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The monosyllabicization of Old Chinese
and the birth of Chinese Writing:
A hypothesis on the co-evolution of the Chinese language
and its writing system[1]

The invention of the Ancient Chinese Writing System (henceforth ACWS) is a significant event in world history. In this paper I put forward a hypothesis on the co-evolution of the Old Chinese language and its writing system (ACWS). I argue that the invention of ACWS bears a strong correlation with the linguistic evolution, more specifically, the monosyllabicization, of Old Chinese. In other words, ACWS might never be invented if monosyllabicization had not occured in Chinese.

The paper is organized in the following way. First, we discuss the reason why a subsyllabic writing system was not invented for Old Chinese (section 2). Next, we discuss the nature of the rebus principle in ACWS (section 3), and its correlation with morphological alternations (section 4). Then I argue that monosyllabicization of Old Chinese is a precondition for the rebus principle, which is crucial for the birth of ACWS (section 5). Lastly, I discuss the implication of the hypothesis for the study of Old Chinese (section 6).

Keywords: Old Chinese language, Chinese writing, monosyllabicization, rebus principle, morphological alternations.

Introduction

The invention of the Ancient Chinese Writing System (henceforth ACWS) is a significant event in world history. The nature and origin of ACWS, however, is still not well understood. In this paper I put forward a hypothesis on the co-evolution of the Old Chinese language and its writing system, ACWS. I argue that the invention of ACWS bears a strong correlation with the linguistic evolution, more specifically, the monosyllabicization of Old Chinese. It is not accidental that Old Chinese became the first language that developed an independent writing system in Southeast Asia.

First, the definition of ACWS and Old Chinese needs some clarification. I use the term ACWS to refer to the earliest systematic writing in Ancient China. In this paper, examples mostly come from oracle bone writing from the later Shang dynasty in the late 2nd millennium BCE, as they are the earliest known form of Chinese writing so far (Keightley 1985). Academics still debate on the question of when ACWS was first invented. Some scholars suggest that

writing systems have been invented as early as the 3rd millennium BCE (Qiu 2013: 34). However, this does not affect the hypothesis put forward here. My argument is that regardless of when the ACWS was invented, certain linguistic innovations must have occurred before this invention.

Old Chinese is defined in this paper as the Chinese language reflected in the earliest known texts, i.e. in the late 2nd millennium BCE. This definition is different from Baxter (1992: 24) where Old Chinese is loosely defined as "Chinese of early and middle Zhou dynasty" (roughly the early and middle 1st millennium BCE), as well as Baxter & Sagart (2014: 1) where Old Chinese is defined in a broad sense to refer to "varieties of Chinese used before the unification of China under the Qin dynasty in 221 BCE". We do not know yet how much the language of Shang differs from that of Zhou. However, as far as the topic of this paper is concerned, the language of Shang is more closely related to the invention of ACWS than that of Zhou.

Why not a sub-syllabic writing system?

Unlike modern alphabets, ACWS is a writing system that does not break down syllables into sub-syllabic units. It is natural for a person who lives in our modern, global world to wonder why an alphabetic writing system was never independently invented in China or even Asia in general. The answer to this question is related to the nature of speech production and perception. Many phoneticians and phonologists think of sub-syllabic units like consonants and vowels as universal phonological concepts. However, Ladefoged (2005) disagrees:

> Talking involves pulling stored forms of words out of some part of the brain, but words are not stored as sequences of sounds. They are stored as wholes, or at least as whole syllables, in which the consonants and vowels are not separate items. [...] The symbols of the alphabet represent segments of speech, and it is probably from thinking in terms of these symbolized segments that we get the idea that there are separate sounds (Ladefoged 2005: 186–187).

