

# A Comparative Analysis of Consonants in Chinese and Arabic Phonetics

FAYROUZ ABDELSAMIE ELSAYED MOHAMED

School of International Chinese Studies (SICS) of East China Normal University (ECNU), Shanghai, China

Arabic and Chinese are one of the most difficult languages to learn in the world. The mark of Arabic is Pinyin characters plus pinyin symbols. On the other hand, the mark of Chinese is ideographic square shaped characters; each pronunciation of a Chinese character is generally a syllable. There are great differences between Arabic and Chinese consonants, so this paper mainly discusses the similarities and differences between the two languages and their respective characteristics through the comparative analysis of Chinese and Arabic consonants.

*Keywords:* Chinese, Arabic, pronunciation, consonant, comparison

## A Comparative Analysis of Chinese and Arabic Consonants

In order to make a comparative analysis of Chinese and Arabic consonants, first of all, we need to have a quite comprehensive and clear understanding of the features of each consonant pronunciation of the two languages. All consonant phonemes in Chinese and Arabic are included in Table 2 below.

The Chinese phonetic symbol is Pinyin, which uses the International Latin alphabets. It has both consonant and vowel letters, while Arabic is phonetic alphabets transcription and the phonetic symbol of consonants is Arabic letters itself.

Chinese language has 22 consonant phonemes; among them [ŋ] can only be used as a tail vowel, [n] can be used as both initial and final, and the rest can only be used as initials. The writing system of Arabic language is a combination of Pinyin letters and language symbols. Arabic has 28 consonant phonemes, two of which are semivowels; some documents often analyze them as consonants.

## Comparison Between Chinese and Arabic Consonants

Chinese and Arabic consonants appearing in the same cell of Table 1 above are compared and analyzed from the aspects of pronunciation position, pronunciation method, and the usage of international phonetic symbols, then seven groups of basic corresponding consonants are found, as shown in the following table:

Table 1

*Comparison Between Pronunciation Position and Pronunciation Method of Chinese and Arabic Consonants*

Chinese Pinyin Letters	m	f	n	l	t	s	k
Arabic Letters	م (ma)	ف (f)	ن (na)	ل (la)	ت (ta)	س (sa)	ك (ka)
International Phonetic Alphabets	[m]	[f]	[n]	[l]	[t̚]	[s]	[kʰ]
Phonemic features	Voiced, nasal, bilabial sound	Voiceless, fricative, labial sound	Voiced, nasal, apico-alveolar sound	Voiced, lateral, apico-alveolar sound	Voiceless, aspirated, plosive, apico-alveolar sound	Voiceless, fricative, apico-alveolar sound	Voiceless, aspirated, plosive, velar sound

Table 2

*Chinese and Arabic Consonants Phonetic Symbols*

consonant pronunciation method		pronunciation position		Bilabial	Labial	Interdental	dental	Apico-alveolar	Retroflex	palatal-alveolar	Dorsal sound	Velar sound	Throat sound	Throat Nasal sound
Plosive	Voiceless	Aspirated		p[pʰ]				t[tʰ] ت ك				k[kʰ] ق		
		Unaspirated		b[p]				d[t]				g[k]		ʔ[ʔ]
	Voiced			m[b]				q[d] د					ɣ[ɣ]	
Affricate	Voiceless	Unaspirated					z[tʃ]		zh[tʃ]		j[tʃ]			
		Aspirated					c[tʃʰ]		ch[tʃʰ]		q[tʃʰ]			
	Voiced									ɟ[ɟ]				
Fricative	Voiceless			f[f] ف	ɸ[ɸ]		s[s] س ش		sh[s]	ʃ[ʃ]	x[x]	h[x] ح خ	ʕ[ʕ]	ʔ[ʔ]
	Voiced				ʒ[ʒ] ژ		z[z] ز		r[r]			ʒ[ʒ]		
	Voiced			m[m] م				n[n] ن				ŋ[ŋ]		
Nasal sound	Voiced							ɲ[ɲ] ي						
Trill sound	Voiced							r[r]						

In addition, 10 groups of similar consonants were found in the same cell or adjacent cells in Table 2 by comparing Chinese and Arabic consonants. The pronunciation of these 10 groups of consonants mainly sounds similar, but they also have some nuances in the closure positions, the methods of pronunciation, etc.

