

Stress and the Development of Disyllabic Words in Chinese

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Abstract

A common conception of Chinese is that most of its words are monosyllabic historically but disyllabic in modern times. Since Chinese lost over 50% of its syllables in the past 1000 years, a standard explanation for the increase of disyllabic words is that they are created to avoid homonyms. I argue instead that, although disyllabic words have increased recently, Chinese has always had many disyllabic words. In addition, the increase of disyllabic words is not primarily due to homonym avoidance, but due to an increase in new vocabulary, most of which consists of polysyllabic borrowings, polymorphemic translations, and polymorphemic creations, which cannot be represented by monosyllabic words. In support of the present analysis, I offer illustration that the use of disyllabic words is not dictated by homonym avoidance but by metrical structure. I also discuss a few other approaches to disyllabic words in Chinese.

ZUSAMMENFASSUNG

Es wird oft behauptet, dass viele chinesische Wörter historisch einsilbig, aber heutzutage zweisilbig sind. Weil das Chinesische mehr als 50% seiner Silben in dem letzten Jahrtausend verloren, wird die Zunahme an zweisilbigen Wörtern oft als Versuch erklärt, Homonyme zu vermeiden. Ich behaupte aber, dass obwohl die Zahl zweisilbiger Wörter zunimmt, es immer viele zweisilbige Wörter im Chinesischen gab. Auch hängt die Zunahme an zweisilbigen Wörtern in erster Linie nicht mit der Vermeidung von Homonymen zusammen, sondern mit der Zunahme an neuen Wörtern, da dieser neue Wortschatz hauptsächlich aus mehrsilbigen Lehnwörtern, mehrmorphemischen Übersetzungen und mehrmorphemischen Schöpfungen besteht, die nicht durch einsilbige Wörter bezeichnet werden können. Als Unterstützung meiner Hypothese werde ich zeigen, dass die Benutzung zweisilbiger Wörter nicht von der Homonymvermeidung, sondern von metrischem Struktur vorgeschrieben wird. Ich werde auch einige andere Analysen von mehrsilbigen Wörtern im Chinesischen besprechen.

RÉSUMÉ

Une idée reçue sur la langue chinoise est que presque tous les mots sont historiquement monosyllabiques, mais aux temps modernes, ils sont dissyllabiques. Pendant ces derniers mille ans, le chinois a perdu plus de 50% des syllabes alors que le nombre des mots dissyllabiques a augmenté pour éviter l'homonymie. Telle est une explication répandue. Cependant, nous constatons que malgré cette augmentation récente, le chinois possède depuis toujours beaucoup de mots dissyllabiques. Par ailleurs, le phénomène d'augmentation ne s'est pas produit principalement afin d'éviter l'homonymie, mais il est dû à l'augmentation de nouveaux mots dont la plupart sont des emprunts polysyllabiques, des calques polymorphologiques et des néologismes polymorphologiques. Ils ne peuvent en effet être représentés par les mots monosyllabiques. Cette analyse nous permet donc de constater que l'emploi des mots polysyllabiques ne s'impose pas pour éviter l'homonymie, mais il est dû à la structure métrique. Nous parlons également de quelques approches des mots dissyllabiques en chinois.

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1. Introduction

A common conception of Chinese is that most of its words are monosyllabic historically but disyllabic in modern times. Since Chinese lost over 50% of its syllables in the past 1000 years, a standard explanation for the increase of disyllabic words is that they are created to avoid homonyms. I argue instead that, although disyllabic words have increased recently, Chinese has always had many disyllabic words. In addition, the increase of disyllabic words is not primarily due to homonym avoidance, but due to an increase in new vocabulary, most of which consists of polysyllabic borrowings, polymorphemic translations, and polymorphemic creations, which cannot be represented by monosyllabic words. In support of the present analysis, I offer illustration that the use of disyllabic words is not dictated by homonym avoidance but by metrical structure. I also discuss a few other approaches to disyllabic words in Chinese.

In section 2 I review the basic facts about disyllabic words in Chinese. In section 3 I discuss previous approaches to disyllabic words and point out their inadequacies. In section 4 I offer the present analysis. I argue that the creation of disyllabic words can be influenced by functional considerations, but the use of disyllabic words is determined by metrical structure. In addition, metrical requirement can prompt the truncation of a disyllabic word to a monosyllabic one, and the stretching of a monosyllabic word into a disyllabic one. In section 5 I discuss some further issues. In section 6 I give the summary.

