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# Has Chinese always been an analytic language? Effects of writing on language evolution

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**Abstract:** Chinese is commonly believed to be an analytic language, but evidence from philological works and cross-linguistic comparisons clearly suggests that various morphological operations existed in Old Chinese. The loss of Chinese morphology can be explained by the ideographic nature of Chinese characters: the Chinese language has been evolving in a way that stabilizes the pronunciation of each character. The effects of writing systems on language evolution can be widely observed from world languages, while writing *per se* has been evolving along the path of phonetization driven mainly by borrowings instead of conscious linguistic analysis. In history, language never picked writing systems based on linguistic features; instead, writing systems affect the evolutionary paths of languages: single signs of a writing system stabilize the basic units of the language.

**Keywords:** Chinese; writing system; historical linguistics; language evolution

## 1 Introduction

It is common knowledge that Chinese is a typical analytic language. In the meantime, the writing system of Chinese, consisting of Chinese characters, is widely recognized as a representative ideographic writing system. When it comes to the relationship between the spoken language and the writing system, ever since Saussure, writing is assumed to be secondary, hence going with the spoken language. This mindset creates an impression that the analytic Chinese language deliberately chooses an ideographic writing system as it fits the analytic nature of the language (e.g., Istrin 2002: 138, 504). However, recent studies proposed various types of morphology in Old Chinese including affixation, inflection and alternation (to be reviewed at length in Section 2), thus fundamentally casting doubt on the assumed secondary position of

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writing to the spoken language: Old Chinese evidently did not pick a writing system that fits it. For this point, this paper calls for reverse thinking by shedding light on the effects of writing on language. At least in the case of Chinese, the use of an ideographic writing system plays a non-trivial role in shaping the path of language evolution. Section 2 briefly reviews the different types of morphological operations in Old Chinese proposed by linguists. Section 3 analyzes the role that writing plays in the disappearance of morphology, and then provides a new model of Chineseness to account for the language and the writing at the same time. Section 4 tries to extend the model to other languages by highlighting the effects of writing on language variation and change in general. Conclusive remarks are presented in Section 5.

## 2 Morphology in Old Chinese

### 2.1 The reconstruction of Old Chinese

Old Chinese usually refers to the Chinese language before the Upheaval of the Five Barbarians (五胡乱华) in the 4th century, when five non-Han peoples invaded China from the north and caused profound changes to the language. The time span of Old Chinese is excessively long as the documentation of the Chinese language can be traced back to the oracle bone script estimated to be 3,500 years old. However, as the ideographic writing system never provides precise records of the phonetic form, historical linguists have to rely on poetry rhymes, philological works and cross-linguistic comparisons to reconstruct the morphology of Old Chinese. Findings are thus speculative in nature.

To decipher classics from the pre-Qin period, Chinese traditional philology, 小学 *xiǎoxué*<sup>1</sup> appeared, focusing on the pronunciations, written forms, and meanings of the characters in those ancient texts. From the perspective of phonology, the Chinese script is syllabic in that each character represents a syllable (Norman 1988: 26; see Section 3 for details). Traditional philologists did not have the idea of phonemes, and they analyzed each syllable – the pronunciation of a single character – into the initial (声母 *shēngmǔ*), the final (韵母 *yùnmǔ*), and the tone (声调 *shēngdiào*). The final can be further analyzed into the medial (韵头 *yùntóu*), which is the glide and oftentimes optional), the nucleus (韵腹 *yùnfù*), and the coda (韵尾 *yùnwěi*) (Duanmu 2011).

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<sup>1</sup> Chinese syllables can be pronounced with different tones to differentiate meanings. In the present paper, Chinese characters are immediately followed by their Pinyin annotations based on the official standard of Modern Mandarin published by the Ministry of Education of China (available at [http://www.moe.gov.cn/jyb\\_sjzl/ziliao/](http://www.moe.gov.cn/jyb_sjzl/ziliao/)). Accordingly, tones are marked by diacritics based on the standard. IPA annotations are also provided when necessary, wherein the tones are marked by “tone-letters” developed by Chao (1930).

Without a standard phonetic alphabet, different types of initials, finals, and codas were all noted by different characters. For example, to annotate the initial of other alliterative characters, the character 幫 *bāng* was conventionally used to represent the voiceless bilabial stop /p/, in contrast with the voiced bilabial stop /b/ conventionally represented by the character 並 *bīng*.<sup>2</sup> Four types of different tones were recognized, i.e., flat (平 *píng*), rising (上 *shǎng*), departing (去 *qù*), and entering (入 *rù*). Chinese traditional philology thrived for two millennia, accumulating rich resources about the pronunciations and meanings of characters in specific contexts of Old Chinese. By putting together the annotations for the same character in different contexts, linguists found that the same character might have different pronunciations contingent upon the context (e.g., Handel 2015; Sagart 1999: 1; Sun 1997, 2011; Xie 2012; Zhang 2010, 2014), indicative of derivational morphology in Old Chinese including voiced-voiceless alternation, vowel alternation, vowel length alternation and tonal change.

Other resources for the reconstruction of Old Chinese are drawn mainly from cross-linguistic comparisons. Chinese is genetically affiliated with Tibetan-Burman languages (Norman 1988: 12), many of which are agglutinative with a variety of affixes. Comparisons with those languages can also shed light on the morphology in Old Chinese.

