally already at the stem level.

Note that our analysis correctly predicts that depalatalization cannot cause alternations between the singular and plural forms of *e*-stem nouns. As noted by Harris (1999: 69) and Bermúdez-Otero (forthcoming: ch. 4), Spanish has a morphological rule, stated informally in (18) below, which requires *e*-stem nominals to take the nonnull allomorph of their stem formative before the plural suffix. The presence of *-e-* in plurals such as [indú-**e**-s] 'Hindus' and [réɟ-**e**-s] 'kings' fulfils a morphological requirement, not a phonotactic one: *[indú-∅-s] and *[rej-∅-s] are phonotactically impeccable; cf. [aw.to.βús] 'bus', [xe.sús] 'Jesus', [sejs] 'six', [bejs] 'beige'. In the same way, constrasts such as [indú-**e**-s] 'Hindus' vs [menú-s] 'menus' or [réɟ-**e**-s] 'kings' vs [xerséj-s] 'pullovers' are symptomatic of a morphological distinction (that between *e*-stems and athematic stems) rather than the operation of a phonological process.

(18)

$$\text{-}\{e/\varnothing\} \rightarrow \text{-e} \;/\; \underset{\text{NSF}}{\underline{\quad\quad}} \rceil_{\text{PL}}$$

Accordingly, plural *e*-stem nouns and adjectives take the /-e/ formative regardless of the shape of the root. However, if the root ends in a palatal, then the singular form will also select the /-e/ allomorph in order to satisfy the phonotactic condition against domain-final palatals: see tableau (15).

(19)

	SG	PL
a. *Palatal-final root*: 'street'		
domain structure	⟦WL ⟦SL kaʎ-{e/∅} ⟧⟧	⟦WL ⟦SL kaʎ-e ⟧ s ⟧
SL	ká.ʎe	ká.ʎe
WL	ká.**ʎ**e	ká.**ʎ**es
b. *Non-palatal-final root*: 'lime'		
domain structure	⟦WL ⟦SL kal-{e/∅} ⟧⟧	⟦WL ⟦SL kal-e ⟧ s ⟧
SL	kal	ká.le
WL	ka**l**	ká.**l**es

In this sense, depalatalization does *not* overapply in plural *e*-stems. Although one can use output-output correspondence to account for the absence of alternations such as *[kan.tíl ~

kan.tí.ʎes], such a solution relies on a misrepresentation of the morphological facts (*pace* Lloret & Mascaró 2005).

2.2.3. The paradox and its solution

So far, this section has established the following points:

(i) diphthongization applies at the stem level;
(ii) palatal consonants in domain-final position are prohibited at all levels;
(iii) superlative *-ísim-o* and the evaluative suffixes are word-level.

In this light, consider now the following data:

(20)	a. Base	b. Stem-level derivative	c. Word-level derivative
	[kwéʎ-o]	[koʎ-ár-∅]	[kweʎ-áθ-o]
	'neck'	'collar, necklace'	'neck.AUG'

Paradigms of this type are interesting because they show three phenomena occurring simultaneously:

(i) the root ends in a palatal consonant;
(ii) the root is subject to the diphthongization alternation;
(iii) as per (2) above, the stem formative of the base fails to surface in derivationally related forms.

For our purposes, the crucial datum is augmentative *cuell-az-o*: (20c). It shows overapplication of diphthongization, which is entirely expected since the suffix *-az-o* is word-level. The question is: how should we account for the fact that the root-final consonant fails to depalatalize?

Let us first assume that the purely morphological approach outlined in (3) gives us the correct analysis of the behaviour of Spanish nominal stem formatives. If so, the morphological structure of *cuell-az-o* will be the following:

(21) ⟦⟦⟦ k{o/we}ʎ ⟧ aθ ⟧ o ⟧

This underlying representation creates a dilemma. If *-az-o* is indeed a word-level suffix, then the underlying /ʎ/ will be domain-final in the stem-level cycle and incorrectly undergo depalatalization: see (22a). If, in contrast, *-az-o* is already visible to the phonology in the stem-level cycle, then the palatal will be syllabified in onset position and escape depalatalization, but the root-vowel will incorrectly fail to diphthongize: see (22b). In other words, we have a *stratification paradox*: the augmentative construction can be neither stem-level nor word-level, yet it must be one of the two.

