# Intelligibility of the alveolar [s] replacing the initial interdental /θ/ in English words

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*Abstract*

*The study examines the intelligibility of a German speaker's replacement of the initial interdental /θ/ with the alveolar fricative [s] in words that occurred in her reading of a short English text. Twenty nine students in university English courses in Sweden listened to, and transcribed the whole reading, where substituting the initial /θ/ of a word with [s]appeared four times. The result shows that the phoneme substitution by the German speaker did not cause misunderstanding in three instances, but it considerably misled the listeners' understanding of a phrase in one occasion. We discuss this finding in relation to the functional load of the initial θ/s contrast (Catford, 1987), and Jenkins' (2002, 2015) Lingua Franca Core syllabus.*

## Introduction

The interdental fricatives /ð/ and /θ/ are not easy to articulate, and they are less frequent than other phonemes in the world's languages (Jenkins, 2015). English is one of the languages that have the two interdentals, but replacing them with some other sounds is a common phenomenon among many of its speakers (Jenkins, 2000; Kirkpatrick, 2010; Pennington, 1996). For example, the voiceless /θ/, which this study is concerned with, is substituted with the alveolar /t/ and the post-dental /t̪ / 'in many areas of Britain and in many indigenous varieties of English, such as African and Caribbean, as well as in many learner varieties' (Jenkins, 2000, p 137). The labiodental /f/ and the alveolar /s/ are also often found as what replace the /θ/, while substituting with /f/ is usually done by L1 speakers and with /s/ mostly by L2 speakers, such as Japanese or German speakers.

In addition to reporting its commonness, research also suggests that the substitution of /θ/ (and /ð/) may not be one of the phonetic features that seriously threaten the intelligibility of a person's English pronunciation. For example, earlier, Catford (1987) introduced the relative functional load of different English phoneme contrasts, which says that the phoneme pairs with high functional load (e.g., the initial /p/ and /b/) hurt intelligibility more than those with low functional load (e.g., the initial /s/and /z) when they are not properly contrasted. Later Munro and Derwing (2006) validated this notion of Catford's through empirical studies. According to Catford's relative functional load table represented by Derwing and Munro (2014, p. 49), the initial/θ/ and /s/ contrast has relatively low functional load at 21 %. In addition, Jenkins (2000, 2002) reported that pronouncing /θ/ as /t/ or /s/ did not cause miscommunication among international interlocutors. Based on this finding, she classified /θ/ as a non-core feature in her Lingua Franca Core syllabus (Jenkins, 2000, 2015).

Against this backdrop, the study examines the intelligibility of a German speaker's alveolar fricative [s] that replaced the initial interdental fricative /θ/ in English words, based on the perceptions of university students in English courses in Sweden. We want to see whether, and to what extent the replacement of /θ/ with [s] in different contexts conforms to what the literature tells about such phoneme substitution.

## Method

### *Subjects*

The subjects were twenty nine people that enrolled in two different English courses at a university in Sweden. Twenty six of them were Swedish L1 speakers and three were English L1speakers.

### *Material*

We used the audio-recording of a German speaker reading a short text in English. The recording was from the Speech Accent Archive, a free online resource (accent.gmu.edu), provided by the linguistic program at George Mason

University in the United States. The whole text is as follows, where the initial voiceless interdental fricative /θ/ in four words are underlined:

'Please call Stella. Ask her bring these things with her from the store: Six spoons of fresh snow peas, five thick slabs of blue cheese, and maybe a snack for her brother Bob. We also need a small plastic snake and a big toy frog for the kids. She can scoop these things into three bags, and we will go meet her Wednesday at the train station.'

The German speaker pronounced the subjected phoneme in the four words as the voiceless alveolar fricative [s]. Table 1 presents the IPA transcript of the speaker for the four words starting with the phoneme, together with the words appearing before and after them, to understand the contexts that influenced the subjects' perceptions. It also provides the IPA transcripts of Received Pronunciation (RP) and General American (GA) pronunciation for the same word strings for comparison.

*Table 1.the German speaker' initial alvelolars that replaced the initial interdental in RP and GA.*

| word strings | German speaker | RP | GA |
|---|---|---|---|
| these things with | d̪iːs sɪŋks wɪθ | /ðiːz θɪŋz wɪð/ | /ðiz θɪŋz wɪð/ |
| five thick slabs | faɪf s̪ik slæbs | /faɪv θɪk slæbz/ | /faɪv θɪk slæbz/ |
| these things into | d̪is s̪iŋs ɪntu | /ðiːz θɪŋz ɪntə/ | /ðiz θɪŋz ɪntə/ |
| into three red | ɪntu s̪ɾi ɹɛt | /ɪntə θriː rɛd/ | /ɪntə θri rɛd/ |

*Transcription task*

As part of their course assignement, the subjects transcribed the speaker individually. They could listen to the speaker as many times as they wanted. However, preciseness in their transcription was not what they were asked to achieve. They were instead told to transcribe as they heard and understood. The subjects knew that the given task was checking the degree of the intelligibility of the speaker, rather than making an errorless transcription.

