

Phonetic Transfer of Chinese University Students in EFL Learning

Zheng Fu

School of English, Tianjin Foreign Studies University
Tianjin, China

Yunfei Ma*

College of Humanities and Social Sciences, Tianjin
Agricultural University
No.22, Jinjing Road, Tianjin 300384, China

*Corresponding author

Abstract—Phonetic transfer is defined as the way in which individual knowledge of a language sound tool can affect how a person perceives and produces language in another language. Although previous studies have investigated phonetic transfer in the area of articulation, how L1 affects L2 pronunciation by speech recognition technology has been under-researched. This paper aims to address the issue by focusing on a sample of 676 Chinese university students. Using quantitative data, it examines whether these participants apply phonetic transfer to EFL learning and what factors may have influenced the result of phonetic transfer. The findings of data analysis confirm that Chinese-to-English phonetic transfer is correct and the extent of these participants’ transfer is larger than expected. The reasons for their high level of transfer are probably due to the learning method of spelling through phonics and the nature of pronunciation acquisition.

Keywords—Phonetic transfer; EFL; Chinese; English; Contrastive analysis; L1; L2

I. INTRODUCTION

Phonetic transfer refers to a common phenomenon in second language acquisition that L1 influences the acquisition of L2 phonology [1-2]. L2 Learners are likely to apply L1 techniques and mechanism when learning L2 [3]. Phonetic transfer is defined as the way in which the sound system of a language can affect one’s perception and production of speech sounds in another language [4]. One application utilized is contrastive analysis which compares attributes and characteristics of L1 and L2 languages [5-7].

This study took Chinese university students as volunteers and investigated how they had L1-L2 phonetic transfer. Their L1 was Chinese and L2 was English. Chinese is a logogram while English is a phonogram; therefore, they have many significant differences in terms of phonetics and phonology [8]. However, English conveys meaning with an alphabetic system and Chinese uses the Pinyin symbols to mark the sounds. Both use International Phonetic Alphabet (IPA) to transcribe their sounds and share some phonetic similarities. The Pinyin system, a Romanized system, can transcribe Chinese sounds into Roman letters. When Chinese and English phonemes are compared, Table I illustrates that both have the intersection of 21 phonemes: 14 consonants and 7 vowels [9]. Because most Chinese and English phonemes are pronounced the same or similarly, the sounds of Chinese and English can be compared at the level of syllables made up of phonemes.

TABLE I INTERSECTION OF L1 AND L2 PHONEMES

English Consonants	Intersections of Consonants	Chinese Consonants
/b/ /d/ /g/ /h/ /dʒ/ /r/ /z/ /ʒ/ /ʃ/ /tʃ/ /v/ /θ/ /ð/	/p/ /t/ /f/ /k/ /l/ /m/ /n/ /ŋ/ /s/ /w/ /j/ (/k ^h / /p ^h / /t ^h /)	/ts ^h / /ts/ /tʂ ^h / /tʂ/ /x/ /z/ /ʂ/ /tɕ/ /tɕ ^h / /ɕ/ /ɥ/
English Vowels	Intersections of Vowels	Chinese Vowels
/i/ /ɪ/ /æ/ /ɒ/ /ɜ/	/i/ /u/ /ɔ/ /ε/ /ə/ /ɔ/ /a/	/y/ /i/ /ɥ/

The following research implied possible Chinese-based transfers in many aspects into EFL learning. Pinyin is regarded as a positive role of in EFL learning [10]. Pinyin symbols are useful for encoding Chinese characters to improve independent study of phonological awareness, tone awareness, phonemic awareness, and onset-rhyme skills. Pinyin awareness can enhance English reading to a great extent in a cross-language transfer [11]. For older English learners, Chinese phonological processing skills were a unique predictor of English reading performance [12]. Pinyin naming and English reading skills may help each other when children learned Chinese characters with Pinyin [13].

