

A comparative study on accentual structure between Spanish learners of French interlanguage and French native speakers

M^a Ángeles Barquero Armesto^{1, 2}

¹University of Geneva, Switzerland

²Autonomous University of Barcelona, Spain

Maria.Barquero@unige.ch

Abstract

In this paper, we compare the prosodic structure in Spanish learners of French and in French native speakers. For this, we will consider the accentual structure of both speaker groups during the reading, in French, of the same text in the same conditions. We started by looking at some differences between the Spanish stress system and the French stress system in order to compare Spanish learners' productions to those of French native speakers. We then considered different variables such as position of stress, number of accentual phrases (AP), number of phonic groups (PG), number of APs per PG, number of syllables per AP, total number of pauses, average duration of pauses, as well as syllable duration.

The results show that the Spanish learners' group does not have any difficulty moving stress to the final syllable of the AP, but they have not yet acquired the delimitative function of stress and the concept of stress group. These results reflect an intermediate stage of their interlanguage in which they have mastered some characteristics of L2 prosody but the outcome is still far from that of native speakers.

Index Terms: speech prosody, interlanguage, L2 French, Spanish learners

1. Introduction

This research lies within the framework of the IPFC-Spanish project (*Interphonologie du Français contemporain*) [1, 2] in which the productions of Spanish learners in French L2 are examined from a segmental [3, 4, 5] and suprasegmental [6] point of view. In the present study, we focus our attention on prosodic aspects. Spanish learners of French start from a prosodic system in which stress is characterized as being free - as it can fall on any of the three (or even four) last syllables of the word [7] -, and in which stress is realized at the word level since it is found on each content word. When considering primary French stress (according to [8] terminology), Spanish learners face a language in which stress is characterized as being in a fixed position, and in which stress has a delimitating function [9]. French stress is found on the last syllable of a group of words, usually called accentual phrase (henceforth AP). This unit (that has received different names such as prosodic word [10], prosodic phrase [11], rhythmic word [12], rhythmic group [13] or rhythmic unit [14]) can be defined as the minimal rhythmic unit which has only one final or primary stress associated with the unit final full syllable [15]. Thus, stress marks and limits each AP, namely its end and the beginning of the next one, shaping an elastic accentual unit [16], in which the number of unstressed syllables may vary.

Given these accentual differences between the two languages, we decided to examine how advanced Spanish learners of French realize APs, in comparison with native French speakers. We can hypothesize that Spanish learners, as

other learners of French whose first language is a free-stress language, will tend to produce smaller units than French native speakers. Recent studies have confirmed this tendency with Polish learners of French [17] and also with Swiss German learners of French [18]. In this study, we compare the prosodic segmentation in French native productions and in French L2 productions of advanced Spanish learners. For this, we examined not only the realization of AP (i.e. position of stress, number of APs, number and duration of syllables per AP) but also the organization of APs in phonic groups (hereafter PG). PG can be defined as speech intervals between pauses [19] and constitutes a higher prosodic level than the AP [10]. As regards PG, the following variables will be examined: number of PGs, number of APs per PG, number and duration of pauses. In order to facilitate the comparison of the data, we will examine productions coming from an oral reading.

2. Method

2.1. Participants, material and procedure

Four Spanish learners of French and four native French speakers (all of them are male) participated in this experiment. All the non-native speakers of French were living in Geneva at the time of the experiment. They were all advanced learners of French (B2-C1, according to the Common European Framework of Reference for Languages-CEFRL-[20]).

The passage that we used in this experiment has been extracted from the PFC text "*Le Premier Ministre ira-t-il à Beaulieu?*" (*Projet Phonologie du Français contemporain*), [21], which is composed of 3 paragraphs. Participants were recorded individually in a sound-treated booth. They were instructed to read the text at a natural rate.

2.2. Data analysis

From the recording of the text, we extracted the second paragraph, which is composed of 9 sentences and of 157 words. We have selected only the second paragraph of the text for this study, in order to avoid excerpts where the readers might feel especially tense or tired, features frequently found at the beginning or at the end of a reading aloud exercise.

After an orthographic transcription, all productions were first automatically segmented into syllables and words using the EasyAlign [22] tool under Praat [23], and manually corrected. Then, three experts annotated all prominences (in the sense of [16], i.e. prominent syllables according to an auditory impression), following a previously established procedure inspired by [24]. Each expert listened three times to every context-window with no waveform display. They had to detect prominences and classify them into two categories (1 = weak prominence, 2 = strong prominence). Then, for each syllable, we computed the "prominence mean". We considered that there was a prominence when the mean was higher than 1.33 and that there was no prominence when the mean was

lower than 0.67. When the mean was between 0.67 and 1.33 we used ProsoProm [24], an automatic tool, in order to determine the presence of a prominence.

