

# Relationships between Foreign Language Sound Perception and Production and Experimental Evidences Obtained in Thai Native Speakers

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**Abstract---** *The purpose of this article is to discuss the issues concerning the relationships between foreign sound perception and production. The relationships between foreign sound perception and production are complex and there are two controversy findings: perception precedes production or vice-versa. The assumption of perception precedes production, which was originally proposed by Polivanov (1931) claimed that perception of a new phonetic contrast must necessarily precede its production. Whereas, the assumption of production precedes perception points out that in certain cases, the production of FL sounds might precede their perception (Neufeld, 1988; Borrell, 1990). This paper will provide the comparison of these two assumption as well as the experimental evidences of relationships between perception and production in foreign language based on a finding of error rate analysis obtained from English voicing perception task and production task in 200 Thai native speakers.*

**Keywords---** *Speech, Perception, Production.*

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## I. INTRODUCTION

This article was interested to examine the important issues in foreign language phonological acquisition as the foreign language sound perception and production.

The consideration will focus on the relationships between foreign sound perception and production. It is revealed that the relationships are complex and there are two controversy findings: perception precedes production or vice-versa. The paper will be begun with the explanation of language-specific sound perception based on phonetics field, the production of consonants in terms of voicing feature, and the assumption of perception precedes production, which was originally proposed by Polivanov (1931) claimed that a new phonetic contrastive perception must be obtained preceding the production. Followed by the assumption of production precedes perception points out that in certain cases, the production of foreign language (FL, hereafter) sounds might precede their perception (Neufeld, 1988; Borrell, 1990). Then, the experimental evidences of relationships between perception and production in foreign language based on a finding of error rate analysis obtained from English voicing perception task and production task in 200 Thai native speakers will be revealed.

## II. PERCEPTION OF LANGUAGE-SPECIFIC SPEECH SOUNDS

In this paper, the explanation of language-specific sound perception based on phonetics field will be employed. Regarding to phonetics, speech sounds can be described as physiological and auditory dimensions and these two dimensions are correlated. According to the investigations in phonetics (i.e. Iverson & Kuhl, 1995; Guion et al., 2000), the results revealed that the relationship between physiological dimension of speech sounds and classifying

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speech sounds can be one-to-one, many-to-one, or one-to many relationships. For instance, physiological characteristics of vowel duration can have one-to-many relationships with different English sound categories. This is because this type of physiological characteristics is used in both vowel and consonant identifying. Therefore, speech perception is explained as mapping physiological characteristics of speech onto phonetic categories. As in phonetics, speech perception is implicitly proposed as language specific phenomenon. The phenomenon consists of mapping physiological characteristics of speech onto language specific phonetic categories. These mappings are also normally modelled as simulated neural networks, which auditory neural mapping is tuned through a proposed sensitivity to the physiological aspect of sounds.

According to the previous studies such as Pitt & McQueen (1998), and Diehl et al. (2001) mapping of physiological characteristics of speech onto language specific phonetic categories can be described as stages of speech perception. However, the way to model and describe will be different based on the theories and disciplines. For instance, Miller & Dexter (1988) and Pitt & McQueen (1998) proposed that there is a stage of pre-lexical decoding in speech perception. This stage is language-specific. Furthermore, McQueen (2004) also proposed that during a pre-lexical coding stage, a listener will perceive and analyze the acoustic-phonetic information of speech sounds as the initial input.

### **III. PRODUCTION OF VOICING IN CONSONANTS**

This section will concentrate on the production of voicing occurred in consonant pronunciation, which is relevant to the experimental evidences illustrated in this article. According to the pronunciation of consonants, there are three types of features. These three features are voicing, manners of articulation, and places of articulation. However, feature of voicing will be illustrated.

During pronunciation, the outgoing airstream, which is used in pronunciation, will be modified by activation of vocal cords. When the vocal cords are closed, the air pressure will be underneath the closure of vocal cords. Then, this air pressure will force the closure of vocal cords until the closure opens. After the closure opens, the degree of air pressure will be dropped and the vocal cords will be closed again. This sequence will be very rapidly repeated during pronunciation. This phenomenon is called vibration of vocal cords. Sounds, which are pronounced with the vibration of vocal cords are called “voiced” sounds as in [z] in the word “zebra” and [b] as in the word “bee”. Sounds, which are pronounced without the vibration of vocal cords are called “voiceless” sounds as in [s] in the word “sugar” and [p] as in the word “pie”. The distinction between voiced and voiceless sounds will be used to distinguish the types of consonants in different languages.

### **IV. PERCEPTION PRECEDES PRODUCTION OR PRODUCTION PRECEDES PERCEPTION**

According to the issue of whether perception precedes production or production precedes perception, the early assumption concerning this issue was proposed in the 1931 by Polivanov. The assumption is that the perception of FL phonemic representation was influenced from the first language phonemic representation system. This assumption also implies that the difficulties occurred in the FL perception are influenced from the structure of first language phonemic representations.

