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AN ACOUSTIC PHONETIC ANALYSIS OF DIFFERENT REALIZATIONS OF [θ] IN SERBIAN-ACCENTED ENGLISH

JOVANA JEVREMOVIC

ABSTRACT

This study investigates several acoustic correlates of the phonetic realizations of [θ] produced by Serbian speakers of English. The impressionistic phonetic transcriptions and aural perception accounts indicate that Serbians have difficulty pronouncing the English non-sibilant [θ] segment accurately. It is reported (Dimitrijevic-Savic & Jerotijevic, 2011; Koffi, 2015a) that they substitute [t], [f], [s], and [ts] for [θ]. The present study uses an acoustic phonetic methodology to investigate how Serbians pronounce this segment. Speech samples from seventeen native Serbian speakers are investigated. These samples are part of George Mason University Speech Accent Archive. Spectrographic and acoustic measurements are provided for 5 words from the elicitation paragraph that contain the digraph <th> represented in the IPA by [θ]. Words containing [θ] in initial position are <things (twice), thick, three>. The only word in text that ends with [θ] is <with>. The acoustic correlates of intensity, duration, VOT, and COG are examined for 85 occurrences of <th>. The results show that [θ] is substituted by the voiceless dental stop [t] 49% of the time, by the affricate [tʃ] 7%, and 1% by the flap [r]. The acoustic measurements indicate that Serbian speakers rely on intensity more than duration and Center of Gravity in determining which segments to substitute for [θ]. The substitute segments are all very similar in intensity with [θ] in GAE.

1.0 Introduction

As is the case with many people who learn an additional language, there is a specific Serbian accent that can be heard when English is spoken. The goal of this study is to find out how L1 Serbian speakers pronounce digraph <th> when they speak English. I want to determine if the unvoiced [θ] interdental fricative is produced according to prescriptive pronunciation rules or replaced by some other sounds specific to Serbian speakers. Words with digraph <th> will be analyzed separately to get a frequency count of accurate and erroneous articulations. Consequently, the influence of different environments on different <th> realizations can be discerned as well. The impressionistic count based on the narrow IPA transcriptions provided¹ for all the participants will be compared to the data acoustically analyzed for this study. In addition, this comparison will be described in case of a mismatch. The acoustic analysis will focus on intensity, duration, center of gravity (COG), and voice onset time (VOT). These acoustic correlates will help answer the following questions.

Research questions

1. Do L1 speakers of Serbian produce [θ] accurately when they speak L2 English?
2. If not, what segments do L1 Serbian speakers substitute for [θ]?
3. Is there an acoustic similarity between the substitute segments of L1 Serbian speakers and the expected English [θ]?
4. What pedagogical implications can be drawn from this analysis?

¹ The provided narrow IPA transcripts for different speakers can be found at <http://accent.gmu.edu> website.

2.0 Inventory of Serbian and English Consonants

Serbian consonants are essentially classified according to manner, place of articulation, and voicing. Serbian and English share a certain number of consonants; however, Serbian has consonants that English lacks, and vice versa. Possible pronunciation problems and compensatory strategies of Serbian L2 speakers of English can be perceived if we compare the two language inventories. Among 25 of the Serbian and 26 of the English consonants, the two languages share 10 segments. In regard to consonantal natural classes, similar consonants are the following: bilabial stops /p, b/, bilabial nasal /m/; labio-dental fricatives /f, v/; alveolar /n, l/, palatal glide /j/; and velar /k, g/.

Contrastively, English fricatives /ʃ, ʒ/ and /tʃ, dʒ/ are palatal, whereas in Serbian they are palato-alveolar. Furthermore, phonemes /t, d, s, z/ are dental in Serbian, but alveolar in English. In that class, English is lacking the dental affricate /ts/. Accordingly, Serbian palatal classification contains different segments than English: affricates /tɕ, dʒ/, nasal /ɲ/, lateral /ʎ/. Serbian consonant inventory does not include glottal stop /ʔ/ or fricative /h/. A similar sound to /h/ is /x/, but it is a velar fricative in Serbian. English consonant inventory does not include the Serbian dental /ts/ and velar /tɕ, dʒ/.

An overall observation can be made that Serbian contains more affricates, but English interdental fricatives are absent in the Serbian inventory of sounds. Most relevant to this study is the description of the difference between English and Serbian fricatives.

