Substitution Patterns of English Voiced Inter-Dental Fricatives by L1 Costa Rican Spanish Speakers

The voiced interdental fricative is a typologically rare sound. According to Phoible, [ð] is present only in 5% of the languages around the world. For this reason, the production of such a sound represents a challenge for many English L2 learners. Previous research has shown that L1 Dutch speakers (Wester et al 2007; Hanulíková, Weber 2010), L1 German speakers (Hanulíková, Weber 2010), and L1 Spanish speakers (Zampini, 1996), among others, encounter difficulties when producing the voiced interdental fricative sound when learning English. Studies regarding the realization of English [ð] by Spanish L1 speakers have addressed the issue of the allophonic relationship of the voiced dental fricative sound and the voiced alveolar stop in Spanish, where the voiced interdental fricative does not represent a phoneme by itself, but rather an allophonic variation of the voiced dental stop in intervocalic position (Zampini 1996; Eckman, Elreyes, & Iverson 2001; Herd, Jongman, and Sereno 2013). Given the allophonic nature of this alternation, speakers of Spanish are not aware of it. Therefore, Spanish speakers might unconsciously transfer this phonological knowledge into the production of the sound in the target language and substitute the voiced interdental fricative sound [ð] with the voiced alveolar stop sound [d] in different contexts.

Anecdotally, Spanish speakers also substitute the English voiced interdental fricative with an alveolar tap [ɾ]. To the best of my knowledge, there seems to be no apparent account of this substitution. This project reports on an experimental study which aims to investigate the realization of English [ð] by L1 Costa Rican Spanish speakers, and answers the following questions: What sounds appear as a substitution of the voiced interdental fricative? What are the phonological contexts in which such substitutions occur? How can we account for these substitutions? Ten English L2 learners in the first year of their English language studies from the University of Costa Rica were asked to participate in three tasks: reading sentences and a paragraph containing the target sound, and answering questions designed to elicit the target sound in the response.

The results show that, out of the 494 words that contain [ð], the sound was produced correctly 43.4% (214 times), while it was substituted with [d] 49.3% (244 times), and surprisingly with [ɾ] 7.3% (36) of the cases, depending on the phonological position of the target sound (Table 1) and the type of task (Table 2).

Table 1. [ð] realization per position (number of occurrences in brackets)

[ð] realization	**Word-Initial Stressed Syllable (301)**	**Intervocalic Position (193)**
[ð] (214)	41.12% (88)	58.88% (126)
[d] (244)	87.29% (213)	12.7% (31)
[ɾ] (36)	0%	100% (36)

Table 2. [ð] realization per task (number of occurrences in brackets)

[ð] realization	**Reading Tasks (350)**	**Free Speaking Tasks (144)**
[ð] (214)	50.29% (176)	26.3% (38)
[d] (244)	40.85% (143)	70.1% (101)
[ɾ] (36)	8.86% (31)	3.5% (5)

The interdental voiced fricative was realized accurately 43.4% of the time, both word-initially (41.12%) and intervocalically (58.88%). Word-initial [ð] was less frequent, although surprising since this is not a context in which the fricative is permitted in Spanish. The English fricative was substituted by [d] a total of 244 times (49.3%). Out of those 244 times, 87.29% of the times (213) it appeared in word-initial position (e.g. the words *there* and *though* were pronounced as [dɛɹ] and [doʊ]), which resembles the contexts where the Spanish [d] appears. The remaining 12.7% (31) occurred in intervocalically within the word (e.g. the words *smoother* and *mother* were pronounced [smudəɹ] and [ˈmʌdəɹ]), despite the fact that that is the context of spirantization in Spanish. The novel finding involves [ɾ]: it was used as a substitution 36 times (7.3%), and all of those substitutions appeared only intervocalically within the word (e.g. the words *together*, *weather* and *another* were pronounced as [təˈgɛɾəɹ], [ˈwɛɾəɹ] and [əˈnʌɾəɹ]). This also resembles the contexts of the Spanish tap sound, which never occurs at the beginning of a word.

In the reading tasks, out of the 350 repetitions, [ð] was pronounced correctly 50.29% (176 times), while it was substituted with [d] 40.85% (143 times), and with [ɾ] merely 8.86% (31 times) of the cases. In the free speaking task, [ð] was produced correctly 26.3% (38 times); it was substituted with [d] 70.1% (101 times), and with [ɾ] only 3.5% (5 times). Not surprisingly, the fricative was realized faithfully more often in the reading task than in the speaking task; however, it is surprising that the tap was more frequent in the reading task than the speaking task.

The allophonic relationship in the learners' L1 between [ð] and its most frequent substitution [d] shows that learners transfer the spirantization process that [d] undergoes in Spanish to English as well. Also, an interesting result is the appearance of the voiced alveolar flap [ɾ] sound as a substitution for [ð], because the relationship of the flap [ɾ] with the voiced interdental fricative sound is not allophonic in either language, although the tap is allophonic in English to the voiced alveolar stop sound.

	English:		Spanish:	
phonemes:	/d/	/ð/	/d/	/ɾ/
	/\	|	/\	|
allophones:	[d] [ɾ]	[ð]	[d] [ð]	[ɾ]

These findings show that learners need to distinguish the allophonic and phonemic relationships in both languages in order to produce phones that will lead to a more native-like pronunciation. Regarding the production of the tap sound as a substitution of [ð], it seems they do understand that [d] and [ɾ] have allophonic relationship in the target language, but mistakenly bring that relationship into production of [ð]. This is perhaps not so surprising since [d] and [ð] are allophonic in their L1, and [d] and [ɾ] are articulatorily similar (Hualde, J. 2014), although in an experimental study, Boomershine et al (2005) showed that for Spanish speakers [ð] and [ɾ] are contrastive sounds perceptually.

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