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## **The Relationship between Perception and Production of Fricatives by Thai Learners of English**

Irish Chan Sioson  
Western Languages Department, Thaksin University  
Khao Rup Chang, Songkhla, Thailand  
\*sioson.irish@gmail.com

### **ABSTRACT**

With English being considered as lingua franca in various settings, there is a great need for mutual intelligibility among participants in different discourses. While comprehensibility accounts for the difficulty listeners experience when understanding speech, intelligibility refers to “how much of the speech is actually understood by interlocutors” (Munro, 2011, p. 9), making both comprehensibility and intelligibility necessary ingredients for successful communication. Situated in Eckman’s (2006) Markedness Theory and Flege’s (1995) Speech Learning Model (SLM), this study aims to investigate whether a relationship exists between the perception and production of fricatives by sixty Thai learners who were taking English as their specialization at a university in Thailand. While most studies exploring the connection between perception and production employed word lists as instruments, the present investigation is different in that it considers the use of sentence level prompts (in context), along with the more commonly used word lists (in isolation) since the participants were at the undergraduate level and were exposed to longer classroom discourse in English. The results show a positive weak correlation between the variables in both isolated and in context settings. If the Thai learners could perceive the fricative sounds, they may or may not be able to produce the fricative sounds accurately. The same is true that if they can produce the fricative sounds, it does not necessarily mean that they can perceive the sounds correctly in isolated or in context settings. Pedagogical implications such as training, out-of-class activities, and materials development, are then drawn from the findings.

*Keyword:* intelligibility, perception and production, fricatives

### **Introduction**

With the demands posed by globalization, and with English being considered as lingua franca in various settings, there is a great need for mutual intelligibility among participants in different discourses. While comprehensibility accounts for the difficulty listeners experience when understanding speech, intelligibility refers to “how much of the speech is actually understood by interlocutors” (Munro, 2011, p. 9), making both comprehensibility and intelligibility necessary ingredients for successful communication. In EFL settings, where English is primarily learned in schools, there is a greater need for more exposure and opportunities for practice in the English language, as well as strategy training for students.

Common sources of difficulty in speaking for non-native English speakers include recognition, discrimination, and production of sounds. In Thailand, as in other EFL settings, exposure to the English language is also an important factor that accounts for the lack of opportunities to practice language. Along with observations from Thai speakers and the

literature (e.g., Kanokpermpoon, 2007; Khamkhien, 2010; Wei & Zhou, 2002), certain sounds pose challenges for many Thai learners of English. They emphasize the value of intelligibility especially in the area of pronunciation and express concern over the pronunciation problems of Thai learners.

For instance, with differences in the Thai and English phonology, some consonantal sounds have been identified as sources of difficulty in pronunciation among Thai learners of English such as plosives, nasals, fricatives, and affricates. This study, however, focused on the fricatives, /θ/, /ð/, /v/, /f/, /ʒ/, /ʃ/, and /z/ and /s/ especially since it has been found that such sounds tend to be problematic for Thai learners of English. This is because English fricatives are very rich and occur in different environments (i.e., initial, medial, and final positions) as compared with Thai's system which only has three fricative sounds, all occurring in the initial position. Moreover, cross-linguistically, the dental fricatives /θ/ and /ð/ are generally considered marked due to their rarity (De Wilde, 2010), posing more problems for L2 learners of English, as compared with other fricatives.

It would, therefore, be interesting to confirm this assertion when considering the discrimination and production of such sounds by Thai learners. It has also been generally viewed that perception precedes production, at least in the area of first language acquisition (Beach, Burnham, & Kitamura, 2001; Rungruang, 2014; De Wilde, 2010). In second language acquisition, there has also been evidence that this is also the case (e.g., Best, 1995; Detey & Racine, 2015; Flege, 1995), and that a link between perception and production has been found (Beach et.al, 2001). However, this perception-production connection and whether one precedes the other remains challenged. It is hoped that the study will examine whether the perception and production of the fricative sounds by Thai English learners correlate with each other, as well as draw pedagogical implications from the results of the investigation.

### Objectives

This study aimed to determine whether correlations exist between the Thai learners' perception and production of critical sounds in English, particularly the fricatives in isolation and in context. The present investigation differs from the previous studies in that it considers the use of sentence-level prompts (in context), along with the more commonly used word lists (in isolation). The reason for this is that since the participants are at the undergraduate level, they are commonly exposed to the English language in use or in context, especially in an academic setting where teachers conduct lectures and classroom activities in English. While the prompts in context only made use of sentences, it would be interesting to note other prosodic features for speech especially in terms of their perception of the sounds.

