Phonological Regularity of Written Phonetic Elements in Modern Mandarin

by

Stephen M. Kraemer
American English Institute
University of Oregon
skraemer@uoregon.edu
Phonetic Compound
（形声字xingshengzi）

- A “signific” part, which indicates meaning
- plus
- A “phonetic” part which indicates sound
- 妈 [ma1] = 女 (female) + 马 [ma3]
The Mandarin Syllable

• A syllable in Modern Standard Mandarin
• Consists of:
  • An initial
  • A final
  • A tone
The Final

• The final can also be broken down into a medial (vowel), a nucleus (vowel) and an ending (vowel or consonant)

• Final = (M)N(E)
## Mandarin Consonants

<table>
<thead>
<tr>
<th>Source: Kratochvil (1968:25)</th>
<th>Labial</th>
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<th>Alveolar</th>
<th>Alveopalatal</th>
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<th>Velar</th>
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<td>ş, z(r)</td>
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<td>affricate</td>
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<td>tɕ, tɕ’</td>
<td>tɕ, tɕ’</td>
<td>tɕ, tɕ’</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Mandarin Vowels

1  ɪ  ɨ  y(ü)  u
   e  ə  ɤ  o
   ɛ
   a  ɒ

Source: Cheng(1973:12)
Background Literature

• Xu Shen—說 文 解 字Shuo Wen Jie Zi (2nd cent. A.D.)
• Soothill-1911
• Karlgren-1916, 1923a, 1923b, 1926, 1940, 1949, 1958
• Wieger-1927/1965
• Astor-1970
• Kraemer-1980, 1991a, 1991b
• DeFrancis-1984
• Alber-1986, 1989
Zhou Youguang (1980)

Hanzi shengpang duyin biancha (A handy look up for the pronunciation of phonetics in Chinese characters)

- Zhou analyzes characters in the Xin Hua Zidian (1971) based on Phonetic elements and sets up three categories of phonetic compound characters based on the similarity of the phonetic compound to the pronunciation of the phonetic itself.

- The 3 categories are:
  - (1) Same pronunciation (同音 Tong yin), including same or different tones
  - (2) Similar pronunciation (半同音 Ban tong yin) (similar phonemes)
  - (3) Different pronunciation (异音 Yi yin) (not as similar to the original phonetic pronunciation)
John DeFrancis (1984)

• DeFrancis also sets up three categories of phonetic compound characters based on the similarity of the phonetic compound to the pronunciation of the phonetic itself.

DeFrancis’s 3 categories are:
• (1) “Complete identity” (same pronunciation including tone)
• (2) “Identity except for tones in some cases”
• (3) “Partial similarity in the segmental phonemes” (DeFrancis (1984))
Types of Phonological Patterning in Mandarin Characters

- Phonemic Congruence
  
  Characters share one or more phonemes

- Featural Congruence
  
  V’s share features
  C’s share features

- Initials and Finals: The Segment

- Segment Structure
  
  Patterning in arrangement of C’s or V’s

- Overall Patterns in the Written Language
Phonemic Congruence
Types of Character Phonetic Series Based on Phonemic Congruence (Kraemer 1980)

Seven Categories:

• Totally Perfect
• Segment Perfect
• Initial Perfect
• Final Perfect
• Tone Perfect
• Initial – Tone Perfect
• Final – Tone Perfect
Seven Categories of Phonetic Series Found in Wieger (Kraemer 1980)  
579 Series Found + 63 (in Astor(1970))  

For a Total of 642 Series  

Out of 858 Series in Wieger(1927/1965)
Seven Categories of Phonetic Series
Found in Wieger (Kraemer 1980)
Out of 858 Series in Wieger (1927/1965)

- Totally Perfect-124 (+63 in Astor (1970))
- Segment Perfect-192
- Initial Perfect-35
- Final Perfect-153
- Tone Perfect-40
- Initial – Tone Perfect-13
- Final – Tone Perfect-22
SOUND CLUES IN MANDARIN CHARACTER PHONETIC SERIES

• Example of 7 Categories of Character Phonetic Series

• based on 周有光 Zhou Youguang (1980)

汉字声旁读音便查 Hanzi shengpang duyin biancha (A handy look up for the pronunciation of phonetics in Chinese characters)
Totally Perfect

• 丈 [tʂɑŋ⁴] (zhàng-measure (land))
• is a phonetic in
  仗 [tʂɑŋ⁴] (zhàng-weapons)
  杖 [tʂɑŋ⁴] (zhàng-cane; stick)
Totally Perfect

-庸 [iuŋ1] (yōng-) is a phonetic in
-墉 [iuŋ1] (yōng-)
-慵 [iuŋ1] (yōng-)
-镛 [iuŋ1] (yōng-)
-鳙 [iuŋ1] (yōng-)
Totally Perfect

