PHONOLOGY OF MANDARIN CHINESE: A COMPARISON OF *PINYIN* AND IPA

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ABSTRACT

Chinese language has an ideographic and logographic writing system, and it has always been a difficult problem to correctly represent the phonology of Chinese characters (syllables and words). The *Pinyin* system uses Roman alphabets to spell the sounds of Chinese characters, but it was not designed as an accurate phonetic transcription system. The *Pinyin* system is simple and easy to learn, but its simplicity also causes the problem that many different phonemes have to be represented by the same letter. The phonetic transcription system widely accepted by linguists is the IPA (International Phonetic Alphabets), a system designed for transcribing the phonemes of the world's languages. To accurately capture Mandarin Chinese phonology, this study compares *Pinyin* symbols and IPA in describing Mandarin initials (consonant sounds) and finals (vowel sounds). At the end, it is found out that both pinyin and IPA have advantages and disadvantages.

INTRODUCTION

The population in China alone accounts for about 1.3 billion, approximately one-fifth of the total population of the human race. With such a high percentage of the human race growing up speaking different varieties of the language as their first language, Chinese is indisputably one of the most commonly used languages in the world. Against such a background, interest in the Chinese language has grown rapidly outside China. China is a unitary multinational state which officially recognizes 56 ethnic groups including *Han, Zhuang, Uygur, Hui, Yi, Yibetan, Miao, Manchu, Mongol, Buyi,* and *Korea*. Chinese, or *zhongguoren*, is used to refer all citizens in the People's Republic of China regardless of ethnic nationality. Apart from the Han majority, the non-Han Chinese, with a total of more than 96.5 million people, constitute roughly 8% of the total population in the People's Republic (Sun, 2006:2).

Chinese, as a language name in English, refers to the Sinitic subgroup of Sino-Tibetan languages in Asia. First of all, Chinese can be translated as *zhongwen* generally referring to the language. *Zhongwen* is also the right term to use for the academic discipline in studying Chinese language and literature, such as *zhongwenxi* for the Chinese department in a university setting. Second, the term *hanyu* 'Hanyu language' is used in the context contrasting the languages spoken by the *Han* nationality the make up 92% of the 1.3 billion Chinese citizens of the People's Republic with all of the non-*Han* languages spoken in China and rest of the world. Third, as *hanyu* is a general term for the languages, many of which are mutually unintelligible among speakers of different varieties of *Han* language. Fourth, Chinese also refers to different Chinese dialects, or *hanfangyan*, but does not include any of the non-*Han*-Chinese languages spoken by ethnic minorities in China. In Singapore, as well as in the other Chinese communities in Southeast Asia,

Chinese is known as *hanyu* 'Han language'. In Taiwan, standard Chinese is known as *guoyu*, literally 'national language'. Traditionally, Han-Chinese is divided into seven major dialect groups, Mandarin (or *beifanghua*- Northern Chinese), Wu, Xiang, Gan, Kejia (Hakka), Yue (Cantonese), and Min (Yuan, 1989). Among the Han-Chinese, Northern Chinese speakers comprise 70% (840 million), Wu 8.5% (102 million), Yue 5.5% (66 million), Min 4.5% (54 million), Kejia 4% (48 million), Gan 2.5% (30 million), and Xiang 5% (60 million) (Zhou, 2003).

Chinese government replaced the name of *guoyu* 'national language' with *Putonghua* 'common speech (language)' in order to highlight political equality among all ethnic groups and their languages (Zhou, 2003). The official definition of *Putonghua* is: 'the standard form of modern Chinese with the Beijing phonological system as its norm of pronunciation, and Northern dialects as its base dialects, and looking to exemplary modern works in *biahua* 'vernacular literary language' for its grammatical norms' (Chen, 1999:24). Standard Chinese has been the official language of China for a few decades. It is used in schools and universities and on national radio and television broadcasts. In this paper, Chinese or Mandarin (Standard Chinese) is used interchangeably.

CHINESE ALPHABETICAL WRITING AND PINYIN

Mandarin is written in Chinese characters, but characters do not provide consistent information about pronunciations. In general, pronunciation cannot be derived from looking at Chinese characters, although sometimes characters with common parts have similar pronunciation. Unlike most languages, Chinese characters are not primarily phonetic, and certainly not alphabetic, but pictographic or ideographic (displaying combinations of pictures or symbols to convey meaning) like ancient Egyptian hieroglyphics. Hence there has needed to be a way of representing in writing the pronunciation of each character when teaching the language. Therefore, Mandarin is typically studied via a transcription. Many transcription systems have been devised for Mandarin Chinese in China and in the West. Most of these are based on the Roman alphabet, and are therefore termed 'romanization' systems.

