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# Prosodic structure and compound words in Classical Chinese\*

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## 1. Introduction

The purpose of this paper is to investigate the nature of compound words in Classical Chinese. I use the term Classical Chinese to cover the language from the Warring States Period (500 BC–200 BC) to the Han dynasty (206 BC–220 AD). My study mainly concentrates on the Han dynasty and the Pre-Qin period (221 BC). This is because compound words in Classical Chinese, as I will show below, developed to a large extent during the Han dynasty. I will discuss the properties of these compounds, the criteria used to identify them and the reason for their development.

Three major points are proposed in this paper. First, I argue that compound words did indeed exist in Classical Chinese and the number of compound words in Classical Chinese sharply increased during the Han dynasty. Second, such a development of compounding in Classical Chinese is chiefly due to disyllabic foot formation, which was newly established around the Han dynasty caused by the loss of bimoraic feet in Old Chinese (c. 1000 BC). Third, I argue that compounds in Classical Chinese are not only syntactic words, but also prosodic words. The former is shown by syntactic relations among each part of the compounds, and the latter is derived from the Prosodic Hierarchy and Foot Binariness in the theory of Prosodic Morphology.

The paper is organized as follows: section two examines criteria for identifying compounds in Classical Chinese; Section three presents a comparative study of *Mencius* (c. 372–289 BC) and the commentary on *Mencius* by Zhao Qi (c. 107–201 AD). Section four discusses previous accounts of development of compounding. Section five investigates the development of disyllabicity and proposes that the development of disyllabicity is independent of compounding. Section six discusses the phonological changes of Old Chinese (OC) and proposes that change of CVC basic (minimal) syllable structure of Old Chinese to a CV basic (minimal)

syllable structure of Middle Chinese (MC) inevitably results in a loss of bimoraic foot formation. The loss of bimoraic feet was compensated for by the introduction of disyllabic feet, and disyllabic combinations are therefore produced in sharply increased quantity during or after the phonological change took place. Given this historical development and the monosyllabic nature of the language, I further propose a Word Formation Rule, incorporated with a Foot Formation Rule based on the recent theory of Prosodic Morphology. Section seven discusses some theoretical implications and empirical consequences of the theory developed in this paper. Section eight provides a summary of this study.

## 2. Criteria for identifying compounds in Classical Chinese

Before we discuss compound words in Classical Chinese, we must first answer the question what a compound word in Classical Chinese is. For example, the combination of two words *tian-zi* (The Son of the Heaven, 'Emperor') in Classical Chinese is generally considered a compound, while *jun-chen* ('monarch and official') is not.<sup>1</sup> What is the difference between these two? Are they differentiated syntactically, morphologically, or semantically? Obviously, we need a set of criteria to identify what can be called a compound in Classical Chinese.

However, the problem with criteria proposed to date is that they are not entirely satisfactory for use with Classical Chinese compounds. For example, let us look at the criteria given by Chao (1968):<sup>2</sup>

- (1) a. Part of the item is neutral-toned.
- b. Part of the item is a bound form.
- c. The parts are inseparable from each other.
- d. The internal structure is exocentric.
- e. The meaning of the whole is not compositional of its parts.

If a combination of two morphemes meets one of these criteria, according to Chao, it is considered a compound in Modern Chinese.

Let us consider (1 a) first. The "neutral-tone" test is quite reliable for identifying compounds in Modern Chinese, for example, *shao.bing* (burn-cake, 'pancake') is a VO-compound because the object of the verb has been neutralized (indicated by a dot "." before the syllable). However, this diagnostic is not valid in Classical Chinese, simply because Classical Chinese is an extinct literary language. Therefore we do not know whether any part of the two combined forms is neutral-toned or not. Therefore, criterion (1 a) cannot be considered a criterion for Classical Chinese compounds.

According to (1 b), if part of the item is a bound form, this item is a compound. However, it is well known that morphemes in Classical Chinese are nearly always free forms, since each part of a compound can be used independently. For instance:

- (2) a. 小人少而君子多...國家久安。  
*xiaoren shao er junzi duo ... guo-jia jiu*  
villain few but gentleman more ... country-family long  
*an.*  
save  
'If there are fewer villains but more gentlemen ... the country will be safe forever.'  
(Hanfeizi. Anwei)
- b. 晉國二則子之家壞。  
*Jin guo er ze zi zhi jia huai.*  
Jin country two then you 's family break  
'If Jin country is broken up, your family will be destroyed as well.'  
(Zuozhuan. Xiang. 24)

In these examples, although *guo* (country) and *jia* (family) can form a compound in (2 a), they can also be used independently in other sentences as in (2 b). This shows that although sometimes two elements are closely knitted together to be used as a compound, there is hardly any evidence to show that one of the parts is a bound form in Classical Chinese.<sup>3</sup> As a result, criterion (1 b) would not work for Classical Chinese compound-ing either.

Let us consider the criterion (1 c), that is, the inseparability of the parts from each other in a compound. (3) is an example showing a fairly well-known compound in *Chunqiu Fanlu* (《春秋繁露》) by Dong Zhongshu (179 BC–104 BC):

- (3) 天子,天之子也。  
*Tian-zi, tian zhi zi ye.*  
 heaven-son, heaven 's son prt  
 'An Emperor is the Son of Heaven.'

*tian-zi* is a compound but this does not mean that the two parts cannot be separated. Since Classical compounds are usually composed of free forms, even if the two forms are bound together to form a compound under one circumstance, they may also be used as a phrase with two single words separately in other contexts. In other words, the inseparability criterion cannot apply without regard to specific contexts as examples (2 a) and (2 b) show. Therefore, criterion (1 c) may not be ideal for use with the Classical language.

The two remaining criteria for determining compoundhood are (1 d) and (1 e). These two criteria seem to work for identifying classical compounds. For example:

- (4) a. 妻子  
*qi-zi*  
 wife-children  
 'wife'
- 妻子好合  
*qi-zi hao he*  
 wife good marry  
 'good marriage with a nice wife.' (Shijing. Tangdi)
- b. 動靜  
*dong-jing*  
 active quiescent  
 'activity'
- 察其動靜  
*cha qi dong-jing*  
 scout his activity  
 'To scout his activity.' (Hanshu. Jimichanzhuan)
- c. 車馬  
*ju-ma*  
 carriage horse  
 'carriage'

大夫不得造車馬。  
*daifu bu de zao ju-ma*  
 officialdom not can make carriage  
 'The officialdom cannot make carriages themselves.' (Liji. Yuzao)

- d. 司馬  
 Si-ma  
 charge military  
 'General (a title in army)'

First, let us consider the criterion of exocentricity indicated in (1 d): the internal structure (of a compound) is exocentric, that is, the syntactic form class of the head of the compound is not the same as that of a phrase in which the compound occurs. In other words, syntactic phrase structure rules cannot apply to the internal structure of a compound, which has been considered as a corollary of the Lexical Integrity Hypothesis (LIH, Huang 1984). According to the criterion of exocentricity, the example given in (4 d) must be a compound, because the verb *si* (to control) cannot serve as a head of phrase when *si-ma* is used as a compound (since *si-ma* is a noun). However, *tian-zi* 'Emperor', as we have seen before, should be considered a compound, since it has become a proper noun. Yet, in (3) *tian zhi zi ye* 'The Son of Heaven', the *zhi*, a possessive marker in Classical Chinese can be inserted into it, which means that a phrasal rule can actually apply to it. Is *tian-zi* a compound? By (1 d) it should not be, but in fact it is. Obviously, (1 d) is not a sufficient criterion.

Consider next (1 e), i. e., the criterion of semantic noncompositionality. This criterion can be rendered as the following equation ("||...||" Indicates the meaning of "..."):

$$(5) \quad ||AB|| \neq a+b$$

Let AB be a combination of two forms A and B, and let the meaning of A be "a" and that of B be "b". If the meaning of AB is compositional, i. e., "a+b", then AB must be a phrase, rather than a compound, given the criterion that the meaning of the whole is not merely a composition of its parts. On the other hand, if the meaning of AB is not "a+b", we will have the following possibilities:

- (6) a.  $||AB|| = a$  (left part of AB)  
 b.  $||AB|| = b$  (right part of AB)  
 c.  $||AB|| = c$  (other)

Accordingly, if a combination of two forms meets one of the three possibilities in (6), it will be considered as a compound. Based on the extended formula given in (6), examples described in (4 a–4 c) must all be analyzed as compound words. This is because in all of these examples, the meaning of the whole (i. e. AB) is not simply a composition of its parts (i. e.,  $AB \neq a+b$ ).

While the semantic criterion seems to work for identifying compounds in Classical Chinese, it is not perfect. For example, in (4 c), *ju-ma* (carriage-horse) meets the condition of the semantic criterion:  $\|AB\| = a$ . That is, *ju-ma* means only “carriage”, and another part of the combination *ma* (horse) has no semantic value at all, hence it is considered a compound. (4 c) represents a special type of compound traditionally known as “*pianyi fuci*” (偏義復詞) – a combination using only one meaning of the two.<sup>4</sup> At first glance, this type of combination would make perfect sense to be identified as a compound, because if one part of the combination has no meaning, the combination would be more like a word, instead of a phrase. However, the problem with this treatment is that, without the sentence given in (4 c), *ju-ma* will not mean “carriage” but “carriages and horses”, that is, the meaning of “carriage” in *ju-ma* is totally dependent on the verb *zao* (to build/make), and there is no evidence to show that *ju-ma* (carriage) has been used anywhere else. If *ju-ma* does not occur freely as a compound, it is difficult to consider it as an independent lexicon entry.

There is an additional problem. If we treat *ju-ma* as a compound, what is the function of *ma* in *ju-ma*? Although the semantic criterion has identified *ju-ma* to be a compound, it creates a problem for further analysis of the internal structure of the compound. If *ju-ma* is formed by a syntactic coordination rule, that is, the structure of *ju-ma* is syntactically “carriage and horse”, how do we explain the fact that half of the structure has no semantic value? As we know that *ma* is a noun proper, and is not a functional element or a suffix, if *ju-ma* is a compound, how can *ma* be ignored totally within the structure?

As we have seen above, none of these five criteria would work completely for Classical Chinese compounds. However, each of them, except for the neutralization of tones, works to a certain degree for certain types of compounds. For example, compounds created by what is known as the reduplication process (Dobson 1959) are easily to be identified by criteria given in (1):

- (7) 匍匐  
*pu-fu*  
 ‘to creep, to crawl, to toddle’

赤子匍匐將入井。

*chizi pu-fu jiang ru jing.*

baby crawling will enter well

‘A baby crawling is about to fall into a well.’

(*Mencius*)

It has been observed (Dobson 1959) that compounds which are derived by reduplication may have the meaning “actions or states in a repetitive pattern, succeeding each other”. Obviously, this type of compound can easily be identified by either (1 b) “part of the item is a bound form” or (1 c) “the parts are inseparable from each other” or even (1 e) “the meaning of the whole is not compositional of its parts”. However, the easiest cases, such as reduplicatives, are in the minority, while the most difficult cases, those that have been called syntactic words (Chao 1968),<sup>5</sup> are in the majority, such as the examples given in (2 a) and (4). The following statistics (taken from Cheng 1981) show the proportion between these two categories (“Der” refers to Derivative compounds and “SynW” refers to syntactic words):

Table 1. Proportion between derivative and syntactic compounds in *Confucius* and *Mencius*

Chronology	Texts	Total	Der	%	SynW	%
c. 550 BC	<i>Confucius</i>	180	24	13.3	138	76.7
c. 300 BC	<i>Mencius</i>	333	44	13.2	249	74.8

There are only 13.3% derivatives in *Confucius*, and 13.2% in *Mencius*; but 76.7% syntactic words in *Confucius* and 74.8% in *Mencius*. If a criterion can only handle 13% of the data in the language, it should not be considered valid. If we consider the development of compound formation through time, what we can see from Cheng’s statistical data is that by Han times (c. 100 AD) the derivatives have decreased to only 8.22% among all the compounds in the following table:

Table 2. Proportion between derivative and syntactic compounds in *Lunheng* (c. 100 AD)

	Total	Der	%	SynW	%
<i>Lunheng</i>	462	38	8.22	424	91.78

Given that 91.78% of the compounds in the language are “syntactic”, we conclude that, in practice, the most effective criterion for identifying compounds in Classical Chinese is the semantic one, that is, the one given by Chao in (1 e), formulated in (6) and modified here as (8):

(8) Semantic Criterion:

If A and B are two independent forms, and the semantic interpretation of A is “a” and that of B is “b”; and if in context X, either

- a.  $\|AB\| = a$  (left part of AB), or
- b.  $\|AB\| = b$  (right part of AB), or
- c.  $\|AB\| = c$  (other)<sup>6</sup>

then the combination of AB is a compound in context X.

I will adopt the semantic principle as a working criterion to embark upon the following study of classical Chinese compounds. However, a more theoretical and formal constraint, i. e., the Word Formation Rule (WFR), and the notion of Idiomatized Prosodic Word defined by the Foot Formation Rule, as developed in section six, will be taken to characterize the idiomatic property of compound word in Classical Chinese.

### 3. Compounding in Zhao Qi's *Mencius Zhangju*

In order to examine the development of Classical Chinese compounds, I have compared *Mencius* (c. 372–289 BC) with Zhao Qi's commentary on *Mencius*, i. e., the *Mencius Zhangju* (c. 200 AD). The reasons for selecting Zhao Qi's work as a body of comparative data are the following. First, the Han dynasty (206 BC to 220 AD) in which Zhao Qi lived (107–201 AD), was an important transition period from Old Chinese (c. 1000 B.C., i. e., the *Shijing* [The Book of Poetry] period) to Middle Chinese (7th century AD, i. e., the *Qieyun* [rhyme dictionary] period.). It is well known that from Old Chinese to Middle Chinese, the language changed a good deal with respect not only to its phonology and morphology, but also to its syntax. (Chou 1959; Wang 1980; Mei 1980; Norman 1988; Baxter 1992; and many others). Therefore Zhao Qi's work is a good place to look at the development of Classical Chinese compounds. Second, we can deduce that the language used by Zhao Qi is close to the

vernacular of that time. This can be seen from Zhao Qi's preface to the *Mencius Zhangju*, which I translate as follows:

... When I took refuge in Haidai (i. e., Shandong province), I had nothing to do except read classical books. Often, I gain new insight from reviewing classics. During this period, a noble man (i. e., Sun Song) admired my hard work and old age. He often came to me and discussed classical texts with interpretations of those texts ... Under these circumstances, I narrated what I know, and wrote this book ...” (Preface to *Mencius Zhangju*)

From this, we know that (i) *Mencius Zhangju* was written during the special time that Zhao Qi had discussions with (or probably gave lectures to) Sun Song, and that (ii) the language used in *Mencius Zhangju* was based on those discussions or lectures. Thus, we might conclude that *Mencius Zhangju* is closer to the Han vernacular than most other documents found in this period.

Third and most importantly, in *Mencius Zhangju*, probably because it is close to the vernacular language, Zhao Qi often uses two-character combinations to interpret one character words in *Mencius*. I will call this the “one-to-two” interpretation in the following discussions. The “one-to-two” annotations allow us to determine when one character has been replaced by two between the Warring States and the Han periods (300 BC–200 AD).<sup>7</sup>

The procedures of the investigation for classical compounding in *Mencius Zhangju* are as follows. First, I list all the tokens that consist of two characters in Zhao Qi that are one-character words in *Mencius*. For example:

- (9) *Mencius*: 聖人且有過。  
*shengren qie you guo*  
 sage-person also have mistake  
 ‘Even sages make mistakes.’
- Zhao Qi: 聖人且有謬誤。  
*shengren qie you miu-wu*  
 sage-person also have false-mistake  
 ‘Even sages make mistakes.’

In *Mencius*, the one character monosyllable word *guo* was used for the concept “mistake”. In Zhao Qi's exegesis, the two characters *miu* and *wu* are combined to gloss the one character *guo*.

In addition to all of the instances of one-to-two translations, I also list annotational materials which contain two-character combinations in Zhao Qi. For example:

- (10) *Mencius*: 棺槨無度。  
*guan guo wu du*  
 inner-coffin outer-coffin no rule  
 'The inner and outer coffins have no rules.'
- Zhao Qi: 棺槨厚薄無尺寸之度。  
*guan guo hou-bao wu chi-cun*  
 inner-coffin outer-coffin thin-thick no meter-inch  
*zhi du*  
 's rule  
 'The thickness of inner and outer coffins have no rules for their size.'

In this example, we have three combinations in Zhao Qi: *guan-guo* which is repeated from *Mencius*, *hou-bao* and *chi-cun* which have no corresponding words in *Mencius*, but are used by Zhao Qi. I will call this type of annotation "none-to-two". Although this type of data is not a word-to-word annotation like the ones given above, nevertheless they are annotations of meanings implied in that sentence. These two-character combinations provide us an opportunity to see how meanings are expressed by the two-character combinations in the Han period language. Therefore, such examples are also included in my percentage study of this section.

As indicated in (10), I also take into consideration the two-character combinations that Zhao Qi repeated from the *Mencius*, such as *guan-guo*. I will call this type-of annotation "two-to-two".

- (11) *Mencius*: *guan guo wu du*  
 inner-coffin outer-coffin no rule  
 'The inner and outer coffins have no rules.'
- Zhao Qi: *guan guo hou-bao wu*  
 inner-coffin outer-coffin thin-thick no  
*chi-cun zhi du*  
 meter-inch 's rule  
 'The thickness of inner and outer coffins have no rules for their size.'

Thus we have three types of combinations that we will examine in this study. These are: (a) combinations used to gloss a monosyllabic word (1-to-2); (b) combinations used to explain the meanings or implications of the sentences (0-to-2), and (c) combinations repeated from the original text (2-to-2). Putting all these combined forms together, I then evaluate them according to the semantic criteria for compounding given in the previous section. Since the use of two characters by Zhao Qi to gloss the one character given in *Mencius* provides an excellent illustration for the study of the development of compounding, we are able to see where and how a monosyllabic word was replaced by a disyllabic compound. The questions we seek to answer are:

- i) How many two-syllable combinations used by Zhao Qi can be identified as compounds?
- ii) How many one-character words in *Mencius* have been glossed by compounds in Zhao Qi's annotation?
- iii) How many compounds have been used by Zhao Qi in his explanations of meanings and ideas within sentences?
- iv) How many compounds used by Zhao Qi have survived into present-day Mandarin Chinese?

As we can see from Table 3, there are a total of 169 two-character combinations in my data: in the *Liang Huiwang Shang* section of the *Mencius Zhangju*, there are 113 tokens; in the *Gongsun Chou Xia* section of *Mencius Zhangju*, there are 56. Among these 169 cases, there are 73 cases that belong to the "one-to-two" category, 60 cases are "non-to-two" and 36 cases are "two-to-two".