- 贯 [kuan4] (guàn-) is a phonetic in
- 惯 [kuan4] (guàn-)
- 捌 [kuan4] (guàn-)
Segment Perfect

• 名 [mǐn2] (míng-) is a phonetic in
铭 [mǐn2] (míng-)
茗 [mǐn2] (míng-)
酩 [mǐn3] (mǐng-)
酩 [mǐn3] (mǐng-)
酩 [mǐn3] (mǐng-)
酩 [mǐn3] (mǐng-)
酩 [mǐn3] (mǐng-)
Segment Perfect

- 困 [kʻuən4](kùn-) is a phonetic in
- 惆 [kʻuən3](kǔn-)
- 捆 [kʻuən3](kǔn-)
- 闢 [kʻuən3](kǔn-)
- 閬 [kʻuən3](kǔn-)
Categories of Phonetic Elements—More Common Characters

• Examples based on 周有光 Zhou Youguang (1980)
  汉字声旁读音便查 Hanzi shengpang duyin biancha (A handy look up for the pronunciation of phonetics in Chinese characters)
Totally Perfect

• 成 [tʂʻəŋ2] (chéng-become)
• is a phonetic in
  城 [tʂʻəŋ2] (chéng-city)
长 [tʂɑŋ3] (zhǎng-grow) is a phonetic in 张 [tʂɑŋ1] (zhāng-surname, measure word)
马 [ma3](mǎ-horse) is a phonetic in

吗 [ma0] (ma-question word)

骂 [ma4] (mà-scold)

妈 [ma1] (mā-mother)
门 [mən2] (mén-door) is a phonetic in
们 [mən0] (men-plural)
方 [fāŋ1] (fāng-place) is a phonetic in

房 [fāŋ2] (fáng-house)
防 [fāŋ2] (fáng-guard against)
访 [fǎŋ3] (fǎng-visit)
放 [fāŋ4] (fàng-let go)
Initial  Perfect

• 先  [ɕiɛn1] (xīan-first) is a phonetic in
• 洗  [ɕi3]   (xǐ-wash)

• 你  [ni3]   (nǐ-you) is a phonetic in
• 您  [nin2] (nín-you-polite)
Initial Consonant + Vowel (CV) Perfect

• 先 [ɕiɛn1] (xīan-first) is a phonetic in
• 洗 [ɕi3] (xǐ-wash)
• both share [ɕi-] xi-

• 你 [ni3] (nǐ-you) is a phonetic in
• 您 [nin2] (nín-you-polite)
• both share [ni-] ni-
Final Perfect


Final Perfect with Related Initial Consonants

長 [tʂʰəŋ2] (cháng-long) 张 [tʂəŋ1] (zhāng-surname, measure word).
They share the final [əŋ] -ang.

The initial Consonants are [tʂ] zh and [tʂʰ] ch.

Both initial Consonants are alveopalatal (retroflex) affricates. They differ only in the feature of aspiration. The consonant [tʂʰ] ch is aspirated, while the consonant [tʂ] zh is unaspirated.
Final Perfect with Related Initial Consonants

They share the final  [ɑŋ] -ang.
The initial consonants are  [f]  and  [p’]  .
The initial consonant  [f]  is labiodental and the initial consonant  [p’]  is bilabial.
Final Perfect with Related Initial Consonants

艮 [kən3,4] (gěn, gèn -brusque; surname)
根 [kən1] (gēn-root)
很 [xən3] (hěn-very).
They share the final [ən] -en.

The initial Consonants are [k] g and [x] h.
• The consonants are both velar. They have the same place of articulation.
方  [fɑŋ1] (fāng) Series-
Quantitative Analysis

方 [fɑŋ1] (fāng-place; square; just a moment ago) is a phonetic in

房  [fɑŋ2] (fáng-house)
防  [fɑŋ2] (fáng-guard against)
访  [fɑŋ3] (fǎng-visit)
纺  [fɑŋ3] (fǎng-spin)
仿  [fɑŋ3] (fǎng-imitate, copy)
放  [fɑŋ4] (fàng-let go)
旁  [p’ɑŋ2] (páng-side)
方 [fāŋ1] (fāng-place) is a phonetic in

2 [fāŋ2]
3 [fāŋ3]
1 [fāŋ4]
1 [p’āŋ2]

In DeFrancis’s Texts, from DeFrancis Index Volume-approx. 1700 chars. (DeFrancis (1970))
8 characters total with individual pronunciations

