

Prosodic Transfer at Different Levels of Structure: The L2 Acquisition of Spanish Plurals

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1. Introduction

A growing body of literature attributes second language (L2) learners' difficulties with inflection to the transfer of constraints on prosodic structure from the native (L1) grammar. There is disagreement, however, about the level of structure implicated: syllable structure (Lardiere 1998, 2003, Bruhn de Garavito 2008) or higher prosodic structure (Goad, White & Steele 2003, Goad & White 2006). We adopt the latter position, reanalysing results from Bruhn de Garavito (2008). We argue that the difficulties that French-speaking L2ers have with Spanish plural are due to French lacking the adjunction structure required for target-like representation of Spanish plural.

Our proposal is couched within the Prosodic Transfer Hypothesis (PTH) which states that difficulties that L2 learners have with the production of functional morphology are due to constraints on prosodic structure transferred from the L1 grammar (Goad, White & Steele 2003, Goad & White 2004). In earlier work, we have observed not only that functional material may be deleted due to prosodic transfer but also that (i) it may be pronounced variably depending on phonological factors (e.g. producing or deleting inflection depending on the shape of the preceding rhyme (Goad & White 2006)), or (ii) it may be pronounced in non-target-like fashion (e.g. producing articles as stressed (Goad & White 2008, 2009)).

In our previous work, we focused on the acquisition of verbal morphology (tense and agreement), as well as articles, in L2 English. In this paper, we report on the acquisition of plural morphology in L2 Spanish. We show that lower proficiency French-speaking learners of Spanish supply the plural variably; at the same time, when plural is supplied, stress is shifted to the syllable containing the plural suffix. We argue that these properties are formally connected: both reveal that plural is prosodically organized in a non-target manner, specifically, in the same manner as inflection is organized in the L1 grammar.

2. Plural inflection in French and Spanish

Plural inflection is not overtly realized on nouns in French, even when the noun is vowel-final; see (1a). Although it is realized if the following word in the DP, noun or adjective, is vowel-initial, as in (1b-c), it is only pronounced when its source is a determiner; when its source is the noun, as in (1d), it is not realized, except in very formal speech or recitation of poetry.

(1) French plural inflection:

- a. deux ami-s 'two friends'
 ∅
- b. les amis 'the friends'
 [z]
- c. ses anciennes femmes 'his former wives' (adj-N)
 [z]
- d. les chaussures oranges 'the orange shoes' (N-adj)
 *[z]

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In Spanish, by contrast, plural regularly surfaces on nouns: it is realized as *-s* after vowel-final nouns and as *-es* after consonant-final nouns; see (2a-b). *e* (phonetically [ɛ]) is usually attributed to epenthesis (e.g. Saltarelli 1970, Contreras 1977, Harris 1980).

(2) Spanish plural inflection:

- | | |
|---------------------------------------|--|
| a. <i>-s</i> after vowel-final nouns: | b. <i>-es</i> after consonant-final nouns: |
| casas ‘houses’ | balones ‘balls’ |
| | árboles ‘trees’ |

As we will see below, French-speaking L2ers often fail to produce plural marking on Spanish nouns. The differences between the two languages illustrated in (1) and (2) may suggest that such deletion is due to L1 influence, since French does not overtly mark plural on nouns. We focus on a point in development when plural is realized variably, at about 50% of the time or more. It is clear, then, that some system of overt plural marking on nouns has been established. What remains to be accounted for is why a relatively high deletion rate continues to be found.

Our account follows from the PTH: we argue that deletion is driven by constraints on prosodic structure, specifically those that regulate how inflection is prosodically organized in the two languages. We maintain that French lacks the adjunction structure necessary for organizing the Spanish plural. Aside from deletion, we will show that interesting patterns of stress shift also implicate a problem with the representation of plural in the grammars of lower proficiency learners. An understanding of this account requires that we first examine stress in uninflected words.