Table 3. Combinations of two characters in Zhao Qi's *Mengzi Zhangju* and *Mencius*

	Total	%	Han Compound	%	Modern Compound	%
1-to-2	73	43	34	47	31	42
0-to-2	60	36	39	65	25	42
2-to-2	36	21	29	80	18	50
Total	169	100	102	60	74	44

From the data given in Table 3, we can see that 73 monosyllabic words in *Mencius* have been replaced by two-syllable combinations in Zhao Qi, and among the 73 two-syllable combinations used by Zhao Qi, 47% of them are compounds. In addition to the replacement of one by two, there are 60 cases of "none-to-two". Among these 60 cases, 65% are compounds. From these data we may conclude the following: first, an ever greater number of compound words were formed during this period. This can be seen clearly from Table 3. Among all of the 169 cases, only 21% of the tokens were disyllabic combinations in the Warring States Period, while 79% of them occurred in the Han dynasty. Although the use of compounds can be traced back to the Shang dynasty (sixth to eleventh centuries BC, see Cheng 1981) and a further development can be found during the Warring States Period, it is evident that a sharp increase in compounding occurred during the Han. The 73 one-to-two cases show that 43% of the time the Han people used disyllabic forms, whereas the people who lived in the Warring States Period used monosyllabic forms in the same linguistic contexts.

All of these pieces of evidence suggest that the people of the Han period used more two-syllable combinations or compounds to express the same concepts which were expressed using monosyllable words during the Warring States Period.

Secondly, the data also suggest that the development of compounds correlates with the appearance of disyllabic combinations. There are 169 disyllabic combinations in Zhao Qi, and by the semantic criterion, only 43% of compounds have appeared. The fact that there are more two-syllable combinations appearing in the language but that fewer compounds can be identified indicates that the appearance of two-syllable combinations may be the fundamental basis of the development of compounds in Classical Chinese.

The data from Zhao Qi comport with the general observation that Classical Chinese compounds are structurally formed using rules from syntax. The following syntactic relations between the two parts of compounds are observed in my data:

(12) Coordinating Compounds

- a. NN  
 尺寸 *chi-cun* meter-inch, 'size'  
 衣食 *yi-shi* cloth-food, 'daily use'

- b. VV  
 忖度 *cun-duo* think-measure, 'ponder'  
 贈饋 *zeng-kui* send-give, 'make a present of'

- c. AA  
 險阻 *xian-zu* dangerous-blocking, 'difficult'  
 純粹 *chun-cui* pure-best, 'unadulterated'

Subordinate Compounds

- d. AN  
 寡人 *gua-ren* single-person, 'I' (1st person Pronoun for Emperor)
- e. NN  
 國人 *guo-ren* country-person, 'aristocrat'

There are no S(subject)–P(redicate), V(erb)–R(esultative complement) and V(erb)–O(bject) compounds found in my data. This indicates that coordinative and subordinative relations are the most favored structures for compound formations, and that VR-structures, VO-structures and SP-structures are disfavored structures.

The comparison between *Mencius* and Zhao Qi shows that a) an ever greater number of compounds developed during the Han dynasty; b) the development of compounds is based on the development of disyllabic combinations; c) compounds must be formed structurally from syntax; and d) coordination and subordination are favored structures for compounding while Verb–Object, Subject–Predicate, and Verb–Resultative are disfavored. All these facts about Classical Chinese compounds call for a theory to explain why they exhibit such properties during the course of their development.

### 3.1. Questions regarding the development of compounds

In this section I will address questions arising from the study of Zhao Qi's data and studies of compounds in general. First, if, as indicated in Zhao Qi's data, compounds are derived from two-syllable combinations or phrases, then why are coordinative and subordinative compounds very common, but Verb–Object, Verb–Resultative, and Subject–Predicate compounds extremely rare?



Second, if coordinative structures such as *cao-mu* (grass-tree) and *lin-mu* (woods-tree) can develop into compounds by specializations of meaning (“grass and trees” → ‘vegetation’, “woods and trees” → ‘woods’, respectively), then why do we not find three-character coordinative structures such as *cao-mu-shu* (grass-woods-tree) as a result of the same process: “grass, woods, and trees” → ‘vegetation’?

Third, if syntax determines the internal structure of compounds, then coordinative compounds such as *dong-jing* (active-quiescent, ‘activity’), *ju-ma* (carriage-horse, ‘carriage’) must be structurally interpreted as “active and quiescent” and “carriages and horses” respectively. However, the semantics of these compounds does not allow us to give a full interpretation of the meanings conveyed by each part of the compounds in these structures: *ju-ma* is not interpreted as ‘carriage and horse’, but as ‘carriage’; *dong-jing* is not interpreted as ‘active and quiescent’, but as ‘active’. The interpretation requires the other part of the compound to be semantically empty, and the syntax of such coordinating structures must thus be interpreted as: “*dong* and \_\_\_\_\_”, “*ju* and \_\_\_\_\_”. How can a syntactic rule allow a coordinative structure with the second part semantically empty? If the second part of a coordinative structure has no semantic value, what does “coordination” mean structurally, and semantically?

Fourth, why was an ever greater number of compounds produced specifically around the period of the Han dynasty? Why did the Chinese language suddenly have such a strong tendency toward the formation of compounds?

Finally, if both coordinative and subordinative structures are the most productive types of compounding, why at the beginning of their development (The Spring and Autumn Period, c. 550 BC), were there more subordinative compounds than coordinated words (see Cheng, 1981)? Also, why after the Warring States Period (c. 221 BC) did coordinative compounds become more and more dominant while the number of subordinative compounds declined (Cheng 1981)?

As a response to these questions, I propose that the sharp increase in the number of compound words is a consequence of the development of disyllabic feet resulting from syllable-structure simplification that occurred from Old Chinese to Middle Chinese. In what follows, I will first review some previous accounts for the development of compounds in section four, and then propose that the development of disyllabicity is independent of compounding in section five. Section six shows how the syllable-structure simplification resulted in disyllabic feet. Some theoretical and empirical implications will be discussed in section seven.

## 4. Previous accounts for the development of compounding

There have been a number of hypotheses to explain the development of compounding in Chinese. To date, the answers that have been provided are mostly functionally oriented.

### 4.1. Loss of phonological contrast

Norman (1988), for example, has suggested that it was “... chiefly due to phonological attrition, which greatly decreased the number of phonologically distinct syllables in the language.” (1988: 86). If phonologically distinct syllables were merged into phonologically nondistinct syllables, it would result in a great increase in the number of homophones in the language. It seems quite reasonable to assume that the increase in the number of compounds around the Han dynasty is a result of the phonological changes in the language. Let us first consider the argument that compounding was caused by phonological attrition. Among the facts known about phonological attrition from Old Chinese to Middle Chinese, two changes have been posited in Sino-Tibetan studies: consonant cluster simplification and the loss of morphological affixation.

Haudricourt (1954 [1972]) proposed that the departing tone in Middle Chinese originated from a suffix *\*-s* in Old Chinese, a hypothesis that has been widely accepted in the literature (Mei 1994; Baxter 1992; and many others). Following this hypothesis, all departing tones of Middle Chinese originally ended in *\*-s* in Old Chinese, from which we may infer a final consonant cluster in CVC<sup>8</sup> roots: *\*CVC-s*. These clusters were lost in the transition to Middle Chinese.

Not only does the suffix *\*-s* allow us to reconstruct final consonant clusters, but sets of characters which shared a common phonetic element (*Xiesheng*) also lead to the reconstruction of initial consonant clusters in Old Chinese. For example, a cluster *\*sm-* has been reconstructed for Old Chinese in examples such as the following: (see Baxter, 1992: 175):

(13)	Modern Chinese		Middle Chinese		Old Chinese	
	喪 <i>sang</i>	<	<i>sang</i>	<	<i>*sm-ang</i>	‘mourning, burial’
	亡 <i>wang</i>	<	<i>mjang</i>	<	<i>*m-jang</i>	‘not have, not exist, die’

It has also been posited (Benedict 1972; Bodman 1980; Mei 1994, and many others), that Old Chinese and Old Tibetan had a prefix *\*s-* which

had a causative or denominative function in Proto-Sino-Tibetan as seen in example (14 b) (taken from Mei 1994).

- (14) 林 *lin* < *ljem* < \**rjem* N: 'forest, woods'  
 森 *shen* < *sjem* < \**srjem* SV: 'woody, well-wooded'

Mei (1994) posits that *lin* and *shen* in Old Chinese differ by the presence or absence of the \**s-* prefix. *lin* "woods" was a noun whereas *shen* was "woody", i. e., a stative verb. The function of \**s-* in the *lin/shen* pair is denominative, turning a noun into something other than a noun, in this case, a stative verb. If this is so, the prefix \**s-* would create another type of cluster in CVC words: \**s-CVC*. However, the \**s-* also did not survive the transition to MC.

This can also be seen from a comparison between the final consonants of Old Chinese and those of Middle Chinese. Based on Li's reconstruction of Old Chinese (1980: 33), a great change in syllable structure occurs from Old Chinese to Middle Chinese (Li 1980: 8) shown as follows.

(15) Old Chinese Final Consonants

Tone	Nasal	Stop
Level Tone	<i>-m -n -ng -ngw</i>	<i>(-b) -d -g -gw</i>
Rising Tone	<i>-mx -nx -ngx -ngwx</i>	<i>(-bx) -dx -gx -gwx</i>
Departing Tone	<i>-mh -nh -ngh -ngwh</i>	<i>-bh -dh -gh -hwh</i>

(16) Middle Chinese Final Consonants

Nasal	Stop
<i>-m -n -ng</i>	<i>-p -t -k</i>

According to the inventory of final consonants reconstructed by Li, there were no open syllables in Old Chinese.<sup>9</sup>

There is no doubt, according to reconstruction of Proto-Chinese phonology (Ting 1979; Li 1980; Yu 1981; Baxter 1992; and many others), that the change from Old Chinese to Middle Chinese resulted in a simplification in syllable structure.<sup>10</sup> This is true if we assume (i) the simplification of consonant clusters, (ii) the loss of morphological affixation, and (iii) the reduction of the inventory of final consonants. Nevertheless, before the consonant clusters were simplified and affixes such as \**-s* were

lost, the possible syllable structure of Old Chinese was \*CCVCC. However, in Middle Chinese the syllable structure changed to CV(-C) where -C consisted of only *-m, -n, -ng, -p, -t, -k* as final consonants. In other words, the CCVCC syllable structure simplified to CV(C). What is crucial to observe here is that consonant clusters were no longer permitted either before or after the main vowel in Middle Chinese.

As a result of consonant-cluster simplification, the number of phonologically distinct syllables in the language decreased dramatically.<sup>11</sup> If both morphological affixes were lost, and the number of phonologically distinct syllables decreased, a consequence of this change would be a great increase in homophones, inevitably increasing the functional load of syllables in the language.

Given the simplification of syllable structure and the decrease in the number of phonologically distinct syllables, it is reasonable to expect the language to develop other means, e. g., compounding, to reduce the functional overload on the syllable. This is the "functional explanation" for the development of compounding in Chinese.

Note that although the functional approach seems a reasonable explanation for compound formation, there are difficulties with this account. The functional approach is based primarily on the assumption that the information carried by the merged syllables results in a functional overload. However, there were some newly developed phonological elements that could have supplanted the loss of contrast. For example, the departing tone replaced the \**-s* (see Baxter 1992: 135), and the loss of the final \**ʔ* (a glottal stop, Baxter 1992: 320) is thought to have been replaced by the high-rising tone (Pulleyblank 1962: 225–227; Mei 1970). Given these developments and also the general hypothesis that "the tones of Middle Chinese are developed from Old Chinese codas and post-codas"<sup>12</sup> (Baxter 1992: 7), it is clear that the functional load was at least partly reduced by remaining contrasts.<sup>13</sup> Given this fact, the functional approach loses some of its appeal as an explanation for the rapid expansion of compounding (see also Labov 1987).

#### 4.2. Semantic Disambiguation of Monosyllables

It is possible that, during the later development of compounding (the Han dynasty), one may find some supporting evidence for the functional explanation from examples such as given in (17).

(17) *Mencius*: (王良)天下之賤工也。  
 (*Wang Liang*) *tianxia zhi jian gong ye*.  
 Wang Liang world 's lousy artisan prt.  
 'Wang Liang is the lousiest artisan in the whole world.'

Zhao Qi: (王良)天下鄙賤之工師也。  
 (*Wang Liang*) *tianxia bi-jian zhi*  
 Wang Liang world clumsy-lousy 's  
*gong-shi ye*.  
 artisan-artisan prt.  
 'Wang Liang is the lousiest artisan in the whole world.'

In (17), Zhao Qi uses two characters *bi* and *jian* to annotate the single character: *jian*. Both *bi* and *jian* had the meaning "workers who lack skill", but *jian* could also mean "cheap, lowly, underestimated", etc. As Jiao Xun (1763–1820 AD, see *Mencius Zhushu*) has pointed out: Wang Liang was by no means a lowly (*jian*) person, because he was a senior official. *jian* in (17) means only "an artisan who lacks skill", this is why Zhao Qi uses *bi* with *jian* in order to disambiguate *jian*. When *jian* is used alone, its meaning can be vague. Therefore, *jian* is combined with *bi* to select the meaning of *jian* 'lacking skill'. This kind of semantic disambiguation was undoubtedly a contributing factor in the development of compounding.

However, the disambiguating function of compounding does not necessarily lead to a conclusion that disambiguation was the key factor in the development of compounding. In fact, empirical evidence argues against such a conclusion. If disambiguation of words via compounding was the major source of compounds as suggested by the functional account, then we would expect coordinate compounds such as *bi-jian* to be in the majority, especially at the beginning of their development. This is because unlike other types of compounds, (for example the Modifier–Head compounds *tian-zi*, Heaven's son, 'Emperor', which lacks the function to disambiguate a monosyllabic word), coordinate compounds can be readily formed in order to fulfil the disambiguative function discussed above. Therefore they would be a trigger for compounding according to the functional account. However, statistical data given by Cheng (1981) show that coordinate compounds were in the minority as shown in Ta-

ble 4 ("Total Comp" stands for Total compound words, "CC" stands for Coordinating Compounds words; "MH" stands for Modifier Head compound words):

Table 4. Percentage of CC and MH compounds in *Confucius* (c. 550 BC)

Comp	Total CC	Total %	Total MH	%
180	48	26.7	67	37.2

37.6% of compounds were MH compounds but only 26.7% were CC compounds in *Confucius' Analects*. The fact that there were fewer CC compounds but more MH compounds argues against the functional solution and calls for a different explanation.

Another problem with the functional explanation is development of counter-functional compounds during this period. By "counter-functional compounds" I mean that the meaning of a compound cannot be inferred from the meanings of the individual parts, and it must be learned independently. For example:

(18) a. 動靜

*dong-jing*  
 active-quiescent  
 'activity'

察其動靜。

*cha qi dong-jing*  
 scout his activity  
 'To scout his activity.'

(*Hanshu. Jimichan Zhuan*)

b. 車馬

*ju-ma*  
 carriage-horse  
 'carriage'

大夫不得造車馬。

*diafu bu de zao ju-ma*.  
 officialdom not can make carriage  
 'The officialdom cannot make carriages themselves.'

(*Liji. Yuzao*)

## c. 市朝

*shi-chao*market-(imperial)court  
'market'

肆諸市朝。

*si zhu shi-chao*<sup>14</sup>

kill it-at market.

'To kill it at the market.'

(Confucius)

Under the functional account, the combination of two forms to form a word must be semantically distinctive and must functionally contribute to the meaning. In most disyllabic combinations, the meanings of the two forms can either be consistent or cooperative. For example, in *zhan-dou* (war-tussle, 'fight'), the meaning of *zhan* 'war' and *dou* 'tussle' are consistent, and the combination *zhan-dou* is more distinctive than either *zhan* or *dou*. In *tian-zi* (Heaven-son, 'Emperor'), *shi-fei* (right-wrong, 'right and wrong') and *yi-shang* (shirt-skirt, 'clothes'), the meanings of the two forms are cooperative, i. e., the concept of "Emperor" is realized by participation of two meanings "heaven" and "son"; the expression "right and wrong" is realized by combination of the meaning "right" with "wrong"; and the concept "clothes" is achieved by a process of abstraction from two meanings "shirt" and "skirt". All these examples show that in order to make a combination functionally contributive and semantically distinctive, each of the two forms in the combination (syntactic compound) must have an independent semantic value. In other words, the meaning of each compound includes, at least to some extent, the meanings of the individual parts. If the meaning of one part of a combination is originally "zero", it makes no contribution to the meaning of the compound under the functional approach.

However, what we found is what is not expected by the functional account in the cases given in (18). As we have seen in (4), this type of compound is traditionally known as "pianyi fuci" – combinations using only one meaning of the two. In other words, the meaning of the other part of the compound must be "zero", or suppressed, in these combinations. It can be seen clearly from the examples above. *ju-ma* means only *ju* (carriage); *cheng-bai* (success-failure) conveys only "failure" (see footnote 15). The *shi-chao* case (18c) is even more convincing: it is a rule in old times that killing must be done at a market, not at the imperial court. It is clear from historical context that the combined form *shi-chao* must

be interpreted as *shi* (the market), rather than *shi-chao* (the market and the imperial court).

Notice that, the *ju-ma* type examples are different from examples such as *shi-fei* (right-wrong, 'right and wrong', *Zhuangzi* c. 300 BC) and *yi-shang* (shirt-skirt 'clothes', *Shijing* c. 1000 BC). The semantic interpretation for *ju-ma* types is this:

(19)	Combined forms	A	+	B	<i>ju-ma</i>
	Surface Meaning	a		b	carriage-horse
	Actual Meaning	a			carriage

The semantic interpretation for *shi-fei* is this:

(20)	Combined forms	A	+	B	<i>shi-fei</i>
	Surface Meaning	a		b	right-wrong
	Actual Meaning	a		b	right and wrong

The semantic interpretation for *yi-shang* is this:

(21)	Combined forms	A	+	B	<i>yi-shang</i>
	Surface Meaning	a		b	shirt-skirt
	Abstract Meaning			c	clothes

As we can see from the above illustrations, the actual meaning of *shi-fei* is the same as its surface meaning, and the abstract meaning of *yi-shang* is different from its surface meaning. Yet, the actual meaning of *ju-ma* only takes one part of its surface meaning: *horses*. Functionally speaking, there would be no confusion in *shi-fei* and *yi-shang*, because their meanings can be figured out or inferred from their surface meanings. However, combinations of the *ju-ma* type are very different. Since no abstract meaning is available for *ju-ma*, users of the language must rely on surface meaning to determine communicative function. Yet, the surface meaning of *ju-ma* (carriage and horse) contains an element that is not what the speaker has actually meant (viz., horse) in (18b). Therefore, how are users of the language to infer that part of *ju-ma* is different from what the speaker had actually meant? This is why many traditional philologists particularly named them the *pianyi fuci* – 'combinations using one meaning of the two'.<sup>15</sup>

Obviously, the development of this type of compound is not explained by a functional account, because they increase rather than eliminate the

functional load in communication. If, as the functional account presumes, the development of compounds is caused by the need to reduce confusion created by phonological attrition, there was no reason for this type of compound to have appeared in the language. The existence of this type of compound shows that two-syllable combinations were highly preferred in the language, regardless of whether the combinations created more functional load or not. In other words, the pressure to create two-syllable forms overrode the communicative function.

These examples not only argue against a purely functional explanation, but raise the following question: why could Classical Chinese, during the period of phonological change, tolerate a linguistic process which might cause communication problems? I suggest that the reason is phonological, namely, the advent of a two-syllable unit. This possibility is explored below.