II. METHODOLOGY

A. Hypothesis Questions

There are still many areas worth studying in Chinese-to-English phonetic transfer. Previous studies of phonetic transfer underscored articulation, but there is a lack of empirical studies on the result of phonetic transfer by speech recognition technology probably as the technology has not been fully applied in the research. The researchers conducted a study on a group of Chinese university EFL students to examine whether L1 (Chinese) affected L2 (English) pronunciation and to what extent L1-L2 phonetic transfer occurred. The study aims to gather empirical evidence that could deepen the understanding how L1 sounds might affect L2 sounds. This study therefore explores the following questions:

- 1) Does L1 pronunciation of Chinese university students affect L2 pronunciation performance?
- 2) To what extent does their L1 pronunciation influence their L2 pronunciation performance?

B. Sampling

The researchers conducted the research in a university in northern China. In the research, 676 non-English major students were voluntarily involved, with 57.5% female and 42.5% male participants. The participants took four-hour long college-level EFL courses every week and their extracurricular EFL learning depended on their interests and goals. The participants were required to fill out a personal information sheet which asked their gender, age, the number of years of English learning, and the number of hours of English weekly practice and to take three tests relevant to this study.

C. Instruments

The purpose of using research instruments was to collect data to test the impact of L1 on L2 pronunciation. All the participants were required to take three measurement tests:

(1) L1 pronunciation test: The Pinyin table was used as the Chinese pronunciation library to test the level and extent of L1 pronunciation. The Pinyin table in the Xinhua Dictionary Index includes all the Chinese sounds to evaluate Chinese university students' L1 pronunciation. All the participants read the Chinese sound library aloud, and their reading was recorded. A speech recognition tool transcribed their speech and assessed their performance of L1 sound mastery.

(2) L2 oral proficiency test: A speaking test of the Test of English as a Foreign Language (TOEFL) was used as an oral English test to measure EFL learners' English oral proficiency. The TOEFL tasks consist of two parts: (a) participants respond to questions, discuss the passage heard, and give an opinion; (b) participants respond in speech to what is heard and solve a problem. A native English teacher administered the TOEFL speaking test and scored each participant according to TOEFL rubrics, including general description, delivery, language use, and topic development.

(3) L2 pronunciation test: An English pronunciation test designed by our researchers was an English word library to detect and assess the participants' L2 pronunciation accuracy. The researchers compared L1 with L2 syllable structure: Chinese words are monosyllabic and English words may be multisyllabic, i.e., a syllable is a Chinese word and one or more syllables form an English word. An English syllable comprises a vowel nucleus, an optional consonant onset and coda, (e.g., cat /kæt/: /k/ is onset, /æ/ nucleus, and /t/ coda); a Chinese syllable might have a vowel medial more than an English syllable, (e.g., kuang /koʌŋ/ Pinyin: /k/ is onset, /o/ medial, /a/ nucleus, and /ŋ/ coda). English single consonants and all vowels, including single vowels and diphthongs, form all the syllables in the English word library. The structure of English syllables can be decoded as V, CV, VC, or CVC (C refers to consonant and V vowel). Because the structure of English syllables is similar to Chinese Pinyin, both can be compared at the level of syllables. The minimal unit of speech discerned by a speech recognition tool is "word" made of one or more syllable, so a monosyllabic word or syllable combinations appear to facilitate word identification. Each individual participant was required to read the library of English words to a speech recognition tool. The participant got a point after a word was recognized as correct.

Thus, in order to study whether the hypothesis of phonetic transfer was established, this study was conducted with quantitative analysis, including descriptive analysis and multiple linear regression analysis. In this research, primary predictors were gender, age, years of L2 learning, hours of L2 weekly practice, L1 pronunciation, and L2 oral proficiency, which might have an effect on L2 pronunciation, the dependent variable.