3. Stress in Spanish and French

3.1. Uninflected words

Regular stress in Spanish falls on the penultimate syllable of vowel-final nouns and on the final syllable of consonant-final nouns; see (3a-b) (Harris 1983). There are exceptions to both patterns, one of which we examine here, namely, consonant-final nouns with penultimate stress; see (3c).¹ Although only 2.03% of consonant-final nouns show this profile (Roca 2005), a good number of these are high frequency words and several were attempted by the participants in our study.²

(3) Spanish stress:

- a. Vowel-final nouns:
[ˈmesa] ‘table’, [benˈtana] ‘window’
- b. Consonant-final nouns:
[baˈlon] ‘ball’, [pasˈtel] ‘cake’, [autoˈbus] ‘bus’
- c. Consonant-final nouns (irregular):
[ˈarbol] ‘tree’, [ˈlapis] ‘pencil’, [aˈsukar] ‘sugar’

Following Harris (1983), we assume that Spanish builds moraic trochees with the foot aligned with the right edge of the word (desinence included); see (4a). We assume further that the irregular pattern in (3c) involves an extrametrical final consonant, as in (4b).

(4) a. Regular pattern:

(ˈme_μsa_μ)_{Ft}
ba_μ(ˈlo_μπ_μ)_{Ft}

¹ We exclude from consideration the more common exceptional pattern where vowel-final words have antepenultimate stress (11.1% of vowel-final words), e.g. número ‘number’. Words of this profile were rarely attempted by the participants in our study.

² Roca’s percentages are based on the 91,000 word list reported in Núñez Cedeño & Morales-Front (1999).

- b. Irregular pattern:
 (la_μpi_μ)_{Ft}<S_μ>

Turning to French, the data in (5) show that French words are stressed on the final (non-schwa) syllable, independent of the shape of the penultimate and final syllables.³

- (5) French stress:
 [pi'sin] 'pool'
 [panɔ'ʁa'ma] 'panorama'
 [ɛskar'go] 'snail'

In contrast to Spanish, we assume that French builds iambic feet, with the foot similarly aligned with the right word edge (e.g. Charette 1991, Scullen 1997); see (6).

- (6) (pi'sin)_{Ft}
 panɔ(Ra'ma)_{Ft}
 ɛs(kar'go)_{Ft}

3.2. *Inflected words*

Our argument for the differences in the prosodic organization of inflection in Spanish and French comes from stress. The addition of plural to Spanish nouns has no impact on the location of stress. For example, adding final *s* in (7a) does not make the plural of [mesa] become [me'sas], which would parallel consonant-final uninflected stems like [ba'lon] in (3b). Similarly, adding *es* to a consonant-final stem like [ba'lon] or [arbo'l] does not cause stress to shift to the right; see (7b-c).⁴ This is evidence that plural is organized outside the prosodic word (PwD) of its nominal host in Spanish.

- (7) Spanish plural:
 a. [mesas], *[me'sas] 'tables'
 b. [ba'lones], *[balɔ'nes] 'balls'
 c. [arboles], *[ar'boles], *[arbo'les] 'trees'

This pattern contrasts with French. In order to see how stress interacts with inflection in French, it is necessary to examine verbal inflection, which is vocalic in shape and is the only inflection to be overtly realized on its host (in contrast to plural in (1)). The examples in (8) show that stress falls on final syllable, even when it is inflectional. That is, when pronounced, inflection falls within the stress domain in French.

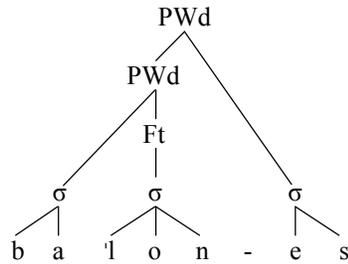
- (8) French verbal inflection:
 [vi'zit] 'visit' [vizi'te] 'visit-INF', 'visit-2PL'
 [vizi'te] 'visit-IMP' [vizi'tɔ] 'visit-1PL'

The structures for Spanish plurals and French inflected verbs are provided in (9). (9a) shows that, in Spanish, plural is an 'affixal clitic': it is adjoined to the PwD of its nominal host. It thus has no impact on stress because it falls outside the lower PwD, the domain in which stress is computed. In French, by contrast, inflection is represented as an 'internal clitic': it falls inside the PwD of its host and so is visible to the stress parse, as shown in (9b).