### Research Questions

This study sought to address the following questions:

1. Is there a correlation between the students' perception and production of the fricatives in isolation?
2. Is there a correlation between the students' perception and production of the fricatives in context?

### Theory

**The contrastive analysis hypothesis (CAH).** In terms of early theories that attempt to explain difficulties in second language acquisition (SLA), the contrastive analysis hypothesis

(CAH) accounts for learner difficulties, attributing to the interference of the first language (L1) system with the second language (L2) system as the primary hindrance to SLA. Formulated by Lado (1957), CAH posits that a scientific structural analysis of two languages helps predict the difficulties second language learners encounter. The more similarities the two linguistic systems have, the easier it is for learners to learn these linguistic aspects or elements, and conversely, the more different two linguistic systems are, the more difficulties learners will have when learning the target language.

CAH, however, has been challenged due to its oversimplification of the process and the difficulty in verifying whether such errors or learner difficulties can actually be predicted, leading to the conclusion that great difference does *not* necessarily cause great difficulty. The shortcomings of the CAH later led to other explanations such as Bates and MacWhinney's (1982, as cited in Brown, 2007) Competition Model, the Avoidance Theory by Schacter (1974, as cited in Brown, 2007), and Eckman's (2006) Markedness Theory or the Markedness Differential Hypothesis.

**Markedness theory.** Eckman (2006) proposes an alternative theory to CAH that would help account for learners' difficulties. While he acknowledges the merits of CAH as regards the systematic comparison of two languages, he argues that certain aspects of a language can be more difficult to acquire due to its markedness. Accordingly, using the principles of universal grammar, the relative degrees of difficulty for the learners directly correspond to the degree of markedness. Eckman (2006) defines markedness as "A phenomenon A in some language is more marked than B if the presence of A in a language implies the presence of B; but the presence of B does *not* imply the presence of A" (p. 320). He notes that given the differences between two languages, there will only be certain areas in which learners are predicted to encounter difficulties while other areas will not pose any problems to the learners. He also recognizes that the learners' L1 may account for their difficulties in learning the L2 to some extent, specifically the extent of the markedness in the areas of differences between L1 and L2. Hence, certain linguistic items need not be learned anew by second language learners given that they have already learned them in their own L1.

**Speech learning model.** Flege's (1995) Speech learning model (henceforth, SLM), which aims to provide an explanation for why 'earlier is better' (p. 233), at least in the area of L2 pronunciation, also underpins the present study. This framework considers foreign accents and errors in production in relation to errors in perception. While the notion of transfer is also taken into account in this model, a different interpretation of transfer is made in that the new phonemes encountered in L2 will pose less difficulty for the learners than when acquiring sounds in L2 that are similar with the sounds in their L1. Because of the learners' perception of sounds as similar or equivalent, there is a tendency to replace the sound in L2 with the sound in L1, hindering them from making new categories. Speech perception has been found to influence production. That is, "learners cannot produce accurately what they cannot perceive accurately" (Detey & Racine, 2015, para. 1). However, it is also possible that production precedes perception (e.g, Sheldon & Strange, 1982 as cited in Eckman, et al., 2007; in Rungruang, 2014).

## Methodology

### Research Design

This study employed the descriptive- quantitative analyses of the perception and production of voiceless fricatives by Thai undergraduate students majoring in English in a university in Thailand. With its objective to determine the relationship between the two variables (perception and production) in two different settings (in isolation and in context), this study

specifically used a correlational design to find out whether an increase or decrease in one of the variables matched an increase or decrease in the other variable, or whether the correlation was by pure chance.

### Participants

This study involved sixty undergraduate students who were in their second year in the English program as their field of specialization in a university in Thailand. Students who had dental braces were excluded from the study as this would affect their production of the fricative sounds. All the participants use Thai, being their first language, at home, while not one of them uses English at home. The majority of the participants were 20 years old at the time of the study, and most of them began their formal study in English at a relatively young age (4- 7 years old).

### Instruments

A modified language background questionnaire by Sioson (2011) and a consent form were used in the study. The background questionnaire was designed to identify the demographic data of the participants such as their age, language/s used at home, age they started to learn English, their self-rating of their abilities in listening, speaking, reading, and writing in their native and English languages, as well as the frequency of exposure to the English language. A Thai English professor from the same university translated the items in the questionnaire into Thai language.

