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A Comparison of Phonemes Between Chinese and Italian and Its Application in Pronunciation Teaching

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Abstract: This paper examines the phonemes of Chinese and Italian, conducting a statistical analysis and comparing their distinctive feature oppositions to identify challenges in phonetic learning, thereby offering suggestions for teaching Chinese and Italian pronunciation. The study is divided into four parts: the first introduces the phonological definition of phonemes and delineates their scope in this context; the second compares the vowel and consonant systems of both languages, presenting foundational data on their similarities; the third analyzes the phonemic oppositions unique to each language, highlighting key differences; and the fourth proposes methods and recommendations for mastering the phonetic systems of both languages based on these differences.

Keywords: Chinese; Italian; Phoneme; Distinctive phonological features; Pronunciation teaching

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1. Introduction

Modern Chinese, or Mandarin, evolved from ancient Chinese and belongs to the Sino-Tibetan language family, specifically the Han-Tai subgroup. In contrast, modern Italian, derived from the Tuscan dialect and refined by countless literary figures, is part of the Indo-European language family, specifically the Romance subgroup. In recent years, with deepening economic, cultural, and technological exchanges between China and Italy, an increasing number of Chinese and Italian learners have begun studying each other's languages. However, mastering any language must begin with its phonetics, including vowels, consonants, and corresponding pronunciation and spelling rules. This paper aims to compare the phonemes of Chinese and Italian, helping students from both countries understand the phonetic differences between the two languages, thereby facilitating their learning and providing recommendations for pronunciation teaching.

2. Definition of phonemes

The term "phoneme" is used ambiguously in Chinese, with different meanings in phonetics and phonology. Narrowly defined in phonetics, a phoneme is "the smallest phonetic unit formed by a single articulatory action" [1]. In phonology,

however, a phoneme, also referred to as a phonemic unit, is "the fundamental unit in a phonetic system that distinguishes meaning." This paper adopts the latter definition. Italian linguist Tulio De Mauro (2003) notes that in any language, people express meaning through specific linguistic symbols such as words and sentences, which combine sound and meaning [2]. Among these, the smallest phonetic units that lack inherent meaning but can differentiate linguistic symbols, thereby distinguishing their meanings, are called phonemes. Generally, phonemes differ from the actual sounds we hear or produce in daily life; they are abstract concepts. In a language, when replacing one sound with another results in a change in meaning, the two sounds belong to different phonemes. Conversely, if the replacement does not alter meaning, the sounds belong to the same phoneme. Thus, in phonology, a "phoneme" refers to a set of related sounds in a language that can distinguish meaning.

3. Statistical comparison of Chinese and Italian phonemes

It is estimated that the average number of phonemes across the world's languages is approximately 31. In the modern Italian phonetic system, there are 7 vowel phonemes: /ä/, /ɛ/, /e/, /i/, /o/, /ɔ/, /u/, and 23 consonant phonemes: /p/, /b/, /t/, /d/, /k/, /g/, /m/, /n/, /ɲ/, /l/, /ʎ/, /f/, /v/, /s/, /z/, /ʃ/, /r/, /ts/, /dz/, /tʃ/, /dʒ/, /j/, /w/, bringing the total number of phonemes in Italian to 30 [3]. Similarly, in modern Chinese, there are 6 vowel phonemes [4]: /ä/, /ɤ/, /i/, /u/, /y/, /ɚ/, and 22 consonant phonemes: /p/, /pʰ/, /m/, /f/, /t/, /tʰ/, /n/, /l/, /k/, /kʰ/, /ŋ/, /x/, /tɕ/, /tɕʰ/, /ɕ/, /tʂ/, /tʂʰ/, /ʂ/, /ʐ/, /ts/, /tsʰ/, /s/, making the total number of phonemes in Chinese 28. From this comparison, it is evident that Chinese and Italian have a similar number of phonemes, close to the global average. Additionally, both languages share some common vowel and consonant phonemes. The following sections provide a detailed comparison of the phonetic systems of Chinese and Italian.

First, the study compares the consonant phonemes of Chinese and Italian. Consonants can be categorized into seven main types based on their manner of articulation: plosives, affricates, nasals, trills, fricatives, approximants, and laterals. The comparison will be conducted according to these categories. **Table 1** shows that Chinese and Italian share 3 out of 9 plosive phonemes (/p/, /t/, /k/), resulting in a similarity rate of approximately 33%.