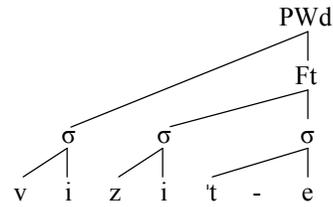
³ This description ignores a number of complications, two of which we mention here. First, word-level stress is not obligatorily realized in French; only the final lexical word in a phrase must receive stress (Verluyten 1982, Post 2000). Second, stress can shift to penultimate position, typically when that syllable contains a vowel that can optionally appear as long (Walker 1984), e.g. [me:zɔ] ~ [me'zɔ] 'house'.

⁴ There are a handful of exceptions to this (Harris 1983 provides a list of six) where stress shifts rightward in the plural, e.g. [reximen] – [re'ximenes] 'regime(s), diet(s)'. We leave these cases aside.

(9) a. Spanish plural: Affixal clitic:



b. French inflection: Internal clitic:



In light of these differences in the prosodic organization of inflection, we turn now to examine how French-speaking learners behave when they are required to pluralize nouns in Spanish.

4. Plural suppliance in learners' productions

The current study examines data from Bruhn de Garavito (1986, 2008), who reports on production data elicited from French-speaking L2 learners of Spanish. Subjects were enrolled in first (Y1) or second year (Y2) Spanish classes in secondary school in Québec.

The experimental stimuli consisted of eight sets of four pictures each. Each picture portrayed a scene that included commonly-used singular or plural nouns. The participants were given one set of pictures at a time. Their task was to select one picture of the four and to describe it so that the interviewer could guess which picture had been selected. This methodology ensured that no explicit focus was placed on any particular noun. Subjects produced a total of 781 nouns in plural contexts. As we will see, though, nouns in plural contexts were not necessarily inflected for plural.

For the current study, data from 40 subjects were phonetically transcribed and coded for a variety of phonological and morphosyntactic measures. A subset of the transcriptions were verified by a second transcriber (a native speaker of Spanish).

Table 1 shows the suppliance rates of plural morphology for consonant- and vowel-final nouns, for the two groups of learners.⁵ There is a significant contingency between suppliance of plural and proficiency level, for both consonant-final ($\chi^2=29.34$, $p<.0001$) and vowel-final ($\chi^2=25.18$, $p<.0001$) stems.⁶ In other words, the Y2 group supplies plural inflection more than the Y1 group, for both types of nouns.

Group	No of learners	C-final pluralized		V-final pluralized	
Y1	28	100/199	50%	221/292	76%
Y2	12	71/84	85%	151/159	95%

Table 1. Plural suppliance on nouns in obligatory contexts

As we saw in (9), the critical difference between Spanish and French concerns how overt inflection is prosodically organized, inside or outside the PWd of its host. We argue below that the two groups of learners also prosodify plural differently which accounts both for the differences in suppliance rates in Table 1 and for whether or not the plural suffix attracts stress.

Let us turn now to stress. We start by examining nouns in singular contexts to determine the kind of feet that learners are building.

⁵ There were two classes of first year students. The classes performed near-identically on consonant-final stems but significantly differently on vowel-final stems. We cannot trace the source of this difference to the profiles of the individual subjects nor to anything about the learning environment: the two groups of first year students used the same textbook and had the same teacher. Concerning patterns of stress behaviour, the two classes performed the same. In view of this and the lack of traceable differences between the two classes, all results for both classes are collapsed.

⁶ We acknowledge that χ^2 results must be interpreted with caution, as the observations are not fully independent.

5. What kind of feet are learners building?

5.1. Vowel-final uninflected nouns

Table 2 shows that the Y1 group regularly shifts stress to the ultima of vowel-final nouns, the pattern transferred from French. The Y2 group, by contrast, shows more variable stress placement, with learners fluctuating between the transferred system and the target system. The contingency between stress placement and proficiency level is significant ($\chi^2=30.51$, $p<.0001$).

Group	No of tokens	Target stress: 'CVCV	Stress shift to final: 'CVCV → CVCV
Y1	606	28%	72%
Y2	328	46%	51%

Table 2. Stress on vowel-final uninflected nouns

The analysis is provided in (10). Y1 learners strongly favour French iambs which leads to stress shift, as shown by the footing in (10b). The Y2 learners are wavering between French iambs and Spanish trochees: target stress arises from learners building moraic trochees (see the footing in (10a)); stress shift to the final syllable results from learners building iambs (see (10b)).