## 2.2 Affixation

The presence of affixes in Tibetan-Burman languages led linguists to speculate that similar affixes also existed in Old Chinese, but in the meantime, agreements can hardly be reached regarding the functions of the proposed affixes, and the proposed functions of the affixes oftentimes overlap with each other. For example, the \*s- prefix is suggested to mark causative (increasing the valency of verbs), iterative, common nouns, nouns for body parts and animals, etc. (e.g., Jin 1998; Mei 2012; Pulleyblank 2000; Sagart 1999: 70; Sagart and Baxter 2012; Schuessler 2007: 18–19), as shown in the following examples:

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2 There is a mismatch between Pinyin and IPA regarding the representations of stops. Since stops in Modern Mandarin only have aspirated-unaspirated contrast, but no voiced-voiceless contrast, the letter *b* in Pinyin actually corresponds to the voiceless unaspirated /p/ in IPA, while the letter *p* in Pinyin corresponds to the voiceless aspirated /p<sup>h</sup>/ in IPA (Ke 2018). However, stops used to have voiceless-voiced contrast in Middle Chinese (Norman 1988: 51). The pronunciation of 並 *bīng* changed from [bɪŋ], when it was used to represent /b/ as the initial of syllables in Middle Chinese, to [pɪŋ] in Modern Mandarin, while the pronunciation of 幫 *bāng* has always been [paŋ].

- (1) Suggested functions of the \*-s- prefix
- a. to create causatives:  
食 *sì* [\*s-ləkh] ‘to feed’ < causative of 食 *shí* [\*m-lək] ‘to eat’
  - b. to form iteratives:  
七 *qī* [\*snhit] ‘seven’ (literally ‘two again’) < iterative of [\*nis] ‘two’ in Sino-Tibetan
  - c. to mark common nouns:  
霜 *shuāng* [\*sraŋ] ‘hoarfrost’ < 凉 *liáng* [\*raŋ] ‘cold’
- (From Schuessler 2007: 18–19)

Similarly, the \*-s suffix is suggested to mark active, causative, accusative, perfective, nouns (nominalized from verbs), the direction of verbs, etc. (e.g., Hong 2009; Jacques 2016; Jin 2005a, 2005b; Mei 2012; Pulleyblank 2000; Wu 2017). Moreover, the \*-r/-l infix is also suggested to be related to causative (e.g., Pulleyblank 1962; Schuessler 2007: 19; Sagart 1999: 111); the \*-m- prefix and the \*-p-(b-) prefix are both suggested to be related to perfective (Wu 2002: 99, 102).

Some linguists claim that affixes are the origins of Chinese tones. A widely accepted view maintains that the departing tone is derived from the \*-s suffix, and thus inherited the proposed functions of the \*-s suffix (e.g., Haudricourt 1954a; Mei 1980; Pulleyblank 1962; Sagart 1999: 131–133), as illustrated below in (2); while the rising tone is derived from the \*-ʔ/-a suffix (e.g., Haudricourt 1954b; Mei 1970; Pulleyblank 1962).

- (2) Suggested functions of the \*-s suffix (developed into the departing tone):
- a. to derive nouns out of verbs:  
责 *zé* [tsreak<sup>35</sup>] ‘to demand payment’ < [\*tsrek]  
债 *zhài* [tsreaɪH<sup>41</sup>] ‘debt’ < [\*tsrek-s]
  - b. to derive exoactive verbs out of endoactive verbs:  
闻 *wén* [mjun<sup>35</sup>] ‘to hear’ < [\*mun]  
问 *wèn* [mjunH<sup>41</sup>] ‘to ask’ < [\*mun-s]
- (from Sagart 1999: 133)

It is noteworthy that the above-mentioned reconstruction of affixes does not have any support from philology. In Chinese traditional philology, characters were treated as basic units of analysis. The idea that one character might represent multiple morphemes never appeared. Meanwhile, some Chinese scholars explicitly questioned the above-mentioned reconstruction of affixes (e.g., Li 2003; Sun 2007a, 2007b; Wang 2006). For example, Sun (2007a, 2007b) targeted directly at the theoretical premises, i.e., the hypothesized phonology of Old Chinese, particularly the existence of consonant clusters, \*-r- as the leading vowel in a diphthong, and \*-ʔ/-s as the coda.

## 2.3 Voiceless-voiced alternation

In philologists' annotations of pre-Qin classics, the situation appears repeatedly that the same character has different but related meanings when pronounced as voiced versus voiceless. Based on rich materials, Xie (2015) summarized that this operation is mostly observed from verbs: the voiceless variant typically denotes an action or a change, whereas the voiced variant typically denotes the resultant state. Mei (1991) pointed out that the voiced-voiceless alternation distinguishes intransitive from causative (transitive). For example:

(3) 折 'to bend; bent'

- a. Original text from *Classic of Poetry* (《诗经》): 折柳樊圃, 狂夫瞿瞿。  
'Bend the willow to build the fence. The crazy man is so rude.'  
Annotation from *Shiwen* (《释文》): 折柳, 之舌反。'Bend the willow: the initial as 之 *zhī* (voiceless), and the final as 舌 *shé*.'
- b. Original text from *Rites of Zhou* (《周礼》): 疡医掌肿疡、溃疡、金疡、折疡之祝..... 'Surgeons take charge of medicine application for bumps, festers, cuts, and fractures.'  
Annotation from *Shiwen* (《释文》): 折疡.....时设反。'Fracture... the initial as 时 *shí* (voiced), and the final as 设 *shè*.'

