

ACQUISITION OF THE LOW VOWEL IN L2 SPANISH BY CHINESE SPEAKERS

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ABSTRACT

This research aims to characterise the timbre of the low vowel [a] in the spontaneous speech of the Spanish interlanguage spoken by Chinese people at different learning stages and to determine the convergent and divergent features of Peninsular Spanish. In addition, we will assess variables including L1, gender, level of Spanish proficiency and (a)tonicity of the vowel to see the extent to which these factors influence the acquisition of the sound. Using methods of quantitative linguistic typology, calculation of *accuracy* and *precision*, the results indicate that in the interlanguage (IL) the [a] is more open than in Spanish; that the IL is a dynamic system that improves the timbre of the vowel [a] with increased Spanish input; that gender and (a)tonicity factors influence learning; and that L1 influences the vowel [a] in the IL for beginner learners, with fossilisation occurring at higher levels.

Keywords: Low vowel, acoustic analysis, L2 Spanish, spontaneous speech, Chinese speakers

1. INTRODUCTION

1.1. Theoretical Framework

The phonetic categories that make up the subsystems of L1 and L2 interact dynamically and they are updated when the L2 input increases statistically and the L1-L2 combined categories (diaphones) change [1]. The phonetic differences between an L2 sound and an L1 sound are closer because the quantity and quality of L2 input affect the formation of new L2 phonetic categories [2].

The interlanguage (IL) [3], a language generated in the process of L2 acquisition, which is the natural result of blending the learner's L1 and the target language, can be described as systematic, dynamic, reduced and variable, and can present backsliding [4]. Fossilisation is another important phenomenon of the IL process, according to which there is a permanent cessation of the development of a linguistic structure [5].

Many phoneticians think that Spanish and Mandarin Chinese share the same vowel system (e.g. [6]) but one of the most relevant differences between

the two is that Mandarin is a tonal language [7]. Therefore, Spanish vowels are not "identical" to the Mandarin category but are "similar" to Mandarin, they are assimilated into the L1 category. These similarities can lead to difficulties because, despite the phonetic differences between L2 and L1 sounds, the learner continues to use the L1 category in both perception and production [8].

Specifically, the [a] in Mandarin, has two variants: [a] and [ɑ], but neither phoneme corresponds exactly to the Spanish [a] [9]. The timbre of the Spanish IL [a] spoken by Chinese speakers is more unstable than that of L1 Spanish [10] and is more open [11] [12] (opposing view, e.g. [13]), with no distinction between tonicity and atonicity and with a greater tendency to internal oscillation [14].

To date, research on IL Spanish spoken by Chinese speakers has been based on limited corpora of informants with basic or independent linguistic competence in controlled speech, ignoring the dynamic nature of the IL and the naturalness of human communication — spontaneous speech —, which is very different from controlled speech [15].

1.2. Aims of the Study

In this study, we aim to characterise the timbre of the vowel [a] in the spontaneous speech of IL Spanish spoken by Chinese speakers at different learning stages. Based on previous literature, we established the following objectives:

- a. Determine the differences and similarities between the [a] sound in Mandarin, the IL and Spanish.
- b. Analyse whether gender, level of Spanish proficiency and (a)tonicity are influential factors in L2 acquisition.
- c. Determine whether there is L1 interference in the IL.

2. CORPUS AND METHODOLOGY

2.1. Corpus

Three corpora of spontaneous speech were created for this research:

A corpus of interlanguage Spanish spoken by Chinese speakers of Mandarin (IL). This is formed by

thirty-six native Chinese speakers (F=18, M=18, age=24 ± 6) studying Spanish philology at a university in China. A total of 814 [a] vowels have been obtained from monosyllables (CV, VC, CVC, CCV, CCVC) uttered by three groups of speakers with different levels, according to CEFR[16]: group A basic, group B independent and group C proficient.

A corpus of L1 Mandarin (L1). This is formed by ten native Chinese speakers (F=5, M=5, age=25 ± 5), from whom sixty [a] vowels have been obtained.

A corpus of Spanish (Sp). This has been obtained from the [17,18] corpus, with seventy-nine Peninsular Spanish informants (F=35, M=44) of different ages, from which we have analysed 298 [a] vowels.

2.2. Methodology

The acoustic analysis of F₁ and F₂ of low vowel sounds was carried out using the Praat program [19] and their values were obtained from the central value of the formant if it was stable, or from the mean value of the formant, if it was not.

