

Production of English Consonants by Catalan Speakers

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ABSTRACT

This study aims to determine whether production of second language sounds is influenced by the native language (L1) phonology through a) only the phonemic inventory of the L1, b) both the phonemic inventory and the allophonic rules, c) only the phones in the L1 or d) the L1 output conditions of the phones. Predictions drawn from these hypotheses were tested against Catalan speakers' production of the English phonemes /d/ and /ð/ in initial and intervocalic position. The results of the production experiment were consistent with two hypotheses: 1) that both the L1 phonemic inventory and the allophonic rules transfer or 2) the surface L1 output conditions are transferred onto L2 production.

1 INTRODUCTION

While the influence of the L1 phonological system on the L2 sound system has been of central interest in L2 phonology research, we still do not know which properties of the L1 phonology transfer into the L2 system to influence the production of L2 sounds. In this paper, we ask whether L2 speakers 1) transfer their L1 phonemic inventory onto L2, and assume a one-to-one mapping from L2 phones to L2 allophones; 2) transfer their L1 phonemic inventories and the mapping from phones to allophones from L1; 3) transfer their L1 allophonic inventory onto the L2 phonemic inventory, and assume a one-to-one mapping; or 4) transfer well-formedness conditions on L1 output. This paper attempts to test these hypotheses by looking at the English speech of Catalan speakers.

Catalan speakers of English are ideal for this study because, in order to test these hypotheses, L1 and L2 should have different phonemes and different realisations of the same phones in the same contexts. This will help us discern whether it is allophones or phonemes of L1 that are transferred onto L2 phones. In Catalan stops are spirantised in intervocalic position (Recasens, 1999) and, therefore, in absolute initial position voiced dental stops /d̪/¹ occur but in intervocalic position they become fricatives [ð]. This scenario is different in English. In English both the voiced alveolar stop /d/ and the voiced dental fricative /ð/ are phonemes and they occur as such either in absolute initial or intervocalic position. The present study aims to find what the relationship between the speakers' L1 and L2 is like when they pronounce these L2 phones.

¹ We assume that the Catalan voiced dental stop will be equated with the English voiced alveolar stop.

Weinreich (1966) pointed out the problem of what he calls ‘phonic interference’. This author writes that “ the problem of phonic interference concerns the manner in which a speaker perceives and reproduces the sounds of one language, which might be designated secondary, in terms of another, to be called primary” (p.14).

From then on, important research on the topic has been carried out mainly by Best (1994, 1995, 1999; Best et al. 1988) and Flege (1987, 1992, 1995, 1997, 1999; Flege et al. 1999) on foreign speech perception. Best’s Perceptual Assimilation Model (PAM) and Flege’s Speech Learning Model (SLM) were mainly devised to explain what happens in perception of sounds of a language different from L1.

Best (1994) is inconsistent in her presentation of examples to clarify her predictions. She states that non-native sounds would be assimilated to native phonemes. Nevertheless, when she aims at illustrating two assimilation patterns from her model, she says that some sounds would assimilate to English [k^h], namely an L1 allophone. Specifically, she writes:

2. The nonnative phones may both be assimilated equally well, or poorly, to a single native category, in which case they may be equally similar/discrepant to native exemplars of that Single Category (SC type). For example, both the Thompson Salish ejective velar /k’ / and uvular/q’ / are likely to assimilate to English [k^h], although both will be heard as strange or discrepant from the English standard.

3. Alternatively, the nonnative pair may both be assimilated to a single native category, yet one may be more similar than the other to the native phoneme, that is, the nonnative phones may show differences in Category Goodness (CG type). For example, both the Zulu voiceless-aspirated velar /k/ and ejective velar /k’ / are likely to assimilate to English [k^h], but the former should be perceived as essentially identical with English standard, while the latter should be heard as quite discrepant from it. (p. 191)

Her inconsistency shows in the fact that she keeps mentioning L1 phonemes as the categories L2 sounds are assimilated to. Nevertheless, whenever she is to provide an example, she either uses L1 allophones, as in the illustration of the two assimilation patterns quoted above, or places L1 phonemes in square brackets. In the example for the first assimilation pattern previous to the quotation above, she writes that “the Hindi retroflex stop /ɖ̣/ is likely to assimilate to English [d] while Hindi breathy-voiced dental stop /ɖ̣^h/ may assimilate a different English phoneme category, the voiced-dental fricative [ð]” (p. 191). Best seems to be thinking of the L1 sounds involved in the interference in phonemic terms but then she fails to provide adequate examples. Her position towards the status of L1 interference is not clear.