(4) 解 'to dissect; separate'

Original text from *Shuowen Jiezi* (《说文解字》): 解, 判也, 从刀判牛角。  
'解, dissect, taking the radical 刀 "knife", to dissect an ox horn.'  
徐铉 Xu Xuan's Annotation: 佳买切, 又户卖切。'(For one pronunciation) the initial as 佳 *jiā* (voiceless), and the final as 买 *mǎi*; (for the other pronunciation) the initial as 户 *hù* (voiced), and the final as 卖 *mài*.'  
孔颖达 Kong Yingda's annotation for 徐铉 Xu Xuan's annotation: 解有两音, 一音古买反, 一音胡买反。"解" 谓解难之初, "解" 谓既解之后。'解 has two pronunciations. For the first pronunciation, the initial as 古 *gǔ* (voiceless), and the final as 买 *mǎi*; for the other pronunciation, the initial as 胡 *hú* (voiced), and the final as 买 *mǎi*. The first 解 refers to the action that just started, while the second 解 refers the state of being dissected.'

According to Pulleyblank (1973), the voiceless-voiced alternation was derived from the *\*h-* prefix in an earlier stratum of Chinese. Sagart (1999: 74) disagreed. He maintained that the real origin of the voiceless-voiced alternation should be the *\*N-* prefix.

## 2.4 Vowel alternation

Sporadic evidence is noticed from philological works showing that vowel alternation also existed in Old Chinese. Particularly, the height of vowels could distinguish meanings in a few cases. Sun (2011) enumerated a few examples, as follows:

- (5) 行 ‘road; line; army’
- 户庚切, 二等字.....义为道路。‘The initial as 户 *hù*, and the final as 庚 *gēng*, mid-low vowel... meaning “road”.’
  - 胡郎切, 一等字.....义为行列。‘The initial as 胡 *hú*, and the final as 郎 *láng*, low vowel... meaning “line; army”.’
- (6) 获 ‘to capture (animals); to harvest’
- 胡麦切, 二等字.....指猎获。‘The initial as 胡 *hú*, and the final as 麦 *mài*, mid-low vowel... meaning “to capture (animals while hunting)”.’
  - 胡郭切, 一等字.....义为收割谷物。‘The initial as 胡 *hú*, and the final as 郭 *guō*, low vowel... meaning “to harvest”.’

It is difficult to tell the functions of vowel alternation from sporadic evidence: no systematicity is observed for this operation.

## 2.5 Vowel length alternation

Some philological works mention that vowels had the contrast of long versus short. This is not a widespread operation but there is a famous example, as follows:

- (7) 伐 ‘attack; get attacked’
- Original text from *Gongyang Zhuan* (《公羊传》): 《春秋》, 伐者为客, 伐者为主。
- Annotation from *Gongyang Jiegu* (《公羊解诂》): 伐人者为客, 读伐, 长言之; 见伐者为主, 读伐, 短言之。‘Those who attack others are guests, pronounced as *fá* with a long vowel; those who get attacked are hosts, pronounced as *fá* with a short vowel.’

Sun (1997: 220) noticed a similar example, i.e., 出 *chū* (long vowel) ‘exit’ versus (short vowel) ‘drive out’. From the sporadic cases it seems that the variant with a long vowel is transitive, whereas the variant with a short vowel is intransitive.

## 2.6 Tonal alternation

Tonal alternation is the most recognized morphological operation in Old Chinese. Examples can be found everywhere in philological works, mostly demonstrating the contrast between the departing tone and other tones. Some examples are presented below in Table 1:

**Table 1:** The contrast between the departing tone and other tones (from Xie 2012: 104, 107).

Character	Original tone	Departing tone
沉 (沈) ‘to sink’	其二子 <u>沉</u> (flat tone) ‘her two sons sank’	施氏…… <u>沉</u> (departing tone)其二子 ‘Shishi sank her two sons’
饮 ‘to drink; to make ... drink’	赵盾 <u>饮</u> (flat tone)酒 ‘Zhao Dun drank alcohol’	晋侯 <u>饮</u> (departing tone)赵盾酒 ‘Jin Hou made Zhao Dun drink’
聚 ‘to gather; settlement’	命司徒循行积 <u>聚</u> (rising tone) ‘order Situ to look over and gather (crops and firewood)’	西南有 <u>郛聚</u> (departing tone) ‘there is a settlement in the southwest called Wu’
数 ‘to count; number’	归而饮至以 <u>数</u> (rising tone)军实 ‘return (to the ancestral temple), drink alcohol to celebrate, and count the captured equipment and trophies’	历、秭、算、 <u>数</u> (departing tone)也 ‘li, zi, and suan are all terms for numbers’

A few cases are preserved in Modern Mandarin in which one character still has the contrast of the departing tone versus other tones, e.g., 数 (*shǔ* ‘to count’ vs. *shù* ‘number’) and 好 (*hǎo* ‘nice; good’ vs. *hào* ‘to like’). There are also cases in which one variant of the alternating pair picked up another form of writing. For example, in the early stage of Old Chinese the character 知 means ‘to know’ when pronounced as the flat tone (*zhī*), ‘wise’ when pronounced as the departing tone (*zhì*). Later another character 智 *zhì* appeared that took over the variant with the departing tone meaning ‘wise’, leaving the original character 知 *zhī* with the verbal meaning only.

Many scholars have discussed the functions of the departing tone alternation. It is generally agreed that this operation is related to the perfective aspect, causativization and nominalization (e.g., Downer 1959: 258–290; Hong 2009; Jin 2005a, 2005b; Mei 1980; Zhou 1966/2004: 81–119). Compared to the voiceless-voiced alternation previously mentioned in Section 2.3, which is also believed to be related to valency change, tonal alternation emphasizes the resulting entity of an action (typically nominal), instead of the resultant state (typically verbal or adjectival) (Wang 2011: 165; Xie 2015).