First, the Mandarin (L1) values were compared with the IL and Spanish (Sp) values using multiple comparison tests: the Scheffe test was applied if the data complied with the normality test and homogeneity of variance test, if not, the Games-Howell test was applied.

The three IL groups were then compared with the target language based on two analysis models: *accuracy* and *precision*. To measure *accuracy*, we chose the ANOVA test, using the SPSS program, version 26, and for *precision*, we compared the centrality (dispersion) of the results for L1 Spanish and the IL, according to the [20] formulae:

$$(1) \quad p1(p2) = \frac{F1(F2)Max. IL - F1(F2)Min. IL}{F1(F2)Max. L1 - F1(F2)Min. L1}$$

$$(2) \quad p = p1 \times p2$$

From this methodology, the results indicate that the multiple relationships between the degree of dispersion (*p*) of an IL vowel and that of Spanish: *p1* indicate the difference in the openness between the IL and the L1, and *p2* reflects the difference in the frontness.

3. RESULTS

3.1. The [a] Sound of Mandarin, IL and Spanish

In this section, we will look at the tonic and atonic variants of [a] uttered by males and females, given the significant differences found in the F₁ [21].

Concerning males (graph 1), the differences between L1 Chinese and the IL are always significant, in both F₁ (p<.001 stressed/tonic (S) and unstressed/tonic (U)) and F₂ (p<.001, S and U). Differences are also significant between Mandarin and Spanish in F₁ and F₂, for tonic and atonic vowels (p<.001).

On the other hand, differences between the IL and Spanish are shown in the F₁ of tonic vowels and the F₂ of atonic vowels (p<.001) and are similar in the F₁ of atonic vowels (p=.082) and the F₂ of tonic vowels (p=.249).

The [a] vowel of Mandarin is more open (upper F₁) and more back (lower F₂) than that of the IL, and the [a] of IL is also more open and back compared to that of Spanish. The F₁ and F₂ show an evolution of the sound in the IL towards the L2 Spanish but without achieving it: the tonic [a] of the IL should be more closed and the atonic, more front.

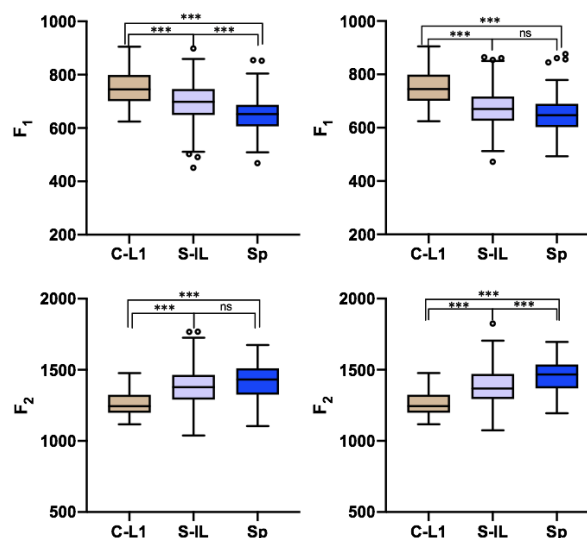


Figure 1: [a] of Chinese (L1), interlanguage (IL) and Spanish (Sp) in the male voice (S: left; U: right).

In the results for females (Figure 2), the differences between L1 Chinese and L1 Spanish are also significant, both in F₁ — p=.024 (S); p=.009 (U) — and in F₂ — p<.001(S and U).

In F₁, the differences between L1 Chinese and the IL are not significant but there are differences between the IL and Spanish. This means that Chinese speakers maintain the [a] very open, typical of Mandarin, in tonic and atonic vowels in the IL (p=.772 and p=.579, respectively), which separates them from Spanish. In contrast, in terms of the F₂, there are significant differences, in tonic and atonic vowels (p<.001), between Chinese and the IL because the [a] of the IL is more fronted and very similar to that of Spanish.

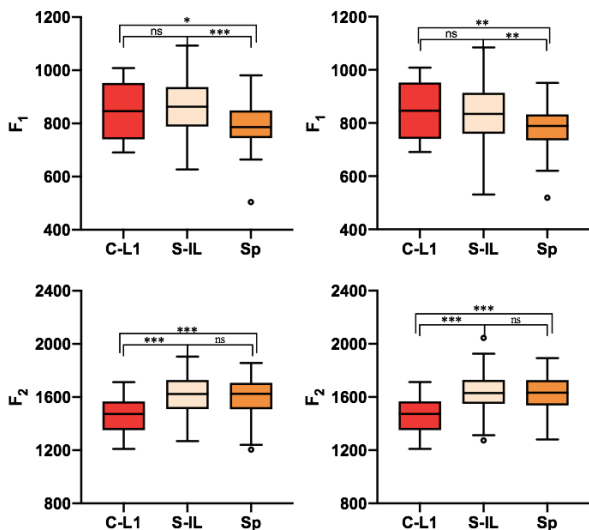


Figure 2: [a] of Chinese (L1), interlanguage (IL) and Spanish (Sp) in the female voice (S: left; U: right).