Flege, however, is consistent in his phonetically based model. When formulating the first hypothesis in his model, he assumes that “sounds in the L1 and L2 are related perceptually to one another at a position-sensitive allophonic level, rather than a more abstract phonemic level” (1995, p. 239). When providing examples that support his assumption, he explicitly states the context in which these allophones occur and their distribution in L1 and L2.

In this paper we assume that the L1 sound system affects the L2 sound system to a certain extent. What we want to find out is how L2 sounds are mapped onto the L1 phones and whether there is any systematicity in this process. Therefore, we aim to cover all the different possibilities of mapping between L1 and L2 phones in the hypotheses we put forward. The difference between SLM and PAM and our hypotheses is that the latter are applied to production of L2 and try to include all the possible combinations of

phonemic/phonetic status and relations between L1 and L2. The following section describes each of our hypotheses.

The first hypothesis assumes that the L1 inventory transfers and a mapping to a default phonetic realisation follows.

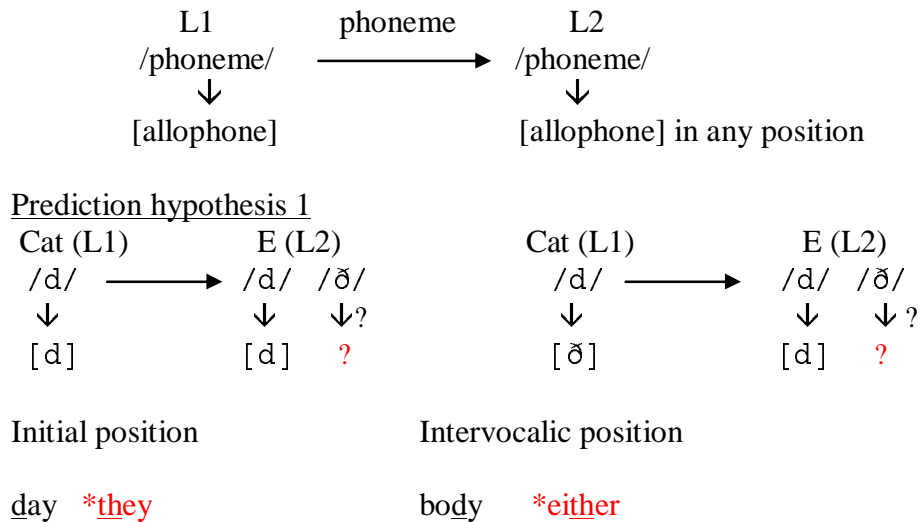


Figure 1

Hypothesis 1 predicts that /d/ will be correctly produced in any position because it exists as a phoneme in Catalan and will, consequently, be transferred to the English phonemic inventory and a mapping to a default realisation will follow. On the other hand, the voiced dental fricative will not be correctly produced in any position because, as it does not have the phonemic status in Catalan, it cannot be transferred to the English phonemic inventory.

The second hypothesis states that both the L1 phonemic inventory and the L1 mapping transfer.