After the identification of the clitic groups [25] on the basis of morpho-syntactic information (e.g. two clitic groups in the following sequence: “les gens || du pays”), we defined the actual APs produced by each speaker: we placed a right AP boundary after the final content word of the clitic group, if the content word was perceived as having a prominent syllable.

The following variables were examined: position of stress, number of APs, number of PGs, number of AP per PG, number of syllables per AP, pause number, pause duration and syllable duration. Statistical analyses were performed using regressions and chi-square tests.

3. Results

3.1. General Data

First, regarding stress position, our results show that, in both groups’ productions, stress is located mainly in oxytone position with 99.99% of stresses produced in this position by the native speakers vs. 96% for the Spanish learners.

Second, this being a reading corpus, we observe a total number of produced syllables almost identical in both groups, respectively 963 by the French speakers vs. 1001 by the Spanish learners, as can be seen in Table 1. The slight difference, not significant (χ^2 (dl = 1) = 0.74, n.s.), can be explained by repetitions of syllables, words or reformulations, that have been found in productions of both Spanish learners and French speakers. Moreover, as can be seen in Table 1, Spanish learners produce globally more PG (χ^2 (dl = 1) = 33.48, $p < 0.001$) and more AP (χ^2 (dl = 1) = 5.00, $p < 0.05$) than the French speakers.

In addition, French speakers produce more AP per PG than Spanish learners (H = 1.75; F = 3; $\beta = 0.538$, $\chi^2 = 43.36$, $p < 0.001$).

Table 1. Summary of general results.

	Spanish learners	French speakers
Total num. of syll.	1001	963
Total num. PG	189	92
Total num. AP	330	275
Mean number AP per PG	1.75	3

Given these differences between French speakers and Spanish learners, we examined in a more detailed way the distributions of PG in both groups.

3.2. Phonic Groups (PG)

Figure 1 presents the percentage of occurrences for the number of AP per PG produced by French and Spanish learners.

The existing differences between both groups of speakers are statistically significant in those cases in which the PG is formed by 1, 2 and 5 APs. Spanish learners show more PGs formed by 1 or 2 APs (χ^2 (dl = 1) = 53.37, $p < 0.001$; χ^2 (dl = 1) = 17.25, $p < 0.001$, respectively), whereas French speakers show more PGs formed by 5 APs (χ^2 (dl = 1) = 6.4, $p < 0.05$).

On the other hand, taking into account only the PGs formed by 1, 2, 3, 4 and 5 APs, we see that French speakers do not show a different number of cases for each category (χ^2 (dl = 4) = 6.47, n.s.), in other words, no clear preference for any category is shown.

However, regarding Spanish learners, statistically significant differences are noticed between the number of APs forming the PGs (χ^2 (dl = 4) = 194.22, $p < 0.001$). Actually, Spanish learners show in their productions a clear preference towards some categories: the PGs formed by only one AP are more numerous than those formed by 2 (χ^2 (dl = 1) = 16.57, $p < 0.001$), which are, in turn, more numerous than those formed by 3 APs (χ^2 (dl = 1) = 17.25, $p < 0.001$).

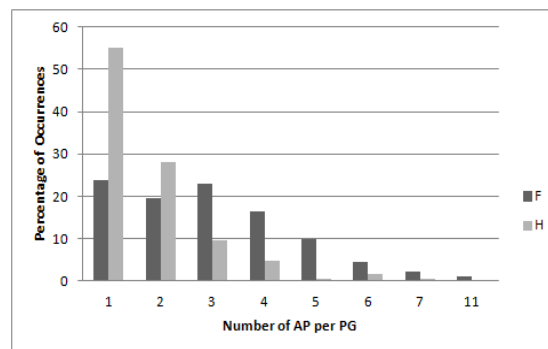


Figure 1: Percentage of occurrences for the number of AP per PG produced by the two groups (F: French speakers; H: Spanish learners).

In summary, Spanish learners, compared to French speakers present PGs composed, in average, by fewer APs. In the same way, they seem to prefer PG formed by 1 and 2 APs.

3.3. Accentual Phrases (AP)

Table 2 presents the mean number of AP and syllables produced by both groups, as well as the mean number of syllables per AP. It can be seen that the length of the AP changes according to the speakers group: Spanish learners show a mean of 3.07 syllables per AP, while French speakers show a mean of 3.53 ($\beta = 0.139$, $\chi^2 = 9.14$, $p < 0.01$).