As for the origin of the departing tone alternation, as previously mentioned in Section 2.2, a comparison between Old Chinese and Tibetan leads many scholars to believe that the departing tone is derived from the \*-s suffix in an earlier stratum, but this hypothesis is not without controversy.

2.7 Summary

Section 2 reviews linguists’ reconstructions of morphology in Old Chinese. Overall, those operations mentioned in philological works, i.e., voiceless-voiced alternation, vowel alternation, vowel length alternation and tonal alternation, are firmly



**Figure 1:** Speculated path of the morphological evolution in Chinese.

believed to exist. In contrast, affixes that are speculated based on cross-linguistic comparisons but not mentioned in philological works are much more controversial, in spite of the fact that those affixes are suggested to be the origins of other operations. That being said, it becomes a perplexing problem to identify the functions of each operation. The *\*s-* prefix, *\*-s* suffix, *\*-r/-l-* infix, voiceless-voiced alternation, and tonal alternation are all suggested to be related to valency change. Besides, the *\*-s* suffix, *\*p-(b)* prefix, and tonal alternation are all suggested to mark the perfective aspect. Little systematicity can be observed from discrete examples, and scholars oftentimes disagree with each other.

Despite the disagreements, the (probable) existence of all those morphological operations evidently shows that Old Chinese was not a thoroughgoing analytic language, at least not so analytic as Modern Mandarin. As Chinese evolved, a large part of morphology was lost, making this language more analytic than before. The speculated path of morphological evolution in Chinese can roughly be summarized below in Figure 1.

In Figure 1, the yellow shade represents the use of affixation, the red shade represents tonal alternation, and the blue shade represents voiceless-voiced alternation. The darkness of the shade roughly represents the frequency of the specific operations. Gradual transitions can be observed from affixes to tonal alternation, and from prefixes to voiceless-voiced alternation, indicative of continua. When it comes to Modern Mandarin, only tonal alternation is partially preserved, while all other operations disappeared.

### 3 Ideographic Chinese characters and the analytic Chinese language

To understand the disagreements regarding the morphology of Old Chinese, one thing to note is the synchronic and diachronic variations of Chinese. It is well-known that the idea of “Chinese” is not defined on the basis of mutual intelligibility, as Norman (1988: 187) puts it:



- (8) To the historical linguist Chinese is rather more like a language family than a single language made up of a number of regional forms. The Chinese dialectal complex is in many ways analogous to the Romance language family in Europe: both have their roots in a large-scale imperial expansion that took place in the centuries just preceding and just following the birth of Christ, the Qin-Han empire in the case of China and the Roman empire in the case of Europe; in both instances the imperial language was carried by armies and settlers to areas previously occupied by speakers of different languages; in the course of their development both were affected by these ‘substratum languages’; in both cases, the newly developing vernaculars existed alongside an antiquated written language and were profoundly influenced by it. In view of these parallels, it would not be surprising if we found about the same degree of diversity among the Chinese dialects as we do among the Romance languages, and in fact I believe this to be the case. To take an extreme example, there is probably as much difference between the dialects of Peking and Cháozhōu as there is between Italian and French; the Hǎinán Min dialects are as different from the Xiān dialect as Spanish is from Rumanian.

The above paragraph explains the synchronic variations between Modern Mandarin and other Chinese dialects, and the regional and diachronic variations of Old Chinese before the Qin dynasty (221 BC – 206 BC) could only be bigger. In fact, before Qin’s unification of China, the control of the royal house over different states was rather loose. The development of each state was largely independent of each other. In *Mencius*, there is the following sentence to describe the southern accent spoken in Chu around the Yangtze River:

- (9) 今也南蛮馮舌之人, 非先王之道。(《孟子·滕文公上》)  
 ‘Now we are having these southern guys speaking in a bizarre accent reproaching the morality of sages.’ (*Mencius*)

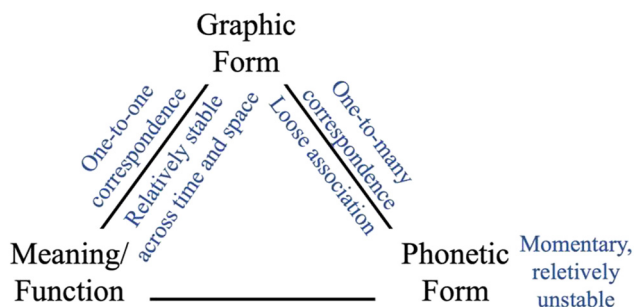
In the Han dynasty, 扬雄 *Yang Xiong* (53 BC – 18 AD) compiled a dictionary called *Fangyan* (《方言》), containing over 9,000 characters, which collects synonyms used in different areas. For example:

- (10) 虎, 陈魏宋楚之间或谓之李父, 江淮南楚之间谓之李耳, 或谓之于虺。自关东西或谓之伯都。  
 ‘Tiger, in the regions of Chen-Wei Song-Chu (central China), some call it *lifu*; in the regions of Jiang-Huai Nan-Chu (southern China), they call it *li’er*, and some call it *wutu*. Across the east and the west of the Hangu gate (eastern and western China), some call it *bodu*.’