For Ladefoged, sub-syllabic units like consonants and vowels are not universal primitives. Therefore, the history of alphabetic writing should be viewed as a unique invention:

> Breaking syllables up into vowels and consonants was an enormous scientific achievement. Speakers of other languages saw what could be done and started using alphabetic characters. But the original notion that syllables could be split into vowels and consonants occurred only once in human history. [...] We also lose out in that our thinking about words and sounds is strongly influenced by writing. We imagine that the letters of the alphabet represent separate sounds instead of being just clever ways of artificially breaking up syllables. Alphabetic writing has almost certainly been invented only once, whereas there are many independent inventions of systems for writing down syllables (Ladefoged 2005: 189–190).

Phonological knowledge of sub-syllabic units was likely non-existent in native Chinese tradition; it only developed at a later stage through intensive communication with other languages[2]. Therefore, a sub-syllabic writing system was not possible during the time that ACWS was invented. Even for the contemporary Chinese language, O'Seaghdha, Chen & Chen (2010: 297) argue based on their psycholinguistic studies that "the original or proximate phonological encoding units in Mandarin are syllables whereas in English and related languages they are phonemic segments".

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[2] For the development of native Chinese phonological theories, see Halliday (1981).

The rebus principle in ACWS

The invention of writing systems was an important milestone in human history. Historically, all ancient writing systems began with the invention of pictograms, semantic symbols for words with concrete meanings. The next stage of development involved figuring out how to represent abstract concepts and functional meaning using only a limited set of symbols, so as to cover the enormous mental lexicon stored in a speaker's brain. One of the most common strategies to solve this problem, developed independently in many ancient writing systems, is the rebus principle. The rebus principle refers to the use of existing symbols purely for their sounds, regardless of their meaning, to represent new words. The application of the rebus principle, which involves the activation of sound at a certain phonological level, is crucial in the invention of all mature writing systems[3].

In ACWS, the rebus principle was frequently used in the earliest documented oracle bone writing.[4] A well-known example of rebus principle in Late Shang oracle bone writing is shown in Figure 1.

Figure 1. An example of rebus principle in oracle bone writing
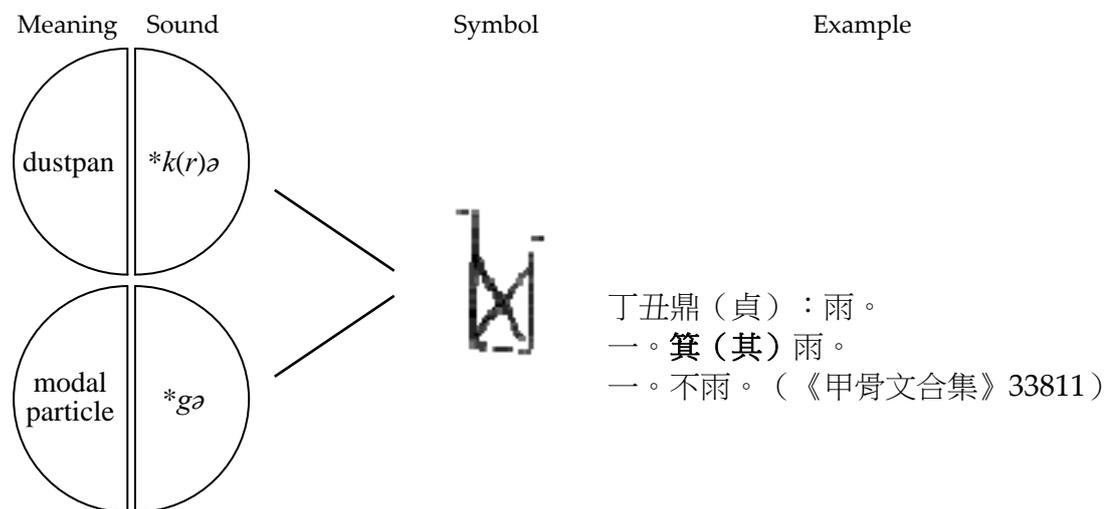
In Figure 1, the symbol invented for the word 'dustpan' 箕 was used for the similar-sounding word 'modal particle' 其. This example shows that the rebus principle was often applied to words with abstract meaning. In addition, when applying rebus principle, scribes from different ages or different groups may have used different symbols to write the same word with abstract meaning. For example, words such as 'disaster', 'difficult', 'finish', 'lose', 'faint', 'morning', 'all', 'raise', and 'strange' were written with different symbols by different groups of scribes (Chen 2007).