Table 2. Summary of the results relative to AP.

	Spanish learners	French speakers
Mean number AP	77	67
Mean num syllables	236.25	236.25
Mean number syll. per AP	3.07	3.53

Given the difference between the number of syllables per AP in both groups, we examined in a more detailed way the distribution for both groups. Figure 2 presents the percentage of AP composed of 1 to 11 syllables for both groups.

The difference between both groups is statistically significant when the AP is formed by 2 or 3 syllables (χ^2 (dl = 1) = 4.56, $p < 0.05$; χ^2 (dl = 1) = 6.04, $p < 0.05$, respectively), with more occurrences for Spanish learners than for French speakers. A similar tendency is shown when it is formed by just one syllable (χ^2 (dl = 1) = 3.57, $p = 0.07$). On the other hand, when the AP contains 5 syllables, an inverse tendency can be observed, with a larger amount of cases for French speakers (χ^2 (dl = 1) = 3.48, $p = 0.08$).

Just as they do with PGs, French speakers do not show any clear preference towards a specific category (χ^2 (dl = 3) = 2.61, n.s.). Spanish learners, on the contrary, do show a statistically significant difference in the different categories (χ^2 (dl = 3) = 46.43, $p < 0.001$). While they produced the same number of APs composed of 2 or 3 syllables, (χ^2 (dl = 1) = 1.11, n.s.), they produced fewer APs composed of 4 syllables (χ^2 (dl = 1) = 24.43, $p < 0.001$). No clear preference regarding APs formed by 4 or 5 syllables is noticed either (χ^2 (dl = 1) = 0.35, n.s.).

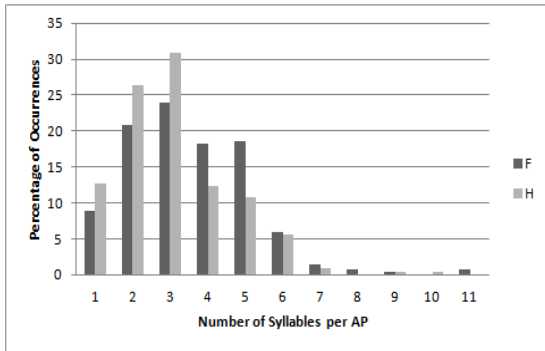


Figure 2: Percentage of occurrences for the number of syllables per AP produced by the two groups (F: French speakers; H: Spanish learners).

In summary, Spanish learners, compared to French speakers, present APs composed, in average, by less syllables. In the same way, they seem to prefer AP formed by 2 and 3 syllables.

3.4. Pauses

As expected, given the PG difference between both groups (cf. section 3.1.), a difference in the mean number of pauses is observed between both groups (cf. Table 3), with more pauses in the Spanish learners' productions (46.25) than in the French speakers' productions (22).

We have also examined the mean duration of the pauses in both groups. As can be seen in Table 3, we observe a similar duration for Spanish learners (443.15 ms) and French speakers (437.38 ms) ($\beta = -5.84$, $t(603) = -0.135$, n.s.).

In summary, Spanish learners produce more pauses than French speakers, but with a similar mean duration.

Table 3. Pause number and duration.

	Spanish learners	French speakers
Mean num. of pauses	46.25	22
Mean pause duration	443.15	437.38

3.5. Syllable duration

Spanish learners and French speakers present an average of syllable duration (i.e. articulation rate) that is significantly different, with a mean of 236.71 ms/syll for the Spanish learners and 199.68 ms/syll for the French speakers ($\beta = 39.58$, $t(600) = 2.92$, $p < .05$). We have examined as well whether the number of syllables per AP has an influence on the syllable duration. As can be seen for both groups in Figure

3, the higher the number of syllables per AP, the shorter the duration of the syllable ($\beta = -24.87$, $t(600) = -9.44$, $p < .05$), which implies a higher articulation rate.

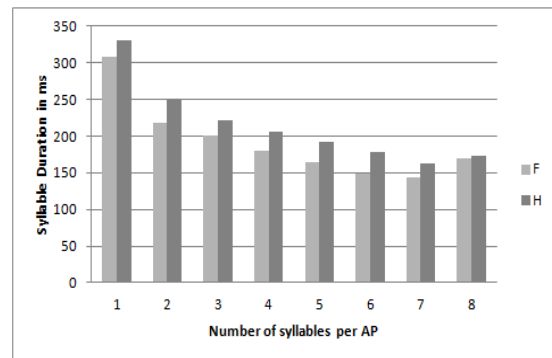


Figure 3: Syllable duration in ms as a function of the number of syllables per AP and group (F: French speakers; H: Spanish learners).

