

The Relationship between Taiwanese EFL Learners' Perception and Production of Two English Vowels

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Article History

Received: 06.03.2021

Accepted: 23.03.2021

Published: 10.04.2021



Abstract: This study primarily examined the relationship between Taiwanese EFL learners' perception and production of two English vowels, /i/ and /ɪ/. A total of 39 students from a private vocational high school in northern Taiwan were recruited to participate in this study. They were required to receive a listening identification test and a pronunciation test to measure their perception and production accuracy of the two vowels. After all the participants' test scores were gathered, an independent-samples t-test was conducted to analyze the data. The statistical results of the study showed that the Taiwanese vocational high school EFL participants did not perceive the two English vowels significantly better than produced them, and vice versa. The finding favored neither the hypothesis that perception precedes production nor the one that production precedes perception in an EFL context like Taiwan.

Keywords: EFL, perception, production, vocational high school, vowels

Introduction

“The relationship between perception and production is especially difficult to determine in adult L2 acquisition, because, in comparison to L1 development in children, adult L2 acquisition is variable along many dimensions” (Baker & Trofimovich, 2006, p. 232). These two abilities are like two processes of language acquisition that have always raised great interest in researchers, with regard to both L1 and L2 acquisition. Therefore, knowing the relationship between perception and production and the effects brought by the individual differences is an important way for both theoretical and pedagogical contributions to language acquisition.

What is the ability of perception and what is production? On the basis of Chang (2007), perception refers to “a person's ability to comprehend contrastive phonemes” (p. 21), which is a passive skill. As for the definition of production, it refers to the ability to “articulate the various phonemes” (p. 21), and this is an active skill.

According to past literature on language acquisition, three hypotheses related to the relationship between speech perception and production have been advanced: (1) perception precedes production; (2) production precedes perception, and (3) perception helps production and vice versa. In the theory stating

that perception precedes production, Flege (1988) asserts that accurate perception is a major key to accurate production. Baker and Trofimovich (2006) suggest that “perception abilities usually surpass, and therefore “precede” production abilities, especially for beginning L2 learners” (p. 232). Lenneberg (1962) indicates that “the vocal production of language is dependent upon the understanding of language but not vice versa” (p. 423). That is to say, in line with the notion of “phonological deafness” (Flege, 1987), a sound must be adequately perceived so that it can be adequately produced. The hypothesis of accurate perception preceding accurate production has been widely supported by both L1 and L2 acquisition studies (Baker & Trofimovich, 2006; Flege, 1995). However, does it have the same consequences when it comes to foreign language (FL) learners? Hung (2012) conducted an experiment investigating the correlation of onset age of exposure to formal English instruction in 26 Taiwanese university EFL learners' perception and production of two English vowels (/I/ and /iy/). The data revealed in his research demonstrates that the participants’ “perception of the tested English vowels significantly outperformed their production” (p. 68). That is, perception in FL acquisition is still a necessary component of the accurate production.

Still, it is wondered whether the developmental order of perception really always precedes production. Another hypothesis regarding the relationship between perception and production proposes that “accurate production precedes accurate perception so that some speech contrasts are maintained in production before they are actually perceived” (Baker and Trofimovich, 2006, p.233). Actually, in other circumstances and with other methods of study, the perception/production order may be reversed. Eckman (2004) claims “if L2 learners receive input that is not auditory, their production abilities may exceed their perceptual skills due to the visible cues obtained from reading” (p. 366). In Eckman’s opinion, this advantage differentiates the acquisition of L2 from L1 because infants only receive auditory input, while it may vary with regard to the type of input for L2 learners. As a result, in L1 acquisition, the perception will always precede production in testing, whereas for L2 acquisition, the situation depends on the input received during L2 studies.

Kassaian (2011) administered an experiment on Persian speakers to understand the relationship between age and gender, and the perception and production of English speech. The analysis of the results revealed that “children, adults, males, and females all performed significantly better in the production test when compared to the discrimination test in both child/adult and male/female comparisons” (p. 374). That is, regardless of age or gender, good perception does not always lead to accurate pronunciation. This conclusion is also consistent with Mack (1989) who believes that the importance of non-native production in L2 is more significant than that of non-native perception. However, some other studies resulting from the researchers' examination of the link between perception and production with different learning methods yield different results and disapprove of the above hypothesis (Kosky & Boothroyd, 2003; Smith, 2001).