(22)	a. *-az-o* is word-level	b. *-az-o* is stem-level
domain structure	⟦$_{WL}$ ⟦$_{SL}$ k{o/we}ʎ ⟧ aθ-o ⟧	⟦$_{WL}$ ⟦$_{SL}$ k{o/we}ʎ-aθ-o ⟧⟧
SL	kwél	ko.ʎá.θo
WL	*kwe.lá.θo	*ko.ʎá.θo[12]

And, recall, we cannot solve the problem by turning depalatalization off at the stem level because that would give rise to unattested alternations such as *[kan.tíl ~ kan.ti.ʎí.to]; see (17).

[12] Of course, [ko.ʎá.θo] exists, but only as a derivationally opaque surname, not as the augmentative of [kwé.ʎo].

The alternative hypothesis is that, in the output of the morphology, *cuell-az-o* has the structure shown in (23); the disappearance of the stem formative of the base is caused by the phonological process of stem-final vowel deletion described in (4a).

(23) ⟦⟦ k{o/we}ʎ-o ⟧ aθ-o ⟧

If we take this view, the stratification paradox evaporates. In the stem-level cycle, the stem formative of the base provides an onset position for the root-final consonant, which accordingly evades depalatalization. In the word-level cycle, the palatal remains in the onset despite stem-final vowel deletion, but stress migrates to the augmentative suffix, causing diphthongization to overapply.

(24) domain structure ⟦$_{WL}$ ⟦$_{SL}$ k{o/we}ʎ-o ⟧ aθ-o ⟧
SL kwé.ʎo
WL kwe.ʎá.θo

We must conclude that nominal stem formatives do occur inside derivational suffixation. Thus, the internal logic of StrOT drives one inexorably to reject the view of Spanish nominal morphology assumed by Harris, Roca, and Oltra-Massuet and Arregi. Insofar as the endings /-o/, /-a/, and /-e/ can precede derivational suffixes, they cannot be 'word markers' in the sense of Harris (1985), but must be genuine stem formatives: i.e. meaningless morphs added to the root in order to satisfy a 'morphomic' constraint on stem well-formedness (Aronoff 1994). Logically, if a denominal derivative is stem-based (as opposed to root-based), the derivational affix will attach outside the stem formative of the base. More generally, nouns and adjectives belonging to the three core classes (i.e. *o*-stems, *a*-stems, and *e*-stems) turn out to have exactly the same tripartite morphological structure as verbs:

(25) *Morphological structure of major-category words (*modulo *athematic nominals)*

a. ⟦$_{Word}$ ⟦$_{Stem}$ ⟦$_{Root}$ ____ ⟧ SF ⟧ INFL ⟧ where SF = stem formative
INFL = inflectional affixes

b. verbs *amábamos*
⟦$_{Word}$ ⟦$_{Stem}$ ⟦$_{Root}$ am ⟧ -á ⟧ -ba -mos ⟧
love -SF -PRET.IPFV.IND -1PL
'we loved'

c. nouns *niños*
⟦$_{Word}$ ⟦$_{Stem}$ ⟦$_{Root}$ níɲ ⟧ -o ⟧ -s ⟧
boy -SF -PL
'boys'

In sum, the austere implementation of StrOT outlined in section 2.1 makes very precise predictions about denominal word-formation in Spanish: in particular, it predicts that stem-based denominal derivatives are subject to the phonological process of stem-final vowel deletion formulated in (4a). In the remainder of this chapter I demonstrate that this prediction is, in fact, correct.

3. The morphological evidence

Over the years, Harris has grounded his rejection of stem-final vowel deletion on three claims:

(i) stem-final vowel deletion has no independent motivation (Harris 1991: footnote 9);
(ii) stem-final vowel deletion cannot account for the absence of nominal stem formatives before derivational suffixes beginning with a consonant (Harris 1983: 92, 147; 1996: 104);
(iii) stem-final vowel deletion cannot account for the behaviour of exotic 'word markers' such as *-us* in *vir-us*, or *-is* in *brind-is* (e.g. Harris 1992: 66, 75).

In this section I show that each of these three claims is false (see also Bermúdez-Otero forthcoming: ch. 4).