No interaction between the group and the number of syllables is observed ($\beta = 4.06$, $t(600) = 1.09$, n.s.), which shows that the number of syllables has the same impact on the syllable duration in Spanish learners and French speakers. This means that both groups behave the same way, but at different rates.

Let us finally mention that the group and the number of syllables explain significantly 24% of the variability of the articulation rate.

4. Discussion

In this research, our goal has been to compare the prosodic structure between the Spanish learners' productions and that from native French speakers. For this, we have analyzed several variables (position of stress, number of APs, PGs, APs per PG, syllables per AP, pauses and mean duration) in readings produced by four advanced Spanish learners of French and by four French native speakers.

The results show, on the one hand, that Spanish learners have acquired the oxytone position of stress, following the French pattern. On the other hand, they reveal that Spanish learners have produced more APs and of a shorter duration, i.e. composed by fewer syllables than those produced by the French speakers. Moreover, they have produced a larger amount of PGs than the French speakers. Even if the Spanish learners have made more pauses, we have seen that the mean duration is similar to that of the French speakers.

These results indicate that Spanish learners still have difficulties with the management of the prosodic structure in French L2. They present not only a prosodic segmentation in smaller units than French speakers, but they also seem to mainly use pauses as a prosodic boundary. Indeed, an analysis of the type of prosodic boundary shows that they only use prominences (not being followed by a pause) as AP boundary in 45% of the cases, whereas French speakers use them in a 70%. Nevertheless, the examination of the boundary position (realized with pauses and/or prominences) reveals that 74% of the boundaries produced by Spanish learners coincide in position with those produced by the native speakers.

Taken together, these results suggest that, although Spanish learners are able to place prosodic boundaries in appropriate positions, they over-segment their productions in

comparison with French speakers, and that they use pauses more often than prominences to mark a prosodic boundary.

Finally, regarding temporal variables, we have seen that Spanish learners present a lower articulation rate than French speakers. More interestingly, this means that the number of syllables in AP has the same impact in French and Spanish learners' productions: the higher the number of syllables per AP, the shorter the duration of the syllable.

5. Conclusions

In the present research, we have seen how the Spanish learners have already adopted some characteristics of the L2 prosody. Their productions in French language reflect rather a specific stage of their interlanguage. On the one hand, they have been able to integrate one of the characteristics of French accentuation: the oxytone position of stress. On the other hand however, it has been established that, even if they are advanced learners in immersion, they still have some difficulties regarding the prosodic segmentation. Indeed, they produce more elements (PGs and APs) than native French speakers, which indicate that they have not yet completely acquired the delimitating function of the French stress, nor the concept of the group accent. These findings are consistent with those of [26], who made several pedagogical proposals in order to help Spanish learners of French to improve this aspect of their prosodic segmentation.

Although the present study still needs to be completed by further analysis (e.g. rhythmic measurements, spontaneous speech), it introduces interesting possibilities that should be further explored to get a better knowledge of the interlanguage accentual system of the Spanish speaking learners of French L2.

6. Acknowledgements

We would like to thank Jordi Barquero and Catherine Beat for their help in the redaction of this paper and Sandra Schwab for her generous assistance and her help in the statistical analyses of the acoustic data. We also thank Lorraine Baqué and Isabelle Racine for their guidance. This research was supported by the Swiss National Science Foundation (100012_132144/1, I. Racine).