The above examples all suggest that dialect differences were huge at that time: even basic vocabularies might have dramatic differences. Coupled with the excessively long time span of Old Chinese, a unitary phonological system of Old Chinese is simply unimaginable. The lack of systematicity in linguists' reconstructions is therefore easily accounted for, and there is technically no way for researchers to pinpoint the phonological system used at a specific place and time. It is surely possible that some morphological operations only existed in a certain area during a certain period of time, and that some morphological operations evolved faster in a certain area than other areas.

If the Chinese language is not defined upon mutual intelligibility, then how is it defined? The answer to this question resides in writing. Although Chinese involves wildly divergent phonological systems, noteworthy, this language has been constantly using the same writing system consisting of Chinese characters. The common language identity arises from the common writing, and the characteristics of this writing system are able to account for the loss of morphology.

As an ideographic writing system, each Chinese character has the graphic form, the phonetic form, and meanings. For the phonetic form, each character is pronounced as one syllable in Modern Mandarin, but distinct from syllabaries, many characters may have the same pronunciation. In fact, there are about 400 syllables (1,300 with tones) in Modern Mandarin, but *Xiàndài Hànyǔ Cídiǎn* 'Modern Chinese Dictionary' (《现代汉语词典》, the official standard in Mainland China) collects over 13,000 characters. As an extreme example, over 200 characters are pronounced as *yì*, each with distinct meanings. From a diachronic perspective, texts written in Chinese characters are passed down from every historical period uninterruptedly, serving as handy dictionaries for writers of later historical periods. Writers' use of each character generally conforms to its meanings and functions as illustrated in previous literature, and thereby the correspondence between the graphic form and the meanings has been relatively stable. In comparison, the association between the



**Figure 2:** Functional structure of ideographic Chinese characters.

Table 2: Development of characters’ phonetic forms.<sup>a</sup>

Stage	Period of Historical Chinese	Phonetic values of Chinese characters
Stage 1	Proto-Chinese (before 800 BC)	Each character corresponded to multiple pronunciations (with or without different kinds of affixes).
Stage 2	Old Chinese (800 BC – 300 AD)	Each character corresponded to multiple pronunciations, with voiceless-voiced alternation, vowel (length) alternation, and tonal alternation.
Stage 3	Middle Chinese – Early Mandarin (300 AD – 1900 AD)	The pronunciation of each character got fixed as: <ul style="list-style-type: none"><li>– New characters were created to take over some variants in the alternations.</li><li>– Most morphological operations gradually disappeared.</li></ul>
Stage 4	Modern Mandarin (1900 AD –)	90 % of characters have only one pronunciation (Zhang and Qin 2016), a few exceptions still involve morphological alternations.

<sup>a</sup>The periodization of Chinese is based on Wang (1980/1996: 35) and Norman (1988: 23), in which the history of the Chinese language is analyzed into Old Chinese (上古汉语 *Shàngǔ Hànyǔ*), Middle Chinese (中古汉语 *Zhōngǔ Hànyǔ*), Early Mandarin (近代汉语 *Jīndài Hànyǔ*), and Modern Mandarin (现代汉语 *Xiàndài Hànyǔ*).

graphic form and the phonetic form is much looser, as ideographic characters never provide precise records of the phonetic forms. Essentially, sound is momentary, always limited by time and space, whereas written texts composed of characters can be delivered across time and space. The functional structure of ideographic characters can roughly be represented in Figure 2.

According to linguists’ reconstruction of Old Chinese, as reviewed in Section 2, the same character might have various pronunciations contingent upon the context. Taken together with the path of the morphological evolution presented in Figure 1, the development of characters’ phonetic forms can roughly be represented in Table 2.

On Stage 1, the pronunciations of each character might contain various consonants in the beginning (prefixes), middle (infixes), or end (suffixes), rendering the boundaries between characters unclear. From Stage 1 to Stage 2, as affixes were eliminated, consonant clusters and most coda stops (except for /n/, /m/, /ŋ/, /p/, /t/ and /k/<sup>3</sup>) disappeared from Chinese syllables, so that the pronunciation of each character became more clearly bounded. For example, a sequence that definitely cannot occur in Modern Mandarin, i.e., /lukliŋ/, was legal on Stage 1, representing two syllables, and the boundary between syllables could be between /k/ and /l/, or between /u/ and /k/.

3 Coda stops /m/, /p/, /t/ and /k/ were also lost during Stage 3. In Modern Mandarin, /n/ and /ŋ/ are the only consonants that can occur in coda position.

From Stage 2 to Stage 4, new characters were created to take over some of the variants in the alternations, such as 智 *zhì* previously mentioned in Section 2.6. Besides, the majority of morphological operations were lost, leaving each character with only one pronunciation. For example, the character 饮 can only be pronounced as *yǐn* in Modern Mandarin, meaning ‘to drink’, but the variant *yìn* ‘to make ... drink’ no longer exists: a particular causative verb 使 *shǐ*/叫 *jiào*/让 *ràng* ‘to make’ is needed to register the causative sense. Nonetheless, there are still a few characters (about 10 % of the top 3,500 high-frequency characters, see Zhang and Qin 2016) preserving multiple pronunciations with distinct meanings, such as 数 (*shǔ* ‘to count’ vs. *shù* ‘number’) and 好 (*hǎo* ‘nice; good’ vs. *hào* ‘to like’) previously mentioned in Section 2.6.

Overall, morphology has been evolving in a way that stabilizes the pronunciation of each character: the association between the graphic form and the phonetic form has constantly been strengthening. In this process, consonants and vowels were fixed before tones. In other words, the morphology of the language has been adapting to the characteristics of the ideographic writing system.