(10) Analysis:

- | | |
|---|--|
| a. Target stress (Y2 learners):
Moraic trochee: (mesa) _{Ft} | b. Stress shift to final syllable (Y1 and Y2 learners):
Iamb: (me'sa) _{Ft} |
|---|--|

5.2. Consonant-final uninflected nouns

Table 3 shows that for consonant-final uninflected nouns, both groups of learners consistently stress the final syllable, regardless of the target. All learners, regardless of proficiency, thus misanalyse consonant-final irregular nouns as regular.

Level	Regular (final stress)		Irregular (penultimate stress)	
	No of tokens	Target stress: 'CVCVC	No of tokens	Stress shift to final: 'CVCVC → CV'CVC
Y1	179	98%	25	92%
Y2	76	99%	19	95%

Table 3. Stress on consonant-final uninflected nouns

Both Spanish moraic trochees and French iambs yield final stress. The footing, however, is different, as (11) shows.

(11) Analysis:

- | | |
|--|---|
| a. Regulars:
Moraic trochee: ba('lon) _{Ft}
Iamb: (ba'lon) _{Ft} | b. Consonant-final irregulars misanalysed as regular:
Moraic trochee: la('pis) _{Ft}
Iamb: (la'pis) _{Ft} |
|--|---|

In sum, the data analysed thus far suggest that the Y1 learners strongly favour the transferred system of stress assignment while Y2 learners are wavering between the French and Spanish systems.

6. How are learners prosodically organizing the plural?

We now examine what happens when Spanish nouns are inflected for plural. Recall from (9) that, in target Spanish, stress does not shift to the plural suffix revealing that plural is represented outside the lower PWd. In French, by contrast, inflection attracts stress, indicating that it falls inside this

domain. If French-speakers have transferred the L1 system into the interlanguage grammar, then the syllable containing the plural affix should attract stress since it is consonant-final, parallel to what we have seen in Table 3 for consonant-final uninflected nouns.

6.1. Plurals of consonant-final stems

We begin with plurals of regular consonant-final stems, e.g. target [ba'lones] 'balls'. The profile in Table 4 reveals that Y1 and Y2 learners behave differently. For Y1 learners, pluralized consonant-final stems undergo stress shift to the final syllable 73% of the time (e.g. [ba'lones] → [balo'nes]). For Y2 learners, on the other hand, pluralized consonant-final stems undergo stress shift only 38% of the time.⁷ The contingency between stress placement and proficiency level is significant ($\chi^2=11.22$, $p<.001$).

Level	No of tokens	Target stress on penult: CVCVC-es	Stress shift to final: CVCVC-es → CVCVC-es
Y1	56	27%	73%
Y2	53	58%	38%

Table 4. Stress placement on plurals of regular consonant-final stems

The Y1 learners' treatment of pluralized consonant-final stems parallels their treatment of irregular consonant-final uninflected stems (Table 3) where they similarly shift stress to the final syllable (e.g. [lapis] → [la'pis] 'pencil'). The Y2 learners, by contrast, treat these two types of consonant-final words differently: pluralized stems do not regularly undergo stress shift (Table 4), in contrast to the irregular uninflected stems in Table 3. Comparing Tables 3 and 4, the contingency between noun type (inflected or not) and stress placement is significant for the Y2 group ($\chi^2=16.02$, $p<.0001$).

Turning to plurals of irregular consonant-final stems like target [lapis-es] 'pencils', Table 5 shows that they pattern in the same manner as the regular plurals in Table 4. This is as expected: recall from Table 3 that uninflected irregulars undergo stress shift to the final syllable for both groups of learners, thereby patterning as regular. Comparing Tables 4 and 5, there is no significant contingency for either group between regular vs. irregular nouns and stress shift (Y1: $\chi^2=1.06$, $p=0.3032$; Y2: $\chi^2=0.77$, $p=0.3802$).