2.1 Interdental fricatives

Jongman et al. (2000) give a thorough description of the acoustic characteristics of fricatives that help the reading and analysis of these sounds in waveforms and spectrograms. Based on their examinations, they confirm the division of fricatives into two major groups: the sibilant (/s, z, ʃ, ʒ/) and the nonsibilant (/f, v, θ, ð). They examined 20 native speakers of (American) English, from various areas in the country. There were ten female and ten male participants, and each produced 144 tokens for CV fricative environment in a sound-proof room. In their study, they examine fricatives in terms of static and dynamic acoustic properties. They found that intensity and spectral information are most important for determining the place of articulation of all 8 fricatives. To this day, we can consider this a most comprehensive study when it comes to fricatives of English. Their examination of this consonantal class establishes a crucial background for my acoustic exploration. Table 1 displays key acoustic measurements of [ð] and [θ] interdental fricatives.

Acoustic Values / Segments	[θ]	[ð]
Intensity	54.7 dB	62.7 dB
Duration	163 ms	88 ms
Center of Gravity (COG)	5137 Hz	5137 Hz

Table 1: Jongman et al. (2000) acoustic data for interdental fricatives [θ] and [ð]

According to the UCLA Phonological Segment Inventory Database, out of 317 languages, /θ/ appears in only 18 languages (Maddieson, 1984, p.45, Table 3.2). Considering this statistics of

fricatives, using acoustic analysis is favorable for examining their features. Gordon, Barthmaier, and Sands (2002) also examined fricatives of 7 endangered languages. They investigated duration, COG, and spectra to see which of these correlates are most robust. COG proved to be the most robust correlate.

A small number of studies researched the Serbian pronunciation of interdental fricatives. These studies will be presented here. They provide an introduction to what can be expected in the findings of this particular research. It should be noted that there were no studies that involve acoustic analyses. Dimitrijevic-Savic and Jerotijevic (2011) explored whether external causes, such as speech style or vocabulary level, would have any influence on the accurate production of /θ/ and /ð/. They further investigated the internal features such as the environments in which those sounds occur. Finally, they wanted to determine if one set of factors has supremacy over the other. Their participants were 18 students who are native Serbian speakers, 13 of whom had a vocabulary level of 2000 - 3000 words, and five with 3000 – 5000 word vocabularies. They all read a story and performed a recall task afterwards. Dimitrijevic-Savic and Jerotijevic recorded their speech and transcribed it, with judgments for /θ/ and /ð/ being accurate or inaccurate. They did not find any statistical importance regarding external factors (speech style). Only [θ] was analyzed regarding internal factors. The researchers perceived the production of [θ] by Serbian L1 learners as 5% more accurate than inaccurate.

Koffi (2015) provided acoustic data for six Serbian speakers (among 67 different L2 speakers, of 7 different L1s). Intensity was measured for all 8 fricative segments realized by Serbian speakers. He also provided the accuracy count based on impressionistic transcriptions from the GMU website. The analysis revealed that Serbian L1 production of [θ] and [ð] was usually unsuccessful and substituted by [t], [d], and [f]. The approach that Koffi (2015) uses is expanded and adapted in the present study. All the details are provided in the Methodology section.

2.2 Compensatory strategy of Serbian English speakers

After a detailed comparison of Serbian and English consonant inventory, we can conclude that Serbian speakers have some alternatives when articulating English consonants that do not exist in Serbian inventory. With respect to the first research question of this study, since /θ/ is not a part of Serbian consonant inventory, a majority of Serbian speakers would not produce those sounds accurately in English. If mispronunciation of [θ] occurs, Serbian speakers are most likely to replace [θ] with [t], and sometimes even with [ts], [s], [f] (Dubois, 1998; Lombardi 2003; Dimitrijevic-Savic & Jerotijevic 2011; Smith 2013; McGuire and Babel 2012; Koffi 2015). The contribution of the present study is in the fact that both impressionistic count and acoustic measurements are provided from speakers of diverse backgrounds, who share the same L1.