3.1. Stem-final vowel deletion in verb stems

Discussing the contrast between the noun [éɾo-**e**] 'hero' and its derivatives [eɾo-ín-a] 'heroine', [eɾo-íʂm-o] 'heroism', Harris (1991: footnote 9) asserts that the final vowel of the base "is not an integral part of the stem" because "there is no independently motivated rule that would delete such a stem-final vowel". One cannot but be astonished by this claim, for it is a trivial task to show that the process of stem-final vowel deletion required to describe denominal derivation operates in exactly the same way in deverbal derivation and verbal inflection.

As is well-known, Spanish verbs fall into three inflectional classes ('conjugations'), characterized by the stem formatives /-a/, /-e/, and /-i/; these are subject to allomorphic patterns of gradation whose details need not concern us here (see e.g. Harris 1997: 547). The data in (26) show that verb stem formatives surface before consonant-initial derivational suffixes. Thus, Harris must stipulate that verb stems are exempt from the putative morphotactic restriction in (3a).[13]

(26)

a. infinitive		b. *nomen agentis*	c. participle
*caz-**a**-r*	'hunt'	*caz-**a**-dor-∅*	*caz-**a**-d-o*
*habl-**a**-r*	'talk'	*habl-**a**-dor-∅*	*habl-**a**-d-o*
*com-**e**-r*	'eat'	*com-**e**-dor-∅*	*com-**i**-d-o*
*beb-**e**-r*	'drink'	*beb-**e**-dor-∅*	*beb-**i**-d-o*
*hac-**e**-r*	'do'	*hac-**e**-dor-∅*	*hech-o*
*pon-**e**-r*	'put'	*pon-**e**-dor-∅*	*puest-o*
*abr-**i**-r*	'open'	*abr-**i**-dor-∅*	*abiert-o*
*dec-**i**-r*	'say'	*dec-**i**-dor-∅*	*dich-o*

Observe that the derived *nomina agentis* in (26b) cannot be analysed as deparicipial formations in *-or-∅* because they do not preserve the gradation and suppletion patterns of the corresponding participles. Needless to say, they are not deinfinitival either: rather, they are based on the verb stem. For example, *caz-a-dor-∅* 'hunter' (pl. *caz-a-dor-e-s*) has the underlying representation shown in (27).

(27) $[\![_{N}\,[\![_{V}\,$ kaθ-a $]\!]$ doɾ-{e/∅} $]\!]$

[13] Similarly, Oltra-Massuet & Arregi (2005) require a special allomorphy rule specific to nominal bases: see note 3 above.

Consider now the augmentative suffix *-ón-∅*. This can be added not only to nominal stems, but also to verb stems, from which it derives *nomina agentis* with jocular or derogatory connotations. By principle (8b), these constructions must be stem-based rather than root-based, since *-ón-∅* is a word-level suffix: see §2.2.1. Moreover, the examples in (28b) are unambiguously deverbal, since they differ morphologically and/or semantically from the corresponding *nomina actionis*. Crucially, however, the augmentative *nomina agentis* lose the stem formative of the base before the initial vowel of the suffix.

(28)	a. infinitive		b. *nomen agentis* (AUG)	c. *nomen actionis*
	*acus-**a**-r*	'accuse'	*acus-ón-∅*	*acuse, acusación*
	*fisg-**a**-r*	'pry'	*fisg-ón-∅*	*fisgoneo*
	*trag-**a**-r*	'swallow'	*trag-ón-∅*	*trago*
	*respond-**e**-r*	'answer'	*respond-ón-∅*	*respuesta*

The contrast between (26b) and (28b) indicates that, in deverbal derivation, the stem formative of the base surfaces before consonant-initial suffixes but is deleted before vowel-initial suffixes, exactly as predicted by (4a).

In fact, stem-final vowel deletion applies in precisely the same way regardless of the syntactic category of the base. First, it does not iterate:

(29)	base		derivative	
Denominal derivation	*héro-**e***	'hero'	*hero-ín-a*, **her-in-a*	'heroine'
	*bacala-**o***	'cod'	*bacala-ít-o*, **bacal-it-o*	'cod.DIM'
Deverbal derivation	*pele-**a**-(r)*	'fight'	*pele-ón-∅*, **pel-ón-∅*	'quarrelsome'
	*mare-**a**-(r)*	'make dizzy'	*mare-ón-∅*, **mar-ón-∅*	'dizzying'

Secondly, stem-final vowel deletion does not apply to underlyingly accented vowels. In (30) I provide two examples from denominal derivation. Note that the bases *café* and *papá* are athematic stems, not *e*-stems, since their respective plurals are *café-s* and *papá-s*.[14] In both, the final vowel must be underlyingly accented because final stress is a marked pattern for CVCV nouns (see e.g. Roca 1988: 398).