While the controversy of the debate rages about which ability precedes another, it is certain that successful learning of L2 sounds involves both perception and production. Yamada (1993) reveals the correlation between perception and production by Japanese speakers, and the results show that although the length of students' residence in an English-speaking environment and being educated in English as an L2 are important, the English perception and production for the segments of /r/-/l/ contrast is still

extremely difficult to acquire because they use their own phonological system for writing English words. Schneiderman, Bourdages, and Champagne (1998) further elucidate that the native-like accent will vary between language learners, depending on whether he/she can correctly perceive that language. In other words, these two abilities are interdependent. Tseng (2011) examined one hundred and two Taiwanese high school students on their performance in the perception and production of three English non-high front vowels: [ei], [ɛ], and [ɑ]. The results of her experiment showed that “the subjects with high achievement on English written test demonstrate better performance in both of the two tasks than those subjects with low achievement do, which suggests that the ability to perform well on English tests is closely related to the ability to perceive and produce English phonetics” (p. 5). Other studies have assessed the effects of English language experience on non-native speakers’ production and perception of English vowels (Flege, Bohn, & Jang, 1997; Rochet, 1995). According to these studies, if adults are given sufficient native speaker input, they will be able to produce and perceive certain L2 vowels more accurately.

Therefore, in order to successfully learn a particular language, a learner must be able to discover what the sound categories of a certain language are, and the teacher must understand the meaningful variations in the perception and production order because these two abilities are not independent of each other. “The two (production and recognition) interact and condition one another, and in the actual practice of the language can hardly be separated” (Fries, 1945, p. 8). Thus, with the findings and theories introduced above, we can generally grasp the concept that factors affecting language perception and production are intertwined. Thus, to see if perception precedes production or is it the other way around in the FL context, the present study aimed to explore whether production has a perception basis by comparing perception and production tests on two English vowels /i/ and /ɪ/ using minimal pairs in English. Below is the research question that this study attempted to address:

RQ: What is the relationship between Taiwanese vocational high school EFL learners’ perception of the two English vowels (/i/ and /ɪ/) and their production of the vowels? Does their perceptual ability precede their productive ability or is it the opposite?

Method

Participants

Thirty-nine native speakers of Chinese recruited from the same class of second-grade of a private vocational high school in northern Taiwan participated in this study. The participants were all born and raised in Taiwan and lived in Taipei by the time of the study. Their ages ranged from 16 to 18 years old (M=16.7), and their gender distributions were 30 females and 9 males. They belonged to the advertising design division, the largest division in the school. All the students learned English as an FL, and the length of their English language learning was more than five years.

In the vocational high school where the participants studied, the number of students in each class was 50, and the total number of class in each grade was 25. After the second grade, the school provided two types of study domains for students to choose from, professional and educational. The professional division had 20 classes while the educational one had the rest five. The procedure of placement was normally based on the ranking order derived from the average scores of both three section-tests in the

first semester and two section-tests in the second semester during the students' first year. Traditionally, the top 50 to 100 elite students from various divisions would be persuaded to enroll in the general education classes, Zhong and Xiao. However, each year, quite a few students with a good academic record gave up the chance to go to general education classes but rather chose the professional education classes for personal reasons. Thus a certain number of students with lower academic performance who were incapable of getting into the class of their choice would be randomly administered to either the educational or professional purpose classes. The class, selected for the current study, compared with the other four general education classes was in the best place of school English competitions.

Moreover, four native speakers of American English took part in the present experiment. One male native speaker produced 20 English words out of 20 minimal pairs items in which vowel distribution was 20 in /i/ and 20 in /ɪ/ (see Appendix A). Regarding the stimuli for the native reader (see Appendix B), the pick of word choice was designed with only choosing one English word with /i/ or /ɪ/ in each minimal pairs item making a total of 20 of the selected English words arranged with equal distribution with /i/ and /ɪ/ in half. His utterances were digitally recorded in a soundproof booth and transcribed on a CD for the perception test used in the current study. The other three foreigners, one male, and two females were required to evaluate the students' performance on a pronunciation test. All of them are native American English speakers (age: less than 30) and English language teachers who had been teaching in Tao-yuan cram schools for at least three years.

Instruments

This research was designed to investigate how accurately the Taiwanese EFL participants could perceive and produce two English vowels (i.e., /i/ and /ɪ/) and to discover whether a significant difference existed between EFL perception and production. Both hardware and software instruments were used to collect data. In terms of the hardware instruments, a Sony soundproof booth was utilized to record a native speaker's utterances of tested sounds/words for a listening identification test and to administer a pronunciation test to the participants. Moreover, a good quality CD player broadcast both the recorded voice of the native speaker for the listening identification test and the recorded voices of the participants for three raters' evaluation. The software instrument SPSS for Windows was employed for analyzing the collected data. Furthermore, a questionnaire (see Appendix F & G) developed based on Hung's (2012) work was included for eliciting the participants' language learning background.