3.0 Methodology

For the purpose of this study, the Speech Accent Archive from George Mason University databases was used. The substantial amount of 2023 examples of English speakers from different language backgrounds are held in the database (last updated on November 20, 2014). All participants were reading the same paragraph (Weinberger, 2014). The database is an open source with available recordings as well as the phonetic transcriptions of the recordings for the

majority of participants. The website states: “We constructed an elicitation paragraph to be read by each subject. The paragraph is written in English, and uses common English words, but contains a variety of difficult English sounds and sound sequences. The paragraph contains practically all of the sounds of English. Subjects are asked to read and agree to a standard Human Subjects Cover Letter (part of the submission process). Each Subject is recorded individually in a quiet room. Subjects sit at a table and are approximately 8-10 inches from the microphone” (Weinberger, 2014, retrieved from: <http://accent.gmu.edu/howto.php>).²

3.1 Participants

This study has 17 participants, even though the Serbian database holds 18 recordings. The last recording is omitted from the study because the narrow IPA phonetic transcription has not been provided. There are 8 females and 9 males who submitted their recordings to the website archive. Their mean age is 30.8 years, ranging from 47 to 25 (22 year range). If we compare their age and the English onset age they reported, the subjects have been learning English for an average of 17 years, primarily in academic setting, ranging from 29 to 0 years. The majority of subjects reported that they are residents of English speaking countries, and have been for an average of 2.7 years. Here the range is 12, with Serbian 11F having lived in an English speaking country for 12 years, and Serbian 4M and 17F having 0 years of residence. This data demonstrates a heterogeneous group of participants, which may be considered beneficial in L2 interlanguage examination. All the participants read the following paragraph.

*Please call Stella. Ask her to 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** red bags, and we will go meet her Wednesday at the train station.*

The highlighted words in the paragraph above are the 5 words with the digraph <th> that carry the expected unvoiced interdental fricative [θ] sound: <things, with, thick, things, three>. After multiplying those 5 segments by 17 speakers who produced them, the result was 85 tokens relative to interdental fricative to be analyzed. For comparison purposes, additional sound [t] was analyzed for each speaker in the words <plastic>, which contributed 17 additional tokens. Therefore, a total of 102 tokens were analyzed for intensity, duration, center of gravity, and voice onset time, using Praat. In addition, frequency counts from both impressionistic and acoustic data were done.

3.2 Acoustic measurements of [θ]

This section addresses the issues related to the various ways in which [θ] was pronounced within the research elicitation paragraph. According to prescriptive pronunciation rules, four word initial segments of <th> in <things, thick, things, three>, and one in word final <with>, are to be produced as a voiceless interdental fricative [θ]. The compensatory strategy discussed earlier reveals that Serbian consonant inventory lacks [θ]. According to the Contrastive Analysis Hypothesis (Lardiere, 2009), since [θ] does not exist in Serbian, L2 speakers of English would have a difficulty producing it. Here, we will see if the prediction proves accurate. First, we will focus on an impressionistic account of what segments were perceived by GMU experts. Next,

² The exact steps of how to submit a recorded speech sample can be found in Appendix 5, entirely copied from <http://accent.gmu.edu/email.php>.

various acoustic phonetic measurements will be used to assess the nature of the sounds that are substituted for [θ]. Eighty-five tokens produced by 17 speakers were examined. The impressionistic data provided by GMU transcriptionists shows that Serbian speakers produced [θ] accurately 41 times. They replaced it by [t] 13 times, by [t̪] 28 times, by [s] twice, and by [r] once. Transcribers for the GMU website made a distinction between dental [t̪] and alveolar [t] in the transcriptions. Nevertheless, if we group the dental and alveolar voiceless stops from the GMU count, they account for 48% of the [t] replacements. In GMU's count, [θ] was produced correctly 48% of the time, while other sounds account for 3%.

The analysis of L1 Serbians' reading in English encompassed frequency count, intensity, duration, VOT, and COG values for each of the expected [θ] sounds. Description of the voiceless interdental fricative and its realizations, as measured by acoustic phonetics software Praat, follows. Summary of the data by segments is provided for each of the five words in Table 4, below.

Words	Things	With	Thick	Things 2	Three	Total [θ]	Total [t]	Total[t̪]	Total[r]
Segments	[θ]	[θ]	[θ]	[θ]	[θ]				
Total	7~10	9~7~1	4~13	6~11	10~1~6	36	42	6	1

Table 2: Acoustic measurements of expected voiceless interdental fricative: data by segments

The instrumental data shows that Serbian speakers pronounced [θ] accurately 36 times, which is 42.35 % of the total data analyzed. The most common substitution by the speakers was the phoneme [t], pronounced 42 times total when [θ] was expected, or 49.41 % of the analyzed data. Another replacement, typical for the word <three>, was the phoneme [t̪], which was produced 6 times or 7.06 %. Finally, there was 1 occurrence of a flap[r], in the word <with>, accounting for 1.18 % of the 85 tokens produced. This data is shown in the pie chart in Figure 5.