Two instruments were developed and subjected to experts' validation. These instruments included two perception tests (in isolation, in context), which were also used as production tests (in isolation, in context). The tests were divided into two sections. The first section has four parts which corresponded to the fricative sound contrasts (i.e., /θ/ and /ð/, /v/ and /f/, /ʒ/ and /ʃ/, and /z/ and /s/). Each section is composed of 18 items of isolated words, in which each sound has three items in all the three environments (initial, medial, final positions). For example, the voiceless sound, /θ/ has three items in the three positions, totaling 9 items, and its voiced counterpart /ð/ also has the same number of items per environment. All the words for these sections were based on the word lists provided by *Home Speech Home* (2016). The first three words listed for each particular phonological environment were included in the test. Only words with three syllables were considered for the medial position while one-syllable words were used for both the initial and final positions. The total number of items for this section was 72. Frequency of certain words in which the target sounds are placed in a particular environment, for example, the /ð/ in the final position or the /ʒ/ in the initial position became a factor, as well. Hence, it was unavoidable to include words such as "bathe", "clothe", "genre" and "Jacques". These less frequent words may influence the results, and even more with their production since they are relatively uncommon word compared with their more common counterparts (e.g., "bath" for "bathe" or "cloth" for "clothe").

The second section also has four parts corresponding to the four fricative contrasts. However, since this type of test required full sentences (in context) the number of words varied in each sentence. At least two words with the same sound in a particular phonological environment were included in the items. The first part (/θ/ and /ð/) has 19 items or points; the second part (/v/ and /f/) has 20 items or points. The third part (/ʒ/ and /ʃ/), has 15 items while the last part (/z/ and /s/) has 23 points. The total number of items for this section was 77.

These tests were both used for the perception and production of the respondents. Instructions in the tests were presented in both English and Thai languages. For the perception tests, the items were recorded and played during their administration. For the first

section, the students were instructed to encircle the sound of the word they heard, whether in the beginning, middle, or end of the word. There was a 3-second gap between the items to give time for the students to encircle their answers. For the second section, the students were instructed to write the symbol for each sound below the word. There was a 15-second gap between each item. As the students had already taken English Phonetics course in the previous semester, and were taking Introduction to English Linguistics at the time of the study, it was assumed that the participants were already familiar with the phonetic symbols. Moreover, sample items and verbal explanations of the instructions were done to ensure the clarity of the instructions. The written instructions were also presented both in English and Thai languages. One important limitation to the development of the instrument is the audio-recorded perception tests as the items were read by the researcher who is a non-native speaker of English, but whose accent was generally judged as “neutral” by a native speaker of English, but has taught phonetics and phonology courses and has conducted pronunciation trainings for teachers and students in an ESL (English as a Second Language) context. Another consideration is that since the researcher was also the participants’ teacher in the Linguistics course and in their Oral Communication course taken the previous semester, it was assumed that the students’ familiarity with the speaker’s accent had already been established at the time of the study.

The tests for perception were also the same tests for production, in which the participants read both the first section (in isolation) and the second section (in context) while they were being recorded. This was done two days after they had taken the perception tests. The tests were subjected to experts’ validation. Two English teachers who hold a Ph.D. in Applied Linguistics were the validators of the instruments. They were asked to evaluate the tests in terms of their content, organization, and format/ layout. Their suggestions were then incorporated in the revised instruments.

### **Procedure**

Students’ consent to participate in the study was sought by asking them to accomplish the consent form which included the nature and purpose of the study, as well as the procedure describing their involvement in the study. They were also informed that their participation in the study would not affect their grades in their subject in any way.

The language background questionnaire and the perceptions tests were then administered, which took about 30 minutes of the class period. The tests were given by the researcher who was the students’ teacher for the subject Introduction to English Linguistics. Aside from the written instructions, verbal explanations and sample items were provided to ensure that the respondents understood what they were supposed to do.

The production tests were then done two days after the perception tests were administered. As the production tests required the participants to read the text and audio-record their oral reading, the administration of the tests took about three weeks, with each recording of the reading lasting for about four to five minutes. The tests were conducted during the free time of the students and the researcher. As much as possible, the production tests were done in a quiet place, though background noise was inevitable as some participants engaged in conversations with their peers while waiting for their turn to do the task. In terms of scoring, self-correction of sounds or the last reading of the word was considered as their final answer, and therefore was scored correctly.

The results of the perception and production tests were then subjected to statistical treatment for analysis and interpretation of the data, in consultation with a statistician.