2. Disyllabic words in Chinese

Karlgren (1949:iii) points out that “(t)he Chinese language has for a century attracted the attention and interest of general linguists as the most typical example of a monosyllabic and isolating tongue.” The statement refers to the fact that the vast majority of Chinese morphemes are monosyllabic, and that most morphemes can be used as free words. This fact has given rise to a popular conception that Chinese speech (or texts) primarily consists of monosyllabic words. For example, Karlgren (1949:6) says, “[Chinese] is monosyllabic, i.e. every single (noncomposite) word consists of one single syllable.” Similarly, Jespersen (1922:369) says, “Each [Chinese] word consists of one syllable, neither more or less.”

However, unlike the popular conception, most Chinese words are not monosyllabic (see section 2). This is because Chinese uses a large number of what might be called compounds, such as those in (1) and (2), transcribed in Pinyin (tones omitted).

(1) Disyllabic words whose meanings are not fully compositional

gong-ji	lun-chuan	da-suan	er-duo	mei-tan
attack-hit	wheel-ship	big-garlic	ear-petal	coal-charcoal
“attack”	“powered ship”	“garlic”	“ear”	“coal”

(2) Disyllabic words whose meanings are compositional

cha-hu	yan-dai	yang-guang	you-deng	pi-xie
tea-pot	tobacco bag	sun-light	oil-lamp	leather-shoe
“tea-pot”	“tobacco-bag”	“sun-light”	“oil-lamp”	“leather-shoes”

In (1), the meanings of the items are not fully compositional, in that the meaning of the whole is not a simple composition of the meanings of the parts. For example, [mei-tan] does not mean “coal and charcoal” but just “coal”, and [lun-chuan] does not just mean “powered ship with paddling wheels” but “powered ship” in general. It can also be seen that in items like [gong-ji]

and [er-duo], one of the two morphemes is semantically redundant. In this sense, those expressions act more like simple words than compounds.

The meanings of the items in (2) are compositional, and for this reason some linguists, such as Dobson (1959:6), did not consider them to be compounds. However, there is ample evidence that such expressions are compounds (for recent discussions, see Dai 1992, Duanmu 1998, and references therein). In fact, there are many compounds in English whose meanings are also compositional, such as *weekend*, *apple pie*, *oil lamp*, and *car dealer*.

In the rest of this section I discuss three facts with regard to disyllabic (or longer) words in Chinese: (a) flexible word length, (b) dominance of disyllabic words in modern vocabulary, and (c) lack of monosyllabic words in new vocabulary.

2.1. Flexible word length

Many Chinese words have both a monosyllabic form and a disyllabic form. (3) shows some examples.

(3) Flexible word length in modern Chinese

	Disyllabic	Monosyllabic	Gloss
a.	mei-tan	mei	
	coal-charcoal	coal	“coal”
b.	shang-dian	dian	
	business-store	store	“store”
c.	da-suan	suan	
	big-garlic	garlic	“garlic”
d.	zhong-zhi	zhong	
	plant-colonize	plant	“to plant”

e.	gong-ji	gong	
	attack-hit	attack	“to attack”
f.	er-duo	er	
	ear-petal	ear	“ear”

The extra syllable in the disyllabic form is semantically redundant or vacuous. For example, in (3a) [mei-tan] does not mean “coal and charcoal” but just “coal”. Similarly, in (3c) [da] does not add the meaning “big”, and even a small garlic is called [da suan].

The flexibility of word length occurs not only in modern Chinese but also in classical Chinese, as noted by a number of previous scholars (see Guo 1938 and references therein). Guo (1938) cites many examples, some of which are shown in (4), transcribed in Pinyin.

(4) Flexible word length in classical Chinese (Guo 1938)

Type	Disyllabic	Monosyllabic	Gloss
reduplication	ai-ai	ai	
	sad-sad	sad	“sad”
merger	nai-he	ne	
	helpless	helpless	“helpless”
truncation	you-yu	yu	
	hesitate	hesitate	“hesitate”
truncation (name)	Guan-Zhong	Guan	“Guan-Zhong”
	Ying	Yan-Ying	“Yan-Ying”
addition (name)	a-Wu	Wu	“Wu”
repetition	xu-ju	xu, ju	
	save-gather	save, gather	“save”

opposites	yi-tong	yi, tong	
	different-same	different, same	“difference”
	huan-ji	huan, ji	
	slow-urgent	slow, urgent	“urgency”

Although the facts for flexible word length in Chinese are clear, the explanation has not been obvious (see section 3).

