

Discrimination of Californian central vowel contrasts by Spanish-Catalan EFL Learners

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I. INTRODUCTION

Previous studies on L2 vowel perception have examined the difficulties encountered by L1-Spanish and L1-Catalan listeners to discriminate English vowel contrasts [1], [2]. However, to our knowledge, no prior study has addressed the perception of vowel contrasts involving the schwa. This is probably due to the fact that /ə/ only appears in unstressed position in English and, as such, researchers might have assumed that it cannot be perceived as similar to any Spanish vowel. In contrast, the schwa is part of the Catalan vowel inventory but phonemic status varies across dialects. For instance, in Peninsular Catalan, the schwa only appears in unstressed position but in Majorcan Catalan schwa can also be stressed [3]. It follows that Spanish-Catalan speakers learning English as a FL face tremendous difficulties to distinguish English /ə/ and /ʌ/ which are often conflated both in perception and production. The *Perceptual Assimilation Model-PAM*, and its extension *PAM-L2* [4] proposes that native language experience shapes the perception of phonological categories in a non-native language. In a previous study, we tested Spanish-Catalan listeners categorization of English vowels. The results showed that there was a perceptual overlap between the English vowel categories /ɛ/, /ʌ/, and /ə/, which were perceived as similar to Catalan /ə/ (see Table I). In terms of *PAM-L2* [4] [5], the /ə/-/ʌ/, /ʌ/-/ə/ and /ʊ/-/ə/ contrasts are classified as uncategorized and partially overlapping because they were not clearly mapped onto a single Catalan category. The present study addresses discrimination accuracy of these vowel contrasts by a group of Spanish-Catalan advanced EFL learners to test the predictions of the *PAM-L2* model.

TABLE I: MEAN PERCENT CATEGORIZATION AND GOODNESS RATINGS (IN BRACKETS) OF AMERICAN ENGLISH MONOPHTHONGS ONTO CATALAN VOWEL CATEGORIES.

Stimulus	Catalan Response Categories											
	a	ai	au	ɛ	e	ei	ə	i	o	ou	ɔ	u
ɛ				35.2 (4.7)	38.1 (4.7)		13.9 (4.3)					
ʌ	60.1 (4.9)						14.5 (4.5)					
ə	16.3 (4.2)			10.7 (4.5)			46.6 (4.6)					
ʊ							10.4 (4.4)		24.9 (4.3)	13.7 (4.4)	9.9 (4.7)	13.3 (3.5)

II. METHOD

A. Vowel stimuli

The target vowels were presented randomly on a computer display to four Californian female speakers who read 10 randomly-presented instances of each vowel target embedded in the *h_bba* nonword as follows: /ɛ/ *hebba*, /ʌ/ *hubba*, /ʊ/ *hooba*, /ə/ *h@bba*. Based on previous studies on vowel perception and production [6] [7], the bilabial context was chosen to reduce the effect of coarticulation. The best four tokens from each speaker were selected for inclusion in the test on the basis of acoustic analysis and auditory judgement.

B. Participants and procedure

Seventeen Spanish-Catalan bilinguals were selected from a pool of 50 participants based on their responses to a L1 background questionnaire. All participants reported growing-up in Spanish-speaking households and were also exposed to Majorcan Catalan since they entered nursery school at the age of 2-3. The participants were experienced EFL learners with a B2+/C1 level of English, according to the CEFRL and were given course credit for their participation. They were tested in groups of two or three in a quiet room at the university premises. Listeners were instructed that they would hear three *h_ba* words and they had to choose whether either the first sound (A) or the third one (B) were similar to X. The task was divided in nine separate blocks, each block testing a different vowel contrast and presented in a counter-balanced order, only the results of the *hebba-h@ba*, *hubba-h@bba* and *hooba-h@bba* contrasts are presented here.

III. RESULTS & DISCUSSION

The mean discrimination scores obtained by the 17 Spanish-dominant EFL learners are pooled in Table II. Each score is based on the percentage of correct responses obtained by each listener out of the total number of trials (48). Values close to 1 indicate perfect discrimination, values close to 0 indicate poor discrimination. Overall, listeners showed high sensitivity to the /ɛ/-/ʌ/ and /ʊ/-/ə/ contrasts, with scores that reached ceiling in many cases. In contrast, discrimination for the /ʌ/-/ə/ contrast was moderate, suggesting a perceptual merge of the /ə/ and /ʌ/ categories. These results provide supporting evidence that patterns of L2 assimilation to L1 categories can predict discrimination difficulty. Discrimination of /ɛ/-/ʌ/ and /ʊ/-/ə/ was excellent because in both cases the two vowels were assimilated to different L1 categories with a small percentage of overlap between them. However, the /ʌ/-/ə/ contrast is difficult to interpret in PAM-L2's terms. Both vowels were assimilated to /a/ and Catalan /ə/, respectively, yet listeners had difficulties discriminating these two vowels, suggesting that both categories might have merged perceptually.

TABLE II: DISCRIMINATION SCORES OF THE CALIFORNIAN VOWEL CONTRASTS

PAM-L2 classification	Contrast	Discrimination scores		
		IPA	Mean	SD
U-U partially overlapping	Hebba-h@bba	/ɛ/-/ə/	0.927	0.077
U-U partially overlapping	Hubba-h@bba	/ʌ/-/ə/	0.567	0.077
U-U partially overlapping	Hooba-h@bba	/ʊ/-/ə/	0.881	0.095

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