PERCEPTION OF CATALAN VOWELS AND DIPHTHONGS BY NATIVE ENGLISH SPEAKERS

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ABSTRACT

Models of second language speech (L2) base their predictions about perception and production of L2 sounds on the degree of similarity between native and non-native sounds. This study presents the results of a cross-linguistic perception experiment involving English and Catalan vowels. A group of English-speaking listeners performed a rated dissimilarity task in which they had to indicate the perceived similarity between two vowel sounds. Stimuli consisted of English-English and Catalan-English vowel pairs.

The results showed that some Catalan-English pairs obtained dissimilarity ratings that were comparable to same-category English-English pairs, while other pairs had ratings that fell between same-category and different category English-English pairs. The results will be discussed in terms of their consequences for L2 categorization and in light of previous findings involving Catalan listeners.

Keywords: perception, second language, cross-linguistic similarity.

1. INTRODUCTION

Influential models of L2 speech acquisition have based their predictions about the likelihood of accurate target language (TL) category formation on the degree of similarity between existing L1 categories and the TL categories (e.g., Best (1995) and Best and Tyler's (2007) Perceptual Assimilation Model, Flege's (1995) Speech Learning Model). For instance, Flege (1995) claims that in order to establish accurate categories for TL sounds, the L2 learner has to be able to discern differences between TL and L1 sounds. Therefore, evaluating the degree of similarity between native and non-native sounds is a necessary first step in the study of the acquisition of L2 speech.

Recent research has advocated for the use of cross-language perceptual tasks as the most reliable way of evaluating phonetic similarity (Bohn, 2002; Strange, 2007). These tasks include interlingual identification or perceptual assimilation tasks (e.g., Guion, Flege, Akahane-Yamada & Pruitt, 2000) and dissimilarity ratings tasks (Flege, Munro & Fox, 1994). For instance, Flege et al. used a rated dissimilarity task in which listeners were asked to provide dissimilarity judgments on pairs consisting of a native and a non-native vowel. This paper presents some results from a larger study examining the cross-linguistic similarity between Catalan and English vowels, here focusing on data elicited by means of a rated dissimilarity task involving English-speaking listeners.

2. METHODOLOGY

Crosslinguistic similarity was measured by means of a rated dissimilarity task (Flege et al., 1994). Stimuli consisted of pairs of vowels and listeners had to indicate on a 9-point Likert scale (where 1 = very similar and 9 = very different) how similar or dissimilar they perceived the two vowels to be. Given the large amount of data explored, the native and non-native vowels were divided into two sets (roughly front and back vowels) and each set was tested separately.

2.1. Stimuli

The stimuli consisted of combinations involving fourteen English vowels and diphthongs (divided into front /iː ɪ ɛ ɜː æ aɪ eɪ/ and back /ʌ ɑː ɒ ɔː uː aʊ əʊ/), and eleven Catalan vowels and diphthongs (front: /i e ɛ a ei ai/, back: /ɔ o u au ou/). The vowels were elicited in b+vowel+t sequences, elicited from three male native speakers of Southern British English and three male native speakers of Eastern Catalan. The stimuli were edited to remove traces of consonant articulation and normalized for intensity. The resulting stimuli were combined to create a variety of pairs with an interstimulus interval of 1.2 seconds.

The vowel combinations used in the experiment included pairs of acoustically close native and non-native vowels as well as pairs of two native vowels for comparison purposes. The latter included same-category pairs like /æ/-/æ/ and different category pairs like /əʊ/-/ɔː/. Every Catalan and every English vowel appeared in the same number of combinations across the total number of same-language and different-language pairs. This resulted in 36 Catalan-English pairs, and 22 English-English pairs (10

same-category pairs, and 12 different category pairs), divided between the front vowels task and the back vowels task. The list of all the pairs can be found in Tables 1 and 2 below. Each stimulus pair was presented in three different talker combinations, and in two possible orders (e.g., Cat. /i/-Eng. /i/ and Eng. /i/-Cat. /i/). The resulting total number of trials was 145 in each task (front vowels task and back vowels task).

2.2. Participants and procedure

Twenty-seven native speakers of Southern British English participated in the study (four males and 23 females, average age of 22 years). Most participants were undergraduate and graduate students. They had no knowledge of Catalan and their knowledge of foreign languages was limited. The listeners performed the task individually in a soundproof booth at University College London. They listened to the stimuli over headphones and gave their responses by clicking on a rating scale appearing on a computer screen. Praat software (Boersma & Weenink, 2017) was used to conduct the experiments. The order of the two tasks (front vowels or back vowels) was counterbalanced across participants. Participants took approximately 20 minutes to complete the tasks.

3. RESULTS AND DISCUSSSION

The dissimilarity ratings obtained for each vowel pair are presented in Tables 1 and 2. Table 1 presents the results for stimuli involving same-category and different category English-English pairs. As expected, same-category pairs received the lowest dissimilarity ratings, with a mean of 1.9, ranging from 1.2 to 1.9.