Regarding the listening identification test and the oral production test, 40 English words containing /i/ and /ɪ/ English vowel tokens were chosen from the participants' textbooks as test stimuli (see Appendix A). These selected English words were included in the 4000-word bank published by Taiwan's Ministry of Education for vocational high school students, and they were regarded as frequently occurring English words in people's daily life. In addition, the 40 words were all devised in the /CVC/ context and constituted into 20 minimal pairs (e.g., read/rid).

Questionnaire

The questionnaire given to the participants was written in Mandarin Chinese (see Appendix F). It was adapted from the questionnaire of Hung (2012). All of the 39 participants were required to fill out and respond to the questionnaire on the purpose of further understanding their language learning

background such as their gender, school major, speaking and listening conditions, age of first being exposed to English, etc. (see Appendix F & G).

Listening identification test

To assess the 39 Taiwanese vocational high school EFL learners' perception of the two English vowels (/i/-/ɪ/), 20 English words (see Appendix B) that consisted of 10 /i/ and 10 /ɪ/ and were randomly chosen from the 20 minimal pairs that the researchers collected and devised (see Appendix A) formed the test items of the perception test. To keep maximum control of the sound stimuli utilized in the test, the native speaker's utterance for producing the test items for the students was recorded in a noise-free condition in a discussion room of the university library. Moreover, a good quality soundproof booth was employed to ensure that the sound was not affected by unwanted source aspects. His utterance was then replicated on a compact disc for the participants' later identification. Each tested word was repeated twice with the interval of 1.5 seconds while the interval between two various tested words was two seconds.

For avoiding misunderstanding or null answers, an oral instruction in Chinese and a demonstration on the blackboard of how to respond to the test were given to the students before the experimenters played the CD player. In addition, the time interval for administering the tests of perception and oral production was designed at a week later for avoiding interference from the listening identification test to the performance of the pronunciation test and then maintaining students' natural English response to these tested two English vowels in words.

Pronunciation test

To evaluate the participants' oral production of the two English vowels (/i/-/ɪ/), a pronunciation test that the researchers self-designed was administered. The data were recorded and collected in a soundproof booth in a quiet room on the campus where the students studied.

When taking the test, the 39 EFL learners were required to pronounce the remaining 20 minimal pairs in words from the selected 40 stimuli which the distribution of the word choice with /i/ and /ɪ/ were also organized with equal and care, say 10 in /i/ and 10 in /ɪ/ (see Appendix D). The format of the pronunciation test was designed the same way with the format of the perception test: the Taiwanese students were asked to repeat each tested word twice, and the interval between the repetitions of each word was 1.5 seconds, while the interval between two different tested words was two seconds.

In this stage, the participants' pronunciation was judged by three native English speakers other than the one who recorded the listening identification test. Prior to the calculation of the test result, the researchers explained to all the three raters the rules in how to evaluate the participants' recordings in order to unify the evaluations and enhance the reliability. Regarding the reliability among the three raters, an inter-rater evaluation study was carried out. Five students who belonged to the same class but did not take part in the process of the oral production test were recruited to take the production test. The result of the evaluation study revealed that the Intra-class Correlation Coefficient is at the level of 0.98 (see Table 1). This number signified that the reliability among the raters' judgments was very high.

The evaluation process was conducted in a discussion room of a university library. The three raters gathered together to listen to the 39 vocational high school EFL learners' utterances played by a CD player, distinguishing the words given on the answer sheet (see Appendix E) and then circling the words according to what they had heard.

Table 1

Inter-Rater Reliability among the Three Raters

Correlation	Intraclass 95% Confidence Interval		F Test with True Value 0				
	Lower Bound	Upper Bound	Value	df1	df2	Sig.	
Single measures	.98	.90	1	144.48	4	8	.00
Average measures	.99	.97	1	144.48	4	8	.00

Scoring

The listening identification test and the pronunciation test were each composed of 20 question items; therefore, the scores of both tests ranged between 0/20 and 20/20. When a student correctly circled English vowels /i/ or /ɪ/ in word on the answer sheet (Appendix C) based on what he or she had heard or correctly produced /i/ or /ɪ/ in word (as agreed to by at least two English native listeners), a point was earned. The higher the score one could get, the more accurately one could perceive/produce the two English vowels.

Procedure

This study proceeded in several stages. First, a total of 39 Taiwanese vocational high school EFL students were recruited and required to fill out a language background questionnaire. Next, the participants were given a listening identification test for evaluating their accuracy in perceiving two English vowels, /i/ and /ɪ/. Thirdly, a week later after the listening identification test, the learners received a pronunciation test for assessing their accuracy in producing the vowels. The collected data were then processed in computer and analyzed with an independent-samples *t*-test.