III. ANALYSIS

A. Descriptive Analysis

A descriptive analysis was used to describe the demographic characteristics of the overall sample size, including the mean, standard deviation, minimum, and maximum of Chinese university students. The data obtained were analyzed with SPSS (version 23.0) to present descriptive statistics needed for answering the research questions. Table II summarizes relevant demographic information of the participants. Their average age was 20.06 years old (SD = 1.37, range = 18 to 25). On average, they reported to have learned English for 9.15 years (SD = 1.75, range = 6 to 15), and they spent 6.58 hours per week on English learning (SD = 2.46, range = 4 to 17). Besides demographic information, Table II illustrates the descriptive result of the three tests, including the mean value and standard deviation for the Chinese university students' L1 pronunciation, L2 oral proficiency, and L2 pronunciation. First, L1 pronunciation had the mean value of 384.98 (SD = 20.47) of the total 412 words. Their average performance was 93.44%, which indicated that the participants spoke Chinese very well. Second, the mean value of L2 oral proficiency was 7.51 (SD = 3.24) of the total 30 points. As participants reported to have studied English for over nine years, it was surprising to see their oral English proficiency was much below the passing standard of 60%. This might explain why learning English in China is often referred to as "Dumb English," i.e., people can read and understand English but cannot speak it well. Third, the mean value of L2 pronunciation was 367.04 (SD = 27.09) of the total 417 words and their accuracy rate was 88.02% on average. Obviously, their high level of L2 pronunciation did not appear to conform to their low level of L2 oral proficiency.

TABLE II RESULTS OF DESCRIPTIVE ANALYSIS

Variable	M	SD	Min.	Max.
Age	20.06	1.37	18	25
Years of L2 (English) Learning	9.15	1.75	6	15
Hours of L2 Weekly Practice	6.58	2.46	4	17
L1 (Chinese) Pronunciation	384.98	20.47	280	411
L2 Oral Proficiency	7.51	3.24	3	23
L2 Pronunciation	367.04	27.09	234	410

Note. N = 676

B. Multiple Linear Regression Analysis

In the multiple linear regression analysis, the goal was to establish a model that explained the most variance in ability. This data analysis assessed which predictors accounted for variability in L2 pronunciation. The evaluation of the adjusted R-square (coefficient of determination), F-value, Beta coefficients, standard Beta coefficients, standard error, with L2 pronunciation are displayed in Table III. The model of L2 pronunciation had an adjusted R-squared value of 0.90, $F(6, 669) = 1025.55$, $p < 0.01$. The F-values of the model was significant, so it explained a significant amount of variance in the outcome variable of L2 pronunciation. L1 and L2 pronunciation values could form a linear relation. Moreover, the beta coefficient was investigated to see the degree of change in the outcome variable for every one-unit of change in the predictors. In the model of L2 pronunciation, L1 pronunciation was strongly and positively associated with L2 pronunciation ($\beta = 0.95$, $p < 0.01$), i.e., for every one-unit increase in L1 pronunciation, L2 pronunciation increased by 0.95. In addition, other predictors were not correlated or weakly related to L2 pronunciation, so they were disregarded. In view of the data, the Chinese participants' L1 pronunciation contributed significantly and primarily to the prediction of L2 pronunciation performance, but the relationships between the other predictors and the outcome variables were interpreted insignificantly or weakly.

TABLE III RESULTS OF MULTIPLE LINEAR REGRESSION ANALYSIS

Variable	<i>L2 (English) Pronunciation</i>		
	B	SE	β
Constant	-108.54**	8.41	
Gender	-.57	.69	-.01
Age	-.63	.39	-.32
Years of L2 (English) Learning	.78*	.30	.05
Hours of L2 Weekly Practice	-.15	.20	-.01
L1 (Chinese) Pronunciation	1.25**	.02	.95
L2 Oral Proficiency	.04	.15	.00
R^2 /Adj. R^2	.90/.90		
F (df)	1025.55** (6, 669)		

Note. $N = 676$. Gender (0 female+, 1 male). * $p < .05$. ** $p < .01$.

IV. DISCUSSION

A. Learning Method of Spelling through Phonics

In the research, the hypothesis that Chinese university students' L1 pronunciation had an effect on L2 pronunciation was true. Although Chinese and English do not belong to the same language family, the empirical results indicated that the participants used their knowledge and skill of L1 pronunciation when pronouncing L2 words. In the transfer process, learners tend to transfer the forms and meanings from L1 to L2 not only productively but also receptively. These participants used L1 Pinyin knowledge and spelling skills to form L2 pronunciations in phonetic transfer, and their L1 pronunciation performance determined their L2 speech production results.

A possible explanation might refer back to how the Chinese participants learned English. A popular idea of second language acquisition is that sounds are learned mainly through imitation [14-15]. L2 learners learn a L2 language by imitating foreign sounds they have heard. Languages are learned through imitation, repetition, and drill, leading to the formation of habits of correct language production.