# Result

Table 2 shows that the replacement of the initial voicless interdental fricative with the voiceless alveolar fricative by the German speaker greatly hurt the intelligibility of her pronunciation in one of the four occasions. In the other three, the subjects had very little or no problem with understanding the speaker.

*Table 2. Error rate in the subjects' perception on the German speaker' initial alvelolars that replaced the initial interdental in RP and GA.*

| word strings | the German speaker's realisation | error rate in the perceptions of the subjects* (%) |
|---|---|---|
| these things with | d̪iːs s̪ɪŋks wɪθ | 0 |
| five thick slabs | faɪf s̪ik slæbs | 89.6 |
| these things into | d̪is s̪iŋs ɪntu | 0 |
| into three red | ɪntu s̪ɾi ɹɛt | 0 |

*The number of the subjects = 29

As seen in the table, no one mistook the interdental /θ/ 'in these things with', 'these things into' and 'into three red' for some other sounds. An English L1 listener thought 'these things with' as '*this thing* with', and a Swedish L1 listner transcribed the same phrases as '*this* things with' and 'these things into' as '*this* things into'. This, however, seemed to be due to the fact that replacing the final voiced /z/ with the voiceless [s] 'these' /ðiːz. Except for the two listeners, all other listeners correctly transcribed the two phrases, and 'into three red' was precisely perceived by all the subjects.

By contrast, only three out of twenty six Swedish L1 listeners and 1 out of three English L1 listeners correctly transcribed the word 'thick' in 'five thick slabs', and all the others perceived it as 'six'. There were some variants among those who mistook the word for 'six' in their transcriptions. A Swedish L1 subject perceived

the phrase with ‘thick’ as ‘five six slash’, another Sweidsh L1 subject as ‘five six slap’, three Swedish L1 subjects as ‘five six laps’, and an English L1 subject as ‘five or six slabs’. Otherwise the phrase was transcribed as ‘five six slabs’.

There can be two possible reasons for this high rate of misunderstanding. First, the sequence of the first four sound segments in the German speaker’s pronunciation of ‘thick slabs’ [sik slæbs] is exactly how the word ‘six’ sounds: /siks/. Second, just before the sound sequence, the word ‘five’ appears, which was correctly perceived by all the subjects, although its final consonant /v/ was replaced with /f/ by the speaker. Consequently, ‘five, six’ as two alternatives for the number of cheese slabs seemed to emerge in the listeners’ minds as a reasonable interpretation for what they could not clearly hear.

# Discussion and Conclusion

The finding shows that only one out of the four instances of replacing the word initial /θ/ with [s] by a German speaker caused misunderstanding, while the other three did not. This is, on the whole, 22.4% of error rate when 26 errors were divided by 116 observations (4 words x 29 subjects). The result does not challenge what is in the literature. The error rate is just a little higher than the 21 % functional load of the initial θ/s contrast in the table by Catford (Derwing & Munro, 2014, p. 49). Given that the subjects of the study correctedly understood the messages in the three substituting instances, the result does not really discord with Jenkin’s Lingua Franca Core syllabus that classifies the initial /θ/ as non-core.

Nevertheless, the finding clearly indicates that in certain contexts pronouncing /θ/ as /s/ can still decrease phonetic intelligibility, even to a great exent. This possibility was once discussed by Brown (1974 cited in Jenkins, 2000), who therefore suggested that if an L2 speaker had difficulty with realising the voiceless interdental, she/he could replace with the labiodental fricative /f/ rather than the alveorlar fricative. However, the functional load of the contrast between /θ/ and /f/ contrast is 15%, and between /θ/ and /t/ (another phoneme that frequently replaces /θ/) is 18 %, both of which are just slightly lower than the 21 % load of the /θ/ and /s/ contrast. In addition, if ‘thick’ in ‘five thick slabs’ were pronounced as ‘fick’ or ‘tick’, that may cause less confusion for the listeners. However, such replacements may cause problems in other contexts: for example, pronouncing the phrase, ‘into three red (bags)’ as ‘into free red (bags)’ or ‘into tree red (bags)’ can create a misunderstanding, which did not arise when the phrase was pronounced as ‘into sri red’ Therefore, it may not be so helpful to encourage learners to replace /θ/ with /t/ or /f/ instead of /s/ to prevent miscommunication. Instead, based on our finding, we rather wish to suggest that English teachers help learners to be aware that not properly realising /θ/ can be problematic sometimes, although they may not need to spend too much time on learning the phoneme.

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