According to Xia (2014: 72), the rebus usage of characters in oracle bone writing is over 70%[5]. Although the rebus principle was frequently used, it was not always used whenever

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[3] For the development of ancient writing systems, see Robertson (2004) and references therein.

[4] This process is related to the term *jiǎjiè* (literally meaning "borrowing") in the traditional *liùshū* categorization of Chinese characters developed during the Han period (see Boltz 1994: 143–155 for more details about *liùshū*). However, there is a significant difference between the two terms. While *jiǎjiè* refers to a certain type of method to invent new characters, the rebus principle refers to the usage of characters regardless of their origins.

[5] The rebus principle is much broader than the *jiǎjiè* method in traditional *liùshū* categorization. Li (1974) found that 129 out of 1156 (about 11%) characters were invented by the *jiǎjiè* method.

possible. On the contrary, in numerous cases when rebus usage was possible, it was not applied. Figure 2 shows one such example.

Figure 2. An example of the limitation of rebus principle in oracle bone writing

| Meaning | Sound | Symbol | Example |

In Figure 2, the word 'next (day)' can be represented by two kinds of graphs, one with a pictograph of 'wing', and the other with a complex character composed of a pictograph of 'wing' plus an additional pictograph of 'stand'. However, the symbol for 'stand' is used only for 'stand' and never appears as a rebus for 'next (day)'. The reason why there is no rebus between 'tomorrow' and 'stand' is not because they are not phonetically close enough; otherwise 'stand' would not be added as a symbol indicating the sound in the complex character. Instead, it is because the rebus usage of 'wing' for 'next (day)' is well established, and 'stand' is frequently used for its original meaning 'stand'; thus the two symbols were kept apart to signal different semantic meanings.

The limited application shown here and other numerous cases indicate that the rebus principle is only a backup option when the semantic meaning of a word is difficult to convey directly by pictograph. Unlike a syllabic writing system where most symbols have lost their semantic meanings and are only used to represent sounds, most concrete words are represented by pictographs in ACWS even when rebus usage of other symbols is possible. Therefore, the distinction of meanings is much more important than economy of symbols in ACWS. In fact, this is one of the main reasons why most scholars consider ACWS as a logographic writing system rather than a syllabic writing system.

Rebus and Old Chinese morphological alternations

In ACWS, rebus principle was applied to both homophonic and near-homophonic monosyllabic words. For near-homophonic pairs, certain phonological contrasts did not block the usage of rebus principle, while others frequently did. Three phonological contrasts in Old

Chinese which almost never blocked rebus usage are *qīngzhuó*[6], *sìshēng*[7], and *děng*[8] respectively. Table 1 contains some examples.

Table 1. Three examples of rebus usage across certain phonological contrasts

	Gloss	Middle Chinese phonological contrasts[9]			Example
		qīngzhuó	*sìshēng*	*děng*	
箕	dustpan	*qúanqīng*			丁丑鼎（貞）：雨。一。**箕**（其）雨。
其	modal particle	*qúanzhuó*			一。不雨。（《合集》33811）
皿	utensil	*cìzhuó*	*shǎng*		乙丑卜，殸鼎（貞）：甲子**皿**（向）乙丑王夢牧石麋，不隹
向	to face	*qúanqīng*	*qù*		（唯）囚（憂），隹（唯）又（祐）。（《合集》376）
擐	put on clothing	*cìzhuó*	*qù*	2nd	□其田于□，其擐（遠），〔湄〕日亡※（災）。
遠	far	*qúanzhuó*	*shǎng*	3rd	