### Statistical Treatment

To address the research questions, Pearson- product moment correlation ( $r$ ) was deemed appropriate to determine whether a significant relationship exists between perception and production in both isolation and context settings. Scores in the perception tests (in isolation and in context) were correlated with the scores in the production tests (in isolation and in context), to see whether one variable is associated with another variable or whether the association between the variables is absent.

## Literature Review

### Intelligibility and pronunciation

With the rapid growth and demands posed by globalization, never has the need for English, specifically, *intelligible* English, been more pronounced. Two important concepts related to intelligibility have been distinguished: comprehensibility and intelligibility. The former accounts for the difficulty listeners experience when they try to understand speech while the latter refers to “how much of the speech is actually understood by interlocutors” (Munro, 2011, p. 9), making both comprehensibility and intelligibility necessary components for successful communication. One domain of language in which intelligibility is realized is speech, particularly, pronunciation. Reduced intelligibility may be attributed to errors in pronunciation (Basson, 1986, as cited in Wei & Zhou, 2002). Unintelligible pronunciation becomes a communication barrier (Wei & Zhou, 2002), results in frustration by and amusement from English native speakers (De Wilde, 2010), attached stigma to non-native accents (Gluszek & Dovidio, 2010), and ambiguity (Phimsawat, 2013). Pronunciation instruction is therefore deemed necessary in addressing problems with intelligibility.

In Thailand, as in other EFL settings, exposure to the English language is also an important factor that accounts for the lack of opportunities to practice the language. Wei and Zhou (2002) noted that Thai EFL learners demonstrate several problems in pronunciation, and cited specific examples in which borrowed words from English are pronounced in Thai style such as “Topland (without /d/), supermarket (without /t/), Lotus (without /s/ and /t/ as /d/)” (p. 1), among others. They noted that the Thai unintelligible pronunciations for such borrowed words were due to their failure to notice that those words are English words, and therefore, they refuse to learn the English way of pronouncing them since they think that they already know the words when they encounter them. This is similar to Reed and Michaud’s (2011) point that despite pronunciation modeling of teachers, learners still continue to produce their incorrect pronunciation, seemingly not hearing the correct way of pronouncing. Khamkhien (2010) found that the Thai learners’ pronunciation competence, specifically on word stress was generally unsatisfactory, given the EFL setting which offers limited opportunities for language use.

Another factor for consideration is the concept of transfer, which is said to play a crucial role in that L2 acquisition is influenced by the L1’s phonological inventory. This idea was considered in the Contrastive Analysis Hypothesis (CAH) which posits that L2 errors may be predicted due to L1-L2 contrasts, in that elements shared by the two languages would not pose problems for the L2 learners while those phonemes that are present in L2 but absent in L1 become sources of errors. In L2 phonology, for instance, when similar phonemes are present in both languages, it is believed that there would be no difficulties on the part of the L2 learner, but that errors are expected when phonemes are absent in L1. For example, Kanokpermpoon (2007) investigates consonant sounds that would likely pose problems for Thai learners of English in that those sounds in English that are absent in Thai phonology are predicted to be sources of difficulties for the students. This is similar with Phimsawat’s

(2013) point that the phonemes that do not exist in Thai phonology are likely to pose challenges to the Thai learner.

Moreover, the phonological environment or distribution becomes another problem when sounds which are present in both English and Thai occur in different syllable positions (i.e., initial, medial, or final). In their study on the pronunciation problems of Thai learners of English, Wei and Zhou (2002) also attributed the features of sounds to differences in languages, for example, in terms of consonant voicing, consonant clusters, intonation, and stress. They further pointed out the Thai way of speaking as regards intonation being transferred to their pronunciation of English words is one of the reasons for why Thai learners have difficulty with English pronunciation.

However, CAH could only provide a partial explanation for the errors of the L2 learners. Hence, Eckman (2006) proposes an alternative theory to CAH that would help account for learners' difficulties. While he acknowledges the merits of CAH as regards the systematic comparison of two languages, he argues that certain aspects of a language can be more difficult to acquire due to their markedness. He argues for the incorporation of the degree of difficulty corresponding to typological markedness. Accordingly, using the principles of universal grammar, the relative degrees of difficulty for the learners directly correspond to the degree of markedness. Eckman (2006) defines markedness as "A phenomenon A in some language is more marked than B if the presence of A in a language implies the presence of B; but the presence of B does *not* imply the presence of A" (p. 320). Hence, certain linguistic items need not be learned anew by second language learners given that they have already learned them in their own L1.