A similar assumption was proposed by Trubetzkoy in 1939. Regarding to Trubetzkoy (1939), the FL sound perception was influenced and classified by the first language sound system. Based on the assumption of Trubetzkoy (1939), the first language sound system acts as a 'filter' of FL sound perception. Therefore, there are errors obtained from the FL sound perception as the results of the influence of first language sound system. As a result, FL sounds cannot be efficiently pronounced because of the uncorrected sound perception (Renard, 1979).

Based on these assumptions, the implication is that incorrect FL sound perception is influenced from the first language sound system. Then, the incorrect FL sound perception provides an effect to the correctness of FL sound production. Therefore, the correctness of FL sound production is also influenced from the first language sound system. That is, the FL sounds, which are similar to any first language sound, will be adjusted to be equated to that first language sound (Flege, 1991). This phenomenon is defined as "equivalence classification".

Thus, regarding to the above hypothesis, the perception of a new speech sound must be occurred before the perception of that sound.

However, when a FL is learnt, not all of sounds, which are correctly perceived, will be efficiently pronounced (Borrell, 1990). These findings were also illustrated by Neufeld (1988). The observations in particular cases can be implied that FL sound perception does not necessary occur before production. The FL sound production can be occurred before perception.

In order to investigate these two controversial assumption, this article will illustrate a part of the research findings obtained from the investigation of relationships between perception and production in foreign language using English voicing perception task and production task in 200 Thai native speakers will be illustrated.

## **V. THE EXPERIMENTS OF RELATIONSHIPS BETWEEN VOICING PERCEPTION AND PRODUCTION IN FL: A FINDING OF ERRORS OBTAINED IN THAI NATIVE SPEAKERS**

### ***Participants***

200 Thai native speakers, who studied English as foreign languages were selected as the participants. These 200 participants were distinguished as two groups based their English evaluation scores. Thus, there were 100 participants obtained the highest scores and the other 100 obtained the lowest scores.

### ***Experimental Design***

There were two types of experimental design: a perception task and a production task. According to the perception task, the voicing perception task consists of 100 pairs of two words. Half of these 100 pairs are two words with the same character of voicing and another half included pairs of two words with the different character of voicing. An individual subjects heard these words on headphone connecting with computer machines. The subjects had to response to these pairs by distinguish whether two words in a pair were same or different voicing sounds. Regarding to the production task, the participants were asked to pronounce English words with voiced and voiceless initial consonants. Each participant was asked to pronounce 50 words. The correctness of pronunciation was evaluated by three English native speakers as a scale of 0 to 3. 0 meant incorrect pronunciation, 1 nearly incorrect, 2 nearly correct, and 3 correct pronunciation.

### Data Analysis

The data obtained from the perception production tasks were analyzed using Two-way ANOVA.

### Finding

According to the controversial issue on either FL sound perception precedes production or production precedes perception, English voicing perception and production tasks was conducted in 200 Thai native speakers using English as FL. The 200 Thai native speaker subjects were classified based on English language skills using English evaluation results. Thus, there were 100 subjects, who were classified as high English skilled learners and 100 subjects, who were classified as low English skilled learners.

The voicing perception task consists of 100 pairs of two words. Half of these 100 pairs are two words with the same character of voicing and another half included pairs of two words with the different character of voicing.

An individual subjects heard these words on headphone connecting with computer machines. The subjects had to response to these pairs by distinguish whether two words in a pair were same or different voicing sounds.

At this part, the percent errors obtained from a task in the perception of voiceless and voiced consonants were shown.

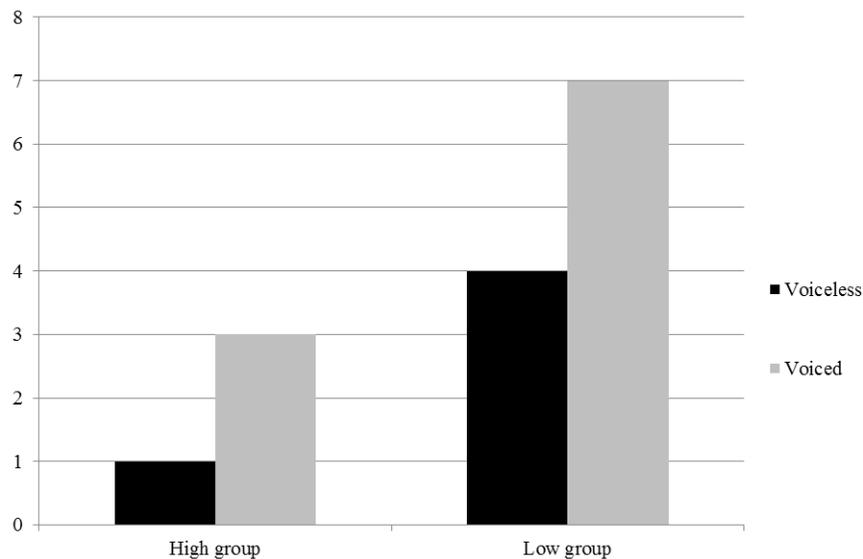


Figure 1: Errors in Voicing Perception between High and Low Groups

For the percentage of errors obtained in different types of voicing, the results in Figure 1 showed that there was a main effect for different types of voicing perception in High group  $F(1, 123) = 19.51, p < .05$  and in Low group  $F(1, 123) = 25.85, p < .05$ .