In Table 1, the first rebus usage ('dustpan' for 'modal particle', see Figure 1 for details) involves *qīngzhuó* contrast, the second rebus usage ('utensil' for 'to face', see Qiu 1993) involves both *qīngzhuó* contrast and *sìshēng* contrast, and the last rebus usage ('put on clothes' for 'far', see Qiu 1985) involves all three contrasts. In these cases and many others, rebus is not blocked by these three phonological contrasts. Notably, all three also appear in morphological alternations in Old Chinese[10]. Table 2 gives some examples.

Table 2. Examples of morphological alternations in Old Chinese

	Gloss	Middle Chinese phonological contrasts		
		qīngzhuó	*sìshēng*	*děng*
敗	defeat (v.t.)	*qúanqīng*		
敗	suffer defeat	*qúanzhuó*		
受	receive		*shǎng*	
授	give		*qù*	
封	enfeoff			3rd
邦	country			2nd
入	enter		*rù*	3rd
内	inside		*qù*	1st
學	learn	*qúanzhuó*	*rù*	
教	teach	*qúanqīng*	*qù*	

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[6] *Qīngzhuó* (清浊) is a traditional term related to Middle Chinese consonantal initials. There are four subsets: *qúanqīng* (全清), *cìqīng* (次清), *qúanzhuó* (全浊), and *cìzhuó* (次浊).

[7] *Sisheng* (四聲) is a traditional term related to Middle Chinese tones. There are four subsets: *pīng* (平), *shǎng* (上), *qù* (去), *rù* (入).

[8] *Děng* (等) is a traditional term related to Middle Chinese Medial and/or vowel qualities. There are four subsets: 1st (一等), 2nd (二等), 3rd (三等), and 4th (四等).

[9] These are traditional Chinese phonological terms invented for Middle Chinese. I intentionally use these abstract terms in order to avoid the controversy over their phonetic details in Old Chinese. See the previous footnotes for details.

[10] Old Chinese shows no evidence of reconstructing inflectional morphology; only derivational morphology can be reconstructed (LaPolla 2003).

In Table 2, there are five pairs of morphological alternations. The first three pairs differ in *qīngzhuó, sìshēng,* and *děng* respectively. The fourth pair differs in both *sìshēng* and *děng*, while the last pair differs in both *qīngzhuó* and *sìshēng*. The *qīngzhuó* alternation is one of the most frequent morphological alternations in Old Chinese[11]. The *sìshēng* alternation is also an active morphological device that has received much attention[12]. The *děng* alternation has received relatively less attention[13].

Why are the phonological contrasts omitted in the writing system and those used as morphological devices the same — is this just a coincidence?

According to classic phonological theories (Dresher, Piggott, & Rice 1994), a phonological relationship is either contrastive or non-contrastive. In other words, contrastive phonological features are contrastive to the same extent. However, Hall (2009) proposes a new understanding of phonological relationships in terms of a continuum with contrastive and non-contrastive at either end.

Figure 3. A continuous set of phonological relationships (Hall 2009:16)

Non-overlapping distributions   Overlapping distributions
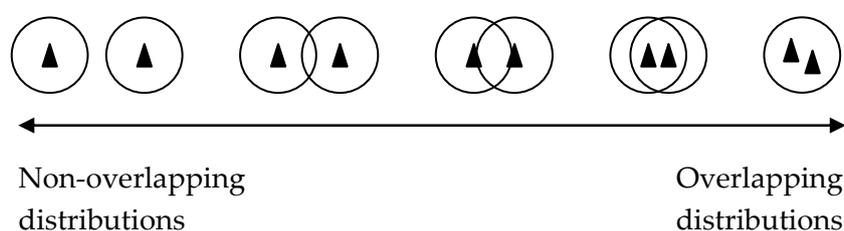
According to the proposal illustrated in Figure 3, phonological relationships are gradient rather than categorical. Besides the contrastive and non-contrastive relationships, there could be something in between. Multiple factors could lead to an intermediate status of this phonological relationship, one of them being morphology. When a set of phonological features is used to differentiate words, it is contrastive. However, its differentiating function could be contracted to some extent when the same set of features is applied to a word pair with the same morphological root. As a result, those phonological features used in morphological alternations have an intermediate status between contrastive and non-contrastive.