Brown (2007) further cites some studies that support the markedness theory. For instance, it has been found that as regards acquisition of morphemes, there seems to be a specific sequence of acquisition in that unmarked items are acquired earlier than the marked items (Rutherford, 1982, as cited in Brown, 2007). Another study that lends support to the markedness theory is Major and Faudree's (1996, as cited in Brown, 2007) investigation on the performance of Korean learners of English in terms of phonology. Rungruang (2014) also employed this theory as framework for his study on the perception and production of English coda clusters by Thai learners considering the differences of English and Thai syllable structures. Since English has more complex codas and Thai has simplex ones, it is believed that Thai learners of English would have more difficulty learning the coda of the language, than it is for English speakers learning the Thai language.

Flege's (1995) Speech learning model, which aims to provide an explanation for why 'earlier is better' (p. 233), at least in the area of L2 pronunciation, is also considered in the present study. This framework considers foreign of transfer is also taken into account in this model, a different interpretation of transfer is made in that the new phonemes encountered in L2 will pose less difficulty for the learners than when acquiring sounds in L2 that are similar to the sounds in their L1.

Aoyama, Flege, Guion, R. Yamada, and T. Yamada's (2004) longitudinal study on the English /l/ and /r/ contrast by Japanese speakers lend support to the SLM. By investigating the learners' perception and production of the sounds, they found that children native speakers of Japanese demonstrated better improvement in the English /r/ compared with the English /l/, with the participants having a significant improvement in terms of the production of the sound /r/ than /l/. Such findings support the SLM in that the success in L2 phonetic acquisition is influenced by how much is the perceived phonetic differences. Moreover, Ingvalson, McClelland, and Holt (2011) examined the predictions made by the SLM in the English /l/ and /r/, as well. This time, other variables were considered such as the length of residency (LOR) in North America, age of arrival in North America, Japanese

usage percentage, and the number of years as a student in English setting in relation to the degree of foreign accent, perception of the sounds, and their intelligible productions of the sounds. The results also provide support to the SLM, along with the two factors considered in the model such as the amount and type of experience with the target language, as crucial in L2 phonetic acquisition.

### **Perception and production**

Perception of sound contrasts already takes place among newborns in the first days and their production skills later develop. In the field of first language acquisition, it has been widely viewed that perception precedes production (Beach, et. al, 2001; Rungruang, 2014; De Wilde, 2010). There has also been evidence that the same is true in the field of second language acquisition (e.g., Best, 1995; Detey & Racine, 2015; Flege, 1995), and that it has been found that there is a connection between perception and production (Beach et.al, 2001).

A study that found a close relationship between perception and production in L2 phonological contrasts is that of Yamada et.al, (1996) who investigated whether training in perception influenced the production of twenty-three Japanese native speakers. A significant improvement had been noted when their pretests were compared with their posttests in both perception and production tests involving English /l/- /r/ minimal pairs, leading to the conclusion that “perception training produced long-term modifications in both perception and production” (para. 21). Such findings guide pedagogical implications on the merits of training that Wei and Zhou (2002) also emphasized.

For instance, Reed and Michaud (2011) also made the observation that although teachers provide models of pronunciation, the learners do not seem to ‘hear’ the target pronunciation and still produced the incorrect one. They asserted that this phenomenon could be addressed by considering the link between listening (perception) and speaking (production) as an “auditory feedback loop, in which speakers use their own output—their own mental model of a sound—as input for their production” (p. 95).

However, this perception-production link and whether one precedes the other remains challenged. For instance, De Wilde (2010) cites some studies (e.g., Brierre, 1966; Sheldon & Strange, 1982) which found that it is production that precedes perception. Although De Wilde’s (2010) investigation found a connection between the two, it yielded different results in the experiments conducted. Employing two production and two perception tests, she found that when the production test results were compared with the results of the AXB task, perception precedes production. Another notable finding of the study is that it was production which precedes perception when the results of the production task were set side by side with the results in the categorization test, leading to the conclusion that the developmental stages in learning could have influenced the participants’ perception skills.

Beach et. al’s (20001) study also found that “production determines perception” (p. 232), with perceptual performance possibly being influenced by production patterns. They compared the discrimination of Thai bilabial stops between bilingual (Greek/Australian English) speakers with monolingual Australian-English speakers. Involving bilingual and monolingual speakers as well as Thai participants, the study found that aside from the knowledge of phonemic systems of two languages, exaggeration in the production of the sounds is found to be important in discriminating unfamiliar sound contrasts. Apparently, by paying attention to the more salient features of sounds, those with stronger perceptual ability tended to exaggerate these same features during production.