3.2. Comparison of Groups with Different Levels of Spanish Proficiency and Spanish

3.2.1. Comparison of accuracy

The differences between the Spanish (Sp) male group and the IL groups are significant in F_1 in the tonic vowel (A v. native, $p=.027$; B v. native, $p=.043$; C v. native, $p<.001$) because they articulate the tonic [a] more open (Figure 3). In contrast, in the atonic position, there are no significant differences between the IL and Spanish groups.

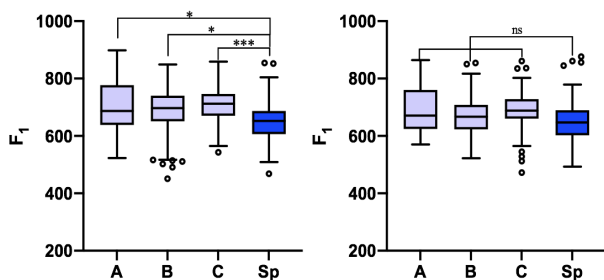


Figure 3: F_1 of [a] of the interlanguage (IL) and Spanish (Sp) in the male voice (S: left; U: right).

In F_2 (Figure 4), there are no significant differences between group C and native speakers, either in tonic ($p=.252$) or atonic ($p=.594$) vowels. Proficient-level informants have a similar position to the target language when articulating this vowel.

The differences between group A and the target language are not significant ($p=.507$) in the results for tonic vowels but they are significant in the atonic vowels ($p<.001$). As for the comparison between group B and the target language, there are significant differences in tonic ($p=.004$) and atonic ($p<.001$) vowels.

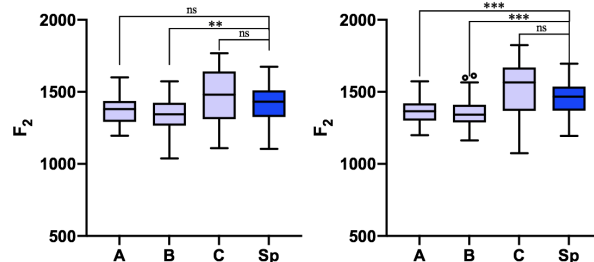


Figure 4: F_2 of [a] of the interlanguage (IL) and Spanish (Sp) in the male voice (S: left; U: right).

For females, in F_1 , the differences between Spanish tonic vowels and those of the three IL groups are significant (A v. native, $p<.001$; B v. native, $p=.041$; C v. native, $p<.001$). The F_1 in atonic vowels only shows significant differences between group A and native speakers ($p<.001$) and no significant differences between group B and C and native speakers ($p=.577$; $p=.219$, respectively). According to Figure 5, females, like males, produce the most open IL tonic vowels. As for F_2 , there are no differences between native speakers and the three IL groups, either in tonic or atonic vowels.

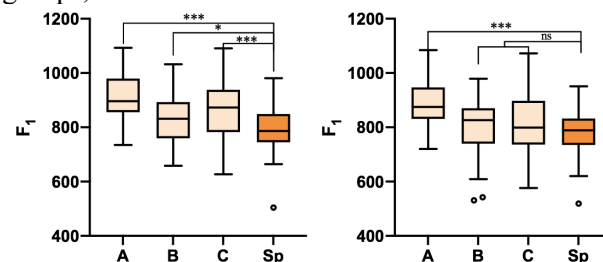


Figure 5: F_1 of [a] of the interlanguage (IL) and Spanish (Sp) in the female voice (S: left; U: right).