Level	No of tokens	Stress shift to penult: CVCVC-es → CV'CVC-es	Stress shift to final: CVCVC-es → CVCVC-es
Y1	44	36%	64%
Y2	18	61%	33%

Table 5. Stress placement on plurals of irregular consonant-final stems

The difference between the two groups of learners discussed above is critical to our understanding of how plural is prosodically organized. For Y1 learners, pluralized consonant-final stems attract stress to the final syllable just like consonant-final uninflected stems. For Y2 learners, on the other hand, pluralized consonant-final stems behave differently from consonant-final uninflected stems: the addition of plural morphology does not typically affect the location of stress.

There is another important difference between the two groups. Recall from Table 1 that consonant-final forms are only pluralized about half of the time for the Y1 learners whereas, for the Y2 learners, suppliance is at near target levels. We propose that these two things are related, as detailed below.

The generalizations that we must account for are summarized as follows. For the Y1 learners, pluralized consonant-final stems (Tables 4-5) are treated in the same fashion as consonant-final

⁷ This number falls to 24%, if we remove three Y2 learners who have high suppliance rates but whose stress patterns mirror those of the Y1 group.

uninflected stems (Table 3): both have stress on the final syllable. In addition, consonant-final forms are pluralized on average 50% of the time (Table 1). For the Y2 learners, pluralized consonant-final stems (Tables 4-5) are treated differently from consonant-final uninflected stems (Table 3): learners only reliably shift stress to the final syllable in uninflected stems. In addition, consonant-final forms are pluralized 85% of the time (Table 1).

We propose the following analysis. Y1 learners recognize that Spanish plural is organized in a different manner from French inflection but they do not understand how. They cannot build the target representation and, consequently, they either delete plural or they resort to the PwD-internal representation for inflection in French leading to stress shift. For the Y2 learners, plural is organized in target fashion, outside the lower PwD as in (9a). With the target structure acquired, plural suppliance rates are high, as expected.

The structures that each group builds for uninflected consonant-final stems and their plurals are shown in (12). As can be seen for the Y2 group, the same stress profile obtains, regardless of whether the interlanguage grammar builds iambs or moraic trochees.⁸

(12) Structures for consonant-final stems:

a. Y1 learners (when plural is overtly realized):

	Regular uninflected	Regular plural	Irregular uninflected	Irregular plural
Iamb	[(ba'lon) _{Ft}] _{PwD}	[ba(lo'nes) _{Ft}] _{PwD}	[(la'pis) _{Ft}] _{PwD}	[la(pi'ses) _{Ft}] _{PwD}

b. Y2 learners:

	Regular uninflected	Regular plural	Irregular uninflected	Irregular plural
Iamb	[(ba'lon) _{Ft}] _{PwD}	[[ba'lon) _{Ft}] _{PwD} es] _{PwD}	[(la'pis) _{Ft}] _{PwD}	[[la'pis) _{Ft}] _{PwD} es] _{PwD}
Mor troch	[ba('lon) _{Ft}] _{PwD}	[[ba('lon) _{Ft}] _{PwD} es] _{PwD}	[la('pis) _{Ft}] _{PwD}	[[la('pis) _{Ft}] _{PwD} es] _{PwD}

6.2. Plurals of vowel-final stems

We turn finally to plurals of vowel-final stems. Recall that, in the target Spanish grammar, the addition of inflection does not lead to stress shift; stress remains on the penultimate syllable. Table 6 shows that there are two patterns of behaviour for the Y2 group: in some cases, stress is target-like, thereby falling on the penult, while in other cases, stress shifts to the final syllable. In contrast, only one pattern of behaviour is robustly observed for the low proficiency group: stress shifts to the final syllable. The contingency between stress placement and proficiency level is significant ($\chi^2=4.8$, $p<.05$).