The following is a comparative analysis of each of these similar consonants from the aspect of pronunciation position and pronunciation method.

First is b[p] and ب[b].

As we can see from Table 2, these two sounds are bilabial plosive, but the difference is that the first one is voiceless consonant, while the second one is voiced consonant. When some Arab students pronounce the b[p], they may pronounce it as a voiced sound.

Second is d[t], ڤ[d], and ض[dʕ].

These three consonants are plosive and apical. The tip of the tongue and upper gingiva form airflow obstruction, but d[t] is a voiceless consonant and the vocal cords do not vibrate when the voice is not aspirated, while ڤ[d] and ض[dʕ] are voiced consonants, so the vocal cords vibrate during pronunciation.

The difference between d[t] and ڤ[d] mainly lies in the opposition of voiceless and voiced sounds, while the difference between d[t] and ض[dʕ] not only lies in the difference between voiceless and voiced sounds, but also lies in the difference of the position of the tongue. When we pronounce ض[dʕ], the middle part of the tongue must be submerged, and getting a bit low, mouth cavity should be relatively large; compared to d[t] the pronunciation is deeper and more velarized.

Third is k[kʰ] and ك[kʰ].

From Table 2, we can see that these two consonants basically have the same pronunciation characteristics, which are velar sound, plosive, voiceless consonant, and aspirated sound. The juncture of slightly raising the root of tongue and soft and hard palate forms obstacle while pronunciation, but when the two sounds are respectively combined with the sound [u], we can find out that the obstruction part of k[kʰ] is more backward, which means that it's closer to the soft palate, while ك[kʰ] is relatively closer to the hard palate. In fact, it also belongs to the pronunciation difference between the similar syllables.

Fourth is g[k] and ق[qʰ].

Both two consonants are plosive and voiceless consonants, but the first one is unaspirated sound, while the second one is aspirated sound. There are also some differences in the parts and methods of pronunciation between these two consonants. The pronunciation of g[k] is a slight lifting of the surface of the tongue and soft palate which forms obstruction, while the pronunciation of ق[qʰ] is lifting the tongue root along with uvula which forms obstruction. g[k] is a velar sound, while the pronunciation position of ق[qʰ] is more velarized.

Fifth is h[x] and ح[χ].

These two consonants are both fricative and voiceless sounds; the pronunciation position is respectively in the tongue root and behind the tongue root. Although h[x] and ح[χ] use the same International Phonetic Alphabet, the pronunciation characteristics of the two sounds are obviously different. First of all, although h[x] and ح[χ] are both velar sounds, the actual pronunciation of h[x] is slightly forward more than ح[χ], therefore ح[χ] has a very obvious fricative sound, in which the hindrance is formed by the posterior section of the blade of tongue along with the soft palate, and the soft palate vibrates, when the air flow passes through it, while h[x] has a weak fricative sound.

Sixth is s[s] and ص[sʕ].

These two sounds are both fricative, voiceless, and dental sounds. The pronunciation position and method of both sounds are basically corresponding. s[s] is pronounced by the tip of the tongue resting on the back of the lower teeth, then the front of the tongue rising towards the hard palate, and the upper and lower teeth slightly close to form an obstruction, while ص[sʕ] is pronounced by the tip of the tongue resting behind the back of the lower teeth, close to the gingiva, the back part of the tongue rise to the soft palate, and the dorsum of the tongue concave; compared with s[s], the position of the tongue tip and the dorsum of the tongue is lower, and the mouth cavity is larger, so the sound is relatively backward and thick. Although there are some differences between the pronunciation of s[s] in Chinese and ص[sʕ] in Arabic, s[s] in Chinese is basically the same as س[s] in Arabic.

Seventh is sh[ʃ], x[ɣ], and ش[ʃ].