Table 2 presents the dissimilarity ratings obtained for the crucial trials, made up of a Catalan and an English vowel or diphthong. The ratings ranged from 1.8 to 7.7. Importantly, four Cat.-Eng. pairs (/au/-/aʊ/, /ɛ/-/ɛ/, /e/-/ɪ/, /a/-/æ/) obtained a rating of 1.8 and thus were within the range of same-category Eng.-Eng. pairs (1.2-1.9). This may indicate a relatively high degree of perceptual overlap between the native and the non-native category. Five other pairs obtained a dissimilarity rating of 3 or lower, indicating a notable degree of overlap (Cat.-Eng. /ei/-/eɪ/, /i/-/iː/, /ou/-/əʊ/, /ɔ/-/ɒ/, /ai/-/aɪ/).

These results are in line with the results obtained from perceptual assimilation tasks performed by the same group of participants (Cebrian, 2014). In that task, Catalan /au/, /ɛ/ and /a/ obtained the highest rates of perceived similarity to native English /aʊ/, /ɛ/ and /a/, followed by Catalan /ou/, /ai/ ad /ei/ and English /əʊ/, /aɪ/ and /eɪ/, respectively.

Table 1: Dissimilarity ratings obtained for same-category and different-category Eng.-Eng. vowel pairs

Same-category V pair		Different cat. V pair	
Eng.-Eng.	Dissim. R.	Eng.-Eng.	Dissim. R.
/æ/-/æ/	1.2	/iː/-/ɪ/	5.3
/uː/-/uː/	1.3	/ɛ/-/æ/	5.8
/əʊ/-/əʊ/	1.4	/ɑː/-/ɒ/	5.8
/ɛ/-/ɛ/	1.4	/ɒ/-/ʌ/	6.1
/ɑː/-/ɑː/	1.4	/eɪ/-/aɪ/	6.6
/aɪ/-/aɪ/	1.5	/əʊ/-/ɔː/	6.6
/eɪ/-/eɪ/	1.6	/ɒ/-/uː/	7.1
/aʊ/-/aʊ/	1.7	/aʊ/-/ɔː/	7.3
/ʌ/-/ʌ/	1.9	/aʊ/-/uː/	7.4
/iː/-/iː/	1.9	/ɪ/-/ɜː/	8.1
		/ɜː/-/aɪ/	8.1
		/ɜː/-/iː/	8.1
Mean	1.5	Mean	6.9

Table 2. Dissimilarity ratings for Catalan-English vowel pairs.

V pair (Cat.-Eng.)	Dissim. rating	V pair (Cat.-Eng.)	Dissim. rating
/au/-/aʊ/	1.8	/ɔ/-/ɑː/	4.9
/ɛ/-/ɛ/	1.8	/o/-/əʊ/	4.9
/e/-/ɪ/	1.8	/ou/-/ɔː/	5.4
/a/-/æ/	1.8	/u/-/əʊ/	5.5
/ei/-/eɪ/	2.4	/e/-/eɪ/	5.6
/i/-/iː/	2.6	/a/-/ɑː/	5.7
/ou/-/əʊ/	2.7	/ei/-/ɪ/	5.8
/ɔ/-/ɒ/	3.0	/a/-/ɛ/	6.1
/ai/-/aɪ/	3.0	/ɛ/-/æ/	6.1
/u/-/uː/	3.3	/ai/-/æ/	6.3
/o/-/ɒ/	3.3	/a/-/aʊ/	6.3
/i/-/ɪ/	3.9	/au/-/ʌ/	6.4
/a/-/ʌ/	4.0	/u/-/ʌ/	6.5
/o/-/ɔː/	4.1	/ou/-/uː/	6.6
/ai/-/eɪ/	4.2	/au/-/ɑː/	6.7
/ɔ/-/ɔː/	4.2	/i/-/aɪ/	6.9
/e/-/ɛ/	4.3	/ɛ/-/ɜː/	7.4
/ei/-/iː/	4.7	/a/-/ɜː/	7.7

These results suggest that English learners of Catalan (or Catalan learners of English) may establish equivalence relationships between the closest L1 and TL vowels. According to the most influential models of L2 speech (Best and Tyler, 2007 Flege, 1995), TL sounds that are assimilated to L1 sounds will not be accurately categorized as equivalence classification will prevent L2 learners from establishing new categories for L2 sounds. However, it is possible that vowels that received ratings comparable to same-category L1-L1 pairs may pattern as perceptually identical, and, in this

case, substitution of a L1 vowel for a TL vowel may go unnoticed by native TL listeners.

Finally, it is noteworthy that English native speakers show a clear tendency to perceive Catalan diphthongs in terms of English diphthongs. This is in line with findings involving Catalan listeners who have also been found to perceive English diphthongs in terms of Catalan diphthongs rather than single vowel sequences (Cebrian et al., 2011). This indicates that sequences of vowels like Catalan diphthongs can play a role in crosslinguistic perception.

4. CONCLUSIONS

This study has investigated the perceived similarity between English and Catalan vowels and diphthongs by means of rated dissimilarity tasks performed by native speakers of English. Catalan stimuli have been found to assimilate to English categories to varying degrees, including cases of perceptual overlap between native and non-native categories. These cases suggest that some non-native vowels may be perceived as near-identical to native categories. The results contribute to previous findings involving perceptual judgements from Catalan speakers and allow us to make predictions about L2 perception and production accuracy. For example, substitution of L2 sounds by L1 categories may go unnoticed in cases of near-identity but may result in non-authentic L2 categories for more distant sounds. Further research is necessary to evaluate these predictions.

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