(30)

a. base		b. derivative		
		UR	SR	
café	'coffee'	[[kafé] in-a]	[ka.fe.í.na], *[ka.fí.na]	'caffeine'
papá	'Dad'	[[papá] it-o]	[pa.pa.í.to][15]	'Dad.DIM'

The same phenomenon can be observed in verb inflection. In the preterite imperfective indicative, for example, stress falls consistently on the stem formative. This pattern gives rise to metrical configurations that are otherwise unattested in the native vocabulary: notably, as in (31b), penultimate stress in a word ending with a falling diphthong (Harris 1983: §4.4.2, 1995: 870; Roca 1988: 398). This indicates that the stress pattern of the preterite imperfective indicative is controlled by the morphology rather than the phonology: more specifically, an

[14] There formerly existed an *e*-stem plural *cafe-**e**-s*, now fallen into desuetude. It occurs, for example, in *El Duende de los Cafees* 'The Goblin of the Cafés', the title of a nineteenth-century Spanish newspaper.

[15] *Pap-it-o* exists, but its base is the hypochoristic *papi*, not the full form *papá*.

allomorphy rule assigns an underlying foot-head to the stem formative.[16] As expected, the underlyingly accented stem formative fails to delete before the vowel of the tense, aspect, and mood marker.

(31) *partíais*

a. UR [$_{\text{Word}}$ [$_{\text{Stem}}$ [$_{\text{Root}}$ part] -í] -a -js]
part -SF -PRET.IPFV.IND -2PL

b. SR [par.tí.ajs]
'part.2PL.PRET.IPFV.IND'

In sum, Harris (1991: footnote 9) is wrong when he asserts that there is no independent motivation for stem-final vowel deletion in Spanish denominal derivation: the same process, subject to identical restrictions, is at work in deverbal derivation and verb inflection. The following tableau provides a possible optimality-theoretic analysis;

(32) a. MAX-V&$_{\text{AdjSeg}}$MAX-V
Assign one violation mark if two or more adjacent input vowels lack an output correspondent.[17]

b. MAX-V́
Assign one violation mark for every accented input vowel that lacks an output correspondent.

c. ALIGN(suffix,onset)
If an input vowel V is initial in a suffix attached to a stem,
then assign one violation mark for every segment intervening between the output correspondent of V and the nearest preceding onset segment.[18]

[16] This rule applies to other tenses, but crucially not to the present: see Oltra-Massuet & Arregi (2005).

[17] For a sequence of adjacent segments as the local domain of a conjunctive constraint, see Łubowicz (2002: 260ff.). In the case of MAX-V&$_{\text{AdjSeg}}$MAX-V, this is the minimal domain over which both members can be simultaneously evaluated (Łubowicz 2002: footnote 5).

[18] McCarthy (2003) denies the existence of gradient constraints such as (32c). The Spanish evidence may be regarded as a counterexample to this claim. Alternative, ALIGN(suffix,onset) could be 'quantized'; I shall not pursue this option here.

d.

		MAX-V&$_{\text{AdjSeg}}$MAX-V	MAX-V́	ALIGN(suffix,onset)	MAX-V
man-o $_{\text{Stem}}$] aθ-a	ma.no.á.θa			*!	
	ma.ná.θa ☜				*
bakala-o $_{\text{Stem}}$] it-o	ba.ka.la.o.í.to			**!	
	ba.ka.la.í.to ☜			*	*
	ba.ka.lí.to	*!			**
papá $_{\text{Stem}}$] it-o	pa.pa.í.to ☜			*	
	pa.pí.to		*!		*

3.2. Denominal derivatives with consonant-initial suffixes

Our analysis predicts that nominal stem formatives will be able to surface before derivational suffixes, provided that those suffixes are consonant-initial. Is this true? Harris (1983: 92, 147; 1996: 104) claims that it is not, adducing evidence from *nomina qualitatis* in *-dad-∅*:

(33)	a. base		b. *nomen qualitatis*	
	*bell-**o***	‘beautiful’	*bel-dad-∅*	**bell-**o**-dad-∅*
	*buen-**o***	‘good’	*bon-dad-∅*	**bon-**o**-dad-∅*
	*herman-**o***	‘brother’	*herman-dad-∅*	**herman-**o**-dad-∅*

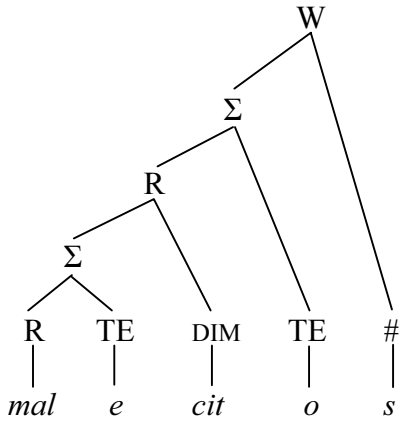
However, these constructions are altogether irrelevant to the matter at hand, since they are root-based rather than stem-based. Thus, the underlying representation of *bon-dad-∅* is neither (34a) nor (34b), but (34c).

(34)			
	a.	[$_{\text{Stem}}$ [$_{\text{Stem}}$ b{we/o}n-o] dad-{e/∅}]	×
	b.	[$_{\text{Stem}}$ [$_{\text{Stem}}$ b{we/o}n] dad-{e/∅}]	×
	c.	[$_{\text{Stem}}$ [$_{\text{Root}}$ b{we/o}n] dad-{e/∅}]	✓

This is confirmed by three facts. First, the relevant suffix has four allomorphs: *-tad-∅*, *-dad-∅*, *-edad-∅*, and *-idad-∅*. Of these, only *-idad-∅* remains productive; *-dad-∅* is never found in neologisms, but only in words inherited from Latin: e.g. *uēr-itāt-e-m* > *ver-dad-∅* ‘truth’, where the first *-t-* was historically subject to lenition in intervocalic position followed by syncope (Pharies 2002: 163). Secondly, many *nomina qualitatis* in *-dad-∅* have bound bases that do not exist as independent stems: e.g. ***frial-**dad-∅* ‘coldness’, ***mortan-**dad-∅* ‘mortality’, ***ver-**dad-∅* ‘truth’; note the absence of **ver-o*, **ver-a*, **ver-e*, or **ver-∅* ‘true’ in modern Spanish. Thirdly, if the suffix *-dad-∅* attaches to roots, it must be stem-level, since word-level constructions cannot be root-based: see (8b). This correctly predicts that the addition of *-dad-∅* bleeds diphthongization: *[b**we**n.dá^{ð}].

Accordingly, the fact that nominal stem formatives do not surface before derivational suffixes is simply due to the absence of productive stem-based denominal constructions with consonant-initial suffixes. The diminutive of *e*-stems constitutes a possible exception. Harris (1994: 185) provides the following representation for the morphological structure of *malecitos* 'bad_thing.DIM.PL', the diminutive of *mal-e-s*.[19]

(35)



If correct, this parse confirms our predictions, for it shows /-e-/, the stem formative of the base, surfacing before /-θit-/, a consonant-initial allomorph of a derivational suffix. Remarkably, Harris does not comment on the inconsistency of his position.

3.3. Exotic 'word markers' and nouns ending in /-s/

Harris's most intriguing argument against stem-final vowel deletion relies on the claim that the set of nominal 'word markers' in Spanish comprises not only the familiar *-o*, *-a*, and *-e*/∅, but also *-i*, *-u* and, crucially, -V-*s* strings (e.g. Harris 1992: 66, 75). These exotic elements appear in loans from Ancient Greek, Latin, English, and other languages (36a), although Harris also provides the same analysis for word-final -V-*s* sequences in certain native items (36b). Harris's views have recently been echoed by Oltra-Massuet & Arregi (2005: 66) and Lloret & Mascaró (2005: 13).