Despite such findings from studies that found a strong link between perception and production, there are other factors that play a significant role in establishing the connection. For instance, Flege (1995) cautions that AOL (age of learning), as well as differences in

methodology, may weaken the correlation between the two constructs. For example, AOL as a factor, based on the studies (e.g., Oyama, 1978; Yamada, 1995) reviewed by Flege (1995) seems to be very influential on L2 production of sounds.

In another study, it has been found that for EFL Thai learners, there was no relationship between perception and production as far as three types of consonant clusters were concerned (Rungruang, 2014). Apparently, the increase or decrease in their perception and production scores seemed to occur by pure chance, so that even if they were able to perceive the sounds accurately, it did not necessarily increase or decrease their correct production of sounds. Moreover, while the study noted that the students seemed to perform better in terms of perception than production, the author concluded that production requires more practice and better understanding of place and manner of articulation.

While most studies exploring the connection between perception and production (e.g., Detey & Racine, 2015; Eckman et. al, 2007; Rungruang, 2014; Yamada, et. al, 1996) employed word lists as instruments, the present investigation differs from the previous investigations in that it considers the use of sentence-level prompts (in context), along with the more commonly used word lists (in isolation).

## Findings

### Overall picture

To illustrate the overall picture of the data, Table 1 shows the mean and standard deviation of the students' scores in perception and production tests in both isolation and context settings.

Table 1

*Mean and standard deviation in perception and production tests in isolation and in context*

	Isolation		Context	
	Perception	Production	Perception	Production
Mean	55.50	56.75	56.42	61.78
SD	5.98	5.50	9.31	4.80

As can be seen, the students generally have almost the same mean scores for perception (total of 72 items) and production (total of 77 points) in isolation, with their perception mean scores in context. Interestingly, their production in context (M= 61.78) is relatively higher compared to the other mean scores. In terms of the standard deviation, the group seems to be relatively homogeneous, at least in their SD in three areas: perception and production in isolation, and production in context. The close differences among their mean scores and standard deviations in all the tests seem to indicate consistency in their perception and production performance. A general glance at the test items seem to show that there are some fricative contrasts that seem easier to perceive and produce (/f/ and /v/), which might be treated as unmarked while some contrasts are harder for them to perceive and produce (/θ/ and /ð/) and may therefore be assigned as marked while some sounds are easier to perceive (/z/ and /s/), but harder to produce (/z/ and /s/) in different phonological environments, lending support to the Markedness Theory. In other words, it might be the case that there are certain sounds that are considered marked in terms of perception, but unmarked in terms of production or vice versa. This mirrors the findings of Detey and Racine (2015) in which the two nasal sounds which were perceived to be phonetically similar were easily perceived than produced, while the nasal sound [ŋ] was easily acquired, being considered as a “new” phone. The findings from their study and the present study lend support to the SLM.

Although these points are beyond the scope of the study, it is interesting to note that while these fricative sounds were found to be problematic for Thai EFL learners there are fricatives that may be easily perceived but difficult to produce. For instance, Kanokpermpoon (2007) asserted that all the three fricative sounds (/f/, /s/, and /h/) in Thai only appear in the initial position and that the other English fricatives would be problematic since they are absent in English. While this point is supported by the findings of the study, there are some English fricatives that the students did not have difficulty discriminating and producing. While some students had difficulty producing the /θ/ and /ð/, most of them were able to produce them correctly when the dental fricatives are in the initial position. These findings lend support to the SLM in that certain sounds, in this case, /v/, θ/, and /ð/ which may have been dissimilar phonetically are deemed to be “new” phonemes and therefore, easier to acquire for the L2 learners.

Furthermore, the frequency of certain words in which the target sounds are placed in a particular environment, for example, the /ð/ in the final position or the /ʒ/ in the initial position became a factor and could have also influenced the results of the study. Since it was unavoidable to include less frequent words such as “bathe”, “clothe”, “genre” and “Jacques”, the students’ production of these words might have posed a problem. For instance, while 44 and 40 students did not perceive the words “bathe” and “clothe”, respectively, 56 and 60 (100%) of the students did not produce them correctly, most of whom reading the words as “bath” and “cloth” with the /θ/ as the final sound. This also means that most of the participants were able to produce the /θ/ sound in the final position, though in this case, the words in question used the voiced /ð/. Hence, word frequency and therefore, familiarity with the words could also provide an explanation for such findings.

### Answers to Research Questions 1 and 2

Table 2 shows whether there is a relationship between the students’ perception and production of fricatives in isolation and in context.

