

Acoustics and Perception do not match in Andalusian Spanish

Medieval Spanish underwent a complex process of phonological merger in the order of sibilant fricatives. In Andalusia, this process led to the merger of CASA-CAZA (*House-Hunting*), a minimal pair that, however, has remained distinguished until today in standard Spanish. In the last century, Andalusia is undergoing a recovery of the CASA-CAZA distinction by mimesis of the national standard (Moya Corral y Sosiński 2015; Villena Ponsoda y Vida Castro 2015, 2017; Regan 2017).

In our research on the reversal of the CASA-CAZA *merger* in Andalusian Spanish, we have verified an acoustic-perceptual dissociation. We have recorded 70% of standard realizations (contrast between CASA-CAZA) in perceptual analysis, versus just 37% of acoustic distance.

In order to know the social distribution of the process and the conclusions it implies for the principles of general phonology and language changes, the realizations of 54 informants were analysed. Those informants were classified by age (18-34, 35-54, >54 years), sex (male and female) and educational level (mandatory, intermediate, university). 20 words from the lexical series CASA, POSO and 20 words from the lexical series CAZA, POZO were analysed in each interview, with a total of 2160 realizations. Intervocalic realizations were always selected—in word interior (CASA) or in initial position by syntactic phonetics (LA SALA), distributed in a balanced way in the initial, middle and final part of the interviews.

Two different analysis were carried out. For perceptual analysis, all tokens were auditory tagged. The researcher classified the realizations according to a more sibilant [s] or non sibilant perception [θ]. Realizations from the CASA lexical series perceived as sibilant [s] were considered split and those perceived as [θ] were considered merged. From 1080 tokens from CASA, 764 (70%) were perceived as [s] and 316 (30%) as [θ], so that it could be sustain that split is quite expanded.

For the acoustical analysis, words were cut and *spectral moments* (standard deviation, skewness, curtosis, centre of gravity), *spectral peak*, *intensity*, *duration* and *zero-crossings rate* were measured with Praat (Boersma y Weenink 2017). Then, multiparametric Euclidean distance was calculated from the sum of those acoustic parameters. However, the average of the acoustic distance was only 37%.

This acoustic-perceptual dissociation (70% in perception, 37% in acoustic) was clear in the following example. A previously regression analysis (carried out in order to explain the social distribution of the euclidean acoustic distance) reflected that the CASA : CAZA distinction had a social meaning associated with educated urban youth from affluent neighbourhoods (all those were the social independent variables included in the regression model: parents education, standard orientation, age, neighborhood, educational leve, modernity, etc.). However, as seen in Figure 1, despite the fact that the majority of speakers conformed to the system, there were two subgroups of speakers that do not; that is, they shown an acoustic distance lower than that expected given their social conditions.

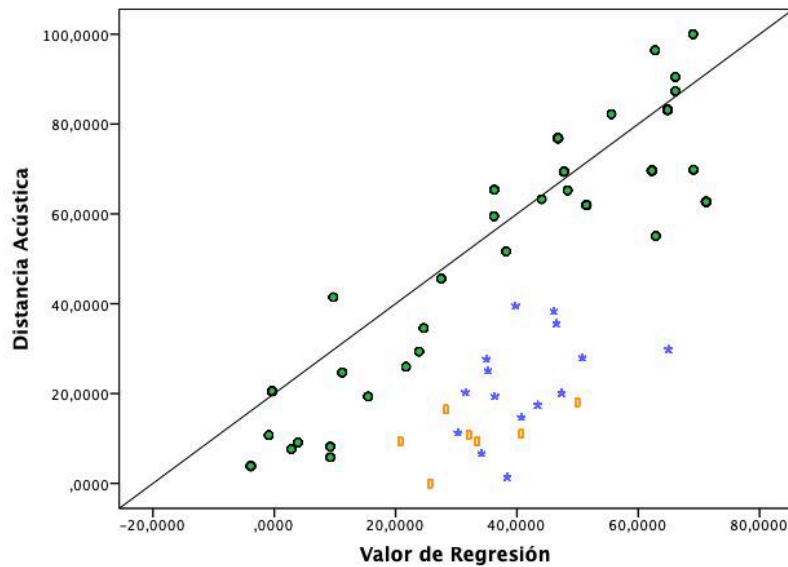


Figure 1
Dispersion of the speakers in the space defined by the mean acoustic distance and the effect of the social independent variables from the regression model

On the one hand, the **Independent Speakers** (7 orange rectangles), so called because their linguistic performance does not seem to depend on the social variables that make up the model, are made up of only 7 speakers. As shown in Table 1, these speakers not only show a low value of acoustic distance between CASA and CAZA, but also show quite low percentages of split performances in the auditory analysis. Although it is undeniable that it deserves an explanation, it should be simply the representation of the error that always exists within a multi-variant model. That is to say, since there is coherence between acoustics and perception, it could be considered that we are facing speakers with social conditions expected to present a relatively high percentage of standard realizations (contrast of CASA - CAZA), but that they do not achieve it, nor in acoustics or perception analysis.

However, the second subset of speakers, represented by blue asterisks (Graph 1), the **Dissociated Speakers** —so called because there is no correspondence between the results of the acoustic analysis and of the auditory analysis, is the most interesting case. This group, made up of 15 speakers, constitutes a case especially worthy of comment, since, unlike the previous subgroup, these speakers present very high percentages of split performances, but very low percentages of acoustic distance (Table 1); that is, an acoustic-perceptual dissociation is found between the results obtained in the auditory analysis and in the acoustic analysis.

The proposed explanation for this apparent contradiction is that a significant part of the speakers from the Malaga speech community would have advanced a great deal in the process of phonemic reallocation —i.e, they would have splitted the fricative continuum according to the lexical series CASA – CAZA because of a mimesis of standard Spanish, which means that individuals would tend to articulate more sibilant realizations for words from the CASA series, and less sibilant realizations for words from the CAZA series. However, since speakers have acquired since the last century the perceptual ability to differentiate allophones with small acoustic distance from each other, relatively close allophones aimed to represent the contrasting phonemes /s/ and /

θ/ are perceived as such by such native speakers. As speakers do not need to increase the allophonic distance to be perceived as *non-merger* speakers, only a small quantity of speakers, who potentially could do it, will not strive to increase this allophonic distance.

Independent Speakers			Dissociated Speakers		
Speaker	Standard Realiz.	Acoustic Distance	Speaker	Standard Realiz.	Acoustic Distance
5	0	9	25	70	1
22	5	25	31	85	12
52	10	9	48	90	14
13	35	18	28	95	18
21	45	16	29	95	10
3	50	11	33	95	19
20	50	11	11	100	0,38
			23	100	20
			26	100	28
			35	100	40
			36	100	30
			37	100	11
			39	100	35
			45	100	27
			53	100	20

Table 1

Groups of Independent and Dissociated Speakers. Comparison of the individual frequency of perceived standard realizations of the lexical series CASA : CAZA and the individual acoustic distance