These three sounds are fricative and voiceless sounds. sh[ʃ] is a sound of the tip of the tongue which bents backward, while pronouncing this sound, the dorsum of the tongue concaves, and the tip of the tongue leans toward the middle of the hard palate, but the tip of the tongue does not touch it, which forms a barrier. x[ɣ] is a tongue dorsum sound. While pronouncing x[ɣ], the front of the tongue leans toward the front of the hard palate, but does not touch it, which allows the air flow to pass through, forming a barrier. ش[ʃ] is a sound of the tip of the tongue. While pronouncing ش[ʃ], the front of the tongue slightly shrinks back and raises toward the hard palate forming a slit with the hard palate, which allows the air flow to pass through.

Eighth is r[z̥] and ر[r].

These two sounds are far from each other in the phonemic characteristics diagram of Arabic and Chinese consonants: One is fricative and retroflex sound; the other one is tremolo and apico-alveolar sound. While pronouncing the tremolo sound of ر[r], the tip of the tongue is snapped and separated from the upper jaw at a high frequency, which forms a gap between the tip of the tongue and the upper jaw to let the air flow pass through. Therefore, the tremolo sound is actually a fricative sound repeated at a high frequency, so it's defined as a fricative sound in some books. If ر[r] is regarded as a high frequency repeated fricative sound, its pronunciation characteristics are close to those of the retroflex fricative r[z̥] in Chinese. The difference between r[z̥] and ر[r] is that the tip position of r[z̥] is more backward than ر[r], the tongue does not vibrate when r[z̥] is pronounced, and its position is relatively stable.

Ninth is z[ts] and ز[z].

These two sounds are apical front consonants, but z[ts] is a fricative, non-aspirated voiceless sound. While pronouncing this consonant, the tip of the tongue is pressed against the upper part of the back of the lower teeth, and the front of the tongue is completely closed to the upper jaw, blocking the air flow to pass through, and then gradually opening up, forming a slit to let the air flow pass through. ز[z] is a fricative voiced sound. While pronouncing this consonant, the position of the tongue tip is basically the same as in pronouncing z[ts], but the front of the tongue is just a bit close to the upper jaw, which forms a narrow slit, to allow the air flow to get through.

Tenth is j[tɕ] and ج[ɕ].

Both of these sounds are affricate consonants. The first one is dorsum voiceless unaspirated sound, while the second one is tongue blade voiced consonant. Because the pronunciation positions of the blade of the tongue and the dorsum are so close, some books classified ج[ɕ] in Arabic as a dorsal consonant. While pronouncing Chinese

consonant  $j[tɕ]$ , the tip of the tongue is pressed against the lower part of the back of the lower teeth, then the dorsum slightly touches the middle part of the upper jaw which forms an obstacle. When the air flow breaks the obstacle, a narrow gap is maintained between the dorsum and the upper jaw, while pronouncing consonant  $ç[ɕ]$ , the front of the tongue is slightly or almost attached to the back of the upper gingiva to form an obstacle, and when the air flow passes through, a narrow gap is maintained between the front part of the tongue frame and the upper teeth roots.

Chinese has six consonants:  $c[tsʰ]$ ,  $q[tɕʰ]$ ,  $p[pʰ]$ ,  $ch[tsʰ]$ ,  $zh[tʂ]$ , and  $ng[ŋ]$ . These six sounds do not exist in Arabic, and their pronunciation is quite different from other consonants in Arabic; there is no Arabic consonant which is similar to those in Chinese. Therefore, Arab students may encounter some difficulties while learning these sounds.

The first four sounds are aspirated, so the problem might be in the aspirated sound. The phonemic characteristics of  $c[tsʰ]$  are equivalent to  $z[ts]$ , while the phonemic characteristics of  $q[tɕʰ]$  are equivalent to  $j[tɕ]$ ; on the other hand  $zh[tʂ]$  and  $ch[tsʰ]$  are both retroflex consonants; those two consonants have a certain difficulty for Arab students, but the pronunciation position and method of these two sounds are basically equivalent to  $sh[ʃ]$ . So if Arab students can master the pronunciation of  $sh[ʃ]$ , there should be no problem with the pronunciation of  $zh[tʂ]$  and  $ch[tsʰ]$ , while  $ng[ŋ]$  is a velar nasal voiced sound, when pronouncing this sound, the mouth must be opened, then the lips will naturally be opened, and the nasal path will also be opened, then the air flow will flow out the higher part of the nasal cavity. This sound can be analyzed by combining the anterior nasal sound  $n[n]$ .