A comparison of the impressionistic count from the GMU transcriptions and the instrumental count presented above yields 35 mismatches. The most prominent difference is that the spectrograms I analyzed show the correct realization of [θ] by 6% less, and the realizations other than [t] by 5% more. A summary of the comparisons is given in the following graph.

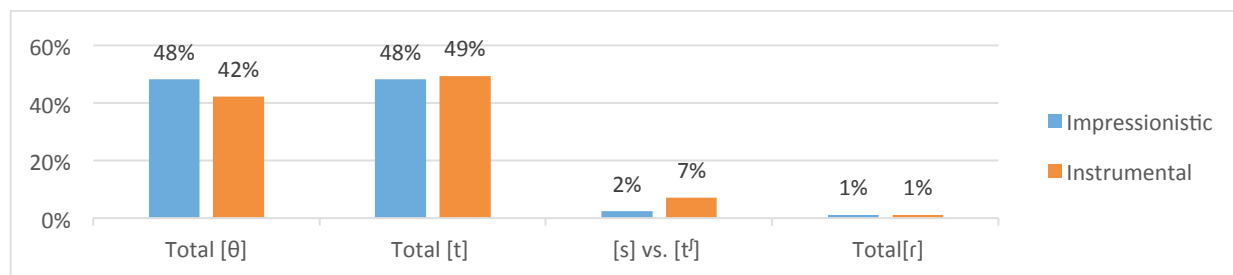


Figure 1: Different realizations of <th>: Impressionistic vs. Acoustic data

3.3 Center of Gravity (COG) Measurements of [θ]

Van Son and Pols (1999) define the center of gravity of a spectrum (COG) as the "mean" frequency. Its value can be obtained by dividing the air flow speed by the constriction area. It is measured in hertz (Hz). Jongman et al. (2000) provide important characteristics of the COG

which support the validity of this research, when the interdental fricatives are accurately produced or replaced by other fricatives: “In general, /s, z/ have the highest spectral mean, and /ʃ, ʒ/ the lowest. The nonsibilant spectral means fall in between” (p. 1257). Higher COG values were found for the voiceless fricatives than for voiced fricatives; there was a similar difference when comparing female and male speakers. Labio-dental and interdental fricatives have similar values of COG. These measurements will prove significant for the study, as having the actual frequencies will assist in describing the actual sound that was produced by a Serbian native speaker.

Of all the acoustic correlations they examined, Jongman et al. (2000) found COG to be the most significant in distinguishing the four places of articulation, regardless of surrounding vowels, speaker variations, or even voicing. Therefore, I could confidently examine segments in terms of COG when I visually perceived them as fricatives. However, it must be noted that all the measurements provided by Jongman et al. are taken from isolated speech in laboratory conditions. I must emphasize that all the recordings I examined are instances of continuous speech. It can be argued that the former are more reliable than the latter. However, continuous speech presents a more real-life example than the segments generated under laboratory conditions. The mean COG Jongman et al. reported for interdental fricatives is 5135 Hz while the mean measurements I got range from around 300 Hz to approximately 3500 Hz. This is not surprising as I examined segments read in a paragraph, either faster or slower, preceded or followed by different sounds. Table 3 presents COG measurements for 17 Serbian L1 speakers whose productions of interdental fricatives are examined.

Words	Things	With	Thick	Things 2	Three
Segments	[θ]	[θ]	[θ]	[θ]	[θ]
COG in Hz					
Mean	3336	1055	2763	3565	2697

Table 3: COG values for accurately produced interdental fricative [θ]

3.4 [θ] Produced as [t].

Serbian talkers substituted [t] for [θ] in 42 instances (49.41 % of the time). Of these, the [θ] in <things> was produced as [t] 21 times, 13 times in <thick>, once in <three>, and seven times in <with>.