#### 4.3. Vocabulary expansion

Cheng (1981; and many others) has suggested that the developing complexity of society required a greater number of vocabulary items and that social requirements motivated the increase in the number of compounds. Of course, by the Han dynasty, China had just been united and become a huge country. Long-term peace encouraged trade, and contacts with foreign countries, especially with India, became much more frequent. The influence of Buddhism also began to be felt in daily life. It was true that the society was much more complicated and there must have been some pressure to develop a lingua franca for the newly-formed country (see, Zhu 1992). However, if this is true, the linguistic question that remains to be answered is why derivational morphological affixes such as \*-s and \*s- shown in 4.1, could be lost in OC in the first place. These losses reduce the size of lexicon. Furthermore, if compounding were just caused by social development, why were compound words formed overwhelmingly by two, rather than by three or more syllables? Most importantly, we know that there are various ways for morphological processes to reduce the overload on syllables, for example, by creating polysyllabic words or producing new words by affixation, etc. If new vocabulary items were needed, why were the new forms not created mostly by a morphological process of affixation and why did compounding become the most important device in Classical Chinese morphology? Social explanations do not account for the structural mechanism of this language change,

and the direction of the morphological development of compounding in Classical Chinese remains an mystery according to the functional account.

#### 4.4. Aesthetic factors

Cheng (1981) has also argued that the simplification of the Old Chinese phonological system was caused by the development of disyllabic compounds, and that the development of compounds is due to extra-linguistic factors. In Chinese tradition, people conceptually prefer a pair of two things, therefore the paired-syllable words (compounds) developed. This solution is theoretically unattractive, and empirically problematic. If this is true, for example, it remains to be explained why Chinese could develop a five-syllable pattern poetry around the late Han dynasty, and a seven-syllable poetry before the Tang dynasty, instead of keeping the perfectly balanced four-syllable pattern poetry of Old Chinese.

### 5. The development of disyllabicity

#### 5.1. Chronology

It is well known that two-syllable combinations can be found in the earliest documents such as *Shangshu* (Archaic History, c. 1000 BC) and *Shijing* (The Book of Poetry, c. 1000 BC; see Cheng 1981). However, if we compare the *Analects* of Confucius (551–479 BC, the Spring and Autumn Period) and *Mencius* (372–289 BC, the Warring States Period) with *Lunheng* (written by Wang Chong of the Han dynasty, 27–97 AD), we clearly see a sharp increase in two-syllable combinations. For example, Table 5 (taken from Cheng 1985) shows that:

Table 5. Compounds in *Confucius*, *Mencius* and *Lunheng*

Chronology	Texts	Number of characters	Compounds	%
c. 550 BC	<i>Confucius</i>	15,883	183	1.15
c. 100 AD	<i>Lunheng</i>	15,553	462	2.97
c. 300 BC	<i>Mencius</i>	35,402	336	0.94
c. 100 AD	<i>Lunheng</i>	35,221	794	2.25

about 1% of the words in both *Confucius* and *Mencius* are compounds. However, the 1% increased to nearly 3% in the *Lunheng*, suggesting that the greatest increase in compounds occurred during the Han dynasty. My own study comparing *Mencius* and Zhao Qi's commentary on *Mencius* given in section 3 confirms these observations: of the total of 169 disyllabic tokens used by Zhao Qi, 43% correspond to monosyllabic words used in *Mencius*, and 36% of them did not appear in *Mencius* at all. In other words, 79% of the disyllabic combinations used by Zhao Qi of the Han dynasty to gloss *Mencius* did not appear in *Mencius*. Furthermore, according to Xu De-an's study (1981), in the Classical Dictionaries *Er Ya* (c. 200 BC) and *Fang Yan* (c. 50 BC), 839 monosyllabic words were replaced by disyllabic forms by Guo Pu (276–324 AD) of the Weijin period (220–420 AD) in his *Commentary on Er Ya* and *Commentary on Fang Yan*.

## 5.2. Textual evidence

Why did the two-syllable unit become preferred during the Han dynasty (206 BC–220 AD)? The answer is partly given by the philologist Kong Yingda (574–648 AD) of the Tang dynasty in his *Commentary on the Five Classics (Wu Jing Zhengyi)* [my translation and my emphasis; SLF]:

(22) a. 視民如禽獸。

*shi min ru qin-shou.*  
see people like bird-beast  
'Treat people like animal.'

(*Shi.Xiaoya.Hecao buhuang.Xu*)

Kong: 經言“虎”，“兕”及“狐”，只有獸耳，言“禽”以足句。

*jing yan hu, si ji hu, zhi you shou er,*  
classic say tiger rhinoceros and fox, only have beast prt.,  
*yan qin yi zu ju.*  
say birds for fulfill sentence.

'The classic text only mentioned beasts: tiger, rhinoceros, and fox, (Mao Heng) adds birds to explain the text in order to *fulfill the sentence*.'

b. 芟夷我農功，虔劉我邊陲。

*shan-yi wo nong-gong, qian-liu wo bian-chui.*  
mow-weed my farm-harvest, kill-slay my edge-frontier

'(You) looted my farm harvest and killed my frontier people.'

(*Zuozhuan.gong.13*)

Kong: 重言“殺”者，以圓文也。

*chong yan sha zhe, yi yuan wen ye.*

repeat say kill Nom. for round writing prt.

'The reason of repeating “kill” is to *perfect the language*.'

c. 羔羊之皮。

*gao-yang zhi pi*  
lamb-sheep 's skin  
'The skin of lambs'

(*Shi.Shaonan.Gaoyang*)

Kong: 兼言羊者，以羔亦是羊，故兩言以協句。

*jian yan yang zhe, yi gao yi shi yang, gu liang*  
also say sheep prt. because lamb also is sheep, so twice  
*yan yi xie ju.*

say for balance sentence.

'The text says lamb with sheep, because lamb is also a kind of sheep, in order to *balance the sentence* it mentions both lamb and sheep.'

In the above examples, according to Kong, the reason for using two-syllable expressions is to *zu-ju* (to fulfill the sentence), to *yuan-wen* (to round off the sentence), or to *xie-ju* (to balance the sentence). The terms *zu-ju*, *yuan-ju* and *xie-ju* used by Kong do not refer to the syntax of the sentence, because (22 a), for example, would be perfectly grammatical without *qin* (bird): *shi min ru shou* (treat people like animals). The terms also do not refer to the semantics of the sentences, because, as Kong points out, in (22 a) the classic text says only tigers, rhinoceros, and wolves, that is, only beasts and not birds. Therefore, adding *qin* (bird) to explain the text is not semantically motivated. If these terms neither refer to the syntax nor the semantics of these sentences, what do they refer to? In fact, the term *xieju* (to balance the sentence) in (22 c) suggests clearly that it refers to the prosody. According to Kong, the three-syllable phrase *yang zhi pi* (sheep's skin) would not be “balanced”. When another syllable *gao* (lamb) is added to *yang* (sheep), it becomes a four syllable phrase and is then “balanced”. As we shall see below, four-syllable units naturally fit into the foot structure, while three-syllable units are highly marked (see, for example, (43)) Given the contrast between a balanced four-syllable unit and a unbalanced three-syllable unit, it is clear that the term *xieju*, as well as *yuanwen* and *zuju*, all refer to the prosody.

Following Kong's intuition, and based on the analysis to be given below, I propose that the increase in disyllabicity during the Han dynasty

was triggered by a new prosodic structure which occurred as a result of a new, simplified syllable structure in Old Chinese.

### 5.3. The independence of disyllabicity and compounding

It is a truism in Chinese linguistics that the change from monosyllabic to disyllabic words has been a strong tendency throughout Chinese history (Wang 1980). I would like to argue that, although the statement is generally correct, it is misleading. This is because the statement is usually interpreted as meaning that two-syllable combinations were constructed in order to satisfy the need for new disyllabic words (compounds). I would like to argue just the opposite: disyllabic words were created to satisfy the need for two-syllable prosodic units. More specifically, I argue that the disyllabicity was a fundamental requirement of the language, and its development had inherently nothing to do with compounding, i. e., the language required disyllabic units regardless of whether they resulted in compounds or not. The reasons for the tendency toward disyllabicity will be given in section 6.3 and the reasons supporting the development of disyllabic compounding will be given in section 6.5.

The hypothesis that disyllabicity is independent of compounding is supported by the following facts. First, most early documents show that two-syllable combinations originally were not compound words, but two-syllable phrases. For example: *guo-jia* 'country' became a compound word, but was originally a phrase:

- (23) 人有恒言，皆曰天下國家。  
*Ren you heng yan, jie yue tianxia guo jia.*  
 people have consistent word all say world country family.  
 'People who have constant behavior all consider the world (of the Emperor), the country (of the feudal princes) and the family (of the high officials of the state).' (Mencius)

國之本在家，家之本在身。  
*Guo zhi ben zai jia, jia zhi ben zai shen.*  
 country's base at family, family's base at body  
 'The base of the fiefdom is the family, the base of the family is the person.'  
 (Mencius. *Lilou. Shang*)

It is well-known that in the Zhou dynasty (c. 1000 BC), *guo* referred to the fief granted to feudal princes enfeoffed by the Emperor, and *jia* was

the fief of high officials of state who were enfeoffed by the feudal prince. The combination of *guo-jia* conveys the meaning of both "the fiefdoms of feudal princes" and "the fiefdoms of high officials." It became a compound word (*guojia* means only *guo* 'country', not *jia* 'family') only during the Warring States Period (500–200 BC), when the social and political system changed. This example indicates how disyllabicity was independent of compounding, because many two-word units were originally phrases, not compounds.

Secondly, in order to become a compound, according to the semantic criterion (8), a disyllabic phrase must undergo a process of lexicalization through specialization of sense. For example (taken from Dobson 1959): *tian-xia* 'sky-below' and *zhao-shang* 'pool-above' both are used in *Mencius*. Literally, *tian-xia* can be interpreted as 'of the sky', 'the below part', that is, 'below the sky' and *zhao-shang* would be 'of the pool', 'the above part', that is, 'above the pool'. *Zhao-shang* in natural language means 'above the pool', while *tian-xia* has a specialized meaning, and refers to 'all below the skies' → 'the world of men' → 'society' → 'the domain of the Emperor'. *Tian-xia* is thus a lexicalized compound, while *zhao-shang* is still a phrase. This is to say that without lexicalization, a two-syllable combination will remain a two-syllable phrase and cannot be considered a compound according to the criterion in (8).

Thirdly, under the pressure to form two-syllable units, some combinations look like compounds, even at the beginning of their formation. For example:

- (24) a. 衣裳 *yi-shang* shirt-skirt, 'clothes'  
 b. 家室 *jia-shi* family-bedroom, 'family'  
 c. 圖書 *tu-shu* picture-book, 'publications'

However, the two parts are interchangeable:

- (25) a. *shang-yi* 'clothes' (*Shijing*) – *yi-shang* 'clothes' (*Shijing*)  
 b. *shi-jia* 'family' (*Confucius*) – *jia-shi* 'family' (*Shijing*)  
 c. *shu-tu* 'publications' (*Hanfeizi*) – *tu-shu* 'publications' (*Hanfeizi*)

The variable order of the forms AB and BA makes it unlikely that the formed units are words, since the interchangeable order between A and B is a strong feature of coordinated phrases. The free order suggests that

as long as two-syllable forms are established, it does not matter whether the coordinated form is AB or BA, because the purpose here is to form disyllabic units, not to form compound words. The above argumentation suggests that the function of two-syllable units was a fundamental need of the language, regardless of whether the outcome was a word or a phrase.

## 6. A metrical approach to Classical Chinese compounds

### 6.1. Syllable structure simplification in Old Chinese

As mentioned in 4.1, phonological changes from Old Chinese to Middle Chinese resulted in a simplification of syllable structure. According to Ting (1979: 717–736) and Yu (1985: 290), the maximal and minimal syllable structures in Old Chinese and Middle Chinese are as follows (C = consonant; M = Medial; V = Vowel, S = Semivowel).

(26)	Chronology	Maximal	Minimal
	Old Chinese (c. 1000 BC)	CCCMVCCC	CVC
	Middle Chinese (800 AD)	{C, S} V {C, S}	CV

The crucial point here is that final consonants in Middle Chinese could not occur in clusters, and were limited only to two types: nasal *-m*, *-n*, *-ng* and oral *-p*, *-t*, *-k* stops. If we compare Middle Chinese with Old Mandarin (OM) (Dong 1954, *The reconstruction of Zhongyuan Yinyun* ([The Zhongyuan Rhyme Dictionary] 1324 AD.), we see that the process of simplification of syllable structure was still active at that time.

(27)	Middle Chinese Syllable Endings: CV ( <i>-m</i> , <i>-n</i> , <i>-ng</i> , <i>-p</i> , <i>-t</i> , <i>-k</i> )
	Old Mandarin Syllable Endings: CV ( <i>-m</i> , <i>-n</i> , <i>-ng</i> )

The process of final consonant attrition continues in Modern Mandarin (MM) as seen in (28) and has been traced by Chen (1975) as given in (29). He reconstructs a reduction schema that applies to the history of Chinese and many other languages.

(28)	Old Mandarin Syllable Endings: CV ( <i>-m</i> , <i>-n</i> , <i>-ng</i> )
	Modern Mandarin Syllable Endings: CV ( <i>-n</i> , <i>-ng</i> )

$$(29) \quad Vn > \tilde{V}n > \tilde{V} > V$$

According to a sociolinguistic study of the Beijing dialect by Barale (1982), the final-nasal consonant attrition noted by Chen follows a process of nasalization of the preceding vowel as seen in (29). Furthermore, Wang (1993) suggests that Mandarin Chinese syllables can all be analyzed as open syllables, that is, the maximal syllable structure in Mandarin Chinese is arguably CV.<sup>16</sup>

Juxtaposing the syllable endings of different periods gives us a clear picture of the process of syllable-structure simplification throughout Chinese history:

(30)	OC: CCVC (C) (C)
	MC: CV ( $\left\{ \begin{array}{l} -m \\ -n \\ -ng \\ -p \\ -t \\ -k \end{array} \right\}$ )
	OM: CV ( $\left\{ \begin{array}{l} -m \\ -n \\ -ng \end{array} \right\}$ )
	MM: CV ( $\left\{ \begin{array}{l} -n \\ -ng \end{array} \right\}$ )

On-going MM: CV

That is, the first step is to drop the “post-coda” (Baxter 1992), and the second step is to drop the coda. There is clearly a strong tendency to simplify Chinese syllable structures by dropping final consonants.

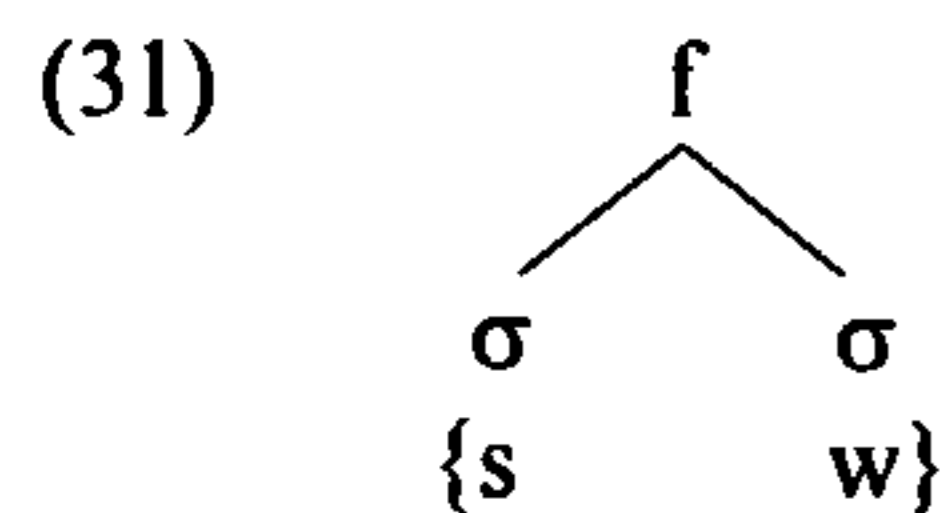
### 6.2. Metrical theory and Old Chinese syllable structure

In metrical theory, syllables with a CVCC structure are heavier than syllables with a CVC structure, and CVC syllables are heavier than CV syllables (see Goldsmith 1990, and references cited there). The process of syllable simplification outlined above clearly shows that syllable weight has



continuously declined throughout Chinese history. Given this fact, the phonological change from Old Chinese to Middle Chinese can be characterized in terms of syllable-weight reduction. An important consequence of the syllable-weight reduction within the new system, I propose, is that a single syllable was not “heavy” enough to form a minimal independent prosodic unit – a foot. In other words, the new system requires the minimal prosodic unit (the foot) to be formed not by one, but by two syllables.

This hypothesis implies that a one-syllable foot was permissible before the final clusters disappeared, but not afterward. Theoretically, this may be justified as follows. In prosodic phonology, in general the structure of a foot can be characterized as consisting of one relatively strong and any number of relatively weak syllables dominated by a single node (see, among others, Liberman and Prince 1977; Kiparsky 1979; Nespor and Vogel 1986). Therefore, the structure of a binary foot would be as follows (“f” stands for a foot, and “ $\sigma$ ” for a syllable):

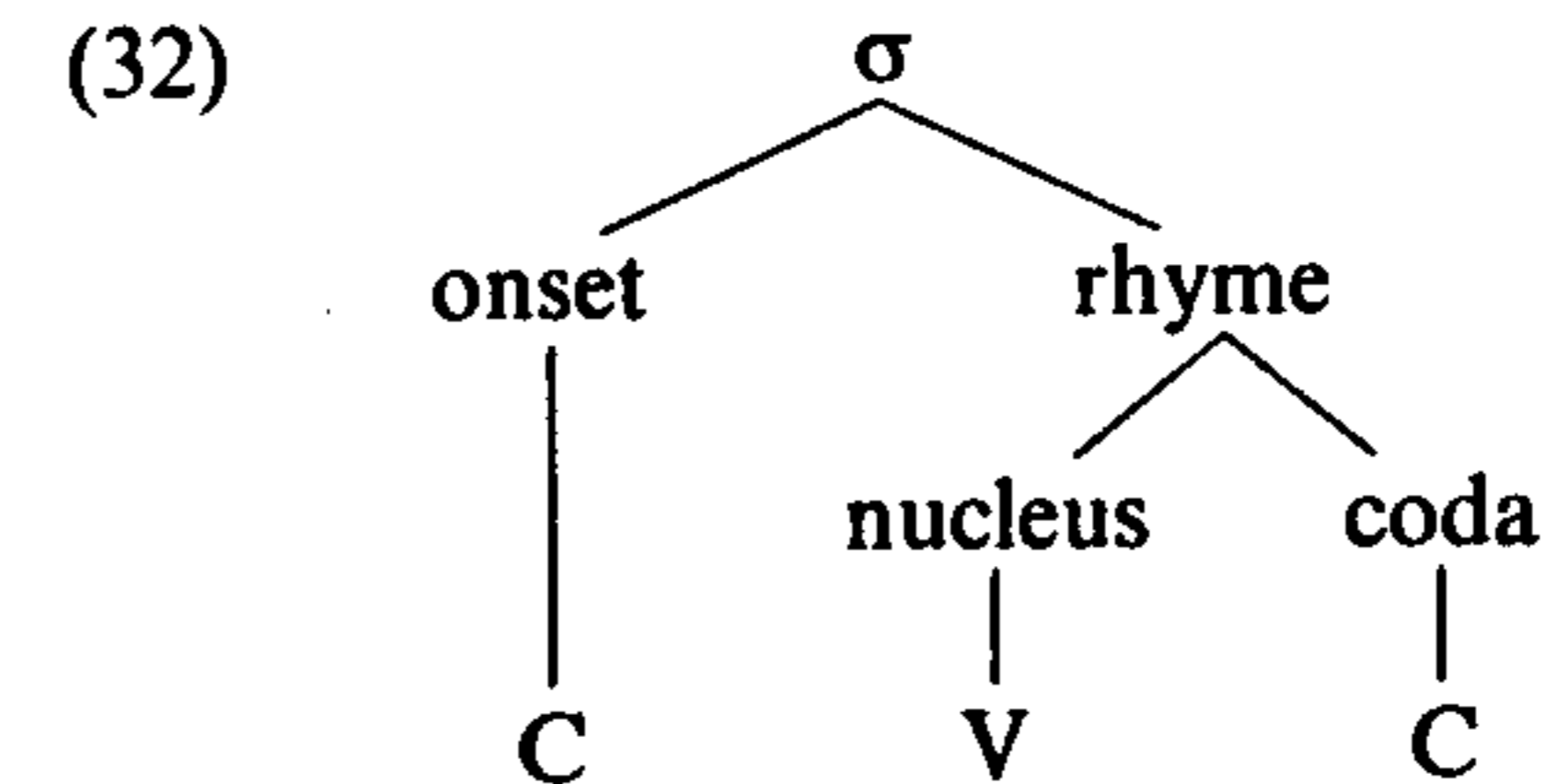


However, based on an analysis of a large number of languages, Hayes (1980) concludes that there are fairly strong restrictions on the grouping of syllables into feet in any given language. That is, a language may have either binary feet, consisting of two syllables each, or unbounded feet, consisting of (theoretically) any number of syllables. In addition to these types of foot structures, one-syllable feet are also found, although they are highly marked.