According to Ni (1948), the first alphabetical writing system for Chinese was designed by the Italian missionary Matteo Ricci and published in 1605 in Beijing (but the record was lost). Subsequently, other missionaries designed various other alphabetical systems, often to aid foreigners to learn Chinese. Before pinyin was developed there were other systems for writing the pronunciation of Chinese words using English alphabet. The most notable is the Wale-Giles system, settled in 1892. However, since the standardization of the Chinese language in the latter half of the century, many of the pronunciations that these old systems represent are no longer valid in China. For example Peking used to be a way to pronounce China's capital, but now in China, it is pronounced Beijing. While superceded in China, some of these old pronunciations are still in common use around the world.

Alphabetical writing did not attract the attention of Chinese intellectuals until after the Opium War (1840-1842). Many proponents of language reform around the turn of the nineteenth century believed that alphabetical writing was a key to the strength of a modern nation. Therefore, besides proposing a standard spoken language, they also proposed to establish an alphabetical writing system. The first Chinese design was published by Gangzhang Lu in 1892. The system adopted by the Republic of China (Taiwan) in 1928 is called *Guoyu* Luomazi 'National Language Romanization'. The system adopted by the People's Republic of China in 1958 is called *Hanyu Pinyin Fang'an* 'Chinese Spelling System' or '*Pinyin*' for short. A main difference between the two systems is that Guoyu Luomazi uses letters to spell tones, whereas Pinyin marks tones with separate diacritics. In this paper, the interest is only on Pinyin.

Pinyin means to join together, or spell out, sounds. Pinyin was developed for Chinese speakers and those learning Mandarin Chinese pronunciation, and is an efficient was of representing Mandarin Chinese sounds with the Roman alphabet. It serves the purpose as the International Phonetic Symbols used in dictionaries to show how English words are pronounced. It was first approved by the Chinese government in 1958, and the International Organization for Standardization adopted it as a word standard in 1982.

Since 1958, the Pinyin system has become very useful for foreigners to learn to speak Mandarin Chinese and it is now most widely adopted by teachers instructing foreign students in Chinese. The success of Pinyin overseas is partially because of its similarities with English letters that make it much easier for students who already know English not only to commit the Chinese phonetic symbols to memory, but also to type Chinese text into English-enabled computers (Sun, 2006: 22). It is obvious that Pinyin was not developed for the English-speaking world. This is in evidence whenever English speakers try to pronounce Pinyin words without any previous study. About half the time, letters in Pinyin represent different sounds from what they would in a typical English word, and most of the time the vowels have peculiar sounds. Pinyin is a system of Romanization (phonetic notation and transliteration to Roman script) for Mandarin Chinese based on the Mandarin dialect of the Beijing area used in the People's Republic of China. While Pinyin uses the Latin alphabet (Roman), it should be kept in mind that it represents the sounds of Mandarin, not of English or any other language.

INTERNATIONAL PHONETIC ALPHABET (IPA)

The International Phonetic Alphabet (IPA) is an alphabetic system of phonetic notation based primarily on the Latin alphabet. It was devised by the International Phonetic Association as a standardized representation of the sounds of oral language. The International Phonetic Alphabet (IPA) is designed to represent only those qualities of speech that are part of oral language: phones, phonemes, intonation, and the separation of words and syllables. To represent additional qualities of speech, such as tooth gnashing, lisping, and sounds made with a cleft palate, an extended set of symbols called the Extensions to the IPA may be used (MacMahon, 1996:821).

The International Phonetic Alphabet (IPA) symbols are composed of one or more elements of two basic types, letters and diacritics. For example, the sound of the English letter ⟨t⟩ may be transcribed in International Phonetic Alphabet (IPA) with a single letter, [t], or with a letter plus diacritics, [t̪ʰ], depending on how precise one wishes to be. Often, slashes are used to signal broad or phonetic transcription; thus, /t/ is less specific than, and could refer to, either [t̪ʰ] or [t], depending on the context and language.