The stabilizing function of the ideographic Chinese characters is also observed from the synchronic perspective. Modern Mandarin and other Chinese dialects have similar semantic units and grammar rules. It is previously mentioned that in the Han dynasty, people in different areas used diverse words to call ‘the tiger’, but at the present time 虎 is the common semantic unit used everywhere in China. However, the phonological differences among dialects are still dramatic. For example, the character 虎 is pronounced as *hǔ* [xu<sup>214</sup>] in Mandarin, [hou<sup>52</sup>] in Suzhounese, and [fu<sup>2</sup>] in Cantonese. Evidently, everything that is firmly encoded in the Chinese characters has been effectively unified, including the graphic-semantic association and the arrangement of characters (grammar rules other than morphology, mainly word order and the use of function words), but things that are not precisely recorded by the ideographic characters have always been subject to change, particularly the phonetic forms.

## 4 The effect of writing on language evolution

Besides Chinese, a general correspondence can be observed between writing systems and the languages chronically using them, especially if we set the scope on the situation before the 18th century when colonization made the Latin alphabet available to virtually all languages in the world.

Based on the linguistic unit that each sign corresponds to, writing systems in the world fall into four major categories: (1) ideographic writing wherein each sign is meaningful; (2) syllabary wherein each sign corresponds to a syllable; (3) abjad wherein each sign corresponds to a consonant; (4) alphabet wherein each sign corresponds to a phoneme. The features of the languages chronically using them can be summarized in Table 3.

**Table 3:** Correlation between writing systems and linguistic features.

Writing system	Representative languages	Typical linguistic features
Ideographic Writing	Chinese (characters), Vietnamese (Chinese characters & chữ nôm)	<ul style="list-style-type: none"><li>– Analytic with monosyllabic morphemes;</li><li>– No consonant clusters and clear boundaries between syllables;</li><li>– Rich diphthongs;</li><li>– Rich internal variations with mutually unintelligible varieties.</li></ul>
Syllabary	Japanese (kana)	<ul style="list-style-type: none"><li>– Agglutinative with monosyllabic or polysyllabic morphemes;</li><li>– No consonant clusters and clear boundaries between syllables;</li><li>– No diphthong.</li></ul>
Abjad	Semitic languages, Iranian languages	<ul style="list-style-type: none"><li>– Inflective: vowels and consonants systematically have different functions;</li><li>– No consonant clusters and clear boundaries between syllables;</li><li>– Few diphthongs;</li><li>– Internal variations occur mainly in vowels but barely occur in consonants.</li></ul>
Alphabet	European languages	<ul style="list-style-type: none"><li>– Inflective: morphemes can be phonemic, monosyllabic or polysyllabic;</li><li>– Rich consonant clusters and diphthongs, and no definite boundaries between syllables;</li><li>– Mutually intelligible varieties with few variations.</li></ul>

To illustrate the above generalizations, transitive-intransitive verb pairs in different languages are exemplified in (11)–(13):

- (11) Gothic (alphabet-using):
- Intransitive (anticausative)

—

Transitive
- bi-auk-n-an* ‘increase’

—

*bi-aukan* ‘increase’
- dis-skrit-n-an* ‘tear’

—

*dis-skreitan* ‘tear’
- us-gut-n-an* ‘be poured out’

—

*giutan* ‘pour’
- fra-lus-n-an* ‘get lost’

—

*fra-liusan* ‘lose’
- and-bund-n-an* ‘be unbound’

—

*and-bindan* ‘unbind’
- us-bruk-n-an* ‘break out’

—

*brikan* ‘break’
- fra-qist-n-an* ‘perish’

—

*fra-qistjan* ‘destroy’
- (from Haspelmath 1987: 17)

## (12) Persian (abjad-using):

Intransitive	—	Transitive (causative)
جوشیدن <i>jušidan</i> ‘boil’	—	جوشاندن <i>jušāndan</i> ‘boil’
خوردن <i>xordan</i> ‘eat’	—	خوراندن <i>xorāndan</i> ‘feed’
خوابیدن <i>xābidan</i> ‘sleep’	—	خواباندن <i>xābāndan</i> ‘put to sleep’
ترسیدن <i>tarsidan</i> ‘scare’	—	ترساندن <i>tarsāndan</i> ‘scare (frighten)’
پوسیدن <i>pusidan</i> ‘corrode’	—	پوساندن <i>pusāndan</i> ‘make rot’
خوشکیدن <i>xoškidan</i> ‘dry’	—	خوشکاندن <i>xoškāndan</i> ‘sear’
خندیدن <i>xandidan</i> ‘laugh’	—	خنداندن <i>xandāndan</i> ‘make laugh’

(from Seveleu-Dubrovnik 2015)

## (13) Japanese (syllabary-using):

Intransitive	—	Transitive
割れる <i>wareru</i> ‘break’	—	割る <i>waru</i> ‘break’
焼ける <i>yakeru</i> ‘burn’	—	焼く <i>yaku</i> ‘burn’
上る <i>agaru</i> ‘rise’	—	上げる <i>ageru</i> ‘raise’
終わる <i>owaru</i> ‘finish’	—	終える <i>oeru</i> ‘finish’
始まる <i>hajimaru</i> ‘begin’	—	始める <i>hajimeru</i> ‘begin’
止まる <i>tomaru</i> ‘stop’	—	止める <i>tomeru</i> ‘stop’
開く <i>aku</i> ‘open’	—	開ける <i>akeru</i> ‘open’

(from Haspelmath 1987: 19–20)
