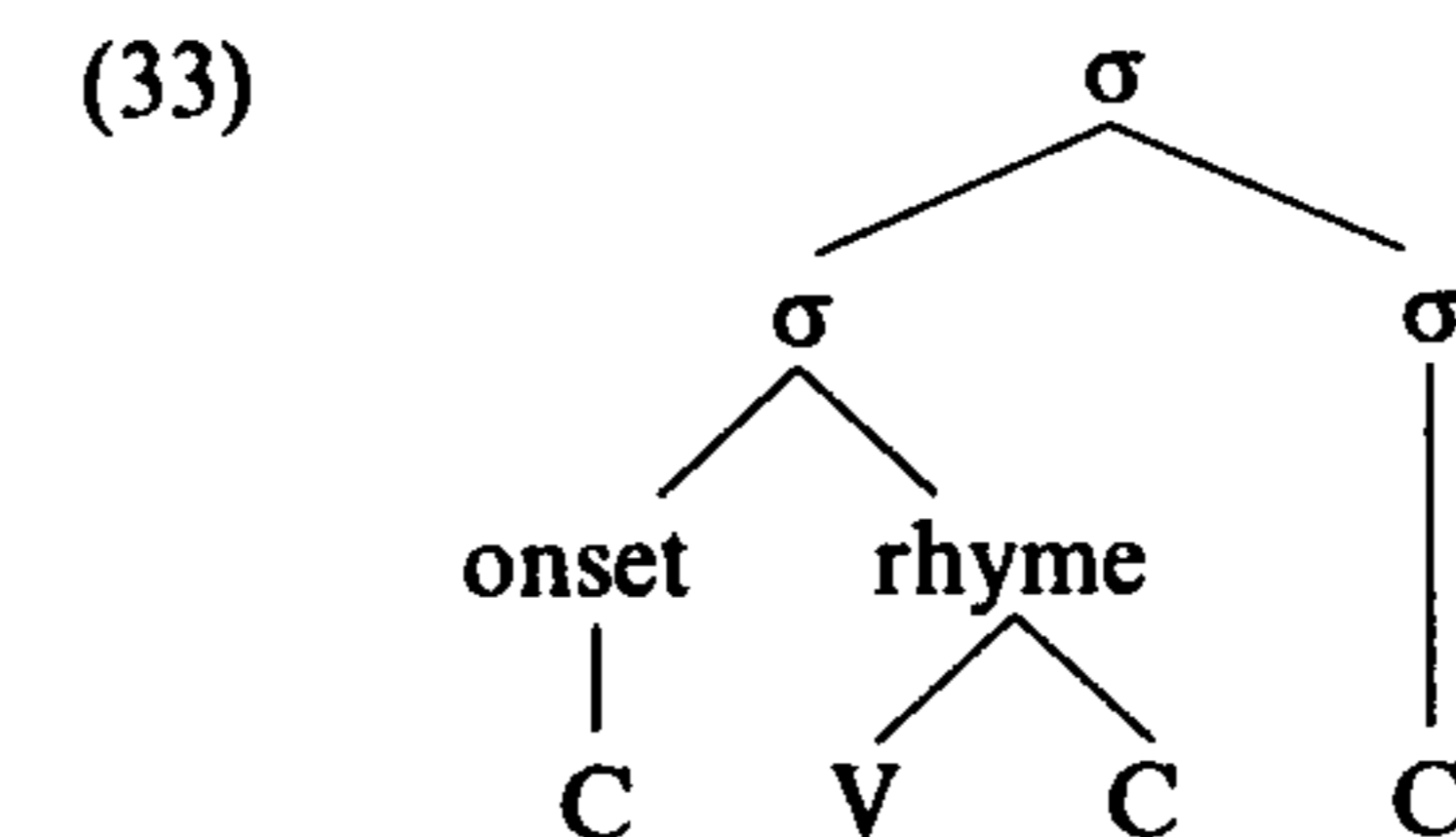
Since Old Chinese was basically a monosyllabic language, it is reasonable to assume that while a foot in Old Chinese may have consisted of more than one syllable, a one-syllable foot would also have been allowed, because the maximal syllable structure in Old Chinese was CCCMVCCC (Ting 1979; Yu 1985), which is, in prosodic terms, not only a heavy, but a “super-heavy” syllable structure. Heavy syllables with complex structures may independently form feet, while light or weak syllables with simple structures may require another syllable to form a foot (see McCarthy–Prince 1993). Since the Chinese syllable went from heavy to weak, it lost the ability to independently form a foot.

### 6.3. Syllable structure simplification as a cause of possible disyllabic feet

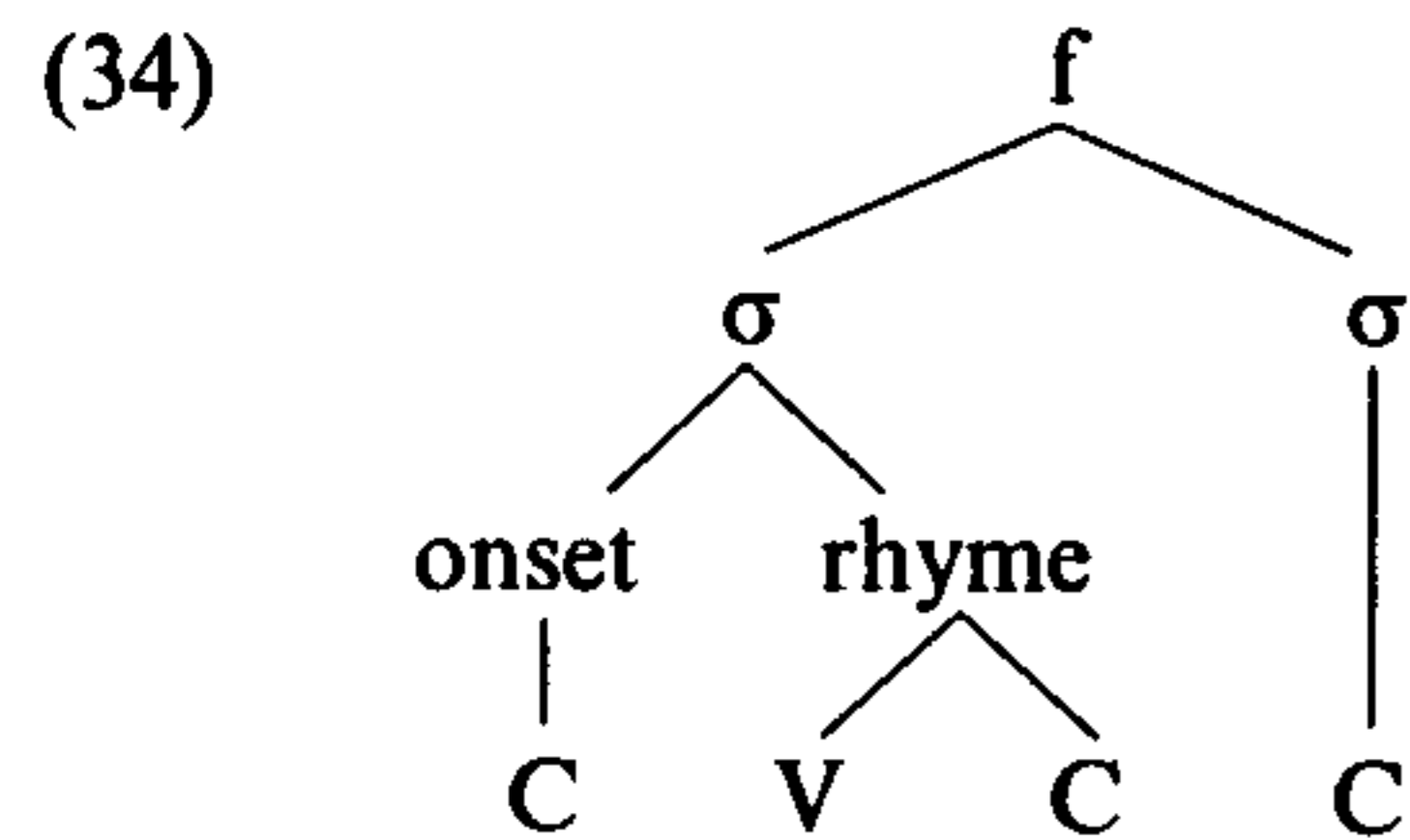
Within the framework of prosodic phonology, whether a syllable is heavy or not depends on whether the rhyme constituent of the syllable is geometrically branching. A heavy syllable is defined as one having a branching rhyme, and a light syllable is defined as one without a branching rhyme. The “weak-nodes-don’t-branch” principle of metrical theory would allow a CVC syllable to have the following structure:<sup>17</sup>



Thus, aside from the obvious increase in length, a CVC syllable structure must also be considered theoretically “heavier” than a CV structure, because it has a branching rhyme. Note that this is exactly the difference between Old Chinese and Middle Chinese with respect to their basic (minimal) syllable structures, as proposed by Ting (1979), Li (1980), and Yu (1985). Furthermore, the syllable structure of Old Chinese is not only minimally CVC, but also maximally CCCMVCCC, i.e., a consonant cluster is allowed in word-final position. The hypothesis that final clusters created super-heavy syllables in Old Chinese is supported by looking at other languages where final clusters also form super-heavy syllables. For example, in Arabic, word final consonant clusters are permitted and syllables that contain such final clusters are superheavy. The interesting fact about Arabic is that it is the syllable-final consonant that “creates” the super-heavy syllables. McCarthy (1979 and elsewhere) suggests a structure like (33) for super-heavy syllables (see also Goldsmith 1990: 198):



What is crucial to note here is that the final CC cluster in a syllable, metrically speaking, behaves differently from a single consonant. This is not to say, of course, that Old Chinese was necessarily exactly like Arabic in terms of prosodic structure.<sup>18</sup> Nonetheless the Arabic case provides us with evidence that final consonant clusters may create super-heavy syllables, allowing such syllables to independently form a foot. Thus the complex syllabic structure in Old Chinese may hypothetically be organized in terms of "Foot", according to (33), as follows.



The hypothesis that Old Chinese had a heavy syllable structure and hence permits one-syllable feet is also supported by the moraic theory of syllable structure, in which a mora ( $\mu$ ) is dominated by a syllable node ( $\sigma$ ) and syllables are dominated by feet ( $f$ ). The syllable node ( $\sigma$ ) may dominate one or two mora nodes, with each mora dominating at most one segmental element. Consequently, consonants are daughters of  $\sigma$  (see McCarthy–Prince 1993: 21). The following structures illustrate this analysis:

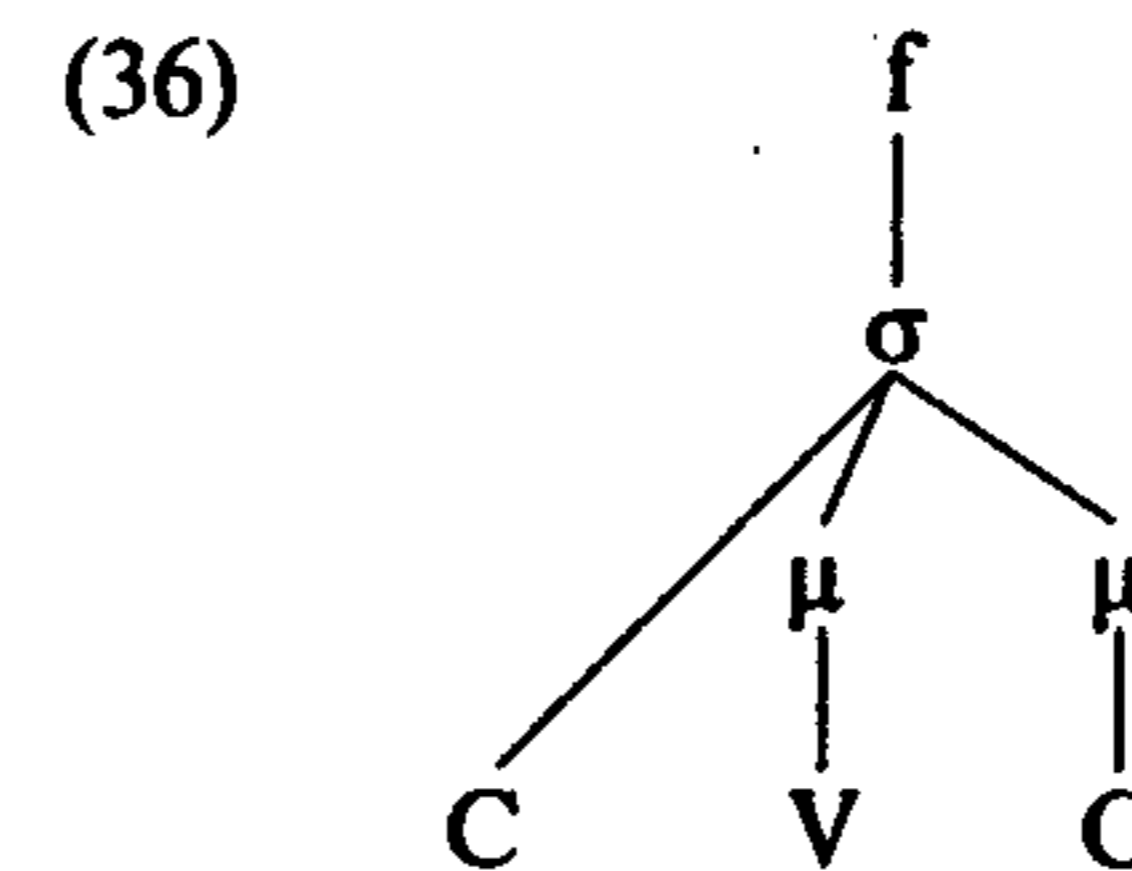


A foot must be either bimoraic or disyllabic, a stipulation required by the Foot Binarity Principle:

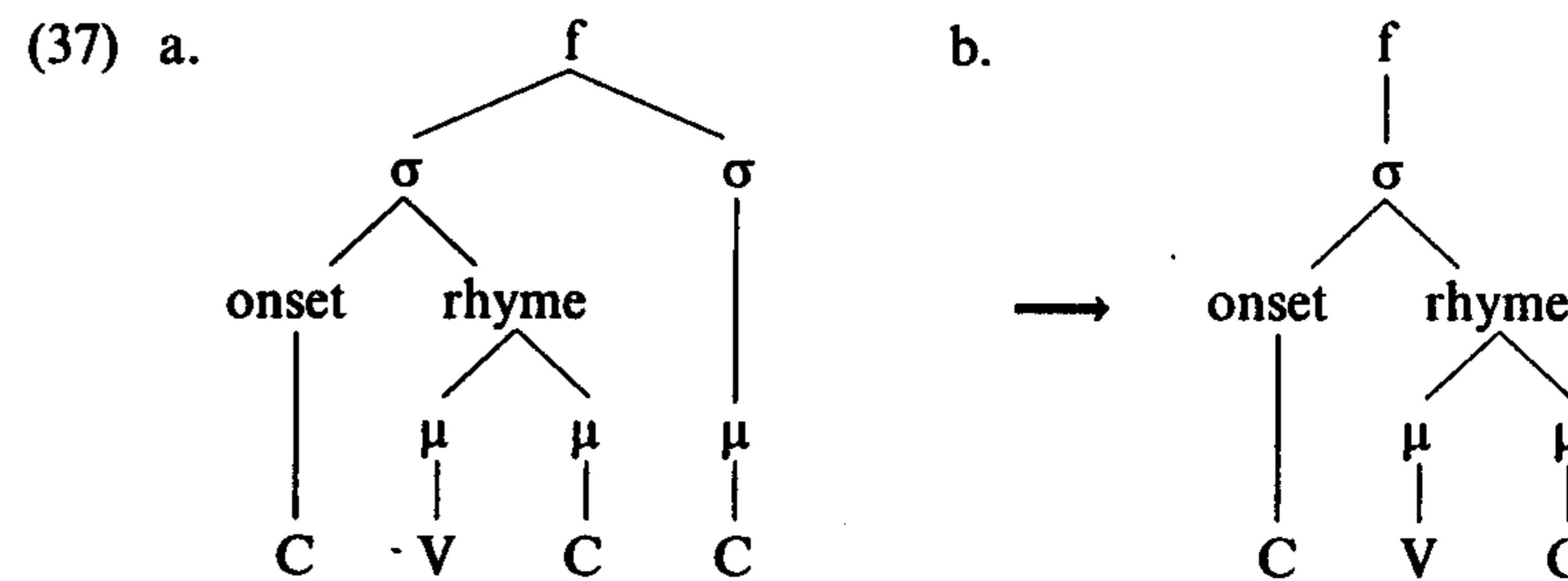
Foot Binarity (McCarthy–Prince, 1993: 43):  
Feet must be binary under syllabic or moraic analysis.