In 1886, a group of French and British language teachers, led by the French linguist Paul Passy, formed what would come to be known from 1897 onwards as the International Phonetic Association. One of the first activities of the Association was to produce a journal in which the contents were printed entirely in phonetic transcription. The idea of establishing a phonetic alphabet was first proposed by Otto Jespersen (1869-1943) in 1886, and the first version of the International Phonetic Alphabet (IPA) was published in August 1888. Its main principles were that there should be a separate letter for each distinctive sound, and that the same symbol should be used for that sound in any language in which it appears. The alphabet was to consist of as many Roman alphabet letters as possible, using new letters and diacritics only when absolutely necessary. These principles continue to be followed today. The International Phonetic Alphabet (IPA) has been modified and extended several times, and is now widely used in dictionaries and text-books throughout the world (Crystal, 1997: 160).

According to MacMahon (1996:822), since International Phonetic Alphabet's creation, it has undergone a number of revisions. After major revisions and expansions in 1900 and 1932, the International Phonetic Alphabet (IPA) remained unchanged until the IPA Keil Convention in 1989. A minor revision took place in 1993 with the addition of four letters for mid-central vowels and the removal of letters for voiceless implosives. The alphabet was last revised in May 2005 with the addition of a letter for a labiodentals flap. Apart from the addition and removal of symbols, changes to the International Phonetic Alphabet (IPA) have consisted largely in remaining symbols and categories and in modifying typefaces.

PHONOLOGY OF MANDARIN CHINESE

Chinese phonology has been studied for over 1,700 years since the appearance of the first rhyming books in the third century. This tradition can be divided into three periods: traditional literature before the twentieth century, the standardization effort in the twentieth century, and the generative influence since the late 1950s (Duanmu, 2007:6). Phonology of Mandarin Chinese consists of initials (consonants), finals (vowels), and tones.

There is disagreement among linguists and scholars on the number of Mandarin consonant sounds. Some authors agree that Mandarin consonant sounds are twenty one (21) while others disagree, saying it is only nineteen. According to Duanmu (2007:23), "Standard Chinese has nineteen consonants. In addition, there are three palatals and some syllabic consonants". For Eme & Odinye (2008:30), "The consonants of Chinese

comprise six plosives, two nasals, five fricatives, six affricates, one lateral approximant and these sum up to twenty-one consonants". In this paper, I will go along with Eme & Odinye (2008) in presenting twenty-one (21) consonant sounds of Mandarin. Below are the consonant sounds of Mandarin Chinese in Pinyin.

	Unaspirated	Aspirated	Nasal	Voiceless fricative	Voiced fricative
Labial	b	p	m	F	
Alveolar	d	t	n		l
Velar	g	k		H	
Palatal	j	q		X	
Dental sibilant	z	c		S	
Retroflex	zh	ch		Sh	r

Table 1: Mandarin consonant sounds in pinyin

There is equally a controversy over the number of vowels in Mandarin Chinese phonology. Some linguists agree on six (6) main vowels, while others agree on five (5) vowels. There are other linguists who think it is lesser than five vowels. A linguist says that Mandarin Chinese has no vowel. According to Duanmu (2007:35), "if we exclude the two 'apical vowels' and the retroflex vowel, standard Chinese has five vowel phonemes". Wang (1993) suggests that the high vowels are glides; if so there are just vowels in Mandarin Chinese. Pulleyblank (1984) suggests that [i,y,u] are glides, [ə] is not specified at the underlying level, and [ɑ] is a pharyngeal glide instead of a vowel. If so, standard Chinese has no vowel at all. In this paper, I present six main vowel sounds in Mandarin Chinese. See the table below:

Vowel sounds in pinyin	Description
a	Low
e	Central
o	Mid-back
i	High-front
u	High-back
ü	High-front

Table 2: Mandarin main vowel sounds in pinyin

Mandarin Chinese finals (vowels) can be divided into: six simple finals (a,e,i,o,u,ü), thirteen compound finals (ai, ao, ei, ia, iao, ie, iou, ou, ua, uai, üe, uei, uo), sixteen nasal finals (eight front nasals: an, en, ian, in, uan, üan, uen, ün; eight back nasals: ang, eng, iang, ing, iong, ong, uang, ueng). The initial (consonants) and final (vowels) sounds make

a total of fifty-six (56) basic sounds. Combinations of initials and finals plus the special cases result in 411-413 possible combinations. Applying the four tones of Mandarin Chinese to this, we get a total of around 1,600 unique syllables.