Table 1. Comparison of Plosives

Italian		IPA	Chinese	
Letter	Example		Pinyin	Example
p	papà [pa'pa]	p	b	爸爸 [päpä] pinyin: bà ba
b	bene ['bɛne]	b		
t	tono ['tɔno]	t	d	大 [tä] pinyin: dà
d	dopo ['dopo]	d		
c (ch)	caro ['karo]	k	g	隔 [kɤ] pinyin: gé
g (gh)	gola ['gola]	g		
		p^h	p	怕 [p^hä] pinyin: pà
		t^h	t	塔 [t^hä] pinyin: tǎ
		k^h	k	渴 [k^hɤ] pinyin: kě

Table 2 shows that Chinese and Italian share 2 out of 9 fricative phonemes (/f/, /s/), yielding a similarity rate of about 22.2%.

Table 2. Comparison of Fricatives

Italian		IPA	Chinese	
Letter	**Example**		**Pinyin**	**Example**
f	fama [’fama]	f	f	佛 [fo] pinyin: fó
v	voto [’voto]	v		
s	sole [’sole]	s	s	死 [sɿ] pinyin: sǐ
s	rosa [’rɔza]	z		
sc (sci, sce)	scena [’ʃɛna]	ʃ		
		x	h	喝 [xɤ] pinyin: hē
		ɕ	x	洗 [**ɕi**] pinyin: xǐ
		ʂ	sh	书 [**ʂu**] pinyin: shū
		ʐ	r	日 [rɻ] pinyin: rì

Table 3 shows that Chinese and Italian share a total of 9 affricate phonemes, with only /ts/ being common to both. It is also worth noting that the Italian sounds /tʃ/ and /dʒ/ bear some resemblance to the Chinese /tʂʰ/ and /tʂ/. However, the former are palatal sounds, while the latter are post-alveolar and retroflex. Since Italian lacks retroflex sounds, these phonemes should not be conflated in pronunciation. Therefore, the similarity rate for affricate phonemes between Chinese and Italian is approximately 11.1%.

Table 3. Comparison of Affricates

Italian		IPA	Chinese	
Letter	**Example**		**Pinyin**	**Example**
z	pazzo [’pattso]	ts	z	昨 [tswo] pinyin: zuó
z	azzurro [ad’dzurro]	dz		
c (ce, ci)	cena [’tʃɛna]	tʃ		
g (ge, gi)	giro [’dʒiro]	dʒ		
		tɕ	j	鸡 [tɕi] pinyin: jī
		tɕ^{h}	q	妻 [tɕ^{h}i] pinyin: qī
		tʂ	zh	遮 [tʂɤ] pinyin: zhē
		tʂ^{h}	ch	车 [tʂ^{h}ɤ] pinyin: chē
		ts^{h}	c	促 [ts^{h}u] pinyin: cù

Table 4 shows that Chinese and Italian share 2 out of 4 nasal phonemes (/m/, /n/), with a similarity rate of 50%.

Table 4. Comparison of Nasals

Italian		IPA	Chinese	
Letter	**Example**		**Pinyin**	**Example**
m	mamma [’mamma]	m	m	妈妈 [māmā] pinyin: mā ma
n	nonno [’nɔnno]	n	n	奶奶 [nainai] pinyin: nǎi nai
gn	sogno [’soɲɲo]	ɲ		
		ŋ	ng	梦 [məŋ] pinyin: mèng

Table 5 shows that Chinese and Italian share 1 out of 2 lateral phonemes (/l/), resulting in a similarity rate of 50%.

Table 5. Comparison of Laterals

Italian		IPA	Chinese	
Letter	**Example**		**Pinyin**	**Example**
l	luna [’luna]	l	l	来 [lai] pinyin: lái
gl (gli)	figlio [’fiʎʎo]	ʎ		

Table 6 shows that Chinese does not have trills, which constitutes one of the biggest challenges for Chinese learners when mastering Italian pronunciation and represents one of the most significant phonetic differences between the two languages. Consequently, the similarity rate for trills between Chinese and Italian is 0%.

Table 6. Comparison of Trills

Italian		IPA	Chinese	
Letter	**Example**		**Pinyin**	**Example**
r	raro [’raro]	r		

Table 7 indicates that Italian has approximants /j/ and /w/, which do not exist as independent phonemes in Chinese. However, since Chinese includes [j] and [w] as allophones of the vowels /i/ and /u/ respectively, learners may struggle to distinguish minimal pairs such as: *lacuale* /laˈku.a.le/ vs. *la quale* /laˈkwa.le/ and *viale* /ˈvja.le/ vs. *via le* /ˈvi.a le/.