1 Phonetic element with 7 phonetic compounds
6/7 = 86%  Segment Perfect
1/7 = 14%  Final Perfect

But 7/7 = 100% Final Perfect or Better
方 [fɑŋ1] (fāng-place) is a phonetic in

房 [fɑŋ2] (fáng-house)-3/4 phonemes are the same as 方 [fɑŋ1]=75%phonetic

防 [fɑŋ2] (fáng-guard against)-3/4= 75%phonetic

访 [fɑŋ3] (fǎng-visit)-3/4= 75%phonetic

紡 [fɑŋ3] (fǎng-spin)-3/4= 75%phonetic

仿 [fɑŋ3] (fǎng-imitate, copy)-3/4= 75%phonetic

放 [fɑŋ4] (fàng-let go)-3/4= 75%phonetic

旁 [p’ɑŋ2] (páng-side)-2/4= 50% phonetic

Thus the average phonetic rating of the phonetic element 方 [fɑŋ1] in the above 7 characters would be 71.4 percent phonetic.
方 [fɒŋ1] (fāng) Series-Quantitative Analysis

方 [fɒŋ1] (fāng-place;square;just a moment ago) is a phonetic in
方 [fɑŋ1] (fāng) Series-Quantitative Analysis

方 [fɑŋ1] (fāng-place; square; just a moment ago) is a phonetic in

枋 [fɑŋ1] (fāng)
鄠 [fɑŋ1] (fāng)
箋 [fɑŋ1] (fāng)
芳 [fɑŋ1] (fāng)
坊 [fɑŋ1] (fāng)
妨 [fɑŋ1] (fāng)
坊 [fɑŋ2] (fāng)
妨 [fɑŋ2] (fāng)
防 [fɑŋ2] (fāng)
舫 [fɑŋ2] (fāng)
舫 [fɑŋ2] (fāng)
舫 [fɑŋ2] (fāng)
舫 [fɑŋ2] (fāng)
舫 [fɑŋ2] (fāng)
舫 [fɑŋ2] (fāng)
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舫 [fɑŋ3] (fāng)
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舫 [fɑŋ3] (fāng)
舫 [fɑŋ3] (fāng)
舫 [fɑŋ3] (fāng)
舫 [fɑŋ4] (fāng)
旁 [p’ɑŋ2] (páng)
徏 [p’ɑŋ2] (páng)
[示]方 [pəŋ1] (bēng)
方 [fan1] (fāng-place) is a phonetic in

6 [fan1]
6 [fan2]
5 [fan3]
1 [fan4]
2 [p’an2]
1 [pen1]

22 characters total with indiv. Pronunciations (Zhou Youguang (1980))(Based on Xinhua Zidian (1971))

1 Phonetic element with 21 phonetic compounds

6/21 = 29% Totally Perfect
12/21 = 57% Segment Perfect
2/21 = 10% Final Perfect
1/21 = 5% Ending η Perfect
But 18/21 = 86% Segment Perfect or Better
21/21 = 100% Final Perfect or Better
方 [fɑŋ1] (fāng-place) is a phonetic in
6 [fɑŋ1] 4/4 phonemes are the same as 方 [fɑŋ1]=6 X 100% phonetic
6 [fɑŋ2] 3/4 phonemes are the same as 方 [fɑŋ1]=6 X 75% phonetic
5 [fɑŋ3] 3/4 phonemes are the same as 方 [fɑŋ1]=5 X 75% phonetic
1 [fɑŋ4] 3/4 phonemes are the same as 方 [fɑŋ1]=1 X 75% phonetic
2 [p’ɑŋ2] 2/4 phonemes are the same as 方 [fɑŋ1]=2 X 50% phonetic
1 [peŋ1] 2/4 phonemes are the same as 方 [fɑŋ1]=2 X 50% phonetic

22 characters total with indiv. Pronunciations (Zhou Youguang (1980))
1 Phonetic element with 21 phonetic compounds

Thus the average phonetic rating of the phonetic element 方 [fɑŋ1] in the above 21 characters would be 81% percent phonetic.
Rime Perfect (NE Perfect)

- In a rime perfect phonetic series, the characters share this same main vowel or nucleus (N) followed by the same final vowel or consonant ending (E).
Rime Perfect

• 门 [mən2] (mén-door) is a phonetic in
• 问 [uən4] (wèn-ask).

• They share the rime  [ən] (-en ).
Rime Perfect: Underlying Forms

- 山 [ʂan1] (shān-mountain) is a phonetic
  in
- 仙 [ɕiɛn1] (xiān-immortal).

- They have the two rimes [an] and [ɛn]
- But they share the same **underlying form** of the rime (-an ) (See Cheng 1973).
Rime Perfect: Underlying Forms

• 占 [tʂan1,4] (zhān-to divine; zhàn-to occupy) is a phonetic in
• 点 [tiɛn3] （diǎn- a point）and
• 店 [tiɛn4] （diàn-shop）.