Chinese is a tonal language. At the supra-segmental level involving the entire syllable rather than a single phone, there are four basic tones, as well as a short and weak neutral tone in standard Chinese. The most frequently used system in describing Chinese tones is scale of five pitch levels developed by YR Chao in 1930 (Sun, 2006:39). Below is the table of Mandarin Chinese tone.

Tone	Marking	Pitch value	Description
1st	mā	55	High level tone
2nd	má	35	High rising tone
3rd	mǎ	214	Falling rising tone
4th	mà	51	Falling tone
5th	ma		Neutral tone

Table 3: Mandarin Chinese tones

MANDARIN CHINESE SOUNDS: PINYIN VERSUS IPA

Phonetic transcription is important factor to consider when talking or teaching Mandarin Chinese. In the case of English, there is usually a certain degree of resemblance between the alphabetic-based orthographical form of a word. In the Mandarin Chinese, however, there is no connection between the logographic system and the phonetic symbols normally used to transcribe Western languages. Although International Phonetic Alphabet (IPA) has developed a set of symbols which aim to describe all human languages including Chinese, many symbols for the Chinese sounds are difficult to learn and inconvenient to type. This is where the pinyin system comes in (Shei, 2014:3). Pinyin is a Romanized system which represents Mandarin Chinese sounds in a convenient way. Pinyin is also used to type Chinese characters as it is compatible with the English-based computer keyboard. Heselwood (2013) call pinyin a 'pseudo-transcription'. It is not a 'real' phonetic transcription system, nor is it a 'real' orthographic system, but it does carry out both functions in a partial sense. Pinyin is currently the most popular tool for encoding Mandarin Chinese sounds for language learners, who can use pinyin to learn the Chinese sounds, to read Chinese text and later to key in the Chinese characters which they learn (Shei, 2014:3)

The table below shows a good one-to-one correspondence between the Mandarin Chinese Pinyin and IPA symbols in both initials (consonant sounds) and finals (vowel sounds). The table also shows the similarities and differences between the IPA and Pinyin symbols for the Mandarin Chinese consonant and vowel sounds.

Pinyin	b	p	m	f	d	t	n	l	g	k	h	j	q	x	z	C	s	zh	ch	sh	r
IPA	[p]	[pʰ]	[m]	[f]	[t]	[tʰ]	[n]	[l]	[k]	[kʰ]	[x]	[tɕ]	[tɕʰ]	[ɕ]	[ts]	[tsʰ]	[s]	[tʂ]	[tʂʰ]	[ʂ]	[ɻ]

Table 4: Mandarin Chinese consonant sounds in both Pinyin and IPA

Pinyin	a	o	e	i	u	ü	ai	ao	ei	ia	iao	ie	Iu	ou	ua	uai	üe	ui	uo
IPA	[a]	[ɔ]	[ə]	[i]	[u]	[y]	[ia]	[aʊ]	[eɪ]	[ia]	[iaʊ]	[iɛ]	[ioʊ]	[oʊ]	[u̯a]	[u̯aɪ]	[yœ]	[u̯ən]	[u̯ɔ]
Pinyin	an	en	ian	in	uan	üan	un	ün	ang	eng	iang	ing	Iong	ong	uang	ueng	-i	-i	er
IPA	[an]	[ən]	[iɛn]	[in]	[u̯an]	[yɛn]	[u̯ən]	[yn]	[aŋ]	[əŋ]	[iaŋ]	[iŋ]	[iʊŋ]	[ʊŋ]	[u̯aŋ]	[uəŋ]	[ɿ]	[ʅ]	[əɹ]

Table 5: Mandarin Chinese vowel sounds in both Pinyin and IPA

CONCLUSION

The International Phonetic Alphabet (IPA) could be used to represent Mandarin Chinese pronunciation, but it requires a good knowledge of the symbols. Though it is more efficient and foolproof than trying to mimic Chinese sounds with an intuitive combination of English letters, it is not easy to write, either by hand or typing. Therefore, pinyin is a better system. Pinyin is a very useful tool to learn to get around China. The Chinese people view their characters as the true Chinese written language, but pinyin can be seen on many maps, road signs, and other notices. It is necessary to note, however, that the Hanyu pinyin 'Chinese spelling system' is currently not used in place of Chinese writing (character) in China. Instead, it is a Romanized system functioning to annotate Mandarin Chinese pronunciation with Roman letters. Because Mandarin Chinese has a large number of homophones, and because of the difficulty in defining the word in Chinese, alphabetical system is not yet an independent working orthography.

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