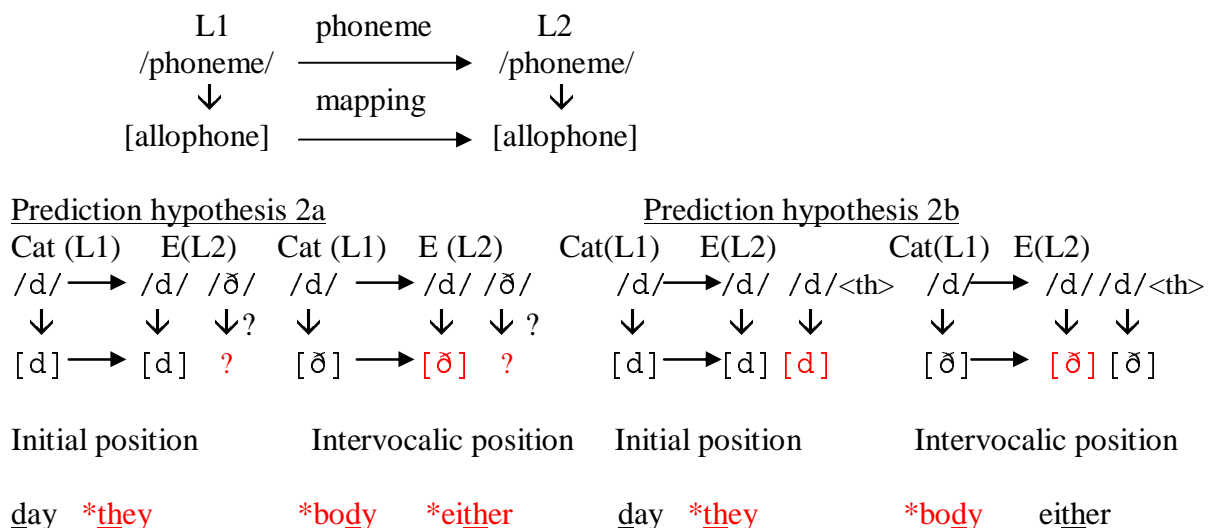


Figure 2

The difference between hypotheses 2a and 2b is that the former only takes into account the phonemic-phonetic status of sounds in L1 and L2, whereas the latter assumes a relationship between spelling and phonetic implementation.

Since, not only the phonemic inventory, but also the L1 mapping is transferred onto L2, /d/ will only be correctly produced in initial position but not intervocalically. The prediction of hypothesis 2a is that only /d/ will be transferred onto the L2 phonemic inventory because this phone has phonemic status in L1 already. On the other hand, /ð/ will not be transferred onto the English sound system because it is not a phoneme in Catalan.

In our experimental context, there is another way in which hypothesis 2 can be interpreted. Consider the possibility that Catalan speakers associate the graphemes <th> and <d> with the phoneme /d/ because this is the Catalan phoneme that is phonetically closer to English /ð/. This is just like English speakers associate the graphemes <ph> and <f> with phoneme /f/. In this way, this hypothesis predicts that whenever Catalan speakers find the grapheme <th>, they will interpret it as /d/ and will consequently produce it as a stop in initial position but as a fricative in intervocalic position, following the L1 mapping that is transferred onto the L2 sound system. This different interpretation of hypothesis 2 is hypothesis 2b.

The third hypothesis states that the L1 allophonic inventory transfers onto the L2 phonemic inventory and a mapping to a default phonetic realisation follows.

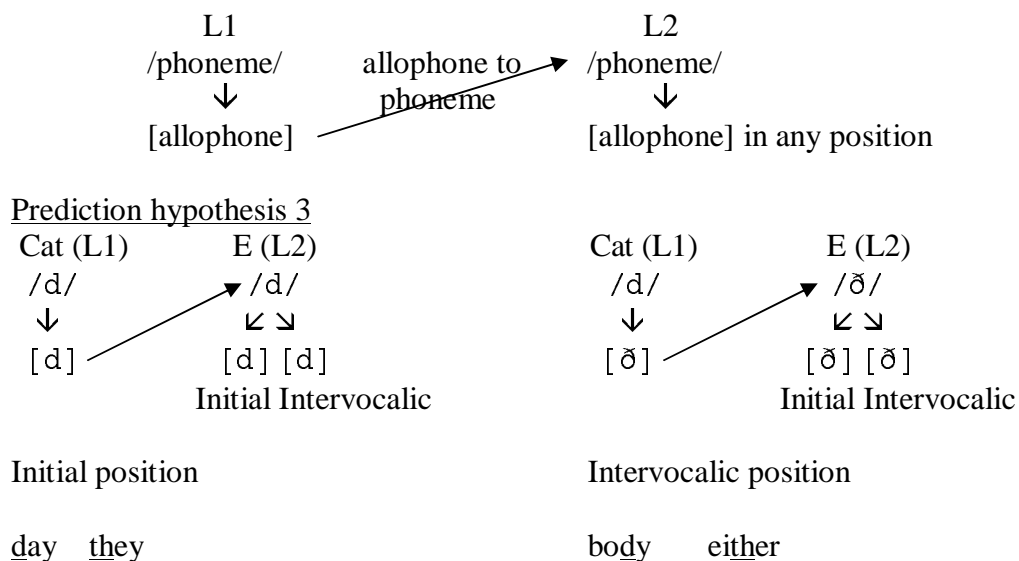


Figure 3

This third hypothesis predicts that the production of /d/ and /ð/ in any position will be good because both phones are allophones in L1 and, as such, will be transferred onto the phonemic inventory. This transfer will be followed by a mapping to a default realisation.