(36) *Exotic 'word markers' according to Harris*

a.			b.		
	*trib-**u***	'tribe'		*Carl-**o-s***	'Charles'
	*güisqu-**i***	'whisky'		*lej-**o-s***[20]	'far'
	*vir-**u-s***	'virus'			
	*brind-**i-s***	'toast'			

Harris supports his claim with two pieces of evidence: one distributional, the other metrical. The distributional argument is twofold. First, Harris notes that the final /Vs/ sequence in words such as *virus* and *Carlos* is absent from derivationally related forms: see (37). Obviously, stem-final vowel deletion cannot explain this fact, since it only applies when vowels are immediately adjacent across a stem-suffix boundary. Suppose, however, that the -V-*s* strings in question are word markers. In that case, the morphotactic restriction in (3a) automatically takes care of the situation.

---

[19] R stands for 'root', TE for 'terminal element' (see note 2 above), DIM for 'diminutive', # for 'number', and W for 'word'. Harris (1994: 184) glosses Σ as 'uninflected word', but what is an inflected word, if not a *stem*? See (7) above.

[20] This is an adverb, but see note 1.

(37)	base		derivative		
a.	*vir-**u-s***	'virus'	*vir-al*	**vir-**u-s**-al*	'viral'
			vír-ic-o	**vir-**ú-s**-ic-o*	'viral'
b.	*brind-**i-s***	'toast'	*brind-a-r*	**brind-**i-s**-a-r*	'to toast'
c.	*Carl-**o-s***	'Charles'	*carl-ist-a*	**carl-**o-s**-ist-a*	'Carlist'
d.	*lej-**o-s***	'far'	*lej-an-o*	**lej-**o-s**-an-o*	'distant'
			a-lej-a-r	**a-lej-**o-s**-a-r*	'to distance'

Secondly, Harris observes that, in exactly the same set of words, the plural form is homophonous with the singular:

(38)	SG	PL	e.g.	
a.	[bí.ɾus]	[bí.ɾus]	*muchos virus*	'many viruses'
b.	[bɾín.dis]	[bɾín.dis]	*muchos brindis*	'many toasts'
c.	[káɾ.los]	[káɾ.los]	*muchos Carlos*	'many Charleses'

Harris (1992: §4) accounts for this fact by suggesting that the final *-s* of the word marker occupies the morphological slot allocated to the plural inflection, blocking the insertion of plural /-s/. See Harris (1999: footnote 22) for a different statement of the same idea.

However, Harris's account is invalid because it conflates two heterogeneous word-types. The crucial piece of evidence, which Harris misses, is the difference between the diminutives of *virus* and *brindis* on the one hand, and *Carlos* and *lejos* on the other.[21] Once this difference is taken into consideration, there turn out to be *three* types of /s/-final noun in Spanish. For convenience, the following examples are drawn from a /θ/-less dialect.

(39)		PL	DIM	DIM.PL	
a.	[lápis-∅]	[lápis-e-s]	[lapis-ít-o]	[lapis-ít-o-s]	'pencil'
b.	[bíɾus]	[bíɾus]	[biɾus-ít-o]	[biɾus-ít-o-s]	'virus'
	[bɾíndis]	[bɾíndis]	[bɾindis-ít-o]	[bɾindis-ít-o-s]	'toast'
c.	[káɾl-o-s]	[káɾl-o-s]	[kaɾl-ít-o-s]	[kaɾl-ít-o-s]	'Charles'
	[léx-o-s]	—	[lex-ít-o-s]		'far'

(39a) is a simple *e*-stem noun. The derivation of its plural and diminutive forms requires no further comment; see specially (18) and (19) above. The relevant underlying structures are as follows:

[21] To be fair, the literature is replete with misleading reports concerning the acceptability of various types of Spanish diminutives. These false reports are sometimes based on impressionistic evidence, sometimes on second-hand judgements. The best way to rectify this calamitous situation is to use quantitative data from spontaneous language use (Eddington 2002). For example, Ambadiang (1997: 111) gives the diminutive of *virus* as '?virus-ito/?virus-cito', that of *brindis* as 'brindiscito', attributing the relevant judgements to previous scholars. However, a search of the World-Wide Web using the Google engine on 24 August 2004 returned over 45 Spanish pages containing one or more tokens of *virus-it-o*, but only one for *virus-cit-o*. An identical search on the same date returned 9 pages with one or more tokens of *brindis-it-o*, none with *brindis-cit-o*. In my Peninsular idiolect, both *virus-it-o* and *brindis-it-o* are perfectly fine and, in fact, the only possible forms.