• They have the two rimes [an] and [ɛn.]
• But they share the same underlying form of the rime (-an ) (See Cheng 1973).
Featural Congruence
Similar Vowel Features

- 是 [ʂʅ4] (shì-to be) is a phonetic in
- 題 [tʰi2] (tí-topic) and
- 提 [tʰi2] (tí-lift from above).
- They share the similar final vowels:
  - [ʂʅ] (i) (in shi) and [ɾi] (i) (in ti).
- The vowels [ʂʅ], [ɾi] and [ɾi] are high, unround vowels and can be considered allophones of the single phoneme -i (see Kratochvil 1968:28).
- Due to co-occurrence restrictions, [ʂ] takes only the back unround vowel [ʂ], while [ɾi] takes only the front unround vowel [ɾi].
Similar Vowel Features

- 是 [ʂʅ4] (shì-to be) is a phonetic in
- 題 [t’i2] (tí-topic) and
- 提 [t’i2] (tí-lift from above).
- C1 V / C2 V (V = i) (phonemic) same final V phonemically)
- [ʂʅ4] / [t’i2]
- (shi) / (ti)
Similar Vowel Features

• 是 [ʂʅ4] (shì-to be) is a phonetic in
• 題 [t’i2] (tí-topic) and
• 提 [t’i2] (tí-lift from above).
• Cheng (1973:14) considers [i] and [ i ] to be variants of a high unround central vowel i and [ i ] to be a separate underlying high unround vowel. Using his phonemic analysis, we might express the pattern [ʂʅ4] [t’i2] as
  • [ʂʅ4] C1 V1 [+high,-round]
  • [t’i2] C2 V2 [+high,-round]
Similar Vowel Features

• 是 [ʂʅ4] (shì-to be) is a phonetic in
  • 寰 提 匙 湜 题 堤 醒（Zhou (1980))
• 湜 [ʂʅ2]
• 寰 [ʂʅ2]
• 匙 [ʂʅ0] [ʦʰʼ2]
• 题 [tʼi2]
• 提 [tʼi2] [ti1]
• 騔 [tʼi2]
• 醒 [tʼi2]
• 堤 [ti1]
Similar Vowel Features

• 是 [ʂʅ4] (shì-to be) is a phonetic in
• 寰提 匙湜题堤騠醍

We see the pattern

• [ʂʅ4] [ʂʅ2] [ʂʅ0] [tʂɿ2] [tɿ2] [ti1] as

• [ʂʅ4,2,0] C1 V1 [+high,-round]
• [tɿ2] C2 V1 [+high,-round]
• [tɿ2] C3 V2 [+high,-round]
• [ti1] C4 V2 [+high,-round]
Similar Vowel Features

带 [tai4] (dài-to wear) is phonetic in

滞 (tʂɿ4) (Zhou 1980)

• We see the pattern
• [tai4] [tʂɿ4] as

• [tai4] C1 V1 [+low,-round] V2  [+high,-round]
• [tʂɿ4] C2 V2  [+high,-round]
Similar Vowel Features

• (滴) [ti] (dì) is a phonetic in
  摘[tʂai1] 谛[tʂɤ2] (Zhou (1980))
  • 滴[tí1]
  • 嫡[tí2]
  • 嘀[tí2]
  • 镝 [tí1,2]
  • 踦[tí2][tʂʅ]2
  • 摘[tʂai1]
  • 谛[tʂɤ2]
Similar Vowel Features

• (滴) [ti] (dì) is a phonetic in
  摘[ʈʂai1] 撇[ʈʂɤ2] (Zhou (1980))

We see the pattern

• [ti1] [ti2] [tʂʅ2] [ʈʂai1] [ʈʂɤ2] as

• [ti1,2] ] C1 V1 [+high,-round]
• [tʂʅ2] C2 V2 [+high,-round]
• [ʈʂai1] C2 V3V1 [+low,-round] [+high,-round]
• [ʈʂɤ2] C2 V2 [+mid,-round]
Initial Consonant Features
Initials and Finals: The Segment

To look at the full segment pronunciation of characters in phonetic series in Modern Mandarin, one needs to recombine initials and finals (the segment), looking at their combinations and paying attention to their co-occurrence restrictions.
Initials and Finals

• In Chinese characters in Modern Mandarin, initial consonants are forming regular recurring patterns. Finals are also forming their own recurring patterns in the written language.
Overall Patterns: Initials vs. Finals

- Initials
  - A
  - B
  - C
  - D

- Finals
  - V
  - W
  - X
  - Y
Overall Patterns:
Segments for Each Individual Phonetic Series

- Initials-Finals (Segments) for Each Phonetic Series
  - A-V
  - B-W
  - C-X
  - D-Y
Implications and Applications

- The phononological patterns of the writing system
- L1 language acquisition
- L2 language acquisition
- Language teaching / Pedagogy
- Psycholinguistics
- Neurolinguistic Processing of Chinese Characters
References


References


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References

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