7. References

- [1] Racine, I., Detey, S., Zay, F. and Kawaguchi, Y., "Des atouts d'un corpus multitâches pour l'étude de la phonologie en L2: l'exemple du projet 'Interphonologie du français contemporain' (IPFC)", in Kamber, Alain/Skupiens, Carine (eds.): *Recherches récentes en FLE*, Bern: Peter Lang, 1-19, 2012.
- [2] Detey, S. and Kawaguchi, Y., "Interphonologie du Français Contemporain (IPFC): récolte automatisée des données et apprenants japonais", *Journées PFC: Phonologie du français contemporain: variation, interfaces, cognition*. Paris, 2008.
- [3] Detey, S., Racine, I., Kawaguchi, Y., Zay, F., Buehler, N. and Schwab, S., "Évaluation des voyelles nasales en français L2 en production: de la nécessité d'un corpus multitâches", in Neveu, F., Durand, J., Klingler, T. et al. (eds.): *Proc. CMLF'10*. Paris: ILF, 1289-1301, 2010.
- [4] Racine, I., Detey, S., Buehler, N., Schwab, S., Zay, F. and Kawaguchi, Y., "The production of French nasal vowels by advanced Japanese and Spanish learners of French: a corpus-based evaluation study", in Dziubalska-Kolaczyk, K., Wrembel, M., Kul, M. (eds.): *Proc. of New Sounds 2010 - Sixth International Symposium on the Acquisition of Second Language Speech* [CD-ROM]. Poznan: Adam Mickiewicz University, 367-372, 2010.
- [5] Racine, I., "Spanish learners' production of French close rounded vowels: A corpus-based perceptual study", in Tono, Y., Kawaguchi, Y. and Minegishi, M. (eds.): *Developmental and Crosslinguistic Perspectives in Learner Corpus Research*, Amsterdam/Philadelphia: John Benjamins, to appear.
- [6] Schwab, S., "Les apprenants hispanophones et l'accentuation en L2: quelques pistes méthodologiques", in *Working Papers in Corpus-based Linguistics and Language Education*, Tokyo: Tokyo University of Foreign Studies, to appear.
- [7] Quilis, A., "Fonética acústica de la lengua española", Madrid: Gredos, 1981.
- [8] Di Cristo, A. and Hirst, D., "L'accentuation non-emphatique en français: stratégies et paramètres", in Perrot, Jean (ed.): *Polyphonie pour Iván Fónagy*, 71-102, Paris: L'Harmattan, 1997.
- [9] Léon, P., "Phonétisme et prononciation du français", Paris: Armand Colin, 2007.
- [10] Vaissière, J., "Rhythm, accentuation and final lengthening in French", in Sundberg, Nord and Carlson (eds.), 108-120, 1992.
- [11] Vaissière, J., "Langues, prosodies et syntaxe", in *Revue de Traitement Automatique des Langues*, 38, 53-82, 1997.
- [12] Padeloup, V., "Modèles de règles rythmiques du français appliqué à la synthèse de la parole", PhD Dissertation, Université de Provence, France, 1990.
- [13] Delais-Roussarie, E., "Pour une approche parallèle de la structure prosodique. Étude de l'organisation prosodique et rythmique de la phrase française", PhD Dissertation. Université de Toulouse-Le Mirail, 1995.
- [14] Di Cristo, A. and Hirst, D., "Rythme syllabique, rythme mélodique et représentation hiérarchique de la prosodie du français", in *TIPA* 15, 9-24, 1993.
- [15] Di Cristo, A., "De la microprosodie à l'intonosyntaxe", PhD Dissertation, Université de Provence, France, 1978.
- [16] Fónagy, I., "L'accent français: accent probabilitaire (Dynamique d'un changement prosodique)", in *L'accent en français contemporain*. Ottawa: Didier, 1979.
- [17] Kaglik, A., Boula de Mareuil, P., "Polish-accented French prosody in perception and production: transfer or universal acquisition process?" in *Proc. of Speech Prosody*, Chicago, 2010.
- [18] Avanzi, M., Bordan, G., Obin, N., "Typological variations on the realization of French Accentual Phrase", in *Proc. ICPhS XVII*, Hong Kong, 2011.
- [19] Grosjean, F. and Deschamps, A., "Analyse contrastive des variables temporelles de l'anglais et du français: vitesse de parole et variables composantes, phénomènes d'hésitation", in *Phonetica*, 31(3-4), 144-184, 1975.
- [20] Council of Europe: *Common European Framework of Reference for Languages: Learning, teaching, assessment*. Cambridge: Cambridge University Press, 2001.
- [21] Durand, J., Laks, B. and Lyche, C., "Le projet PFC: une source de données primaires structures", in Durand, J., Laks, B. and Lyche, C. (eds): *Phonologie, variation et accents du français*, Paris: Hermès, 19-61, 2009.
- [22] Goldman, J.-P., "EasyAlign: an automatic phonetic alignment tool under Praat", in *Proc. of Interspeech*: 3233-3236. <http://latlucui.unige.ch/phonetique/>, 2007.
- [23] Boersma, P. and Weenink, D., Praat, version 5.2. www.praat.org, 2011.
- [24] Simon, A. C., Avanzi, M., Goldman, J.-P., "La détection des proéminences syllabiques. Un aller-retour entre l'annotation manuelle et le traitement automatique, in: *Proc. of CMLF*, Paris, 1685-1698, 2008.
- [25] Garde, P., "L'accent". Paris: Presses univ. de France, 1968.
- [26] Baqué, L., "L'enseignement/apprentissage de la prononciation en classe de FLE: problématique de l'accentuation", in: Gauchola, R.; Mestreit, Cl., and Tost, M. A. (eds.): *Enseignement/apprentissage du FLE. Repères et Applications*. Bellaterra (España), pp. 176-188, 1995.