However, imitation does not play an important role in the learning of L2 pronunciation for Chinese students, but the major EFL learning method is how to spell with symbols. Chinese children are required to learn Pinyin symbols first and pronounce words by spelling through phonics at the beginning of school. After they master Pinyin symbols to mark Chinese characters, they then learn how to read and write characters. The same is true for them to learn English. At the level of elementary school, Chinese children are required to master the IPA and memorize the pronunciation of English words by spelling because spelling methods can enhance the accuracy of English pronunciation. Since most Pinyin phonemes are similar to English letters, Chinese students spontaneously use Pinyin as a supportive tool to spell and read English words at the beginning of English learning.

B. Nature of Pronunciation Acquisition

In the study, some of the findings conflict with the understanding of L2 pronunciation. It is well known that learning time is always regarded an important dimension of production performance. The accumulation of knowledge takes time and effort in the classroom and in the extracurricular learning. The length of time matters in L2 performance because processing time is a significant factor [16] [17]. However, in this data analysis, years or hours participants spent learning and practicing English had no or a very weak effect on L2 pronunciation. In addition, oral English proficiency is thought to be an important factor in predicting English pronunciation [18]. Much to surprise, Chinese participants' L2 oral proficiency did not relate to the accuracy of L2 pronunciation as data analysis demonstrated that no significant value showed up.

A possible explanation is that for the Chinese participants' L2 pronunciation is more acquired than learned. The distinction between language acquisition and learning is based on the individual's internal processes of learning and the degree of consciousness brought to the learning task. Acquisition implies the language involvement of innate, species-specific linguistic knowledge in one's mastery of a language, whether it is native or foreign [19]. Generally speaking, children acquire an L2 through a subconscious process during which they are unaware of phonetics, which is similar to the way L1 acquisition happens. Chinese children have formed their accent in pronunciation and will transfer L1 accent into L2 pronunciation through the natural transfer process. They can hardly change their accent and even develop "Chinese English" accent. As pronunciation is acquired, L2 pronunciation is dependent on L1 pronunciation level. Because these participants' Chinese level was highly standardized due to long-term training and assessment, they converted more Chinese sounds into English words than expected, as their performance of phonetic transfer presented at a high level.

V. CONCLUSION

This study explored the impact of Chinese university students' L1 on L2 pronunciation in EFL learning. The results of this empirical research answered the hypothetical questions. Multiple linear regression analysis was used to answer whether L1 pronunciation had an influence on L2 pronunciation and at what extent the impact of phonetic transfer was. The results showed that these Chinese participants' L1 pronunciation had an effect on L2 pronunciation. Surprisingly, the statistic results showed that this effect was very strong, which was different from the understanding of the great differences between the L1 and the L2. The reasons are probably because their L1-L2 phonetic transfer is related to the way they acquire a language. First, Chinese students learn L1 and L2 by the method of spelling through phonics. Second, they are inclined to obtain L2 pronunciation by speech acquisition rather than speech learning. Chinese students have undergone long-term standardized assessments of Chinese, so their level of Chinese pronunciation is rather high, which leads to the high L1-L2 phonetic conversion.

This study can contribute to the current literature and to the teachers of second language acquisition for opening up new ideas for future research. Speech recognition technology can be used as a tool for comparing language speech and helping teachers to correct L2 learners' pronunciation. Future research can analyze phonetic transfer between two or three languages of the same or different language families. It is highly recommended to conduct further research on bilingual or multilingual learners to understand how they process phonetic transfer in bilingual or multilingual environments. In addition, the study can enable L2 teachers to pay attention to the positive impact of L1 on L2 pronunciation and can encourage L2 teachers to use standardized speech in the class. L2 teachers can add L1 or L2 pronunciation instruction and correction in the teaching to investigate which way to intervene L2 pronunciation more effectively.

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Introduction of Author: Zheng Fu (1977 -), female, the Han nationality, from Tianjin. Associate professor of Tianjin Foreign Studies University, visitor in La Sierra University, Doctor of Education. Research interests: English Language and Literature, English education.

Introduction of Corresponding Author: Yunfei Ma (1977 -), female, the Han nationality, from Tianjin. Lecturer of College of Humanities of Tianjin Agricultural University, master of English language and literature. Research interests: English Language and Literature, English education.

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