(40)

SG	⟦W ⟦S lapis-{e/∅} ⟧⟧	
PL	⟦W ⟦S lapis-e ⟧ s ⟧	by morphological rule (18)
DIM.SG	⟦W ⟦S ⟦S lapis-{e/∅} ⟧ it-o ⟧⟧	
DIM.PL	⟦W ⟦S ⟦S lapis-{e/∅} ⟧ it-o ⟧ s ⟧	

In contrast, *virus* and *brindis* are athematic nouns: the sequences /us/ and /is/ are just part of the root, and the stem has no formative (see (1d) above). Thus, both the plural suffix /-s/ and diminutive /-it-o/ attach on the outside of a formativeless stem. The homophony between the basic singular and plural forms is caused by straightforward degemination of the underlying /s-s/ string in the plural (Contreras 1977).[22] Thus, the underlying structures for the forms in (39b) are the following:

(41)

SG	⟦W ⟦S birus ⟧⟧	
PL	⟦W ⟦S birus ⟧ s ⟧	undergoes degemination in the phonology
DIM.SG	⟦W ⟦S ⟦S birus ⟧ it-o ⟧⟧	
DIM.PL	⟦W ⟦S ⟦S birus ⟧ it-o ⟧ s ⟧	

The absence of the string /us/ in *vir-al-*∅ and *vír-ic-*o poses no particular difficulty. Like *nomina qualitatis* in *-dad-*∅ (see §3.2), these are root-based forms, derived from the bound root ⟦√ bir-⟧. Indeed, both *-al-*∅ and *-ic-o* occur very commonly in combination with bound bases: e.g. ***sider-****al-*∅ 'sidereal', ***polém-****ic-o* 'polemical'. This implies that they are both stem-level suffixes, since root-to-stem derivation cannot be word-level: see principle (8a). As predicted, *-al-*∅ bleeds diphthongization: see (9a). Harris (1992: 76) acknowledges the possibility that derivatives such as *vir-al-*∅ and *vír-ic-o* may be root-based, but chooses not to pursue it.

(42)

viral	⟦W ⟦S ⟦√ bir ⟧ al-{e/∅}⟧⟧
vírico	⟦W ⟦S ⟦√ bir ⟧ ik-o ⟧⟧

Finally, both items in (39c) are pseudoplural *o*-stems. These items exhibit a syntax/morphology mismatch:[23] whatever their number features (or indeed their category) in the syntax, in the morphology they have the structure of plural *o*-stem nominals, including the suffix /-s/ in the outermost morphological layer of the word. This correctly predicts that the diminutive suffix, which attaches to stems and not to words, will be inserted inside the final /-s/:[24]

(43)

SG	⟦W ⟦S karl-o ⟧ s ⟧	/-s/ mismatched with syntactic features
PL	⟦W ⟦S karl-o ⟧ s ⟧	
DIM.SG	⟦W ⟦S ⟦S karl-o ⟧ it-o ⟧ s ⟧	/-s/ mismatched with syntactic features
DIM.PL	⟦W ⟦S ⟦S karl-o ⟧ it-o ⟧ s ⟧	

There is just one minor complication. Let us assume that the requirement for pseudoplural /-s/ is specified as a subcategorization feature of the base. If so, it seems that the *-it-o* allomorph of the diminutive suffix is transparent with respect to this feature, whereas *-*(*e-*)*cit-o* is opaque,

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[22] *Pace* Harris (1992: 76), one does not expect this sequence to be repaired by vowel insertion: it is only initially in the prosodic word that Spanish uses epenthesis to rescue an unsyllabifiable /s/.

[23] In other words, they provide an instance of 'extended deponency' in the sense of Corbett *et al.* (2004).