Table 7. Comparison of Approximants

Italian		IPA	Chinese	
Letter	**Example**		**Pinyin**	**Example**
i	viale [’vjale]	j		
u	quale [’kwale]	w		

Based on the comparison of the seven categories of consonant phonemes above, we can conclude that Chinese and Italian have a total of 36 consonant phonemes, with 9 phonemes common to both languages. Among these shared consonants, 3 are plosives, while the remaining categories each share 0 to 2 phonemes. As a result, the overall similarity rate between Chinese and Italian consonants is relatively low, at only 25%, with no individual category exceeding a 50% similarity rate.

Notably, Chinese consonants are predominantly voiceless, totaling 17 phonemes, which account for 77.3% of all consonants in the language. This represents an absolute majority and constitutes 47.2% of the combined 36 consonants in both languages - nearly half. This highlights the prominence of voiceless consonants as a distinctive feature of Chinese phonetics. However, most of these voiceless consonants in Chinese do not overlap with Italian across the seven categories, and Chinese lacks trills and approximants, which are present in Italian.

In contrast, Italian encompasses all seven consonant categories, with 8 voiceless and 15 voiced consonants, showing a predominance of voiced sounds. Additionally, all voiceless consonants in Italian are unaspirated.

The study then compare the vowel phonemes of Chinese and Italian, as shown in the **Table 8**.

Table 8. Comparison of Vowels

Italian		IPA	Chinese	
Letter	**Example**		**Pinyin**	**Example**
a	lana [‘lana]	ä	a	大 [tä] pinyin: dà
è	sette [‘sɛtte]	ɛ		
é	seme [‘seme]	e		
i	nido [‘nido]	i	i	衣 [i] pinyin: yī
ó	dono [‘dono]	o		
ò	sodo [‘sɔdo]	ɔ		
u	luna [‘luna]	u	u	书 [**ʂu**] pinyin: shū
		ɤ	e	喝 [xɤ] pinyin: hē
		y	ü	鱼 [y] pinyin: yú
		ɚ	er	耳 [ɚ] pinyin: ěr

Chinese and Italian have a total of 10 vowel phonemes, with 3 vowels common to both languages. Additionally, Italian exhibits the open/close vowel distinction (e.g., [ɛ] vs. [e], [o] vs. [ɔ]), a phonetic feature absent in Chinese. Consequently, the similarity rate between the vowel systems of the two languages is 30%.

Overall, Chinese and Italian have 46 phonemes, of which 12 are shared, resulting in a total similarity rate of approximately 26.1%. Neither the vowel nor the consonant systems exceeds a one-third similarity rate, indicating significant challenges for learners from either language background. Therefore, the first step for learners is to overcome native pronunciation habits and acquire new articulation methods. To achieve this, it is

essential to understand the distinctive phonological oppositions in both languages.

4. Key distinctive features in Chinese and Italian

As discussed in Chapter 1, phonemes are the smallest phonetic units that distinguish meaning. To fulfill this function, different phonemes rely on distinctive features. Not all phonetic features can distinguish phonemes, but those that do in a particular language are called distinctive features. "The oppositions of phonemes based on distinctive features are meaning-distinguishing oppositions, that is, a phonemic opposition" [1]. Chinese and Italian exhibit many unique phonemic oppositions.

4.1. Key distinctive features in Chinese compared to Italian

The primary distinctive feature in Chinese is the opposition between aspirated and unaspirated voiceless consonants. To verify this, we use "minimal pairs"—word pairs that differ by a single phonetic element in the same position [2]. For example, the Chinese words " 怕 " ([pʰä], pinyin: pà) and " 爸 " ([pä], pinyin: bà) form a minimal pair distinguished by the aspirated /pʰ/ and unaspirated /p/. In Italian, however, aspiration does not serve a distinctive function. For instance, the voiceless /p/ in "professore" (teacher) does not change meaning if aspirated.

Another distinctive feature in Chinese is between front and back nasals. In Chinese, /n/ and /ŋ/ are distinct phonemes, whereas in Italian, [ŋ] is merely an allophone of /n/. For example, the Chinese words " 进 " ([tɕin], pinyin: jìn) and " 静 " ([tɕiŋ], pinyin: jìng) form a minimal pair where replacing /n/ with /ŋ/ alters both pronunciation and meaning. In Italian, words like "incanto" [iŋˈkanto] may feature [ŋ] as a variant of /n/, but this does not create a meaningful distinction.