### **The Difficulties of Arab Students in Learning Chinese Initial Consonants**

Arab students have no difficulty in acquiring the 22 initial consonants of Chinese language, because Arabic has similar phonemes. But there are still some problems that need attention.

First is the aspirated and unaspirated sound.

This error mainly occurs in the following four groups of aspirated and unaspirated consonants:  $b[p]$ \( $p[pʰ]$ ,  $d[t]$ \( $t[tʰ]$ ,  $g[k]$ \( $k[kʰ]$ ,  $z[ts]$ \( $c[tsʰ]$ . More problems usually occur in pronouncing  $b[p]$  and  $p[pʰ]$ , because  $p[pʰ]$  has no similar sound in Arabic, and it is easy to pronounce it same as Arabic  $پ[p]$ . For example, the two aspirated and unaspirated initial consonants of *bian* and *pian* are usually read in reverse.

Some Arab students who are learning Chinese language have other foreign language backgrounds such as English, French, in addition to their native Arabic language. The voiceless consonants in English and French sometimes are aspirated, sometimes are unaspirated, moreover the aspiration level is lower than that in Chinese, so they have more errors in learning Chinese aspirated and unaspirated consonants.

Second is voiceless and voiced consonants.

The main point is that the unaspirated voiced sound  $z[ts]$  is pronounced as a voiced sound. Sometimes Arab students pronounce unaspirated voiceless sound as a voiced sound, and this might be due to the deep influence of other languages, such as English, French, etc., which students had studied before studying Chinese.

Third is the four Fricative sounds:  $sh[ʃ]$ ,  $x[ç]$ ,  $h[x]$ ,  $r[ʐ]$ .

Some Arab students read *shi* and *xi* as *shi*. The pronunciation of these two syllables is obscured, which may be affected by the final vowels. While teaching these two consonants, they can be compared with two vowels, so that students can experience the differences between the two syllables.

Some Arab students pronounce the initial sh[ʃ] as [ʃ]. This is a typical phenomenon of negative transfer of mother tongue. For example, the initial consonant sh[ʃ] in the syllable “Shuan” (“拴”) might be pronounced as s[s], and the initial consonant x[ɕ] in the syllable “xuan” (“宣”) might be pronounced similar to the sound of [θ].

In order to solve the problem of pronouncing the initial consonant sh[ʃ] as [ʃ], teachers should teach the three sounds of sh[ʃ], x[ɕ], and [ʃ] together in the classroom to let the students distinguish the difference between them. The main difference between these three sounds is the height of the tongue and the position of the tongue tip. The teacher can use the top of two fingers to represent the tip of the tongue, and use the palm to represent the middle part of the dorsum, transforming the shape which represents the subtle difference of tongue position, tongue tip position, and its relationship with the upper jaw.

Some Arab students have obvious fricative sound when they pronounce h[x], which is similar to the soft palate fricative sound ḥ[χ] in Arabic. This is also a typical phenomenon of the negative transfer of the mother tongue. For example, the initial consonants h[x] in syllable “hun” (“混”), k[kʰ] in syllable “kun” (“困”), and g[k] in syllable “gun” (“滚”) might be pronounced as fricative sounds.

r[ʐ] is also a phenomenon of the negative transfer of the mother tongue. The difference between r[ʐ] in Chinese and ʀ[r] in Arabic is that the tip position of r[ʐ] is more backward than ʀ[r]. Some Arab students pronounce r[ʐ] with tremolo sound which occurs in ʀ[r]. While teaching r[ʐ], teachers should point out the difference between Chinese r[ʐ] and the tremolo sound, which is that r[ʐ] is pronounced with the tip of the tongue without touching the upper jaw, the tongue is in a stable state, and then let a bit light airflow pass through. The teacher should use hands to demonstrate the difference of the position of the tongue while pronouncing both two sounds.

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