Based on the moraic theory of syllable structure and the Foot Binarity Principle, the structure (35 a) cannot form a foot because there is only one mora, which violates the Foot Binarity Principle. Structure (35 b),

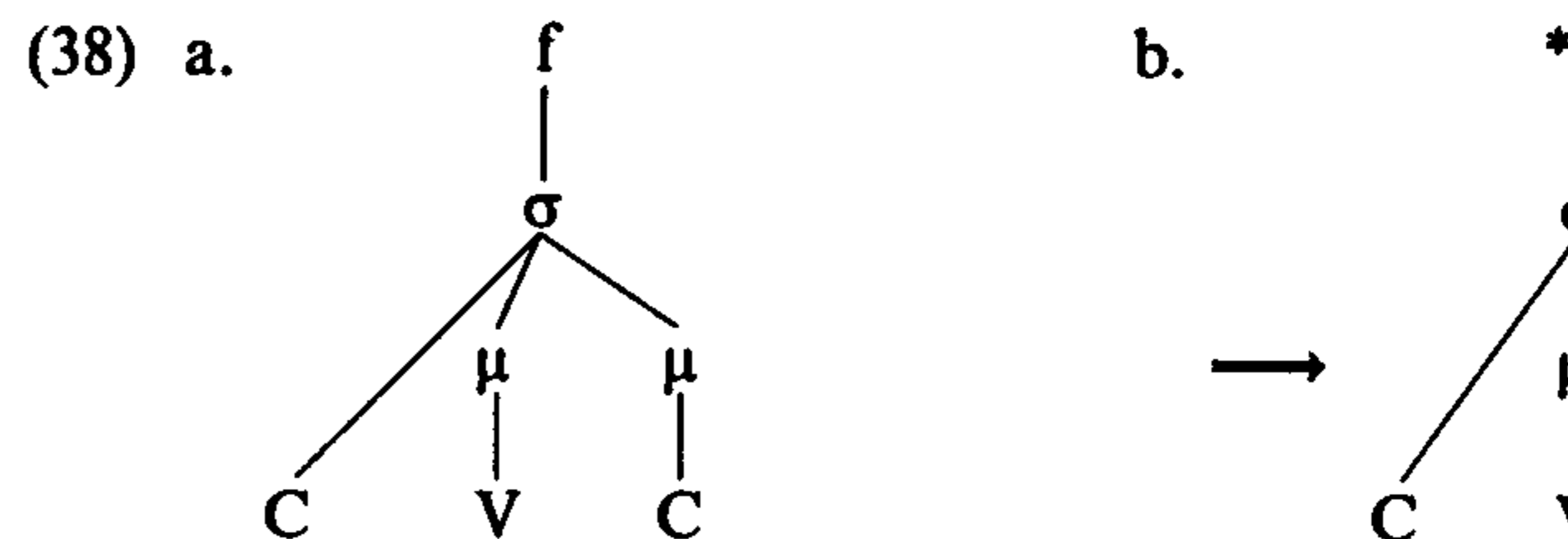
however, will form a perfect foot because there are two moras, thus meeting the Foot Binarity Principle requirement that a foot must be at least bimoraic. Based on this theory, we may reasonably propose that the basic syllable structure of CVC was able to serve as an independent foot in Old Chinese,<sup>19</sup> as shown in (36).



Note that this theory also predicts that if final consonant clusters are dropped from the language, we will have structure the following, as illustrated in (37) below:



The prosodic weight of the CVCC foot is reduced. If we assume that the loss of coda reduces the minimal syllable structure to CV in Middle Chinese, we lose the phonological basis for bimoraic feet:



The loss of the post-coda results in a loss of a super-heavy syllable structure, and the loss of the coda results in a loss of moraic branching structure. Since both apparently occurred in the language, the resulting structure would no longer be able to serve as an independent foot.<sup>20</sup> Furthermore, if the language changed its syllable structure systematically from (a) to (b) in (37) and (38), the result would have been that one-syllable words (since Old Chinese is basically a monosyllabic language) would no longer constitute independent feet. If this is so, two-syllable combinations will come to play a major role in foot formation in the language. To restate, the bimoraic foot disappeared in Old Chinese due to the loss of final consonants and consonant clusters. This, in turn, leads to the loss of heavy and super-heavy syllables. Since the foot is an obligatory level of prosodic structure, according to the theory presented above (see also Selkirk 1980 b, McCarthy–Prince 1991, 1993; Kager 1992, and many others), the language made up for the loss of bimoraic feet by replacing them with disyllabic feet. Therefore, the change of syllable structure from Old Chinese to Middle Chinese may be prosodically characterized as a change from bimoraic to disyllabic feet, resulting in the tendency to form two-syllable combinations.<sup>21</sup>

#### 6.4. Grammatical evidence for the disyllabic foot

I have argued elsewhere (Feng 1994), that a monosyllabic word was unable to form an independent foot during the Warring States Period (475–221 BC), while a two-syllable unit was able to form a standard foot in positions where an independent foot was required, as shown in the following analysis.

- (39) a. 子何言?  
*zi he yan?*  
 you what say  
 ‘What do you say?’ (Shangshu. Yiji, 1000 BC)
- b. 是獨遵何哉?  
*Shi du zun he zai?*  
 it only follow what prt  
 ‘What does it expressly follow?’ (Lunheng. Huoxu, 100 AD)

Although Classical Chinese of the Pre-Qin period (221 BC) is basically an SVO language, different types of SOV order are clearly observed. For

example, if the object of a verb is a *wh*-expression, it must occur directly to the left of the verb as shown in (39 a). This type of SOV word order (i. e., *wh-V*) changed after the Han dynasty. In example (39 b) a *wh*-object would follow the verb in the Han text *Lunheng*. However, when an object *wh*-expression is formed by two constituents, e. g., *he zui* ‘what guilt’, it does not appear to the left of the verb before the change from [*wh-V*] to [*V-wh*]: \*[What-N V].

- (40) \*宋何罪有?  
 \**Song he-zui you?*  
 Song what-guilt have  
 ‘What guilt does Song have?’

Rather, the structures that are allowed are [*what-N pro-V*] or [*V what-N*]. For example:

- (41) a. 宋何罪之有?  
*Song he-zui zhi you.*  
 Song what-guilt it have  
 ‘What guilt does Song have?’ (Mozi. Gongshu)
- b. ... 有何舊怨?  
 ... *you he jiu yan?*  
 ... have what old complain  
 ‘What old grievance do (you) have?’ (Jinyu.4, Wei Zhao Zhu)

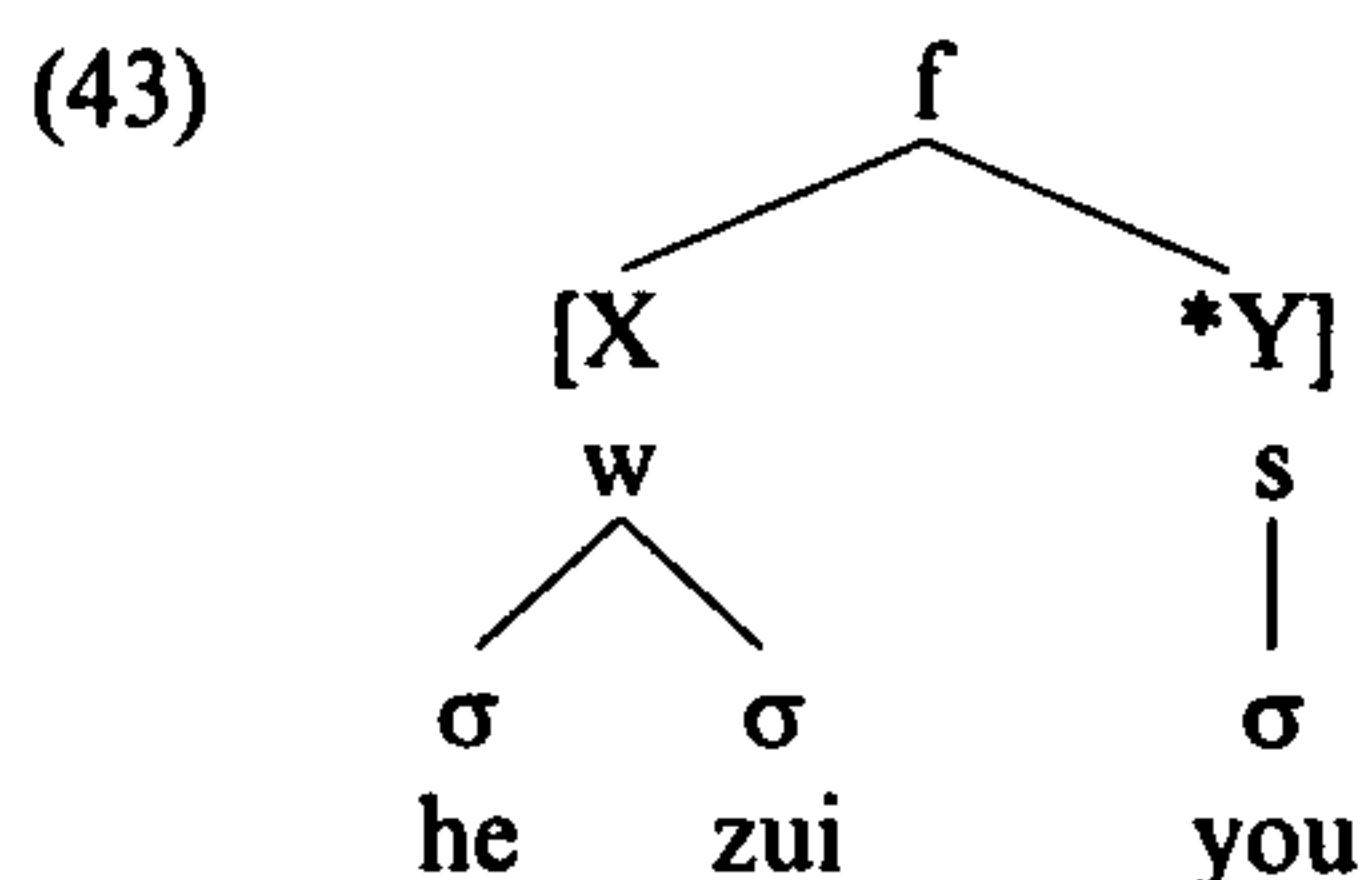
Either a pronoun *zhi* ‘it’ is inserted between the *wh*-expression and the verb in earlier documents, or the *wh*-expression appears to the right of the verb after the Han dynasty.

The question, then, is why \*[*he-zui you*] (what-guilt have) is not well-formed while [*he you*] (what have) is. In Feng (1994), I propose that (i) Proto-Archaic Chinese was an SOV language, and it changed into an SVO language which is what we see as Old Chinese (1000 BC). Based on this, the SOV orders such as the [*wh-V*] structure are considered as remnants of the change from SOV to SVO. In order to account for the survival of SOV phenomena, I propose that since Classical Chinese was basically an SVO language, the primary sentential stress falls on the right side of the sentence.<sup>22</sup> A Sentential Prosodic Rule is thus formulated as follows:

## (42) Sentential Prosodic Rule

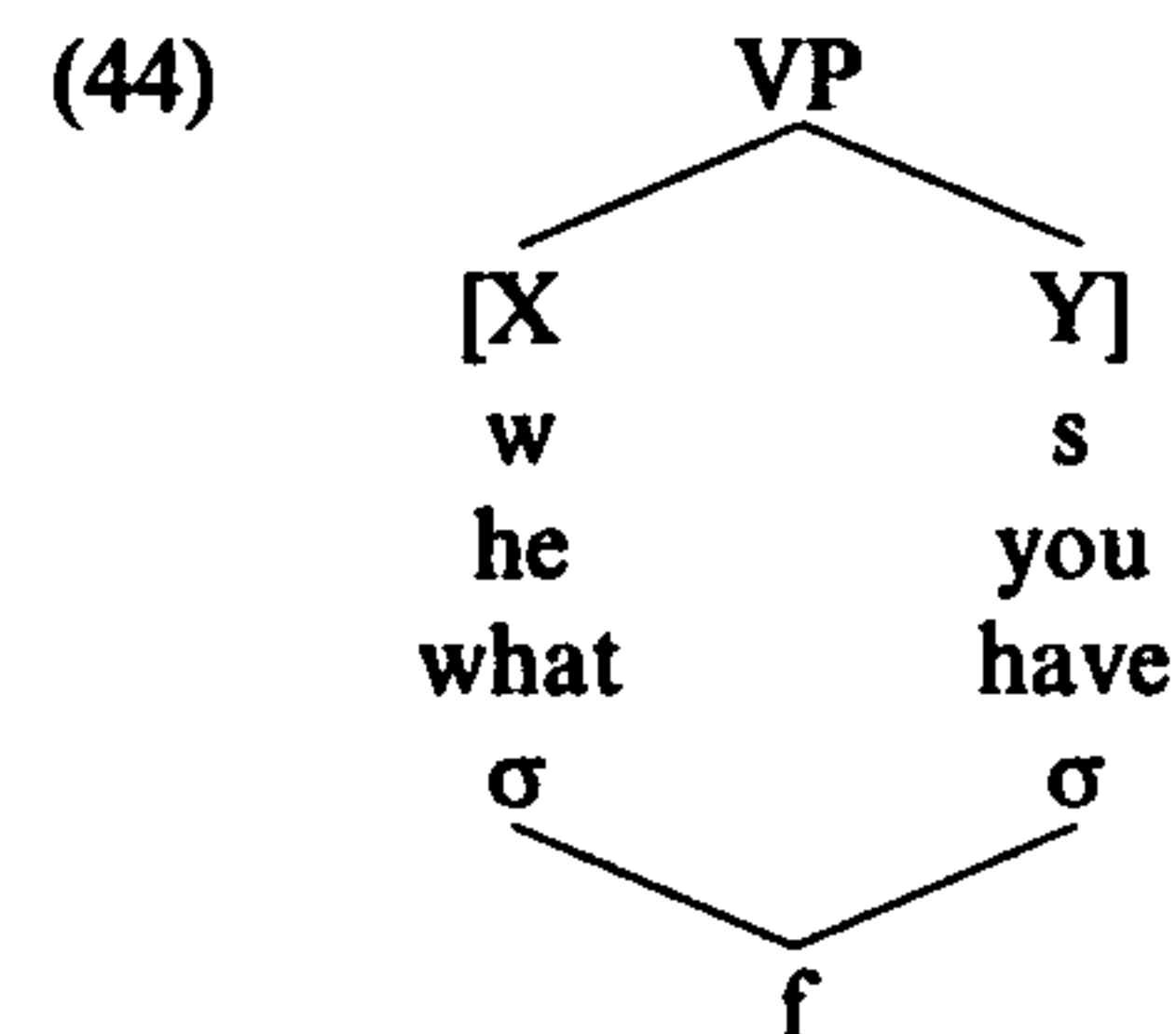
For  $[X Y]_P$ , if X and Y are constituents of P, and if P is the last phrase of a sentence, then Y must be stressed.

According to the Sentential Prosodic Rule, a sentence is acceptable if the last element of the last phrase is properly assigned a stress, otherwise it will be ill-formed prosodically. Following this analysis, the non-existence of (40) is accounted for by saying that *you* is the last element of the sentence, and the last phrase that contains *you* is the VP structure \*[*he zui you*], therefore, *he zui* will be the X and *you* is the Y of the Sentential Prosodic Rule. However, the monosyllabic word *you* 'have' is not heavy enough to act as an independent foot to realize the primary stress in the following structure:

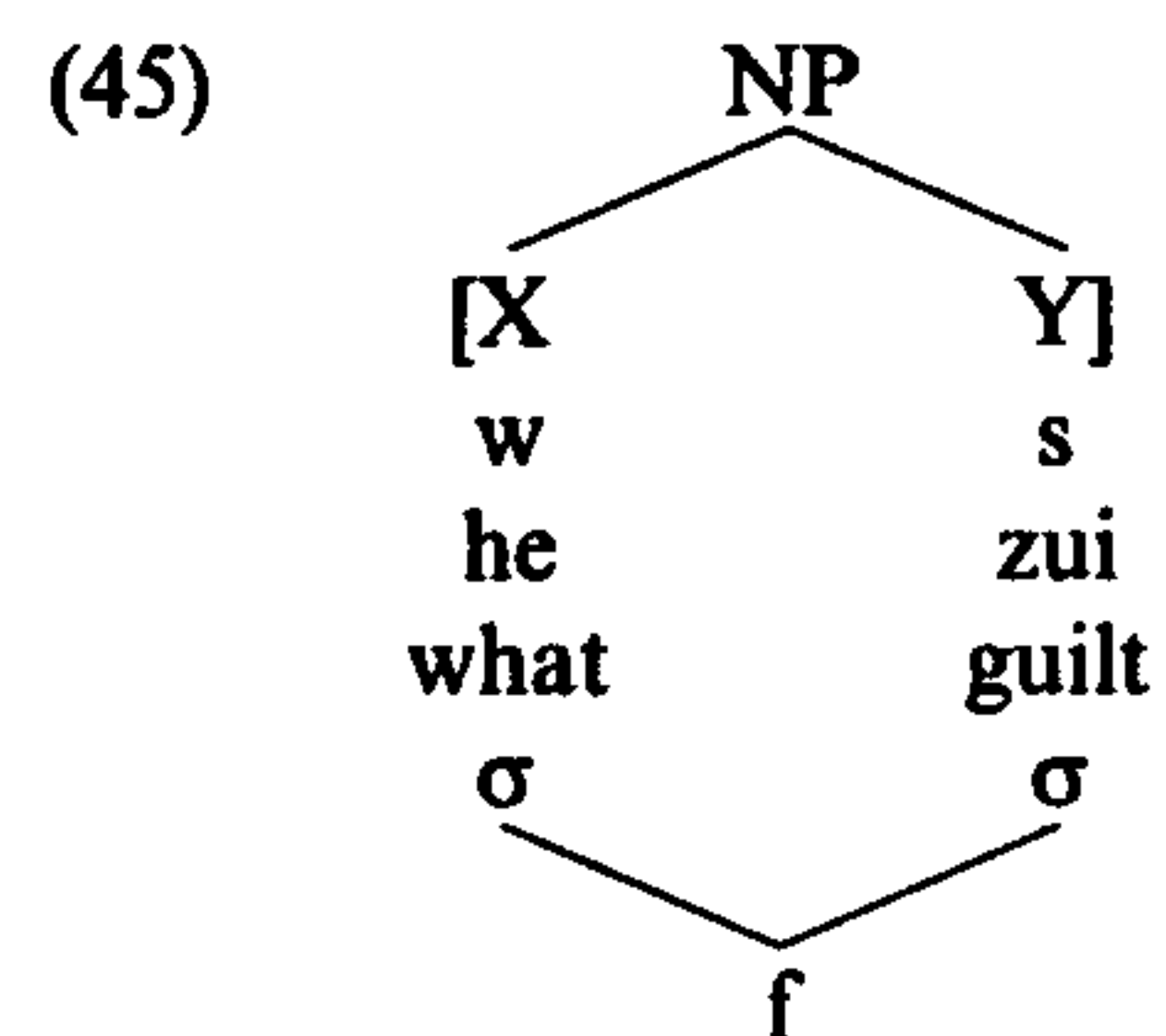


That is, within the prosodic domain of  $[X Y]_{VP}$ , X consists of a branching node, while Y consists of only a non-branching node, therefore, Y cannot realize the sentence-final stress. Technically speaking, according to Liberman and Prince's relative-prominence principle (1977), a strong node must be licensed by a weak node. This implies that the stress cannot be realized on Y itself, because it is a single node, and as I have argued before (see 6.3), one syllable cannot serve as a branching node in a prosodic structure. In the branching node VP, Y still cannot realize the stress, because X, the sister node of Y, is a branching node, and is prosodically stronger than a single node, i. e., than Y. As a result, (43) must be ruled out. The implication of this argument predicts that if another syllable is attached to the node Y in (43), or the elements under the X node reduce to a monosyllabic *wh*-expression, then the sentence final stress can be realized (on a disyllabic foot), and the sentence will be grammatical. This is exactly what happened, as we can see below.