3.2.2. Comparison of precision

As can be seen in Tables 1 and 2, the p -values of the IL [a] are less than 1 in both tonic and atonic vowels, except for the p -value of group C in the atonic vowel, which means that, generally, male Chinese speakers produce this sound in a very stable way. The results are very interesting because, logically, we would expect the p -value of the L1 to be less than 1 and the p -value of the IL to be greater than 1 and consequently the IL realisations would be less stable.[19]

In Table 1, comparing the p -values of the three groups A, B and C, the p -value of group A is lower and that of group C is higher, both in the tonic (A 0.692; C 0.947) and atonic (A 0.572; C 1.518) vowels, implying that pronunciation of the vowel [a] by male learners in the initial IL stage is very stable, in other words, close to their L1, Mandarin [8]. As they progress through the levels (from B in tonic vowels and C in atonic vowels), a new category starts to be formed for the L2.

	p1	p2	p
A	0.972	0.712	0.692
B	1.031	0.939	0.968
C	0.819	1.156	0.947

Table 1: *p* values of the tonic vowel [a] in the male voice of the IL.

	p1	p2	p
A	0.768	0.745	0.572
B	0.867	0.894	0.775
C	1.016	1.494	1.518

Table 2: *p* values of the atonic vowel [a] in the male voice of the IL.

In females, similar to males, the *p*-values of the tonic [a] vowel are lower than the standard value 1 (A 0.626; B 0.715; C 0.846), which explains why the realisations of this phoneme by female Chinese speakers are very stable (see Table 3). In the unstressed position, from the independent level onwards, there is already a change of category (B 1.023), which progresses in C (1.373). Findings show that there is a relevant interference of Mandarin in the learning of Spanish in the initial stage and that it has more influence on tonic than atonic vowels (see Table 4).

	p1	p2	p
A	0.751	0.833	0.626
B	0.784	0.913	0.715
C	0.973	0.870	0.846

Table 3: *p* values of the tonic vowel [a] in the female voice of the IL.

	p1	p2	p
A	0.843	0.985	0.831
B	1.037	0.987	1.023
C	1.148	1.196	1.373

Table 4: *p* values of the atonic vowel [a] in the female voice of the IL.

4. DISCUSSION

In the IL, for both genders, we have observed that, in general, they produce a more open [a] vowel than native Spanish speakers, particularly in the tonic position, supporting the conclusions of other authors [10][11][12] and, in contrast, with [13]. These results seem reasonable if we consider that the vowel of L1 Mandarin, more open than Spanish, may influence the IL. As for the tongue position (F_2) of [a] in the IL, females produce it in a similar way to Spanish, more fronted than in Mandarin, in tonic and atonic vowels, and males only in tonic vowels. These results lead to the observation that females acquire the tongue position earlier in the production of the sound. However, the opening is difficult for both genders.

Analysing the learning process, we have observed that in terms of the acquisition of the vowel opening (F_1), there is more difficulty in the tonic realisations of the IL than atonic (Fig. 3, 4 and 5), a result contrary to the statements of [22], for the vowels of the IL, and of [23], for the [e]. According to [22,23], the realisation of tonic vowels is easier than the atonic vowels. In terms of F_2 , referring to the position of the tongue and as we have said, women have less difficulty than men.

In group A, both genders have a more stable tonic [a] sound, more typical of Mandarin. In other words, we can confirm that there is a tendency among learners to continue using the L1 category, which essentially fossilises in the tonic vowels of groups B and C, which was also noted by [5], without considering the tonicity factor. In line with [8], we believe that the factor causing these difficulties in learning the sound could be because the sounds of the L1 and the target language are similar. However, this is not the case with the atonic variants, which evolve as they receive more L2 input. We understand that this input encourages the formation of a new category, close to L2 at a proficient level (C) and, in some cases, also at the independent level (B), as stated by [2]. When we distinguish the (a)tonicity factor, we see that this change is more marked in atonic than tonic vowels (Tables 1, 2, 3, 4), a factor which [2, 8] did not consider and which we determine to be relevant.

5. CONCLUSIONS

The results of this research have shown that in the IL, the [a] sound is made more open than in Spanish and similarly or more closed than in Mandarin. As for the tongue position, the sound [a] in the IL is more fronted than in Mandarin and, therefore, more similar to Spanish. The interlanguage is in a centralised position between the L1 and the L2 with which it shares some features.

We have verified that gender, level of Spanish proficiency and (a)tonicity are influential factors in the acquisition of the L2.

We have observed L1 interference in the IL in group A and also the appearance of the fossilisation phenomenon in groups B and C.

The data obtained allow us to better understand the process of Spanish acquisition by Chinese speakers of different levels and to understand the similarities and differences between the low vowel of the IL and that of the target language. These data may constitute an important basis for the preparation of pronunciation teaching activities adapted to the needs of the learners.

6. REFERENCES

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