3.5 Voice Onset Time (VOT)

Voice onset time is a distinct feature of stop consonants and describes the time between the release of air and the voicing (Ladefoged, 2006, p. 146). It is measured in milliseconds and differs among different stops and whether the sound is voiced or unvoiced. Many exhaustive studies with a sizeable number of tokens examined have been done comparing VOT values of stop consonants for English and various other L1s (Chao and Chen 2008, Trajkovic, 2013). This acoustic clue is used primarily to determine aspiration and whether L2 speakers are aspirating sounds of English as expected. In general, voiced stops have lower VOT values than voiceless. Koffi (2015b) indicates that the usual voice onset distinction is at 30 milliseconds (ms), while voiced stops have values usually lower than 30 milliseconds. It is important to know how to measure VOTs for the valid interpretation of spectrograms. If in fact Serbian English speakers pronounce the digraph <th> as stops, this can actually be proven by VOT measurements.

Trajkovic (2013) specifically explored VOT of Serbian pronunciation of English. She measured VOT values dependent on specific vowel environments. The average number she obtained for the voiceless dental stop [t] produced by Serbian learners of English is 52 ms, with the highest aspiration in front of high vowels. Again, we can see that the most prominent evidence of “[θ]-stopping” (McGuire & Babel, 2012) are the measurements of VOT. For the 17 participants of the current study, VOT data was gathered when a sound was produced as a voiceless dental stop [t]. To illustrate the production of a segment as a stop, I have gathered all my VOT measurements for the voiceless dental stop [t] in Table 4.

Words	Things	With	Thick	Things 2	Three	Plastic
Segments	[θ]	[θ]	[θ]	[θ]	[θ]	[t]
VOT in ms						
Mean	30	38	28.3	28.6	39	31.1

Table 4: VOT measurements for voiceless stop [t] realizations of the <th> digraph

The word <plastic> from the elicitation paragraph was taken rather than <toy> in order to minimize aspiration. This applies to this study when we compare the realizations of <th>. The VOT <things, thick> falls very close to that in <plastic>. We can conclude with certainty that those segments were indeed produced as voiceless dental stops [t]. The average VOT in <with> and <three>, however, is about 7 ms higher than one in <plastic>. This can account for the fact that segments in those words were produced more successfully as fricatives, so perhaps even though a stop was produced, there was a tendency for it to be more aspirated and longer.

3.6 [θ] Produced as [tʃ]

Most of the differences between the GMU transcription and the acoustic data were with the realizations of the digraph <th> in the word <three>. Transcribers did not perceive an affricate in any of the cases. However, the instrumental data shows that there were 6 instances of [θ] being produced as the voiceless palato-alveolar affricate [tʃ]. This sound is quite common in the Serbian language, and the English cluster <tr> is often pronounced as [tʃ] by Serbian speakers. On the following spectrogram (Figure 2), [tʃ] is clearly an affricate because of the high energy on the waveform, duration (affricates are typically very long, which the spectrogram shows), and the frequency (again, a high level of energy is confirmed by the COG measurements).

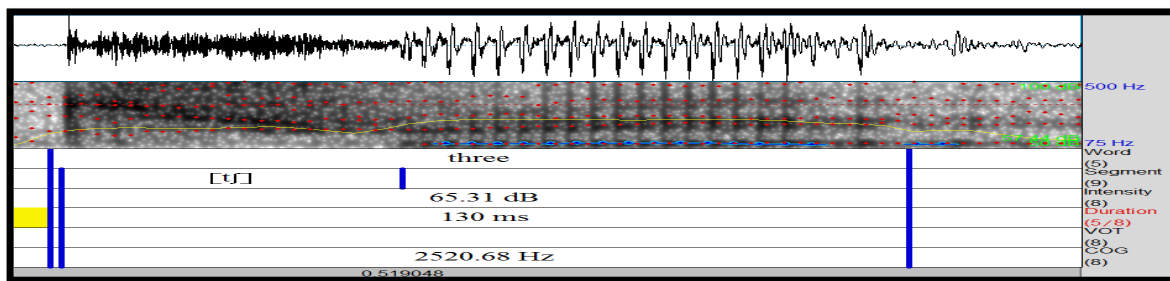


Figure 2: Serbian 6M pronunciation of <three>

4.0 Intensity. There is no consensus as to which features are the most prominent when it comes to the analysis of fricatives and stops. The measures obtained for intensity and duration are meaningful in comparing consonants. These features are included in most exhaustive studies of fricatives to this date (Jongman et al., 2000, Gordon et al, 2002, Koffi, 2015). Here, measurements collected for VOT and COG using Praat are presented. These also help to precisely indicate the realized segments. Table 5 displays the mean intensities for all the aforementioned realizations of <th>:

Words	Things	With	Thick	Things 2	Three	Plastic
Segments	[θ]	[θ]	[θ]	[θ]	[θ]	[t]
Intensity in dB						
Mean	64.61	61.98	66.02	65.49	62.25	64.17
GAE³	-	-	62.38	-	-	63.47

Table 5: Intensity measurements for voiceless interdental fricative

Table 5 shows the mean values for each word. Since [θ] was replaced by [t] in the vast majority of the time, the measurements for <plastic> are given as well so that we can compare the substitutions to the actual expected [t] sound. Furthermore, a comparison with General American English (GAE) speakers is made. The intensity for GAE and Serbian speakers is very similar with a range of about 3 dB for <thick> and 1 dB for <plastic>. Among only Serbian speakers, intensity between the two words has less than 2 dB difference. Referring to Table 5, we can deduce that it is not surprising that [θ] was substituted by [t] in such a great number, as the difference in their mean intensity is not perceptually significant. We can also infer that Serbian speakers are louder than GAE speakers, although again the difference is not substantial.

5.0 Duration

In Table 6, the duration count in milliseconds shows the mean duration of the expected <th> sounds compared to [t] in <plastic>. The difference is clear as each of the words had both the fricative and stop realizations. The highest duration among the six words is in the word <three>, which is expected since there were 6 realizations (out of 17) that were affricates.

Words	Things	With	Thick	Things 2	Three	Plastic
Segments	[θ]	[θ]	[θ]	[θ]	[θ]	[t]
Duration in ms						
Mean	43	46	41	45	100	36

Table 6: Duration in ms for the realizations of [θ]

5.0 Discussion and Implications

Data analysis of this study has provided some interesting insights. Overall, we conclude that the English interdental fricative [θ] is usually mispronounced by Serbian speakers. The segment is most commonly replaced with the dental stop [t]. I will summarize the findings by providing examples of realizations in cases of correct and incorrect articulation. I will also show

³ GAE (General American English speakers) measures are taken from Koffi (2015). The numbers represent mean values of intensity in running speech for relative segments, [θ] and [t] in the words <thick> and <plastic> respectively.

the different environments and the relationship among them. Additional observations are made when the percentages of correct pronunciations for each of the 17 speakers are compared.

First, two examples of word initial voiced and unvoiced <th> sounds and word final unvoiced <th> sounds are observed. Serbian 1F mispronounced <th> sounds 100% of the time. Figure 3 shows the most common replacements for this speaker. Her replacements are representative of the major substitutions of all the participants. In contrast, Figure 4 shows the spectrogram of Serbian 11M, the speaker with the most accurate pronunciation among the 17 participants.

If we refer to the biographical information of the 17 participants, we draw some conclusions based on the data. Serbian 1F is the speaker with the lowest number of years of English learning (0 reported). Contrastively, Serbian 11M is the speaker who spent the most years in an English L2 environment (12 years). This clearly shows the effects of the length of English L2 learning and the length of English residence on the interlanguage development of Serbian L1 English speakers.