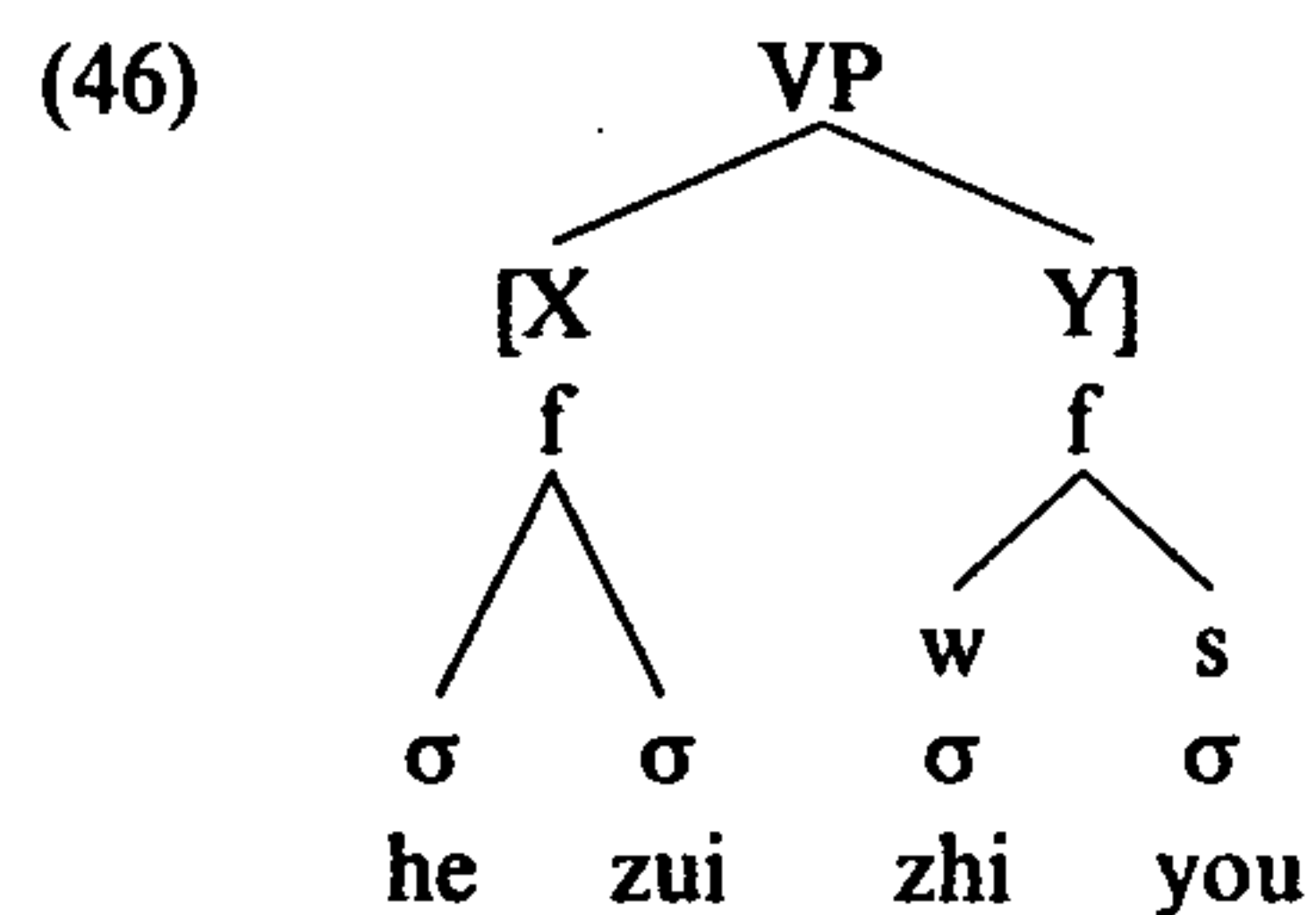
*He you* 'what have' is grammatical, because *he you* is not only the last phrase but also a minimal prosodic unit, namely, a foot. Therefore the primary stress can be assigned to the right element *you*.



*You he-zui* 'have what guilt' is also grammatical because *he-zui* is the last phrase (NP) and these two words form an independent foot with the stress on the right, satisfying the requirement of Sentential Prosodic Rule :



The structure of *he-zui zhi you* 'what guilt it-have' is also acceptable, because *he zui zhi you* forms the last phrase (VP) in the sentence, where *he-zui* is still the object of the verb, *zhi* is cliticized onto the verb *you*<sup>23</sup> (forming a prosodic foot with *you*), hence *zhi-you* would be interpreted as the Y and *he-zui* as the X, illustrated in (46).



Since there are two syllables under the Y position, they can form a standard foot so that the stress can be assigned to it, satisfying the Sentential Prosodic Rule.

Note that if *he you* is grammatical, there is no reason to rule out *he-zui you* either syntactically or semantically. The only difference between these two structures, I argue, is their prosodic structure. Thus the best way to explain the non-existence of \**he-zui you* is to assume that *you* is a monosyllabic word, and one syllable is not heavy enough to act as a standard foot.<sup>24</sup>

This is further confirmed by examples of the following kind in which an extra, meaningless syllable is used in order to form a disyllabic foot.

- (47) 夥頤, 涉之爲王沉沉者!  
*Huo-yi, she zhi wei wang tantan zhe.*  
 Great-yi, She Nom.prt being King magnificent prt  
 'Great, the way that She became a king is magnificent!'  
 (Shiji. Chenshe Shijia)

The sentence is traditionally taken to be closest to the vernacular given by Sima Qian (145–? BC). Probably because the word *huo-yi* used in the Chu dialect is relatively uncommon, Fu Qian (c. 184?–? AD) glosses it:

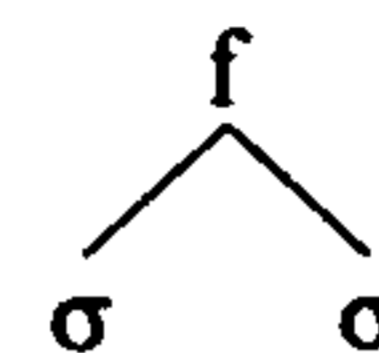
- (48) 楚人謂“多”爲“夥”，又言“頤”者，助聲之詞也。  
*Chu ren wei duo wei huo, you yan yi zhe,*  
 Chu people call great is *huo*, again say *yi* N.prt.  
*zhu-sheng zhi ci ye.*  
 support sound 's word prt.  
 'In Chu dialect, the word for “great” is “*huo*”. However, “*yi*” is added to make the sound better.’ (Fu Qian, *Shiji.Suoyin*)

According to Fu Qian, the meaning of the exclamation expression *huo-yi* in (47) is interpreted as the same as the monosyllabic left-hand constituent *huo*, thus making *yi* semantically empty. Here, the addition of *yi* to *huo* occurs to lend metrical support to *huo* as Fu Qian notes. The fact that a monosyllable needs extra “sound support”, while a disyllabic unit does not (see Guo 1985), indicates that a monosyllable is not heavy enough prosodically to act as an independent foot needed to realize the stress on an exclamation or a focus expression. Therefore, the use of “sound support” on a monosyllable provides further evidence for the argument that a disyllabic unit constitutes a standard foot.

## 6.5. Disyllabic feet, prosodic words, and phrase structure

Given the prosodic arguments in section 6.3. and the grammatical evidence in 6.4, a Foot Formation Rule for Classical Chinese is therefore formulated as follows:

- (49) Foot Formation Rule in Classical Chinese



a standard foot must be formed by at least two syllables.

As we have seen, disyllabic feet resulted from syllable reduction, therefore the Foot Formation Rule must apply chronologically after the loss of final consonant clusters in Old Chinese. As shown before, there was a sharp increase in disyllabicity during the Han dynasty, and it is well known that by the Han dynasty, final consonant and consonant clusters had almost disappeared completely (Mei 1980, Baxter 1992). The fact that the development of disyllabicity followed the loss of the final consonants and consonant clusters is chronological evidence corroborating the Foot Formation Rule given in (49).

If the above analyses are correct, we have answered the question of where the tendency to disyllabify originated. Recall that I have also argued (e.g., 5.3) that the development of disyllabicity was theoretically independent of compounding. The Foot Formation Rule in (49), may be considered system-internal evidence supporting this hypothesis.

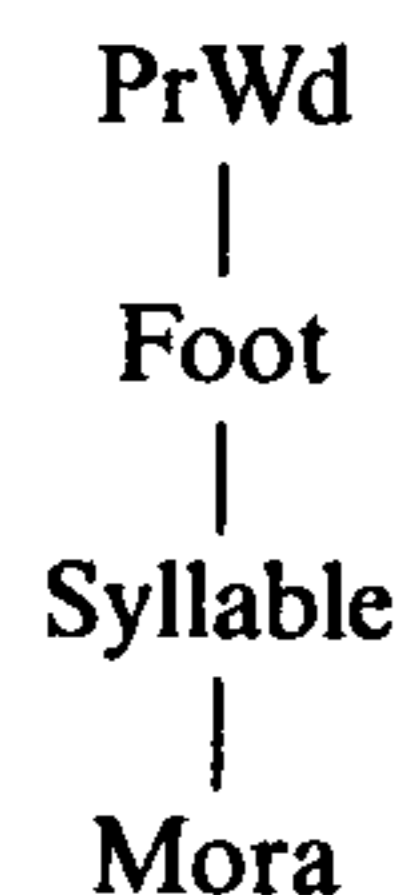
Now, if disyllabicity did not directly result in compounding, why did the Classical morphology proceed in the direction of compounding and what is the relationship between the development of disyllabicity and that of compounding?

I argue that although the development of disyllabicity is inherently independent of the development of compounding, the Foot Formation Rule played a crucial role in word formation in Classical Chinese. This is not because disyllabicity is inherently related to compounding as a means of word formation, but because of the fact that Classical Chinese was basically a monosyllabic language. Once the monosyllabic nature of the language is assumed, disyllabicity can then be considered a “cause” for the development of compounding.

### 6.5.1. Minimal Prosodic Word

The relationship between disyllabicity and compounds can be naturally derived from the recent developments in the theory of Prosodic Morphology (see McCarthy–Prince 1993). In prosodic morphology, prosodic restrictions are defined in terms of prosodic units such as mora, syllable, foot, and prosodic word (PrWd) which are hierarchically organized (see Selkirk 1980 a, 1980 b; McCarthy–Prince 1993):

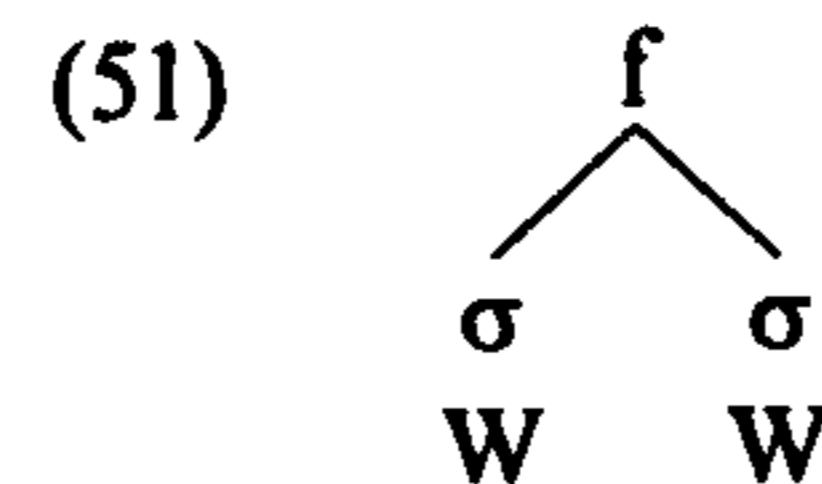
(50) Prosodic Hierarchy



In this theory, any instance of the category Prosodic Word (PrWd) must contain at least one foot. According to Foot Binarity, every foot must be bimoraic or disyllabic. Thus a PrWd must contain at least two moras or syllables. The “at-least” requirement automatically leads to a notion about what would be the smallest Prosodic Word: a minimal Prosodic Word is a metrical Foot. As argued by McCarthy–Prince (1993), the Prosodic Hierarchy and Foot Binarity, taken together, derive a notion “Minimal Word”. We shall see below how the notion “minimal word” interacts with the disyllabic foot and phrase structure rules.

### 6.5.2. Phrase Structure Correspondence and Idiomatized PrWd

As mentioned before, Classical Chinese was a monosyllabic language. If a foot must be formed by two syllables, and each syllable is a word in the language, the only way to make disyllabic feet in the language would have been to group two words together as shown below (“W” stands for Word):



In other words, a disyllabic foot inevitably results in a two-word prosodic combination. That is,

(52)  $\text{Foot} = \sigma + \sigma = W + W$

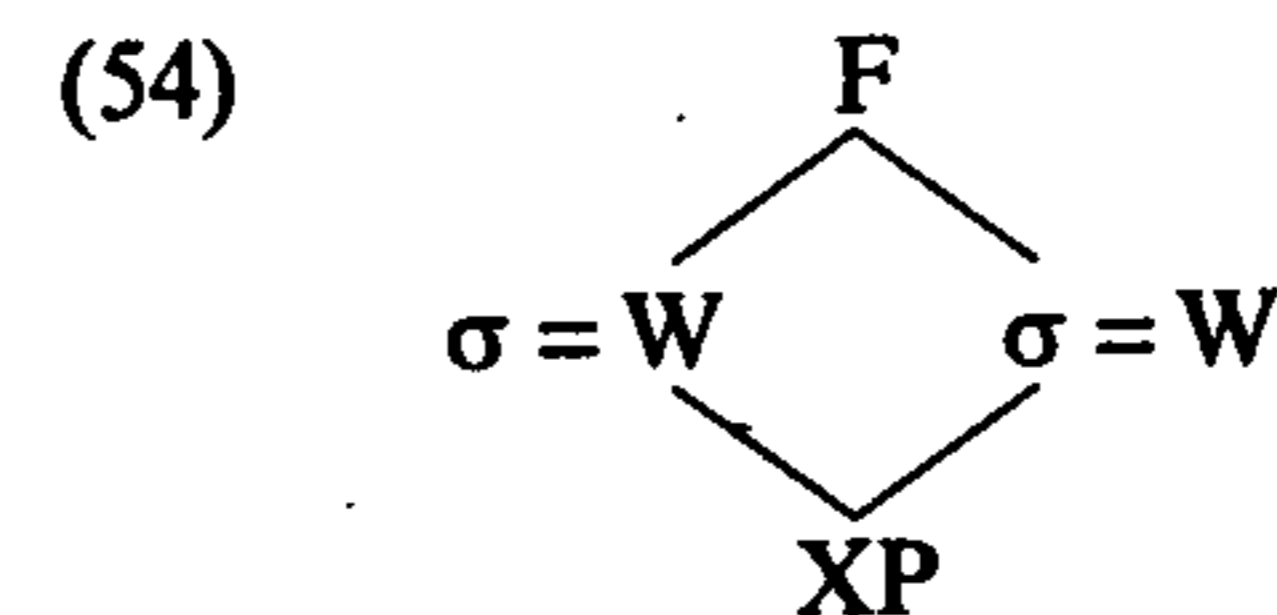
a disyllabic foot must be based on a two-word combination in the “monosyllabic” system.

However, such combinations are also constrained by phrase-structure rules in the language.<sup>25</sup> It follows that feet that are realized on two words would often happen to correspond to phrases (XP):

(53)  $\text{Foot} = \sigma + \sigma = W + W = \text{XP}$

That is, the equation “ $\sigma = W$ ” inevitably leads to the equation “ $F = \text{XP}$ ”.

Once a foot corresponds to a phrase, the prosodic foot will merge with the phrase, due to structural isomorphism. When this happens, the following situation results:

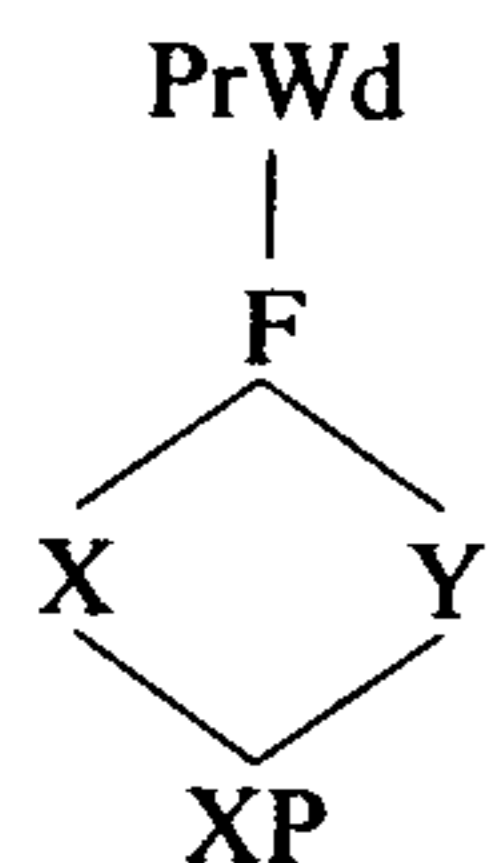


(54) illustrates that a correspondence between a prosodic foot and a syntactic phrase will eventually lead to a merging of these two structures. Since, by the Prosodic Hierarchy in Prosodic Morphology, a foot is dominated directly by the Prosodic Word, and the minimal prosodic requirement for a word is the presence of one foot, the merging of a prosodic category (a foot – the minimal prosodic requirement for “word”) with a syntactic category (a phrase) would readily satisfy the Prosodic Word requirement. Therefore, the merged structures all have the potential to form PrWs in the prosodic morphological system. Note that, the prosodic integrity of Foot always forces two elements in a phrase to be closely

knitted together, hence one element cannot occur without another, otherwise it will violate the minimality requirement for being a prosodic word. However, when a prosodic word is repetitively used in the language, the two elements in that phrase will be fixed, resulting in what I will call an Idiomatized Prosodic Word. This analysis proceeds from the assumption that idioms are phrasal categories. Note that by only one step further, the Idiomatized PrWds can be lexicalized as compounds. That is, compounds are lexicalized idiomatic phrases.