Level	No of tokens	Target stress on penult: 'CVCV-s	Stress shift to final: CV'CV-s
Y1	219	28%	72%
Y2	147	39%	61%

Table 6. Stress placement on plurals of vowel-final stems

The two groups' treatment of vowel-final forms follows directly from our analysis. For the Y1 group, pluralized vowel-final stems pattern the same as all other stems, whether inflected or not: stress falls on the final syllable. For the Y2 group, pluralized vowel-final stems (Table 6) behave similarly to

⁸ This would hold true for the Y1 learners as well, i.e. final stress under a moraic trochaic analysis ([ba('lon)_{Ft}]_{PwD} and [balo(nes)_{Ft}]_{PwD}) as under the iambic analysis in (12a), but robust stress shift in vowel-final words (Table 2) has already shown that Y1 learners rarely build trochaic feet.

vowel-final uninflected stems (Table 2): two types of feet are permitted for words of this shape and the addition of plural *s* does not lead to stress shift.

Turning to the analysis, for the Y1 learners, plural is inside the lower PWd. Combined with iambic footing, stress falls on the final syllable; see (13a). For the Y2 group, plural is outside the lower PWd so the addition of *s* does not trigger stress shift to this syllable. (13b) shows that there are still two possible locations for stress because the interlanguage grammar permits both iambs and moraic trochees but, critically, the addition of *s* has no bearing on where stress falls.

(13) Structures for vowel-final stems:

a. Y1 learners:

	Uninflected	Plural
Iamb	[(me'sa) _{Fi}] _{PWd}	[(me'sas) _{Fi}] _{PWd}

b. Y2 learners:

	Uninflected	Plural
Iamb	[(me'sa) _{Fi}] _{PWd}	[[[(me'sa) _{Fi}] _{PWd} s] _{PWd}
Mor troch	[('mesa) _{Fi}] _{PWd}	[[('mesa) _{Fi}] _{PWd} s] _{PWd}

7. Conclusion

We have proposed that there is a relationship between variable suppliance of plural morphology and stress shift triggered by the addition of the plural suffix. As (14) summarizes, Y1 learners recognize that plural is not prosodically organized in the same manner as is verbal inflection in French, as a PWd-internal clitic, but their lack of understanding of the target affixal clitic structure leads them to fluctuate between deletion of the plural and resorting to the structure for verbal inflection transferred from the L1 grammar. Y2 learners, by contrast, can build the target structure, leading both to high suppliance of plural morphology and to the absence of stress shift induced by the addition of plural.

(14) Summary of learners' behaviour

	Prosodification of plural	Suppliance rate for Spanish plural	Foot shape
French grammar	internal clitic (for verbal inflection)	–	iamb
Y1 learners	internal clitic	lower	iamb
Y2 learners	affixal clitic	higher	iamb ~ moraic trochee
Spanish grammar	affixal clitic	high	moraic trochee

Although the Y2 learners have acquired the appropriate structure for prosodically organizing the plural suffix, they are not yet target-like on foot headedness: their grammar is still fluctuating between French iambs and Spanish moraic trochees. The PTH makes no prediction about whether the change in foot shape should be acquired before or after the adjunction structure required for representing plural. However, given that the adjunction structure is entirely absent from the French grammar, one might have reasoned that this structure would be particularly difficult to acquire, more difficult than the change in foot headedness. This is counter to what we have observed. We speculate that the reason why foot shape is more resistant to change is because the French system of stress yields the correct location for stress in Spanish approximately half of the time, namely for regular consonant-final forms. This is in contrast to inflection where the French system (for verbal inflection) never yields the correct stress for Spanish plurals.⁹ Further, although the location of regular stress in Spanish systematically

⁹ This leaves aside the handful of vowel-final words with final stress like *mamá*, *papá* and *café* that take *s* in the plural.

varies, which should signal to the learner that the transferred L1 grammar is not appropriate, the presence of irregular forms (11.97% of vowel-final forms and 2.08% of consonant-final forms (Roca 2005)) introduces an element of complexity that learners must contend with. This is in contrast to the representation of plural: while appropriate representation of the plural requires the projection of new structure, there is no ambiguity in the ambient data about whether plural is inside or outside the PWd of the base to which it attaches (cf. note 4).

In conclusion, many approaches to variable suppliance of functional morphology have been proposed in the literature. We contend that only a phonological approach can account for the relationship observed between the suppliance rate of plural morphology and the effects that the addition of the plural suffix has on stress placement. Furthermore, a solution that only considers syllable structure cannot account for the data; a consideration of differences in higher prosodic structure between the L1 and L2 is crucial.

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