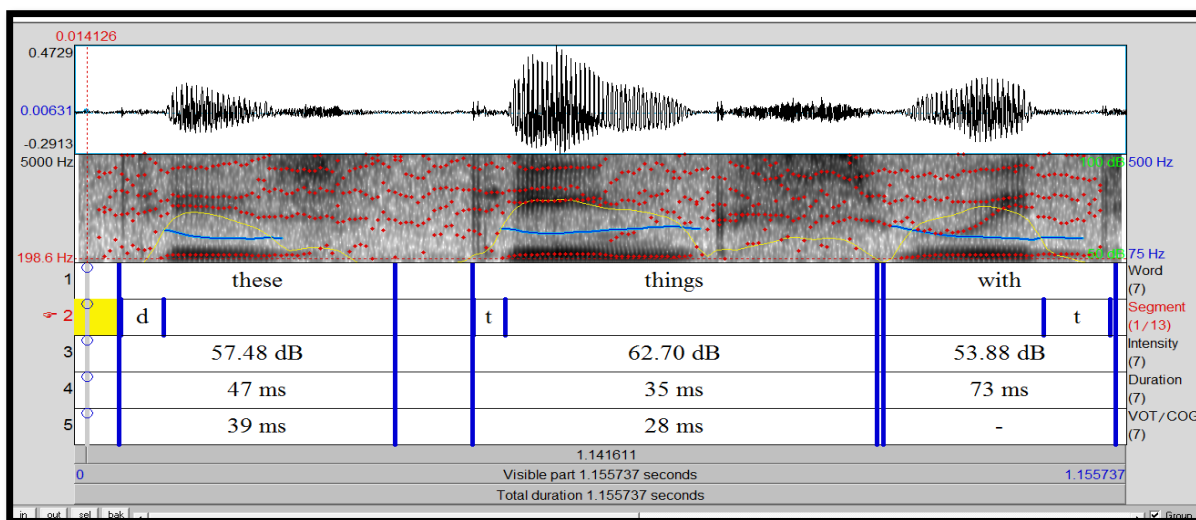


Figure 3: Serbian 1F: realizations of <th> digraph in three representative environments

The spectrogram in figure above clearly shows each segment of <th> pronunciation. All three important positions were given: the word initial and word final expected [θ], and the word initial [ð]. The primary characteristics of stops are demonstrated: the “sharp spike,” as Ladefoged (2006) calls it, as well as the VOT (the space between the stop and the vowel).

The findings show that Serbian compensatory strategy depends on the specific environments of sounds. The <th> digraph tends to be pronounced as a dental stop. However, for comparison purposes, I will show the case of the correct pronunciations of Serbian 11M, the speaker with the highest percentage of correct pronunciation.

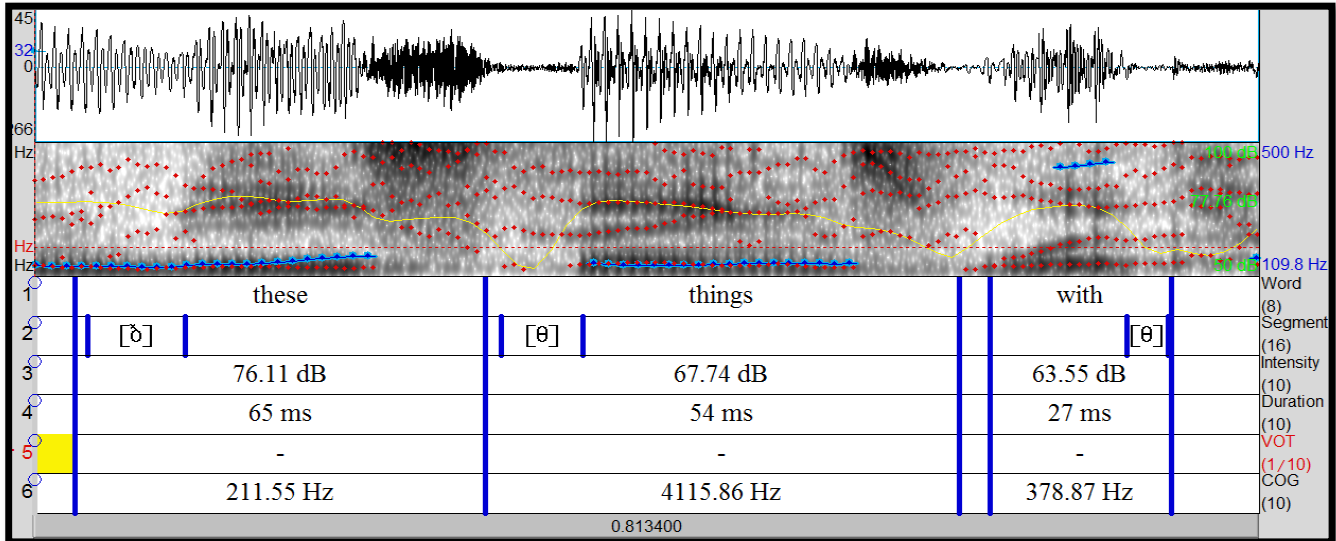


Figure 4: Serbian 11M: realizations of <th> digraph in three representative environments

To look at things from a slightly different point of view, Figure 5 provides a detailed account of correct pronunciation of [θ] sound for each of the 5 words.