[24] Spanish differs from Portuguese, which has two diminutive suffixes: /-iɲ-/, which is stem-based, and /-ziɲ-/, which is root-based. See Rainer (1996: §3), Bermúdez-Otero (forthcoming: ch. 2).

blocking its percolation. This accounts for the contrast between the diminutive singular forms of *Carl-o-s* and *lun-e-s*:[25]

(44)	SG	PL	DIM.SG	DIM.PL	
a.	[kárl-o-s]	[kárl-o-s]	[karl-ít-o-s]	[karl-ít-o-s]	'Charles'
b.	[lún-e-s]	[lún-e-s]	[lun-e-θít-o]	[lun-e-θít-o-s]	'Monday'

We can now see why it is a bad move to treat the final /Vs/ string in *virus* and *brindis* as an exotic word marker, rather than as part of the stem. By taking this path, Harris leaves himself no formal resources to account for the difference between pseudoplural words and athematic stems ending in /s/.

Harris's (1992: 75) metrical argument for exotic word markers fares no better. Harris asserts that, among *o*-stems, *a*-stems, and *e*-stems, there are no singular nouns with a closed ultima and antepenultimate stress (see also Roca 1988: 398). Words such as *Sócrates* 'Socrates' and *análisis* 'analysis' appear to break the pattern, but they cease to be exceptional if the final /Vs/ string is treated as a word marker on a par with *-o*, *-a*, and *-e*. However, there are two problems with this suggestion.

First, Harris is invoking a *covert* property (viz. morphological constituency) in order to account for an *overt* property (viz. an exception to prevalent phonotactics). Whenever one makes such a move, one must be able to specify how the learner acquires the covert information in the *explanans* independently of the overt data in the *explanandum*. Otherwise, the argument becames circular: it is a false explanation of *obscurum per obscurius*. In the case of *Sócrates* and *análisis*, there are two overt facts that could help the learner to discover the status of the putative word markers: (i) the failure of the final /Vs/ string to appear in derivationally related words such as *Socrát-ic-o* and *analít-ic-o*, and (ii) the homophony of the singular and plural forms. However, each of these facts admits of an alternative explanation: as we saw above, *Socrát-ic-o* and *analít-ic-o* may be based on bound roots, and the plurals may be subject to degemination. Harris fails to show how the learner will navigate this decision tree. In such circumstances, the onus of proof lies on the more abstract account; the default assumption must be that the learner simply stores the metrical properties of *Sócrates* and *análisis* in the underlying representation.

In fact, Harris's explanation does not even achieve full generality, for, even if we were to grant that items such as *Sócrates* and *análisis* contain exotic word markers, there would remain a good number of singular nouns in the language with the exceptional metrical pattern. Some of them can be dismissed as unassimilated loans: e.g. the trade mark [bé.ne.ton]. However, others, as Roca has repeatedly warned, belong in the core vocabulary: *régimen* 'diet', *Júpiter* 'Jupiter' (Roca 1988: 406, 418; 1990: 149).

In conclusion, there are no such things as exotic word markers in Spanish. The language has precisely four nominal stem classes:

(i) *o*-stems
(ii) *a*-stems
(iii) *e*-stems, with two subclasses: *e*/∅-stems (e.g. *cruz-*∅ ~ *cruc-e-s*) and *e*-only stems (e.g. *cruc-e* ~ *cruc-e-s*)
(iv) athematic stems

All four classes contain some pseudoplural items. Nothing in the behaviour of nouns ending in /s/ raises problems for an analysis of Spanish denominal derivation based on stem-final vowel deletion.

[25] Note, however, that for a majority of speakers *lunes* seems to be an athematic stem, rather than a pseudoplural *e*-stem. A search of the World-Wide Web using the Google engine on 3 August 2005 returned 28 Spanish pages containing *lunes-it-o*, and only 5 containing *lun-e-cit-o*.

4. Conclusion

At first blush, the behaviour of Spanish nominal stem formatives appears to admit of at least two analyses. In StrOT, however, only one of them proves viable. Fortunately, the analysis required by StrOT turns out to be the correct one, as shown by a number of independent morphological arguments. This is a highly significant result, for it shows StrOT to be not only descriptively adequate, but also highly restrictive and heuristically powerful. As Harris himself points out in a different connection,

> […T]he problem with this complex set of data —like any other— is that it can be described in a vast number of ways that cannot be immediately rejected on *a priori* grounds. Discussion becomes interesting only when and to the extent that a restrictive theory, supported empirically by (perhaps few but compelling) crucial cases, radically reduces the available descriptive options.
>
> Harris (1997: 552)

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