The fourth hypothesis states that the well-formedness output conditions of L1 transfer onto L2.

2.3 Procedure

Subjects' production was tested in single sessions. Subjects were recorded while they read the two lists: first the word list, and then the minimal pairs.

2.4 Materials

The recording materials were a Sony TCD-D8 DAT recorder and a Shure 16A microphone on a tripod stand. The microphone was placed 20 centimetres away from the mouth of the speaker.

3 RESULTS

The data elicited in this production test was divided in two blocks and each one was auditorily analysed by a phonetically trained native English speaker (MC and ZB). They were asked to identify the segment they heard in initial or intervocalic position (depending on the token) as either /d/ or /ð/, or provide their own transcription if they thought the sound corresponded to none of them.

The output of the transcribers' work was filtered in a way such that for target /d/ items, any transcription giving us [d], [ɖ] and intervocalic [ɾ] was considered a good production of /d/. The reason for considering the two stops good productions of /d/ was that their manner of articulation is that of stops. As for intervocalic [ɾ], it was considered to be good production of target /d/ because flaps are good productions of such a phoneme in American English sounds, when following a stressed syllable. For target /ð/ items, tokens considered to be produced as [θ].

After cleaning the data in this way, the results of the analysis can be observed in figures 5 and 6.

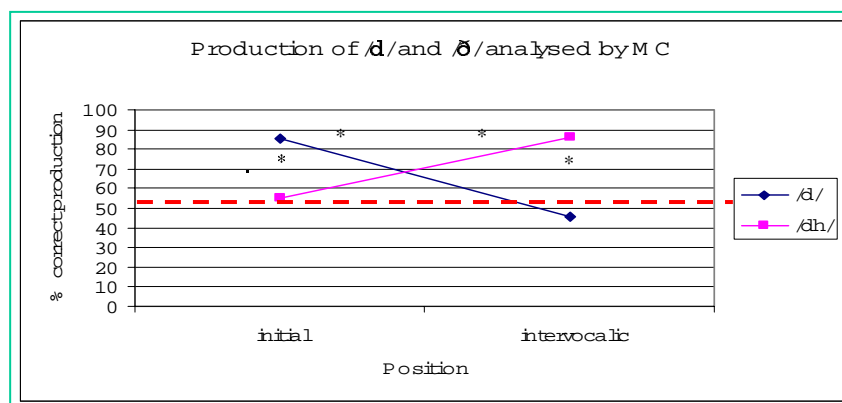


Figure 5 Production of /d/ and /ð/ by Catalan Speakers analysed by MC

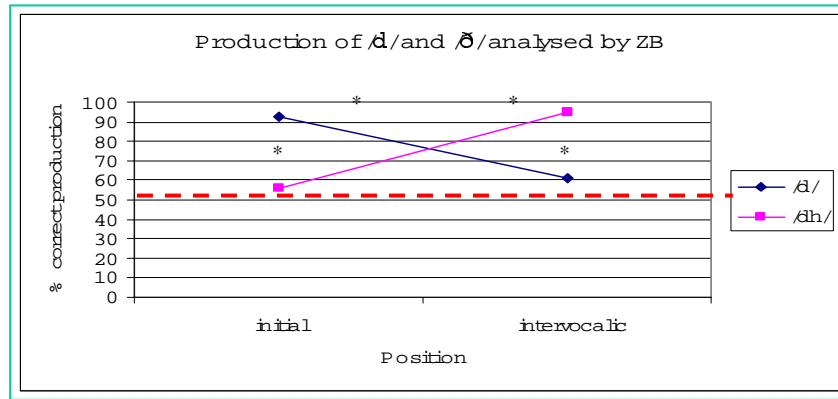


Figure 6 Production of /d/ and /ð/ by Catalan Speakers analysed by ZB

The stars in the figure captions above indicate the comparisons that reached significance. Both figures 5 and 6 show that Catalan speakers seem to have problems with the production of intervocalic /d/ and initial /ð/, mainly. That is, they are pronouncing words like ‘body’ *['bΛðɪ] and ‘they’ *['deɪ]. However, their pronunciation of words such as ‘day’ and ‘either’ is fine overall.