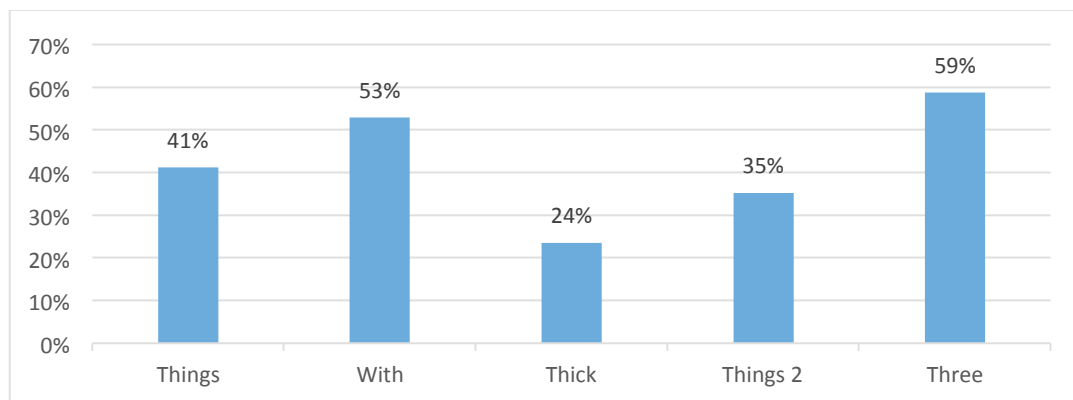


Figure 5: Correct pronunciation of voiceless interdental fricative [θ] in different environments

This study examined the words <things, thick, three> for expected [θ] sound in the CV environment. Based on the above graph, we can see that such environment presents a problem for Serbian speakers, with all the realizations being correctly pronounced on average of 40% for voiceless. [θ] in VC environment <with> was pronounced correctly 53%, difference of 13% higher compared with the CV environment. However, it would probably be beneficial to further study this VC environment in relation to other types of vowels such as [u], [o], [e].

By observing the measures for [θ] and its major substitute [t] we note that they are actually similar in terms of intensity. Therefore, replacement of the less common sounds (interdental fricatives) with the alveolar stops is not surprising. Furthermore, Koffi (2015) argues that if the intensity of substitutions range is 3dB or less, and if they share voicing and place of articulation, that would not impede the intelligibility. Still, intelligibility issues are possible with some minimal pairs such as <three> vs. <tree>, <bath> vs. <bat>, <thank> vs. <tank>, <death> vs.

<debt>. Such minimal pairs would provide good phonetic training. Making students aware of the differences in minimal pairs, and focusing specifically on those sounds is strongly recommended. Teachers can help correct any deviations that occur. However, constant and systematic practice by Serbian L1 students of English is crucial for any improvements in their pronunciation. Further, focus on phonetics in the curriculum is recommended.

In conclusion, I would like to emphasize that the objective of this study was to provide an instrumental account of the actual sounds produced by Serbian speakers when interdental fricatives are expected. This could be expanded with similar studies that would yield more accurate results if they were done with different Serbian L1 speakers or recorded in a strict laboratory environment. The recordings examined in this study were instances of continuous speech. Also, since I was the only researcher transcribing and analyzing the continuous speech segments, rater reliability should be explored. To ensure more accurate analyses, collaboration with another phonetician to analyze the continuous speech utterances would have increased the reliability of the data collected.

These limitations notwithstanding, I believe that this study gives an accurate account of the characteristics of Serbian L1 speakers' interlanguage when it comes to specific features of <th> pronunciation. The data provided can help develop some specific strategies that Serbian L1 English learners could employ. There has been a need for this kind of research because other researchers on this issue were gathering data based only on perception. Future studies should expand on possible intelligibility issues of Serbian L1 speakers of English.

ABOUT THE AUTHOR

Jovana Jevremovic (maiden name Marinovic) is an MA TESL graduate from St. Cloud State University. While dedicated to teaching ESL, she has explored linguistics and took the opportunity to contribute to the research on her L1 (Serbian) speakers of English. Jovana is originally from Kragujevac, Serbia, where she has finished her BA and MA in English Language and Literature at the University of Kragujevac. She is an alumna of the Global UGRAD Exchange program which brought her to SCSU, and she has felt like she belongs to the community ever since. Therefore, she has decided to pursue doctoral studies at the same university and is currently in her second semester of Higher Education Administration Ed.D. program. She is a graduate research assistant at SCSU Online department and she teaches English online. Email: jovanamarinovic09@gmail.com

Recommendation: This paper is an abridged version of Chapter 2 of **Jevremovic's** MA thesis supervised by **Dr. Ettien Koffi** who recommended it for publication.

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