As previously mentioned in Section 2, transitive-intransitive verb pairs involved voiceless-voiced alternation and tonal alternation in Old Chinese, which are suggested to be descendants from affixation, but most of these operations are extinct in Modern Mandarin: a great number of verbs can be used transitively and intransitively in the same form in Modern Mandarin (Zhang 2019). Other languages tend to be richer in valence-changing morphology. The alphabet-using Gothic derives intransitive (anticausative) verbs from transitive verbs by adding a single consonant *-n-*, as shown in (11). The abjad-using Persian derives transitive (causative) verbs from intransitive verbs by changing the vowel, while the preceding consonant – the onset of the syllable – remains unchanged, as shown in (12), characterizing a typical inflective language. In the syllabary-using Japanese, no single phoneme has the function to derive verbs (single phonemes cannot be morphemes) – the same stem is conjugated with different affixes to form the transitive-intransitive counterparts, as shown in (13) – an “equipollent” system is employed (Haspelmath 1993).

Besides, the linguistic units that are clearly represented by written signs tend to be relatively stable across regional varieties of a language; while internal variations occur mainly in the linguistic units that are not clearly represented by written signs. For the languages using ideographic writings, the ideographic signs derived from

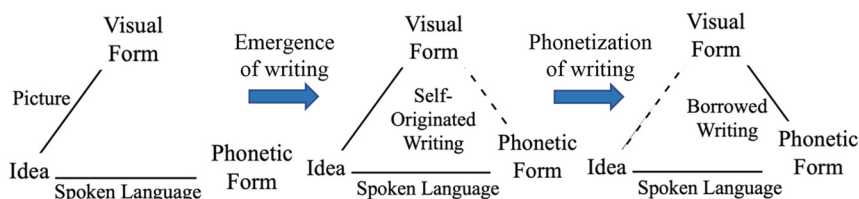
pictures stabilize the basic semantic units of the language across all its varieties, pronounced as clearly bounded syllables, but the exact phonetic values are not clearly represented by the writing, so a considerable degree of phonetic variation is allowed. For the languages using syllabaries, the structures of syllables tend to be simple, and morphemes must be combinations of syllables instead of single phonemes. For the languages using abjads, consonants tend to be more stable than vowels across different regional varieties, as only consonants are clearly represented in the writing. For the languages using alphabets, morphemes can take the form of single phonemes or the combinations of phonemes: the concept of syllables is not clear; internal variations occur mainly in prosodic features as every phoneme is clearly represented in the writing.

The correlation presented in Table 3 is normally interpreted as evidence for the secondary position of writing, as if a language picks the writing system that best fits it, but the traceable history of writing clearly shows that no language ever picked writing based on linguistic features. In fact, as illustrated below in Table 4 (Morgan 1905), a striking resemblance can be observed from the earliest writing systems in human history, although they were used for typologically remote languages.

**Table 4:** A comparison of the earliest writings from different places (Morgan 1905).

	Fish	Bird	Ax	Arrow	Bottle
Mesopotamia					
Egypt					
China					

It is generally agreed that writing started from pictures (e.g., DeFrancis 1984: 151; Gelb 1952/1963: 11–12). Pictures have meanings in their own right. When they developed an association with the spoken language, they could be called writing. In other words, the earliest writings were inherently ideographic, while their associations with the spoken languages were gradually developed. The resemblance



**Figure 3:** The emergence and phonetization of writing.

presented in Table 4 is therefore easily explained by the origin of writing. Divergences occurred only when those earliest writing systems were borrowed by foreign peoples. The borrowing of writing implies the existence of a language in need of a writing system. In this scenario, the borrowed writing is secondary to the language. Here came a problem that the borrowing of the ideographic signs could be cumbersome due to the large number of signs. A convenient solution to this problem was to borrow some signs only for the phonetic value, deprived of their meanings. For example, the character 以 *yǐ* originally meant ‘to use’ in Chinese, but when Japanese borrowed it, its cursive form 以 was used merely to represent the syllable *yi*, deprived of any meaning itself. In this way, the number of signs was reduced through phonetization, which further increases the borrowability of the writing system. The emergence of self-originated writings and the phonetization of borrowed writings are illustrated in Figure 3.

If a writing system was borrowed and adapted many times, the ideographic nature would keep decreasing until the signs became completely phonetic. Importantly, the complete loss of ideographic signs only happened in borrowings: in history, self-originated writing systems did not automatically evolve to syllabaries, as Gelb (1952/1963: 165, 196) puts it:

- (14) Near as some of the phases of word-syllabic writings were to the development of a full syllabary, they never quite reached it. The reason for this does not lie solely in the conservative attachment of people for their own writing. It is rather the protection of vested interests of a special caste, religious (Egypt, Babylonia), or political (China), that frequently may have been responsible for maintaining a difficult and obsolete form of writing, making thus its general use by the people impossible. It is therefore foreign peoples, not bound by local traditions and religious or political interests of an alien group, that are frequently responsible for introducing new and important developments in the history of writing.

...



An interesting conclusion which can be drawn about the new syllabic writings is that they were all created by heterogeneous peoples... In all cases it was the foreigners who were not afraid to break away from sacred traditions and were thus able to introduce reforms which led to new and revolutionary developments.