MC’s data was analysed using a two-way repeated measures ANOVA, with two within-subjects factors, namely Phoneme and Position. The ANOVA revealed a significant Phoneme x Position interaction [F (1, 19) = 45.236; p < .001]. Such an interaction is consistent with both hypotheses 2b and 4. These theories predict a difference in production depending on the position of these phonemes. The two main effects did not reach significance: Phoneme [F (1, 19) = .562; p = .463] and Position [F (1, 19) = .792; p = .385].

Another two-way ANOVA was run on the data analysed by ZB. The ANOVA also revealed a significant Phoneme x Position interaction [F (1, 19) = 83.262; p < .001]. The main effects did not reach significance, either: Phoneme [F (1, 19) = .047; p = .830] and Position [F (1, 19) = .591; p = .452].

Some planned comparisons were carried out to find out whether the expected differences were significant. In table 1 (below), significant differences are represented by a star. The difference in all the planned comparisons proved to be significant.

	MC	ZB
Initial vs. intervocalic /d/	F (1, 19) = 46.321; p < .001*	F (1, 19) = 37.787; p < .001*
Initial vs. intervocalic /ð/	F (1, 19) = 14.547; p = .001*	F (1, 19) = 29.445; p < .001*
Initial /d/ vs. initial /ð/	F (1, 19) = 12.587; p = .002*	F (1, 19) = 18.006; p < .001*
Intervocalic /d/ vs. intervocalic /ð/	F (1, 19) = 26.386; p < .001*	F (1, 19) = 29.635; p < .001*

Table 1 Results of the statistical analysis for the relevant planned comparisons in the analysis by MC and ZB

4 DISCUSSION

The findings of this production experiment support hypotheses 2b and 4 because these hypotheses predict that /d/ is significantly better pronounced in initial position than in intervocalic position, and /ð/ is better pronounced in initial than in intervocalic position. It looks as though these L2 learners are learning how to pronounce phones in L2 regardless of their position but their pronunciation is still significantly better when contexts in L1 and L2 match.

Finding support to hypothesis 2b means that both the L1 phonemic inventory and the L2 mapping transfer, and Catalan speakers associate the graphemes <d> and <th> with phoneme /d/. Therefore, <d> in initial position is well produced but <th> is not and the opposite happens in intervocalic position.

Since hypothesis 4 is also supported, we could claim that the output conditions of Catalan transfer from L1 to L2 directly. Namely, the surface pronunciation of L1 segments is carried onto L2 production. Therefore, the transfer from L1 onto L2 is complete at the surface level.

5 CONCLUSIONS

The results of this experiment provide evidence for hypotheses 2b and 4. The first one suggests that both the L1 phonemic inventory and the L1 mapping transfer, whereas hypothesis 4 claims that L1 output conditions are followed in L2. These two hypotheses have in common the transfer of the allophonic distribution of phones in the environments where they occur in L1. This suggests an important influence of allowed surface L1 sequences on the L2 output, even after reaching a high level of proficiency in this L2. Therefore, we can conclude that L1 surface level phonic patterns strongly interfere in L2 pronunciation, even in students who are at an advanced stage of their L2 acquisition.

The fact that the results of our experiment are consistent with hypothesis 2b points towards the possibility for Catalan speakers to associate the graphemes <th> and <d> with the phoneme /d/. Future research should investigate the influence of spelling on sound production further.

Since the mispronunciation of the phones under study can lead to misinterpretations due to the existence of possible minimal pairs, phonetic instruction of the phones under study is recommended in L2 classes, even at advanced levels. Further research could focus in checking whether the same kind of interference takes place in other levels of proficiency and in the L2 production of speakers with L1s and L2s different from those studied here.

6 ACKNOWLEDGEMENTS

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