Therefore, when the rebus principle extends its application from homophones to near-homophones, those features used in morphological alternations are the most suitable candidates because they are less contrastive than other phonological contrasts which are not used in morphological alternations.

The monosyllabicization of Old Chinese as a precondition for *rebus*

In this chapter, we will discuss the precondition for rebus in ACWS, focusing on the case of *qīngzhuó*, one of the most popular morphological devices and also a phonological contrast that does not block rebus. Table 3 lists two pairs of words which differ only in terms of *qīngzhuó* categories.

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[11] See Sagart (2003), Phua (2004), Handel (2012), Jacques (2018), among others.

[12] This alternation is also known as the "*qù* tone alternation" since the derived forms are almost always Middle Chinese *qù* tone. See Downer (1959), Mei (1980), Jacques (2016), among others.

[13] See Yu (1999) for the 3rd-*deng* and non-3rd-*deng* alternation, and Sagart (1999) for the reconstructed *-r-* infix for the 2nd-*deng* derivation from non-2nd-*deng*.

Table 3. Reconstruction of the qīngzhuó contrast in Old Chinese

	敗	敗	伯	白
	defeat(v.t.)	suffer defeat	eldest	white
Middle Chinese	paejH	baejH	paek	baek
Old Chinese (Zhengzhang 2003)	praads	braads	praag	braag
Old Chinese (Baxter & Sagart 2014)	pˤa[t]-s	N-pˤa[t]-s	pˤrak	bˤrak

As shown in Table 3, while *qīngzhuó* categories are reconstructed as voicing contrasts in Middle Chinese, scholars have different opinions on their reconstructed forms in Old Chinese. Some scholars, represented by Zhengzhang (2003), project the voicing contrast in Middle Chinese directly back to Old Chinese. Other scholars, represented by Baxter & Sagart (2014), propose two origins for the Middle Chinese voicing contrast (henceforth called two-origins proposal). For those pairs involved in morphological alternations, they reconstruct a prefix *N- as the source of voiced consonants, while for those pairs that were not involve in such alternations, they project the voicing contrast back to Old Chinese[14].

In terms of writing, the *rebus* method could be applied to both types of pairs regardless of whether they are morphologically related. For example, the first two words meaning ˙defeat (v.t.)˙ and ˙suffer defeat˙ in Table 3 are represented by the same character 敗, while the second two, meaning ˙eldest˙ and ˙white˙, are both represented by the same character 白 in ACWS. If the proposal about phonological relationships outlined in Chapter 4 is on the right track, then, when reconstructing Old Chinese, we must maintain a similar phonological relationship as reflected in Middle Chinese regardless of their morphological relations. Therefore, our hypothesis favors the first approach represented by Zhengzhang (2003).

However, this does not mean that the two-origins proposal by Baxter & Sagart (2014) is wrong, as it is supported by comparative evidence[15]. In fact, both proposals in Table 3 could be right, if we regard them as reflecting different evolutionary stages of the Chinese language: the two-origins proposal could be true for Proto-Chinese, when the ancestor of the Chinese languages first split from other Tibeto-Burman languages, while the two origins could have already merged into one in Old Chinese, when the writing system was invented. In other words, although the ultimate origin of the *qīngzhuó* alternation was prefixation, it had already become a stem alternation at the stage of Old Chinese.