Table 2

*Relationship between perception and production of fricatives in isolation and in context*

	Correlation coefficient (r)
In isolation	0.24
In context	0.31

With a correlation coefficient of 0.24, the results show that there is a positive weak correlation between the perception and production of English fricatives in isolation by Thai learners. This means that while a relationship can be observed between the two variables, the link is too weak to conclude that as perception increases, the production increases as well.

As can be seen, a correlation coefficient of 0.31 also yields a positive weak correlation between the perception and production of English fricatives in context by Thai learners. This suggests that as their perception scores increase, there is lower chance of their production scores to increase as well.

### Discussion

Drawing on the results from both settings (in isolation and in context) the findings show that if the Thai learners could perceive the fricative sounds, they may or may not be able to produce the fricative sounds accurately. The same is true that if they can produce the

fricative sounds, it does not necessarily mean that they can perceive the sounds correctly whether in isolated or in context settings. The findings are close to that of Rungruang (2014) who found no significant relationship between the perception and production of Thai students as far as three types of consonant clusters were concerned, which meant that when the learners perceived the speech sounds correctly, their correct production of the sounds was made by pure chance only.

Moreover, the findings of this study seem to be consistent with Flege's (1995) point that other variables such as AOL or methodological aspects of the research may affect the strength of correlation between perception and production. While AOL was not actually considered as a variable for examination in this study, it may somehow provide an explanation for the weak correlation found in the present research. Although the participants began to learn English at a relatively early age (4-7 years old) their limited exposure to the language outside school could have influenced their speech perception and production. It is interesting to reiterate that none of the participants used English at home, which illustrates the lack of exposure to the language which could affect the way they discriminate English sounds (perception), as well as the lack of opportunities to practice them (production). This calls to mind Rungruang's (2014) point on his study on Thai EFL learners that production requires more practice and better understanding of place and manner of articulation. For example, AOL as a factor, based on the studies (e.g., Oyama, 1978; Yamada, 1995) reviewed by Flege (1995) seems to be very influential on L2 production of sounds. Flege offers a possible explanation that accounts for the role of age in L2 production in that L2 learning at an early age may facilitate learners to 'pick up' detailed information on the sounds in L2 as compared to those learners who started learning the L2 at a later time. Given this assumption, and situated in an EFL setting such as Thailand where exposure to the English language is quite limited outside an English class, this may have influenced the students' perception and production of sounds.

Moreover, despite their young age learning the language, it is also possible to account for models of correct pronunciation, that is, the teachers, that would affect the way they perceive and produce English sounds, as Wei and Zhou (2002) identified one cause of pronunciation problems for Thai learners is the Thai style of pronouncing English words by some teachers. They pointed out that "Since the teacher's pronunciation is Thai style, the students' pronunciation will be the same" (p. 7). The AOL and the exposure to the target language factors would also lend support to the explanation raised in SLM that as far as L2 pronunciation is concerned, 'earlier is better' (Flege, 1995, p. 233). Phimsawat (2013) also pointed out that are only a few teachers who are well- trained in English phonetics and contrastive phonology. Knowing for instance, Chomphan's (2012) description of the Thai speech phonology would be expected to aid teachers in the pronunciation instruction of Thai EFL learners. This then leads to more training for teachers in English phonology and contrastive phonology, along with the methodological trainings for them to teach phonology to EFL learners.

In relation to providing good models for English pronunciation, it is also important to note the people learners interact with. As pointed out by Ingvalson et. al, (2011) it is insufficient that the quantity of exposure to the target language be considered, but the *type* of experience the learners have and *with whom* they experience the language play very significant roles in L2 acquisition. In this study, even if the participants began studying at a relatively young age, the limitation in their interaction with speakers of English and the use of the language outside the classroom poses additional constraints in L2 acquisition, at least as far as discrimination and production of sounds are concerned. The students would, therefore, benefit from out-of-class activities that provide regular exposure to and interaction

in the English language. It would also help if they are provided with a print-rich environment at home and given readings in the English language as part of these activities. According to the participants' demographic information on their exposure to the English language, it is the internet, of all the other forms of media such as television, newspaper, or radio, as the most common source of their exposure to the English language. By capitalizing on online sources written in English, such as news articles, blogs, or even social networking sites, the learners do not only get exposure to the language, but they are provided with opportunities to use the language, for instance, by writing in the comments sections of the article, or by posting their status in English online.