Owing largely to the secluded geographical environment protected by Tibet to the west and the Pacific Ocean to the east, Sinosphere did not have much contact with other civilizations before the Age of Discovery, so the borrowings of writing systems only happened on a limited scale. Self-originated ideographic writings and the derived syllabaries managed to survive. In contrast, the histories of Europe and the Near East have witnessed the rises and falls of numerous peoples. From Egyptian hieroglyphs and/or the Sumerian cuneiform script, writing systems kept being borrowed and adapted, resulting in abjads and alphabets that completely replaced the original ideographic writings. As fully phonetized writing systems, alphabets and abjads are even more borrowable than syllabaries with fewer signs: there are always more syllables than phonemes in a language. Clearly, the evolution of writing was triggered mainly by borrowings, but not by conscious linguistic analysis. The essential motivation for the developments in writing was to facilitate borrowing: writing has been going with cultural contacts, but not the linguistic features of languages. Therefore, the correlation presented in Table 3 can only be explained by a coincidence or an effect of writing on language. Given the history of the Chinese language presented in Sections 1 and 2, wherein the language has been constantly adapting to the ideographic writing system, a hypothesis can hereby be posited:

- (15) Hypothesis of writing determinism: single signs of a writing system anchor the pivot units of the language using it, only around which variations of this language occur.

Support for the hypothesis can not only be drawn from Chinese, but also be captured in the histories of many languages. Up until the conquest by Greeks in the 4th century BC, Ancient Egypt had been using the self-originated writing system of hieroglyphs, and meanwhile, the language had been evolving in a way similar to the history of Chinese: with the elimination of some suffixes and coda stops, e.g., the coda *-r* and the feminine marker *-t*, the boundaries between syllables became clearer, making the language increasingly analytic (Bendjaballah and Reintges 2009; Loprieno and Müller 2012). Both Vietnamese and Korean used Chinese characters for more than a millennium, and there is convincing evidence showing that consonant clusters were lost from these two languages during this period (Nghieu 2019; Park 2009; Tamura 1980). Persian and Arabic provide examples representing the languages using abjads. As an Indo-European language, unlike European languages, Persian has been using

various types of abjad scripts for the recent 2,300 years. Accordingly, rich variations can be observed from vowels but not consonants. The diphthongs /ai (aj)/ and /au (aw)/ in Old Persian became /ei (ej)/ and /ou (ow)/ in Modern Persian, but the variety spoken in Afghanistan preserves the old forms (Miller 2013; Rahbar 2008). In Arabic, the diphthongs /au (aw)/ and /ai (aj)/ in Old Arabic are only maintained in Malta and some areas in Tunisia today. In other varieties, they have become /e:/ and /o:/, and in Maghreb dialects have further merged with /i:/ and /u:/.

In the evolution of writing, the association between the graphic form and the spoken language has generally been strengthening. In contexts where there were large-scale cultural contacts, this association was developed mainly by the phonetization of writing happened in borrowings and adaptations; but when there was little or no cultural contact, the language would adapt to the writing system: in this way, the writing system determines the evolutionary path of the language.

## 5 Concluding remarks

By reviewing the evolutionary history of Chinese morphology, coupled with the evidence from typologically remote languages, this paper calls for an attention to the part that writing plays in language evolution. It is hypothesized that single signs of a writing system stabilize the basic units of the language using it. Languages never picked writing systems based on linguistic features. Instead, features of the writing system affect the evolutionary path of the language.

A common counterargument for the hypothesis of writing determinism points to the large number of undocumented languages, but in fact, nobody can provide the exact number of undocumented languages (Chambers and Trudgill 1980: 3–4; Croft 2000: 13–20, 2003: 26). Stable borders can hardly be drawn between languages without recourse to writing systems: it is exactly writings that help to demarcate and stabilize the borders of languages. Without writing systems, languages may change so fast that persons of the present generation may have difficulty to converse with people three or four generations older (Gelb 1952/1963: 223–224).

Meanwhile, there are a few points that must be clarified. In the first place, it is still admitted that writing and speech are two separate symbolic systems, and that speech appeared before writing in human history—in the history of human evolution, it was easier to control the sound than to leave visual symbols with sophisticated forms—but this does not necessarily mean writing is secondary to speech. Secondly, the effects of writing on language evolution do not preclude the effects of other factors. For example, the simplification of English morphology is widely believed to be related to language contact (e.g., Givón 1979; Kusters 2003: 9; Trudgill 1998; Whinnom 1980), in which the writing system obviously did not play the major part.

Accordingly, the hypothesis of writing determinism cannot be interpreted the other way around: it is impossible to infer whether writings existed for a particular language based on its linguistic features. For example, syllables in the Hawaiian language unexceptionally have a CV(V) structure-the boundaries between syllables are as clear as in Japanese-but this cannot be taken as evidence for the existence of a Hawaiian syllabary.

The implications of the present study extend to typological studies by connecting the multiple strata of language evolution: the effects of writing systems explain many puzzles in linguistic typology. Some languages are evidently affiliated sharing a considerable number of cognates, but morphological features appear to be quite different, such as Chinese and Tibetan; while some languages are not directly affiliated yet present similar morphological features, such as Chinese and Vietnamese. This mismatch can hardly be explained without recognizing the role of writing on language evolution. Therefore, two strata of language evolution can be recognized, i.e., the pre-writing evolution that lays the foundation of lexicon and syntax, and the post-writing evolution that stabilizes phonology and morphology. Furthermore, the genetic affiliations of some languages, including Japanese and Korean, have been contentious. Such contentions can also be accounted for by the present theory as genetically affiliated languages can take divergent evolutionary paths when different types of writing are adopted. Along this line, further research is called for to explore the interaction of writing and other factors in language evolution, to analyze the social and psychological mechanisms underlying the changes related to writing, and to test the present theory in various contexts.

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