This brings us to the problem of reconstructing the word-template in Old Chinese. Scholars have different views on this issue: many Chinese scholars reconstruct a monosyllabic word-template for Old Chinese (see Ding 2002 for a review), while Baxter & Sagart (2014) reconstruct the word-template shown in Figure 4.

Baxter & Sagart (2014) regard the word template in Figure 4 as iambic-disyllable[16]. Following Pittayaporn's (2015) definition of sesquisyllable,[17] we classify it as sesquisyllable rather

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[14] An alternative hypothesis which reconstructs an *s- prefix as the source of voiceless consonants has also been proposed (see Handel 2003 for a review). Nevertheless, the details of reconstruction are not relevant here. The alternative hypothesis may be viewed as a variant of the "two-origins proposal", since its proponents reconstruct different phonological contrasts for pairs that were involved in morphological alternation and for those that were not.

[15] See Sagart (2003) for details. Also, see Phua (2004) for typological concerns on reconstructing prefixation rather than stem alternation.

[16] See Brunelle & Pittayaporn (2012) for further details of this term.

[17] Pittayaporn (2015) defines "sesquisyllable" as "a prosodic word consisting of a full stressed syllable preceded by a consonant or a sequence of consonants. The consonant or consonant sequence must not contain a phonemically contrastive vowel."

than iambic-disyllable. From a diachronic perspective of *monosyllabicization*, a word-template evolution widely attested in Asian languages (Michaud 2012), sesquisyllable is a common in-termediate stage from iambic-disyllable to monosyllable, as discussed in detail in Brunelle & Pittayaporn (2012), shown in Figure 5.

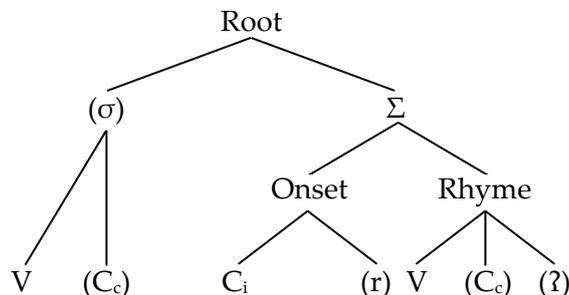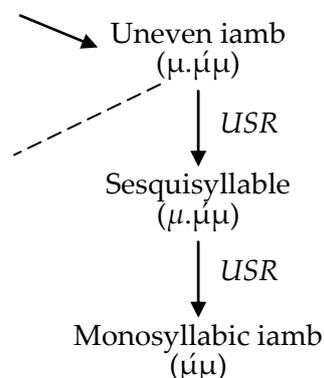*Figure 4.* Hypothetical Old Chinese word-template (Baxter & Sagart 2014: 53)


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                        Root
              ┌──────────┴──────────┐
            (σ)                     Σ
           ┌─┴─┐            ┌────────┴────────┐
                         Onset              Rhyme
                        ┌──┴──┐          ┌────┼────┐
          V    (Cᶜ)    Cᵢ      (r)     V   (Cᶜ)   (ʔ)
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V   (C$_c$)   C$_i$ (r) V   (C$_c$)   (ʔ)

Figure 5. Word-type shifts (uneven iamb>sesquisyllable>monosyllabic iamb) [18]

Uneven iamb
(μ.μ́μ)

$\downarrow$ *USR*

Sesquisyllable
(*μ*.μ́μ)

$\downarrow$ *USR*

Monosyllabic iamb
(μ́μ)

If we accept that Chinese also went through the monosyllabicization process,[19] then, the question of reconstructing the word-template in Old Chinese is not a matter of right and wrong. Rather, the question should be reframed as: At which stage in the evolution process was Old Chinese?

We have argued that the application of the *rebus* method in ACWS could be better ex-plained in terms of a language system where prefixation had already changed to stem alterna-tion. This is very likely to be a byproduct of the monosyllabicization process outline in Figure 5, where the minor syllables in the iambic-disyllable template became pre-initials in the ses-quisyllabic template, or consonant clusters in the monosyllabic template. As a result of these word-type shifts, morphological alternations originally derived from prefixation gradually be-came less and less productive, and finally remained only in fossilized forms[20].