4.2. Key distinctive features in Italian compared to Chinese

The primary distinctive feature in Italian is the opposition between voiced and voiceless consonants. For example, the minimal pairs "pasta" (['pasta], pasta) and "basta" (['basta], enough), "cara" (['kara], dear) and "gara" (['gara], competition), and "modo" (['modo], way) and "moto" (['moto], movement) demonstrate how voicing distinguishes meaning. In Chinese, replacing a voiceless consonant with a voiced one does not change meaning but may reflect dialectal variations.

Another challenging feature for learners is the opposition between open and close mid-vowels in Italian, such as "bòtte" (['bɔtte], hits) and "bótte" (['botte], barrel), or "pèsca" (['pɛska], peach) and "pésca" (['peska], fishing). Chinese lacks such vowel distinctions, though this feature is becoming less prominent in modern Italian.

5. Recommendations for pronunciation teaching in Italian and Chinese

Based on the statistical comparison of Chinese and Italian phonemes and the analysis of their distinctive phonological oppositions, the following practical recommendations are proposed for pronunciation teaching in both languages.

5.1. General recommendations for pronunciation teaching in both languages

Given the low similarity rate (26.1%) between Chinese and Italian phonetic systems, learners face significant challenges. However, teaching practices reveal that students often use native characters or sounds to

approximate foreign pronunciations. For example, Chinese learners may annotate Italian words with similar-sounding Chinese characters, while Italian learners may do the same with Italian syllables for Chinese words. While this method is efficient, it leads to pronunciation errors due to the systems' differences. For instance, Chinese learners might annotate the Italian word "danno" ([danno]) as " 大诺 [ta nwɔ]" ignoring voicing and adding an extra vowel. Similarly, Italian learners might substitute the Italian syllable "ce" ([tʃɛ]) for the Chinese word " 车 " ([tʂʰɤ]), resulting in mispronunciation. To address this, two recommendations are proposed:

(1) Comparative teaching

Teachers should emphasize the differences between the two phonetic systems, ensuring Chinese learners master Italian pronunciation rules and Italian learners master Pinyin. Correct annotation systems should be prioritized.

(2) Prohibition of native annotation

During the initial learning phase, students should be discouraged from using native annotations and encouraged to rely on the target language's spelling system.

Additionally, both Chinese and Italian students should practice distinguishing between palatal and retroflex sounds. Chinese lacks palatal affricates like Italian "ce" ([tʃɛ]) and "gi" ([dʒi]), while Italian lacks retroflex sounds like Chinese /tʂ/ and /tʂʰ/. Therefore, Chinese students should practice flattening the tongue against the palate for Italian palatals, while Italian students should curl the tongue toward the mid-palate for Chinese retroflexes.

5.2. Recommendations for teaching Italian pronunciation to Chinese learners

(1) Practice unaspirated voiceless consonants

Chinese students tend to aspirate voiceless consonants like /p/, /t/, and /k/ due to Pinyin influences. Teachers should emphasize unaspirated pronunciations to match Italian norms.

(2) Distinguish voiced and voiceless consonants

Since voicing is distinctive in Italian but not in Chinese, students must learn to produce and recognize voiced consonants like /b/, /d/, and /g/.

(3) Early introduction of trills

The Italian trill /r/ is absent in Chinese and poses a significant challenge. Given its high frequency in Italian, teachers should introduce trill exercises early.

(4) Ignore open/close vowel distinctions

The open/close vowel opposition, rooted in Tuscan dialects, is increasingly ignored in modern Italian. Teachers can simplify instruction by omitting this feature.

5.3. Recommendations for teaching Chinese pronunciation to Italian students

(1) Practice aspirated consonants

Italian students must learn to aspirate voiceless consonants like /pʰ/, /tʰ/, and /kʰ/, as aspiration is distinctive in Chinese.

(2) Clarify pinyin "b, d, g"

Italian students may confuse Pinyin "b, d, g" (voiceless) with Italian "b, d, g" (voiced). Teachers should highlight this difference.

(3) Distinguish front and back nasals

Chinese distinguishes /n/ and /ŋ/, unlike Italian. Students should practice minimal pairs like "pen" vs.

"peng" or "jin" vs. "jing."

6. Conclusion

Every language has a unique phonetic system, and the difficulty of mastering it depends largely on its similarity to the learner's native system. Chinese and Italian require significant effort to overcome native phonetic habits. In recent years, Italian pronunciation teaching has gained attention, with numerous resources becoming available. This paper aims to contribute to this field by comparing the two phonetic systems and offering practical recommendations for pronunciation instruction.

Disclosure statement

The author declares no conflict of interest.

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