Furthermore, the detail analysis of mean correct production scores as function of voicing obtained from English production task were illustrated in Figure 2.

As illustrated in Figure 2, there were the mean correct production scores in English voiceless and voiced consonants as produced by the two groups of subjects.

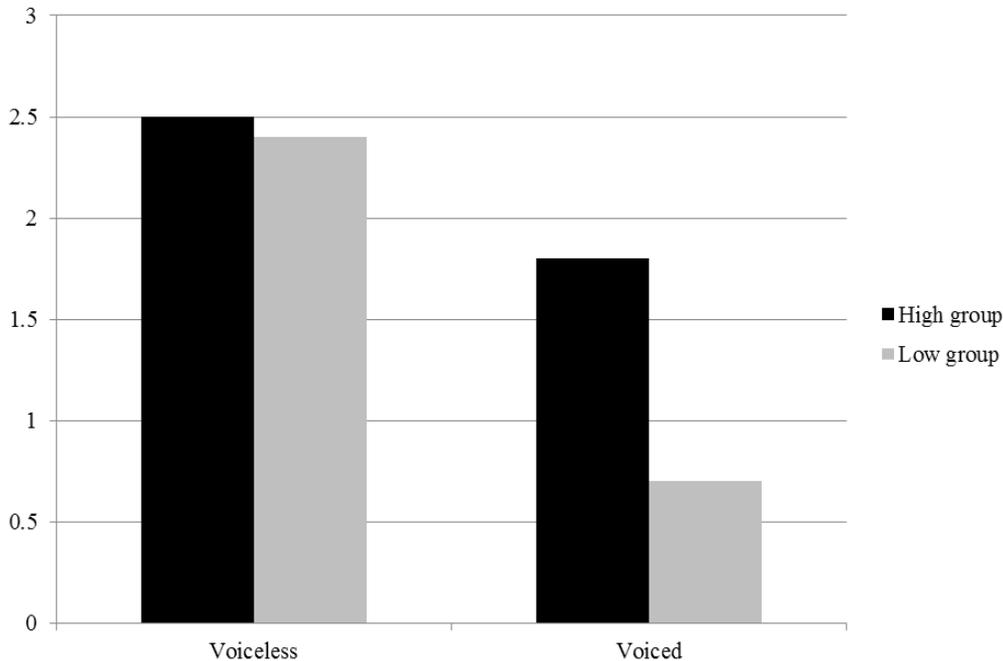


Figure 2: Mean Correct Production Scores in Voicing between High and Low Groups

Figure 2 showed that overall; the mean correct production scores obtained from the production of English voiceless consonants were higher than those obtained from the production of English voiced consonants in both High and Low groups.

Based on the analysis of error rates obtained from perception and production tasks, the results showed a close link between FL perception and production based on the sound features of voicing and the link is also related to the FL proficiency of FL speakers. The implication is that FL production should rely on FL perception. However, the results cannot clearly lead to whether there is any preceded skill. However, based on the previous studies, which are mentioned earlier, the relationship between FL perception and production cannot be simply investigated and clarified. This is because there are various factors influencing the relationship and also based on the designed tasks, which are used to investigate the phenomenon.

In conclusion, the implementation is strong supported from these results that there is strong relationship between FL perception and production. This relationship should be concerned in further investigation of foreign language learning and acquisition.

## VI. CONCLUSION AND IMPLEMENTATION

In summary, the results revealed that there is a relationship between perception and production abilities obtained in both groups of participants. The findings can be implied that there was a positive relationship between perception errors and production errors. Although, the implementation obtained from the review of previous experimental studies and the evidences obtained from Sudasna Na Ayudhya (2010) strongly support that there is closed relationship between FL perception and production. The findings also illustrated that there was different degrees of relationship between FL perception and production obtained from two groups of participants. Thus, this can be

implied that the relationship between FL perception and production can be influenced from various factors in the development of FL skill. These findings are also found in the other studies conducted using different languages. For instance, Perkell et al. (2004) and Ghosh et al. (2010) illustrated that adult samples who can greater discriminate contrastive sounds as a /s-/ʃ/ will show better contrastively production of these sounds. The similar finding was also found in the study conducted in children subjects. For example, Byun & Tiede (2017) investigated perception and production of American English rhotics in children. The results revealed that the development of sound perception and production is closely linked. However, the relationship can be matured at different rates.

The results obtained from the present study can be implied to further investigate methods for foreign language skill development based on the assumption that people with a more practice of sound perception also produce that sound more accurately. This implication is also currently focused in the current model of speech perception and production training. For instance, the model of the Directions into Velocities of Articulators (DIVA) framework (Guenther, Hampson, & Johnson, 1998; Guenther, Ghosh, & Tourville, 2006) provides basic assumption that auditory perception of target sound is primary and has an important role in the other language competency development. In addition, in order to provide a precise explanation concerning the relationship between FL perception and production, the effect of factors such as individual difference, phonetic features, and degrees of language skills should be included in the explanation.

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