This hypothesis is also supported by a recent proposal on the role that language contact must have played in the formation of the Chinese language. It has long been recognized that

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[18] This figure is a part of the original figure in Brunelle & Pittayaporn (2012: 424), where they emphasize the important role of rhythmic effects on word-type shifts.

[19] Salmons & Zhuang (2018: 556) proposed a hypothetical evolution cycle from Proto-Chinese to Modern Chinese. They regard the reconstructed iambic-disyllable template as the initial stage of Proto-Chinese, and argue that the Chinese language changed to a monosyllabic template through an intermediate stage of C(C)V(C), before returning to the disyllabic template again in Modern Chinese.

[20] A similar case could be found in the fossilization of the suffix *-n* in modern Wu dialects, see Fang (1993) and references therein.

the division between Northern and Southern Chinese dialects and the typological shift from Old Chinese to modern Chinese is largely due to language contact between Chinese and various neighboring language families (Hashimoto 1978, Mei 1997). Recent studies suggest that the origin of the Chinese language may also be a result of language contact. Delancey (2013) argues that "the language of Shang was a highly-creolized lingua franca based on languages of the Southeast Asian type". Although the exact nature and chronology of the language contacts that shaped Old Chinese require further study, the scenario is very much compatible with our hypothesis that the linguistic innovation of Old Chinese provided the basis for the wide application of *rebus* (the rebus principle), which ultimately gave rise to the birth of the Ancient Chinese Writing System.

Implication and future direction

In this paper I put forward a hypothesis on the co-evolution of the Old Chinese language and its writing system, ACWS. I have argued that the invention of ACWS bears a strong correlation with the linguistic evolution, more specifically monosyllabicization, of Old Chinese. In other words, ACWS may have never been invented if Chinese had not gone through monosyllabicization.

If the hypothesis we have proposed is convincing, it will have a significant consequence for the study of Old Chinese. To understand better the evolution of Chinese languages, it seems necessary to distinguish two different stages. One is Proto-Chinese or Pre-Old-Chinese, which represents a stage that predates the invention of Chinese writing. The other is Old Chinese, which represents a stage when the writing system has already been invented. The evidence for reconstructing Proto-Chinese will mainly come from comparison with other Sino-Tibetan languages, while the evidence for reconstructing Old Chinese will mainly be based on excavated texts, including writing practice, rhyming patterns, and the formation of word families.

Regarding the direction of possible future research, we would like to explore the similarities and dissimilarities between independently invented writing systems and seek for potential parallels that might show a similar nature to the origin of the Ancient Chinese Writing System.

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Шэнь Жуйцин. Моносиллабизация в древнекитайском языке и генезис китайской иероглифики: гипотеза о совместной эволюции китайского языка и китайской письменной системы

В статье выдвигается гипотеза относительно совместной эволюции древнекитайского языка и сложившейся на его основе системы письменности. Утверждается, что изобретениее китайской письменности тесно коррелирует с лингвистической эволюцией китайского языка, в особенности его моносиллабизацией, и что без перехода китайского к односложной структуре слова изобретение такого рода письменности было бы невозможно.

Работа начинается с обсуждения возможных причин того, что для древнекитайского языка не была изобретена алфавитная система письма. Вслед за этим анализируются особенности ребусного принципа в устройстве древнекитайской письменности и его связь с морфологическими чередованиями; приводятся аргументы в пользу того, что обязательным условием для появления ребусного принципа (и вместе с ним собственно древнекитайского письма) является моносиллабизация. В последней части работы обсуждается значимость данной гипотезы в общем контексте изучения древнекитайского языка.

Ключевые слова: древнекитайский язык, китайская письменность, моносиллабизация, ребусный принцип, морфологические чередования.