Another possible explanation for the weak correlation found in this study may have something to do with its methodological constraints. For instance, the gap between items in the perception tests might have influenced their performance as well. The time allotment with 3-second gaps for words in isolation and 15-second gaps for items in context might have affected their answers. Moreover, in the items in context, it is possible that they were only able to notice the sounds in question in the initial position due to its salience and/or orthography. For instance, the sounds and orthography for /f/ and /v/ and /s/ and /z/ are pretty much straightforward, but with the word "chef" /ʃɛf/, 19 students got this wrong in the perception test, but only one student was not able to pronounce it correctly in the production test. Another example is the word "is" in which for the perception part, 43 did not "perceive" it correctly /Iz/ and marked the item as "s", when in the production test, only one participant produced it as /s/ while the rest were able to produce the sound /z/. The orthography of the word may have been a factor in the results of the study. Another related point is the familiarity of students with some words, as in "voyage" in the expression, "bon voyage" and "collage" which both have the /ʒ/ sounds, and are closely similar with the words "voyage" and "college". Because these words are relatively uncommon, and therefore, marked, it is no surprise that the students would have problems with familiarity with or exposure to such words. Such possible explanation would then lend support to the Markedness Theory, in that despite the differences in the two language systems which could predict the learners' difficulties, as posited by CAH, there are certain aspects of language which can be more difficult to acquire due to their level of markedness.

Not surprisingly, therefore, that the results of the study seem to conflict with the findings from most studies (e.g., Detey & Racine, 2015; Yamada et al., 1996), which found a relationship between perception and production, since as pointed out, Flege (1995) notes that several factors may weaken the correlation between the two.

### Limitations

As fricative sounds were deemed to pose challenges for Thai English speakers (Kanokpermpoon, 2007; Khamkhien, 2010; Wei & Zhou, 2002) the study limits its extent to English fricatives especially because they are very rich and occur in different phonological environments (i.e., initial, medial, final positions) compared to Thai's system, which only has three fricative sounds, all of which occur in the initial position. Moreover, as the aim of the investigation is to identify the correlation between the variables, it is only limited to describing the current perception and production skills of the participants, and therefore, the study did not employ any interventions as well as it did not account for other variables such as age of learning (AOL), motivation, language proficiency level, gender, exposure to the English language, among others. However, while such variables were not considered to be correlated with perception and production, the participants' background may aid in providing possible explanations for the results of the study.

### Recommendations

As the results of the present study add to the conflicting findings in the literature, it is suggested for future researchers to explore other areas of investigation in relation to the phonological perception and production of EFL and ESL learners by considering the following recommendations:

1. studies on other phonetic sounds that pose great difficulty for native speakers of other languages,
2. research that identifies and explores specific marked and unmarked sounds in a particular language,
3. explorations of learner factors such as AOL, gender, experience with the language, among others to examine their relationship with the students' perception and production of L2 phonology,
4. research on perception and production of sounds using standardized means of assessment, or developing a variety of assessment tools that consider different phonological environments of specific sounds,
5. studies that employ teacher and student training in perception and production as intervention to determine the effects of trainings on the students' performance,
6. studies that use instructional materials based on language differences of phonological features as an intervention to identify the effects of materials on the students' performance, and
7. investigations on the perception and production of other linguistic areas beyond the phonological level, for example, morpho-syntactic, semantic, or pragmatic aspects of the language.

### Conclusion

Pedagogical implications may then be drawn from the findings of the study. First, trainings for both teachers and students are strongly recommended as Yamada et. al (1996) found that identification training led to long-term modifications in the perception and production of EFL learners. Wei and Zhou (2002) also stressed the importance of pronunciation training to EFL teachers, as they identified the Thai style of pronouncing English words as one of the reasons for the pronunciation problems of Thai learners. Second, part of this training or instruction would be exposure to a variety of authentic materials such as videos, audio-recordings, newscasts, or songs and to serve as models of intelligible pronunciation and engagement in out-of-class activities to increase their perception and sensitivity to sound contrasts and to enhance the type of experience they have with the target language. Third, including phonetics courses (Saalfeld, 2011), as well as teaching pronunciation learning strategies (Sardegna, 2011) would also be useful for improving pronunciation. Fourth, methodological training for teachers is also recommended since aside from providing good models of pronunciation, explicit instruction especially when it comes to articulatory techniques and properties that influence pronunciation would be beneficial to learners of English. Moreover, as Kalackal (1985, as cited in Wei & Zhou, 2002) suggested, presenting the descriptions of articulation of both the L1 and L2 would help students realize and correct their own way of pronouncing. Finally, appropriate assessment tools may be devised to evaluate students' performance in both discrimination and production of sounds.

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