Results

To respond to the research question of the current study, an independent-samples *t*-test was administered to determine the level of significance of the difference between the participants' mean scores on the listening identification and pronunciation tests.

The Relationship between EFL Perception and Production

Table 2 showed the comparison between the 39 participants' overall perception and production of the two English vowels (/i/ and /ɪ/) on the tests. The results of the independent-sample *t*-test revealed that no significant difference between the mean scores of perception and production was found ($t = 1.10$, $p > .05$). The statistical data suggested that the Taiwanese vocational high school EFL participants'

ability in perceiving the tested vowels was no better than their ability to pronounce the vowels, and vice versa. In other words, their perceptual ability and their production ability were equivalents.

Table 2

The Independent-Samples t-Test Results of the Difference between the Learners' Perception and Production of Two English Vowels (N=39)

	Mean	Mean Difference	t	df	Sig. (2-tailed)
perception	12.69	0.79	1.1	76	0.3
production	11.9	0.79	1.1	66.08	0.3

Discussion

The main purpose of this study is to explore the relationship between Taiwanese vocational high school EFL students' perception and production of two English vowels (i.e., /i/ and /ɪ/) by comparing their performances on a listening identification test and a pronunciation test. The statistical results of the relationship between perception and production indicate that none of the differences between the mean scores of perception and production was found ($t = 1.10, p > .05$). That is to say, the Taiwanese vocational high school EFL participants' ability in perceiving the two tested vowels was equal to their ability to pronounce the vowels. The learners' perceptual ability did not "precede" their productive ability or vice versa. None of these two abilities was better than the other. Therefore, the finding does not lend support to either the hypothesis that perception precedes production nor the one that production precedes perception in an EFL context like Taiwan.

The results of the present study are inconsistent with those from Hung (2012) and Hung and Yan (2017) that also investigate the relationship between Taiwanese EFL learners' perception and production of English sounds. Hung (2012) focuses on the examination of Taiwanese university EFL students' perception and production of two English vowels /i/ and /ɪ/. The findings of the experiment suggested that EFL perception precedes production. However, due to the fact that Hung (2012) lacked inter-rater reliability data, the research results might be considered unreliable. To re-examine the relationship between EFL perception and production in Taiwan and to obtain more trustworthy facts, the researchers of the present study calculated the inter-rater reliability before requesting three native speakers of English to judge the participants' recordings. It turned out that the results were not in accordance with Hung's.

Hung and Yan (2017) explored the relationship between Taiwanese vocational high school EFL learners' perception and production of two English fricatives, /s/ and /θ/. With the data of high inter-rater reliability (.91), the study concluded that EFL perception precedes production. The research design of Hung and Yan (2017) is very similar to that of the current research. The major difference between the two studies lies in that Hung and Yan probed in to Taiwanese vocational high school students' perception and production of English consonants while this project scrutinized their perception and production of English vowels. Despite the similarity in design, the findings of the two studies are different. Hung and Yan (2017) supported the hypothesis that perception comes before production; however, the current study did not. Nor did this study favor another hypothesis that production leads to perception. If we try

to conclude the findings above, it seems that the notion that perception precedes production only occurs in the FL acquisition of English consonants. To further verify this, more related studies are needed to provide accurate data and evidence.

Additionally, another interesting finding was observed in this study: more than half of the participants attempted to use the over-duration skill for /i/ to identify or produce a vowel pair in English words. The finding was in accordance with the findings of several previous studies (Escudero, 2000; Escudero & Boersma, 2004; Flege, Bohn, & Jang, 1997; Lin & Repp, 1989) that L2 language learners, including Taiwanese foreign language learners, have a tendency to use vowel duration to distinguish English /i/ and /ɪ/. Thus, the knowledge of certain vowels may need more explanations and practice in the classroom context for helping learners to yield correct performance in pronunciation.

Regarding the limitations and delimitations of this study, the number of participants was only 39, and they all came from the same vocational high school. Hence, the results of the present study might not be generalized to students in other (vocational) high schools. Furthermore, this study only focuses on the exploration of two English vowels. Other vowels or consonants should also be examined so that the EFL perception-production relationship can be better understood. Consequently, it is suggested that prospective researchers of the same research interests recruit a wider variety of participants and include different English segments.

Conclusion

To sum up, the results of this study favored neither the hypothesis that perception precedes production nor the one that production precedes perception in an EFL context like Taiwan. Although the findings of this study do not show any significant relationship between EFL perception and production, they are somewhat speculative at this moment and need to be replicated with more EFL learners and different phones.

Acknowledgment

The authors thank the blind reviewers of this paper for their insightful and constructive comments. They are also grateful for the funding from the School of Foreign Languages, Fuzhou University of International Studies and Trade, PR China.

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