If the above analysis is correct, given the Prosodic Hierarchy in (50), the structure (54), which is derived from the Foot Formation Rule, including the monosyllabicity of the language, would be considered the Word Formation Rule for Classical Chinese, formulated as (55):

(55) Word Formation Rule in Classical Chinese

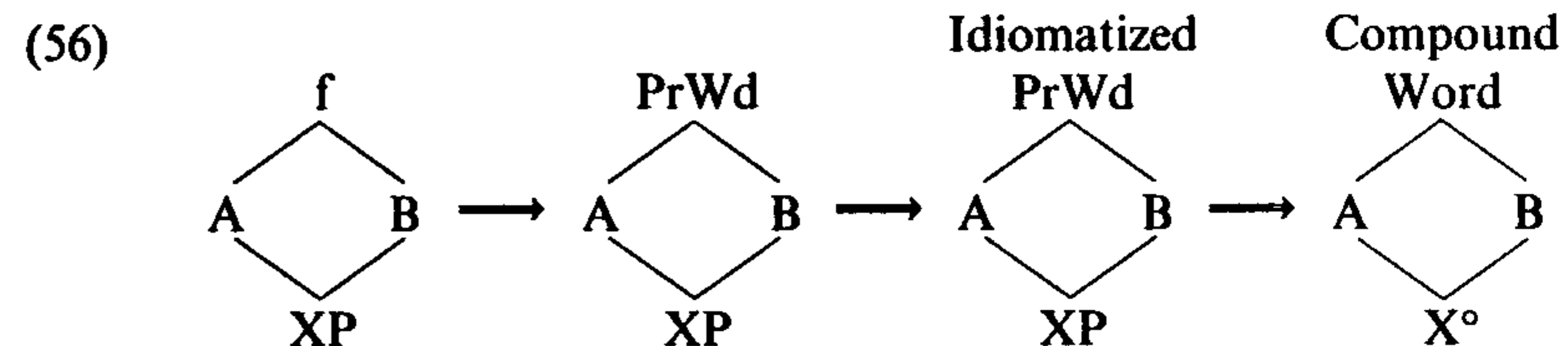


X and Y form a prosodic word, iff the combination of X with Y simultaneously satisfies the syntactic and prosodic conditions of being a phrase and a foot, respectively.

Note that compound words in Classical Chinese are syntactic words because they historically originated from disyllabic phrases. Compound words are prosodic words also, because they are lexicalized idiomatic PrWds. This entails that not every phrase can develop into a compound, but only those which meet the prosodic requirements. Neither can any foot be identified as being a compound, but only those that represent an independent syntactic unit, i. e., a phrase. By prosody, only phrases that fit the description of being one foot are eligible to become compounds. By syntax, only feet that represent independent phrases are qualified to be compounds.

Given all the analyses above, the origin of compounding can now be described as follows: the phonological change of Old Chinese resulted in a disyllabic foot, the disyllabic foot, in turn, resulted in disyllabic PrWds, disyllabic PrWds are formed by two-syllable phrases given the monosyllabic property of the language, and the two-syllable phrases are idiomatized in usage, becoming Idiomatized PrWds. When Idiomatized PrWds

are lexicalized, they become an  $X^0$  level category item, i. e. a compound word in the lexicon, as illustrated in (56):



This, I argue, is how disyllabic phrases, compounds and the prosodic morphological system came about.

Since the disyllabic foot became standard, and a foot is the minimal unit for a PrWd, forming a standard foot in the language will eventually lead to idiomatized PrWds, and the ensuing compounds in the language. Compounds are therefore the result of foot formation. This is why disyllabic compounds increased in number after the establishment of foot formation. Given the theory presented here, the semantic criterion in (8) can therefore be replaced<sup>26</sup> and most separable disyllabic combinations will all be treated as Idiomatized PrWd listed in the dictionary. Compounds are only those that have clearly undergone a process of Lexicalization (or a category changing rule, see Feng 1995: 141) such as *si-ma* 'general' of (4 d).

The theory presented here requires that the prosodic argument of being one foot and the syntactic relation of being a phrase interact to determine PrWds and compounds in Classical Chinese: the syntax determines the structural relation between each element of a compound, the prosodic template of a foot determines the metrical shape of that compound. Compounds are identified only by a process of lexicalization. Any two-syllable combination that is closely knitted together and listed in the dictionary, but exhibits some phrasal properties, will belong to the category of Idiomatized PrWds. Under the treatment of Idiomatized PrWd, there is little surprise why the two forms A and B in coordinating structures, such as *tu-shu* 'picture and book' given in (25) can be formed as either *tu-shu* or *shu-tu*. Because they are idiomatized phrases, and both orders, AB and BA satisfy the requirements for a Idiomatized PrWd in a coordinating structure. This also explains why *ju-ma* 'carriage and horses' can be formed by two words, but without the surface meaning of the second word, as seen in (18). Because the Foot Formation Rule demands that a minimal prosodic word be formed by at least two syllables, *ju* must take another word (here, *ma*, in the same semantic field with *ju*) to meet this

requirement. The PrWd licenses *ju-ma* to function as an independent prosodic unit, even though the actual meaning of *ju-ma* is focused on only *ju*.

## 7. Empirical consequences and theoretical implications

If, as I have argued, the bimoraic foot lost its phonological basis, and the two-syllable unit came to constitute the standard foot in Classical Chinese, what we would expect empirically is for two-syllable combinations to become more and more common during the course of the change. Given the fact that Classical Chinese was basically a monosyllabic language, and given the Foot Formation Rule requirement that a standard foot must be formed by a unit at least two syllables long, the only way to make a disyllabic foot in the language would have been to group two words together. As shown above, a disyllabic foot would often result in two-word prosodic combinations and such combinations would also be constrained by phrase-structure rules in the language. It follows that the prosodic foot would, in turn, often result in Idiomatized Prosodic Word. If two-word combinations were the only way to realize disyllabic feet, we would expect that, in the early stages, naturally-occurring syntactic two-word phrases would be highly preferred candidates to act as two-syllable feet. More explicitly, it is more likely that naturally-occurring phrases would bear two-syllable feet than it is that entities (two-syllable words) would be created expressly for that purpose.

If disyllabic feet are originally realized on naturally-occurring phrases, the result of these developments would be the following: (“>” means “result(s) in”)

(57) Phonological change > disyllabic feet > disyllabic phrases >  
 1 2 3  
 idiomatized PrWd > compounds  
 4

Since disyllabic feet are mostly realized on syntactic two-word phrases, it is likely that naturally-occurring two-word phrases would be the first candidates for disyllabic feet at the beginning of the development of disyllabicity. Also compounds would originate from these naturally-occurring disyllabic phrases.

This hypothesis receives support if we find that disyllabic combinations (phrases or compounds) in Classical Chinese did indeed originate

from naturally-occurring disyllabic phrases, rather than from those expressly created for prosodic requirement.

How can we distinguish the naturally-occurring phrases from those created expressly for prosodic requirements? Furthermore, how do we distinguish disyllabic combinations that originated from naturally-occurring phrases from those that were created expressly for the prosody?

Considering the first question, we have seen that there are two structures which are very productive for compounding, namely, coordinating and subordinating structures (see section 3). We also know that each of these structures can be formed by different types of syntactic relations among the two elements they contain. For example, the coordinating structure can be formed by a noun plus a noun, or a verb plus a verb, etc., and the subordinating structure can be constructed by a noun modifying a noun, or an adjective modifying a noun, etc. According to Cheng (1981), there are 6 types of coordinating and 9 types of subordinating structures as shown in (58) (N = noun, A = adjective, V = verb, P = pronoun, Num = number).

Table 6. Types of coordinating vs. subordinating structures  
 I. Coordinate structures

Types	Examples	Gloss
1. NN > N	<i>jia-bing</i>	‘armor-weapon; war, military’
2. VV > V	<i>gong-ji</i>	‘attack-assault; to attack’
3. AA > A	<i>kong-ju</i>	‘fear-dread; frightened’
4. AA > N	<i>xian-liang</i>	‘able-virtuous; worthy man’
5. VV > N	<i>xue-wen</i>	‘study-inquire; knowledge’
6. Num + Num > A	<i>san-wu</i>	‘three-five; a few’

### II. Subordinate structures

Types	Examples	Glosses
1. NN > N	<i>tian-zi</i>	‘Heaven-son; Emperor’
2. AN > N	<i>xiao-ren</i>	‘small-person; a person of low position’
3. VN > N	<i>qi-ren</i>	‘beg-person; beggar’
4. VV > N	<i>fu-xing</i>	‘help-travel; entourage’
5. NV > V	<i>cao-chuang</i>	‘grass-create; to initiate’
6. AV > V	<i>yan-ju</i>	‘comfortable-live; to relax’
7. AV > N	<i>xian-sheng</i>	‘early-born; sir, teacher’
8. PN > P	<i>wu-zi</i>	‘my-sir; you’
9. Num + N > N	<i>bai-xing</i>	‘hundred-names; people’



Given the different coordinating and subordinating structure types, the argument for naturally-occurring phrases can be tested by assuming that if there are more types of subordinating structures, there would be more occurrences of subordinating compounds, and if there are fewer types of coordinating structures, there would be fewer occurrences of coordinating compounds. This is because everything else being equal, more structure types will produce more total occurrences of that structure, and vice versa. This prediction is borne out as seen in Cheng's (1981: 112) statistical data given in Table 4, repeated here as Table 7. ("Total Comp" words, "CC" stands for Coordinating Compound words, "MH" stands for Modifier Head compound words):

Table 7. Percentage of CC and MH compounds in *Confucius* (c. 550 BC)

Comp	Total CC	Total %	Total MH	Total %
180	48	26.7	67	37.2

In Table 6, we have seen that there were more structure types of the subordinating than of the coordinating variety. From Table 7, we see that there are more instances of subordinating than of coordinating structures. The correlation between the number of structure types and the number of instances of that structure can be seen clearly in Table 8. ("CC" stands for Coordinating structure and "MH" for Modifier Head structure).

Table 8. Number of structure types vs. number of structure instances for CC and MH compounds

	Structure types		Structure instances	
CC	6	40%	48	42%
MH	9	60%	67	58%

The 40% versus 60% of structure types closely correlates with the 42% versus 58% of instances of coordinating and subordinating structures, respectively. The correlation supports our contention that if there are more types of subordinating structures, there would be more instances of

disyllabic forms (phrases or compounds) formed by subordinating structures, and vice versa. Given this, a reasonable explanation for the correlation is to assume that disyllabic feet originated by making use of naturally-occurring phrases, and that compounding started from natural phrases as well.

Although the correlation between the number of structure types and the frequency of their occurrence supports the claim that disyllabic feet in Classical Chinese were realized on naturally-occurring phrases, this does not necessarily mean that disyllabic forms did not originate from phrases that were created for prosodic purposes, because it is not yet clear what the structure of phrases created expressly for the prosody would be. Since both structures, the subordinating and the coordinating, can form two-word phrases equally well, both structures can serve for the need for disyllabicity. As a result, if the notion of "phrases created for prosody" is not specified, there would be no judgement on the second part of the hypothesis that disyllabic combinations (phrases or compounds) in Classical Chinese originated from naturally-occurring disyllabic phrases, rather than from those expressly created for the prosodic requirement.

Considering this question, I suggest that coordinating structures can be considered structures which are created expressly for the purposes of prosody. This is because the coordinating structure exhibits special syntactic and semantic properties which the subordinating structure lacks, that is, with or without part B, the semantic interpretation of A in a [A+B] coordinating structure would always be approximately the same. Compare:

(58) a. Subordinating

*Tian-zi* (Heaven's son) ≠ *zi* (son)  
*qi-ren* (beg-person, beggar) ≠ *ren* (person)

b. Coordinating

*kong-ju* (fear-dread; frightened) = *kong* (fear, frightened)  
*kong-ju* (fear-dread, frightened) = *ju* (dread, frightened)  
*gong-ji* (attack-assault, attack) = *gong* (attack) = *ji* (attack)  
*zhan-dou* (warring-tussle) = *zhan* (fight) = *dou* (fight)  
*sha-lu* (kill-kill) = *sha* (kill) = *lu* (kill)

Subordinating structures are not as flexible as coordinating structures in their ability to form disyllabic combinations out of monosyllabic words without affecting the semantic interpretations of the phrase. In other

words, the subordinating structure cannot be freely used without changing the original meaning of the phrase in which it occurs. However, the coordinating structure can do this easily by simply adding a synonym to the original monosyllable verb, noun, or adjective in any position of a sentence without changing the basic syntactic structure and meaning of that sentence. This, as we have seen before, is what Zhao Qi did in his *Mencius zhangju* (e. g., (17)). Given this analysis, it follows that the coordinating structure has an advantage over subordinating structures in creating disyllabic phrases.

If the Coordinating structure is the structure by which phrases could be created expressly for prosodic purposes, and if as I argued before, it is more likely that naturally-occurring phrase would bear two-syllable feet, than that coordinating structures would be created expressly for that purpose, we would then predict that there must be statistically more naturally-occurring disyllabic phrases (i. e., more subordinating phrase) than coordinating disyllabic forms in the earlier stages, because it requires less effort to make use of naturally-occurring phrases than to create new ones. This is also borne out as seen in Table 7. there were 67 tokens of subordinating, but only 48 tokens of coordinating structures.

If the coordinating structure is used to create disyllabic phrases, and if the creation of disyllabic forms is required only when the disyllabic foot became stronger, we would further expect that a reverse situation would occur in the language, i. e., there would eventually be more disyllabic combinations that were formed by coordinating structures than by subordinating structures, because when the prosodic requirement becomes stronger and stronger, making use of naturally-occurring phrases would not be efficient and productive, so the phrases created for prosody would come to dominate in late stages. This analysis receives support from Cheng's (1981: 112; (1985: 337) statistical data given in Table 9. ("Total Comp" = Total compound words, "CC" stands for Coordinating Compounds, and MH for Modifier Head Compounds).

Table 9. Percentage of CC and MH compounds in *Confucius*, *Mencius* and *Lunheng*

Chronology	Texts	Total Comp	Total CC	%	Total MH	%
c. 550 BC	<i>Confucius</i>	180	48	26.7	67	37.2
c. 300 BC	<i>Mencius</i>	333	115	34.5	100	30
c. 100 AD	<i>Lunheng</i>	2088	1401	67.24	517	24.76

Table 9 shows that making use of naturally-occurring phrases was replaced by coordination as a way to meet the prosodic requirement. Since coordinating structures have certain productivity advantages over subordinating structures in creating disyllabic forms, coordinating word structures came to dominate in the later stages.

The theory presented here explains why some compounds undergo a process of dephrasalization (making use of naturally-occurring phrases), while others (created for prosodic requirement) do not. It also explains why there were more subordinating compounds in earlier stages than later on, and why compounds created for disyllabicity were mostly found at the later stage (most examples of this type given by Cheng (1981) are from *Han Feizi*, c. 230 BC).

Secondly, the theory presented here also explains why SP, VO, and VR structures are disfavored structures for forming compounds as seen in section 3. Let us consider the VO construction first. The reason why VO compounds were very rare has to do with sentence prosody. It is claimed that the sentential normal stress in SVO languages such as English (Lieberman-Prince 1977) and Chinese (Chao 1968) generally falls on the right-most element of a sentence (e. g., (42), and note 22). Since VO phrases in Classical Chinese frequently appear at the ends of sentences,<sup>27</sup> the object of the verb in a sentence will often be the target of the normal sentence-final stress. As seen in section 6.4, according to Lieberman and Prince's relative-prominence principle (1977), a strong node must be licensed by a weak node. Therefore, a single node alone cannot realize the stress. Since one syllable cannot serve as a branching node in a prosodic structure, another syllable must be attached to it to form a disyllabic foot in order to realize stress. Thus if the object is a monosyllabic word, that word must attach to the preceding verb to become a part of a foot in order to realize the stress.

However, when the VO predicate becomes a foot and the primary stress has been realized upon it, the VO foot must fulfill the requirement assigned by sentential stress. As a result, a VO structure is bound with sentential stress in a sentence. In other words, the normal stress on VO structures will always require the VO to be the verb and the object of that sentence,<sup>28</sup> hence it is difficult for them not to serve as the main predicate of the sentence, and it is hard for dephrasalization or lexicalization to take place. This explains why there are hardly any VO verb compounds in Classical Chinese. Under this analysis, the way for a VO combination to become a compound is for it to avoid acting as a predicate of the sentence. This is achieved by changing its part of speech, i. e., acting as a noun, such as *si-ma* (control-army, general), which is precisely what has been observed in the literature.

As for VR, since the verb-resultative complement structures are a later development in the language (starting from the Han dynasty), it is no surprise that VR compounds are rare before the Han. In addition, SP compounds are even rarer, simply because there are hardly any SP phrases in the language,<sup>29</sup> partly due to the fact that the subject in Classical Chinese is often dropped.

## 8. Summary

I have argued in this paper that two-syllable (compound) words in Classical Chinese appeared in large numbers during the Han dynasty because of the advent of a disyllabic prosodic foot structure during that period. I argued that an earlier, bimoraic, monosyllabic foot could no longer be supported by a syllable structure that had undergone simplification following the loss of consonant clusters and syllabic-final consonants. Based on the moraic theory of syllable structure, I argued that a Foot Formation Rule (49) follows naturally from the loss of final consonants and consonant clusters in Old Chinese. Furthermore, given the fact that Classical Chinese is basically a monosyllabic language, the Word Formation Rule (55) is thus derived from the Prosodic Hierarchy and the Foot Binariness principles adopted in this paper. The theory presented here requires that the prosodic integrity of being a single foot and the syntactic relation of being a phrase interact to cause PrWd, Idiomatized PrWd, and compounding in Classical Chinese: syntax determines the structural relations between each element of a compound, and prosody determines the metrical size of that compound.

Under this analysis, I have also argued against the hypothesis that the increase in compounds around the time of the Han dynasty was due to a decrease in the number of phonologically distinct syllables. I argue against this functional hypothesis, because it cannot account for the fact that compounds given in (18) and footnote (15) are highly counter-functional, and also because it cannot explain the structural mechanism of the morphological development of compounding.

Using this prosodic-based analysis to account for the development of classical compounding, we have explained a wide range of phenomena, such as why there are more Modifier-Head compounds than coordinate compounds at earlier stages of compounding, and why the reverse situation occurs later on, i.e., more coordinate compounds than Modifier-Head compounds. Questions such as these are answered naturally under the unified theory developed here.

The arguments made here are quite different from the traditional analysis in many aspects. First, in the traditional analysis, the only connection between phonological change and compounding is that phonological change resulted in more homophones, causing the development of compounds (e.g., 4.1). The present study took a new look at phonology and compounding from a prosodic point of view. By taking prosody into account, we reached a new understanding of the phonological change in the development of compounding.

Secondly, the importance of "Foot" has been recognized in the literature for quite a long time (e.g., Guo 1932 [1985]; Chen 1979; Shih 1986). However, no connection had been made between the Foot Formation Rule (Chen 1979; Shih 1986) and the development of disyllabicity. On the contrary, linguists (for example, Guo 1932 [1985]) had believed that disyllabicity is merely a stylistic device, and that the disyllabic foot occurred throughout the history of the Chinese language. The present study has made a first attempt to motivate a Foot Formation Rule based on the phonological system of Classical Chinese. It is argued that the Foot Formation Rule was established during the Han dynasty based on characteristics of syllable structure.

Third, compound words are traditionally known as syntactic words in Chinese (e.g., Chao 1968). The present study argues that compound words are not merely syntactically structured, but also prosodically motivated. As a result, the so-called compounds in Classical Chinese can naturally be divided into two categories: a word category and a phrasal category, and both are listed in the dictionary. The former are compounds based on lexicalization (or a category changing rule, cf. *si-ma* 'charge-military' → 'general' as in (4d)). The latter are Idiomatized PrWds based on their frequency of usage (cf. *yi-shang* 'shirt-skirt', 'clothes'; *jia-bin* 'armor-weapon', 'military'). It is also possible that some items can be listed twice in the dictionary, once as a lexical word (cf. *tian-zi* 'Emperor'), once as an idiomatic item (cf. *tian-zi* 'Heaven-Son' → *tian zhi zi ye* 'Son of the Heaven'). Strictly speaking Idiomatized PrWds are neither (free) phrases nor words, but are idioms created by the prosodic system and fixed in usage, exhibiting special properties: they are listed in the dictionary, used as lexical items, bear the same metrical shape as a compound word, and yet, still retain some phrasal properties. Therefore, Idiomatized PrWds constitute an intermediate category between free phrases and words in the morphological system of Classical (as well as Modern) Chinese.

## Notes

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1. *jun-chen* is not a compound by the semantic criterion given in (8) in contexts such as the following:

- (i) 君以計蓄臣, 臣以計事君, 君臣之交計也。  
*jun yi ji xu chen, chen yi ji shi*  
 monarch use trick treat official official use trick serve  
*jun, jun-chen zhi jiao ji ye.*  
 monarch, monarch and official 's relation trick prt.  
 'The monarch uses tricks to gain officials and officials use tricks to serve the monarch, the relations between them are nothing but tricks.'  
 (Hanfeizi. Shixie)

2. Huang (1984) also proposed criteria for modern Chinese compounds. His criteria are based on the Lexical Integrity Hypothesis which says, roughly, no phrasal structure rule may apply to a lexical item, and the Phrase Structure Constraint which requires, roughly, that no two constituents appear after the last verb. The Lexical Integrity Hypothesis works (but not completely for classical Chinese as we can see below), but the Phrase Structure Constraint will not apply to Classical Chinese, simply because two constituents are allowed to appear after the verb. Therefore, although Huang's criteria are important for modern Mandarin Chinese, the Phrase Structure Constraint is not relevant to Classical Chinese.

3. Derivative compounds are different; see below.

4. In traditional philology, this has sometimes been called *lian lei er ji* ('bring two words of the same kind together') which means A is added to B, because it is the same semantic category. In this case, usually one part of AB functions as a dummy place holder, which has no semantic interpretation at all.

5. The term Syntactic Word refers to compounds which are formed according to syntactic relations such as Subject + Predicate (SP), Modifier + Head (MH), Verb + Object (VO), Verb + Resultative complement (VR), and Coordinate Constructions (CC).
6. The term "others" refers to meaning specializations, such as *tian-xia* (sky-below, 'the Emperor'): "below the sky" → "all below the skies" → "the world of men" → "society" → "the Emperor".
7. Of course, the best way to study compounding in *Mencius zhangju* may be to list all of the monosyllable words in *Mencius* that have been translated into two-syllable combinations in Zhao Qi's commentary, i. e., to provide an exhaustive listing of the "one-to-two" notes. However, since time does not allow for such an investigation, I will analyze two chapters of *Mencius Zhangju*, namely, the *Liang Huiwang Shang* and the *Gongsun Chou Xia*. These two chapters (c. 300 BC) constitute nearly 15% percent of the entire book. This 15% sample size is sufficient to postulate (1) different proportion of compounds in the Pre-Qin period and the Han dynasty; (2) the basic linguistic properties of compounds in these two periods.
8. As shown below, the minimal syllable structure in Old Chinese is CVC as proposed by Li 1980 and Ting 1979.
9. Although the no-open-syllable hypothesis for Old Chinese has been questioned by scholars (see Norman 1988 and Baxter 1992), there are scholars who accept this hypothesis, such as, Lu Zhiwei (1947), Li Fang-kuei (1980), Ting Pang-Hsin (1979), and Yu Naiyong (1985). Most importantly, as argued by Ting (1979) and illustrated by Yu (1985), syllable structure was clearly more complex in Old Chinese than in Middle Chinese. In this paper, I adopt Ting's hypothesis that the basic (minimal) syllable structure of Old Chinese is CVC. Note that even though not all syllables in Old Chinese are CVC, most scholars agree that the majority of syllables in Old Chinese had a minimal CVC structure. If this is so, the theory developed in this paper can still be held without assuming the strong form of the "no-open-syllable" hypothesis as we will see below.
10. This is why Baxter introduces the term "pre-initial" for first segment of initial clusters (\*s- of \*sk-) and "post-coda" for final segment of syllable-final clusters (\*-s of \*-ks), for Old, but not Middle, Chinese (see Baxter 1992: 7).
11. For example, *yu* 愚 (foolish, stupid) and *yu* 虞 (anxiety, worry) are phonologically different in Old Chinese, but they became homophones in Middle Chinese, as did *jing* 京 (city) and *jing* 驚 (surprise), see Wang 1980.
12. The term "coda" refers to segments immediately following the main vowel; and "post-coda" refers to final segment of syllable-final clusters. See also note 10.
13. The distinctive function of the new tone system can be seen clearly from the fact that the number of etymological words which are distinguished by tonal differences (for example, Level Tone of nouns cognately related with Departing Tone of verbs – the change of category from Noun to verbs [Mei 1980]),

dramatically increased during the late Han dynasty. For example (taken from Chou 1962: 54):

- |     |                       |                                |
|-----|-----------------------|--------------------------------|
| (i) | Noun (Level Tone)     | Verb (Entering Tone)           |
|     | <i>kuan</i> 'cap'     | <i>kuan</i> 'to cap'           |
|     | <i>jei</i> 'clothing' | <i>jei</i> 'to wear (clothes)' |

14. In *Mencius*, *shi-chao* can also be used to mean only *shi* (market) but not *shi-chao* (market and imperial court):

- (i) 鞭之于市朝。  
*Da zhi yu shi-chao.*  
 whip him at market-court  
 'Whip him at the market.'

15. There are more examples of this type (see Gu Yanwu [1613–1682 AD], *Ri-zhi-lu*, *Juan.27*):

- (i) 擅兵而别, 多他利害。  
*shan bing er bie, duo ta li-hai*  
 take army and leave, more other benefit-harm  
 'Take the army and leave, there will be more harm (to us).'  
 (Shiji. Wuwang Bi Zhuan)

- (ii) 生女不生男, 缓急无可使者。  
*sheng nü bu sheng nan, huan-ji wu ke shi zhe*  
 born female not born male, unhurried-hurried no can use prt.  
 'If one has only girls but no boys, there is no help for urgency.'  
 (Shiji. Cangong Zhuan)

- (iii) 先帝嘗與太后有不快, 幾至成敗。  
*Xian di chang yu Taihou you bukuai, ji zhi*  
 late Emperor before with Queen have unhappy, almost cause  
 cheng-bai  
 success failure.  
 'The late Emperor often had a fight with the Queen, it almost causes a failure.'  
 (Houhanshu. Douhe Liezhuan)

In modern Chinese, there are also compounds of this type. For example:

- (iv) *Ta yaoshi you ge hao-dai, haizi zenme ban?*  
 She if have one good-bad, children how do  
 'If she has a disaster, what about her children?'

16. Along the lines of Chen's nasal attrition (1975), Wang (1993) proposed the reduction of the postnuclear consonant (*n*, *ng*): from a consonant into an approximant, forming a part of the V. That is, the nasal endings of the syllable rime are all [-consonantal], and can be viewed as part of a diphthong. As

a result of her analysis, Beijing Mandarin syllables are all arguably CV, where the V covers both single vowels and diphthongs.

17. Regarding the medial segment in Old Chinese, here I would like to claim that the medial is part of the onset, based on recent analyses by Hsueh (1986), Duanmu (1990), Bao (1990), and Wang (1993), in which the prenucleus (i. e., *y*, *w*, *y'* medials) in Mandarin Chinese is not analyzed as part of the rhyme. Therefore, whether the syllable contains a medial or not, the syllable weight remains the same, since the syllable onset has no bearing on this matter.
18. One may argue that although Arabic is one of the languages that is sensitive to the prosodic weight of syllables, it does not mean that (Old) Chinese is also sensitive to prosodic weight. However, as I will show in 6.4, the well-formed [σ-σσ] and ill-formed \*[σσ-σ] prosodic structures in Classical Chinese indicate that Classical Chinese was indeed a prosodic-weight-sensitive language. See also notes 19–20 for more support of this argument.
19. At this point, I should point out that the assumption that the CVC syllable structure of OC is capable of forming an independent foot does not mean that the replacement of bimoraic one-syllable feet by two-syllable feet is an all-or-none operation, i. e., it is unlikely that one-syllable feet suddenly were all considered ill-formed and two-syllable feet were immediately dominant. What seems natural is that the phonological basis for the monosyllabic foot was lost step by step and monosyllabic feet became more and more disfavored, while disyllabic feet became more and more common and dominant – the result of a decrease in disfavored elements and a corresponding increase in favored ones (Kroch 1989). This follows because the syllable structure reduction in OC and the ensuing four-tone system in MC actually took a quite long time to be finally completed (probably by the late Han, see Xu 1996: 269). Nevertheless, the unacceptability of the monosyllabic foot can be seen clearly from both Classical Chinese (e. g. (43)) and Modern Chinese, as follows:

A: *Jintian ji hao?*  
 tody what date?  
 'What date is today?'

B. a. \**Wu.*  
 'Five.'

b. *Wu hao.*  
 five-number  
 'Five.'

c. *Chu wu.*  
 Beginning five  
 'Five.'

d. *Shi wu.*  
 ten five  
 'Fifteen.'

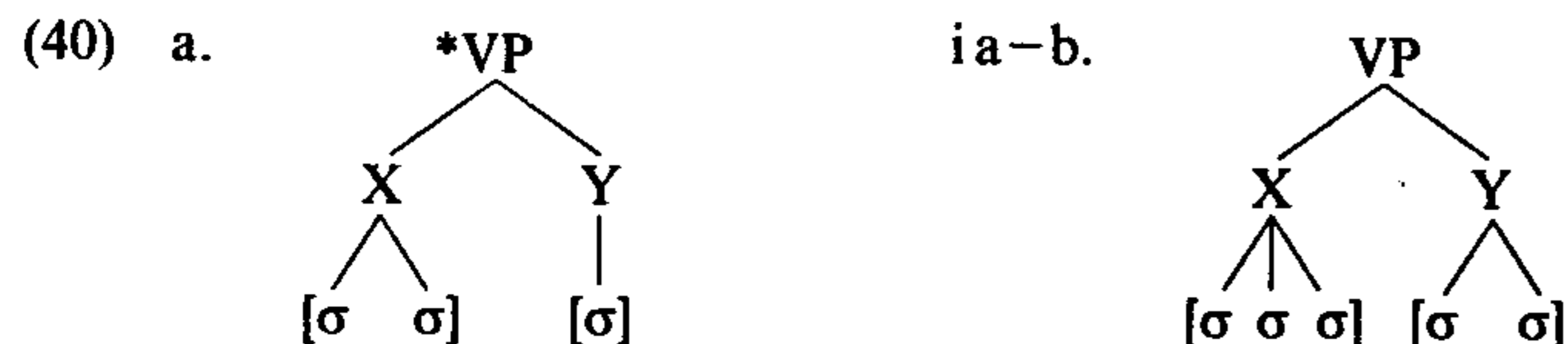
20. One may argue that since diphthongs in Chinese (Middle Chinese and Modern Mandarin) can also be analyzed as consisting of two moras, a syllable that contains a diphthong can still be a bimoraic foot even if the coda is lost. However, I will not consider diphthongs in Chinese to be able to form a standard foot using long vowels as they can in other languages, even though diphthongs in other languages are sometimes analyzed as two moras. The reasons are as follows: first, there is no evidence of a phonological contrast between long vowels and short vowels in Chinese, therefore there is no evidence to show that diphthongs are necessarily distinctively longer (or heavier) than monophthongs. Secondly, it is well known that Mandarin syllables are of the same length for single rhymes (monophthongs) and compound rhymes (diphthongs) (see Duanmu 1990, and Wang 1993), therefore, if diphthongs are considered as long vowels so that they can form a bimoraic foot, then monophthongs must also be considered as being able to form a foot, because there is no length difference between these two types of syllables. However, it has been widely recognized in the literature (Chen 1979, Shih 1986; also see examples given in note 19), that there are clear prosodic contrasts between two-syllable and one-syllable units in poetic prosody (Chen 1979). Also, a monosyllabic word must be grouped with another foot in the Tone Sandhi domain defined by Foot Formation which normally contains at least two syllables (Shih, 1986). This contrast is also observed in syntactic structures as discussed in 6.4 below. On the other hand, there is no prosodic contrast between diphthongs and monophthongs in the language. Therefore, if we consider a minimal foot as being formed by two syllables, the prosodic and syntactic properties of one-syllable and two-syllable units can be captured. If, on the other hand, a monosyllable is considered a normal foot based on an analysis that monophthongs consist of two moras, one cannot explain why diphthongs do not differ from monophthongs. In addition, a significant generalization about the prosodic properties of one-syllable and two-syllable units is lost. Therefore, no matter how one analyzes diphthongs, prosodically speaking, diphthongs must be considered equivalent to monophthongs, and both lack the ability to form a foot (for more arguments on this and related questions, see Feng 1995; 246–252).
21. There may be an alternative account for how to motivate the disyllabicity (or the Foot Formation Rule [49] given below) from the phonological changes (e. g., 4.1 and 6.1) in Old Chinese. San Duanmu has suggested to me that the incapability of Mandarin to form an independent foot with only one syllable is due to the tonal system of the language (Duanmu 1994, personal communication through e-mail). If this is so, according to the hypothesis that disyllabic feet were newly developed in Classical Chinese and the fact that the tonal-system followed the loss of final consonants, the development of disyllabicity could also be attributable to the development of the tonal system in

Classical Chinese. As mentioned above (4.1), the tones of Middle Chinese were developed from Old Chinese codas and post-codas: *\*-s* > Departing Tone; and *\*-ʔ* > High-rising Tone. By the time of the Han period, the tonal system was partially (if not completely) established (see note 13). Given this fact, if one syllable cannot form an independent foot in a tonal language in general, then the development of the tonal system would be another factor to motivate the Foot Formation Rule given in (49). Nevertheless, the tonal-based account also supports my analysis for the establishment of the Foot Formation Rule.

22. See either Duanmu's Non-head Stress Rule (1990), or Cinque's (1993) hypothesis that phrasal stress is assigned universally as follows: in [XP Y] or [Y XP], stress goes to XP, or the syntactic complement. The Sentence Prosodic Rule in (49) given below can be derived from Duanmu's and Cinque's hypothesis: that is, within a VP, if the language is SVO, the Sentence Normal Stress falls to the right of the verb, i. e., the complement of the head of the VP.
23. Note that in the surviving SOV structure *he-zui zhi-you*, *zhi you* 'it-have' can never be separated. This indicates that, *zhi* in *he zui zhi you* must be a pronominal clitic form cliticized onto the verb (e. g., *zhu* 諸, a fusion form of *zhi-yu* 'it at' [之于]).
24. At this point, one may argue that the nonexistent structure of *\*[[he-zui] you]* is not due to whether a monosyllable can be a foot or not, but to the contrast between two syllables *he-zui* versus one syllable *you*. In other words, it might be argued that a foot that consists of fewer syllables cannot compete with a foot that contains more syllables. However, note that a disyllabic foot is able to compete with a trisyllabic foot, as seen in (i a) and (i b) below:

- (i) a. 吾何邇封之有?  
*Wu he er-feng zhi you?*  
 I what near-fiefdom it have  
 'What near fiefdom do I have?' (Zuo.Zhao 9)
- b. 吾子相之, 老夫抱之, 何幼君之有?  
*Wuzi xiang zhi, laofu bao zhi, he you-jun zhi you*  
 You assist him, I carry him, what young prince it have  
 'You assist him; I carry him; what kind of young prince do we have?' (Gongyang.Cheng 15)

In (i a), *he er-feng zhi-you* is the last phrase, and in (i b) *he you-jun zhi-you* forms the last phrase. According to the SPR (Sentence Prosodic Rule), in both cases the left node X contains three syllables *he er-feng* (what near-fiefdom) or *he you-jun* (what young-prince), while the right node Y contains only two syllables *zhi-you*. Yet, unlike (40), (i a) and (i b) are grammatical. The contrast between (40) and (i a–b) is illustrated as follows:



This strongly suggests that two-syllable units behave differently from one-syllable units. Given the different prosodic behaviors between monosyllabic units and disyllabic units, the argument for the one-syllable foot can no longer be held. The fact is that a standard foot can always stand alone, but one syllable is incapable of doing so, as exemplified in (40). It follows that a one-syllable unit, unlike a two-syllable unit, cannot form a standard prosodic foot.

25. In Classical Chinese, word order was the fundamental means for indicating grammatical relations between the elements of a sentence. Therefore, combinations of words must be constrained by phrase-structure rules of the language.
26. Note that there is no theoretical reason to expect that all  $X^0$ -level constituents would be semantically non-compositional, nor any reason to expect that all  $X'$ - or  $X''$ -level constituents would be semantically compositional (see Liberman–Sproat 1992). The semantic criterion (8) is unsatisfactory in this connection. The Foot Formation Rule, on the other hand, encourages the development of disyllabic lexical units given the theory presented here. The Word Formation Rule, a formal constraint for prosodic words, is theoretically motivated. Therefore compounds in Chinese can be formally derived by (55) alone. I would like to thank Mark Liberman for pointing this out to me.
27. For example, of 158 sentences I collected from *Qin Jin Xiao Zhi Zhan* [The War between Qin and Jin in Xiao] in *Zuo.Xi 32–33*. (c. 200 BC), there are 120 sentences in which a verb with or without its complement appears at the end of the sentence, and only 14 sentences in which VO combinations do not appear at the end of the sentence, constituting 9% of the total. Among the 120 final-VP structures, 44% are VO structures, 19% are single verbs (intransitive or transitive without object) and 8% are [V–PP] structures, as illustrated below:

Table i. Verbs with their complements in *Zuozhuan. Xi 32–33* (c. 200 BC)

Total	...VO XP]	[...V PP]	[...V]	[...VO]	Final-[VP]	other
158	14	13	38	69	120	33
(100%)	(9%)	(8%)	(19%)	(44%)	(76%)	(21%)

Note that the only structure that would allow a VO combination to escape from the sentential stress is the structure [...VO XP]. However, there are only

9% cases off this type. On the other hand, in 44% of the cases VO appears at the end of the sentence. If we compare the non-final VOs and the final VOs, we see a large difference between the two:

Table ii. Final and non-final VOs in *Zuozhuan. Xi 32–33* (c. 200 BC)

Total	Non-final VO	Final-VO
83	14	69
100%	17%	83%

That is, only 17% of VO combinations do not fall under sentential stress position, while 83% occur in sentential stress position. So the object of the verb in these sentences will often be the target of the normal sentence-final stress.

28. The iambic stress on VO compounds in Modern Chinese sometimes causes speakers to treat them as phrases (Chao, 1968). For example:

- A. *Wo hen dan-xin ta de jianglai.*  
I very bear-heart he/she future  
'I worry about his/her future.'
- B. *Ni dan shen xin a!*  
you bear what heart prt.  
'what on earth are you worrying about!'

It has been suggested (Chao 1968: 431; Feng 1995: 107) that sentence stress can ionize an iambic compound into a phrase in modern Chinese in certain contexts. This analysis supports the assumption that sentence stress on VO structures causes them to be construed as phrases.

29. It is also possible, as Feng (1993) has argued, that in Classical Chinese there was a pause between the subject and the predicate in declarative sentences. If it is so, the pause may block the natural combination of an SP structure from being a foot; hence it is harder for the SP structure to become a compound than for other structures, given the hypothesis that compounds must be constrained by the prosodic integrity of being one foot.

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