2.2. Dominance of disyllabic words in modern vocabulary

Traditional Chinese dictionaries contain only characters (monosyllabic morphemes), and the notion ‘word’ did not occur in Chinese linguistics until this century. In the 1950s, extensive discussion took place on the definition of word in Chinese. Although some disagreement still remains, considerable consensus has been reached. In 1959, the first systematic study on Chinese words, entitled *Putonghua Sanqian Changyongci Biao* [3000 Commonly Used Words in Standard Chinese], was completed by Zhongguo Wenzhi Gaige Weiyuanhui Yanjiu Tuiguang Chu [Chinese Language Reform Committee Research and Popularization Office], hereafter ZWGW (1959). The study involved about 40 scholars over nearly three years, and the word list was checked for statistical accuracy with a selection of modern written texts that totaled 130,000 characters. Modern written Chinese is called [baihuawen] “plain speech writing”, which is much closer to speech than classical Chinese.

For the first time, ZWGW (1959) offers the clearest evidence that monosyllabic words constitute only a small part of the modern Chinese vocabulary. ZWGW (1959) lists a total of 3624 words, which represent about 80% of all occurrences of words in modern Chinese. Of the list, monosyllabic words consist of just 29%. The details are shown in (5).

(5) Commonly used words in modern Chinese (ZGWG 1959)

Category	Total	Mono.	% Monosyllabic
Noun	1690	262	16%
Verb	925	380	41%
Adjective	451	140	31%
Adverb	194	41	21%
Others	364	217	60%
All	3624	1046	29%

Of all the words, the majority are disyllabic (and occasional trisyllabic). Since proper names have generally been excluded, the disyllabic (or trisyllabic) words are mostly compounds, such as those in (1) and (2). A similar result is arrived at by He and Li (1987), who compiled a frequency list of 3000 most commonly used Chinese words, based on a modern Chinese text corpus of 1,070,000 character tokens. (6) shows various word lengths in the list.

(6) Word lengths in 3000 most commonly used Chinese words

Length	1-syllable	2-syllables	3-syllables	4-syllables	All
Count	809	2094	89	9	3000
%	27.0%	69.8%	3.0%	0.3%	100.0%

Once again, monosyllabic words make just 27% of the total, and disyllabic words dominate the vocabulary.

It is hard to determine how often compounds occurred in historical Chinese. Dobson (1959:6) offers a strikingly low estimate of compounds in Late Archaic Chinese (LAC, 4th and 3rd centuries BC). He suggests that “(t)he proportion of compound words to single or free words as they occur in the control material of LAC was never higher than three per cent.” However, Dobson only considered a small set of compounds, namely, those that “are characterized by

specialization of sense”. For example, [tian-xia] “heaven-under” is literally “under the heaven”, but it also has the specialized meaning of “society” or “the Empire”, therefore it is a compound. However, there are numerous compounds whose meanings are compositional, such a *apple pie*, *mouse trap*, *leather shoe*, and *oil lamp* in English, or similar expressions in Chinese, as seen in (2). Since Dobson did not consider such compounds, his estimate must have been far too low.

Even if researchers agree on the definition of compounds in historical Chinese, there is still another difficulty. Because of the cost of the materials for writing, as well as the cost of the writing process itself, historical Chinese texts may not reflect the spoken language but a highly condensed writing style. For example, to my knowledge, no linguist assumes that the language of the oracle bones (between 1400 BC and 1100 BC), which was the earliest record of written Chinese, represented the spoken language of that time. In addition, because of the reverence for ancient texts, the original writing style may have influenced the entire literary tradition. As Karlgren (1949:57) observes, “in the written language of the pre-Christian era right down to our own day, people have continued to use the original short and concise word material.” This tradition dominated until the 20th century, when the [baihuawen] “plain speech writing” movement (also called the ‘Vernacular Movement’) started and many writers began to write the way Chinese is spoken.

Despite the difficulty in estimating disyllabic words in historical Chinese, there is some evidence that disyllabic (or longer) words are increasing in modern Chinese. This is discussed in the next section.

2.3. Lack of monosyllabic words in the new vocabulary

Most words introduced in the past century are disyllabic. For example, consider the two kinds of verbs in (7), taken from ZWGW (1959).

(7) Two kinds of verbs in commonly used Chinese words

	Total	% Monosyllabic
a. bodily and daily activities	280	73%
b. political and legislative activities	135	2%

There are 280 verbs that refer to bodily or daily activities, which obviously belong to the old native vocabulary. Of the 280, 73% are monosyllabic. In fact, the 27% ‘disyllabic verbs’ in (7a) contain a number of verb-object constructions that in many ways act like a phrase. (8) shows some examples.

(8)	wo shuo	li fa	ban jia
	hold hands	cut hair	move house
	“to shake hands”	“to have haircut”	“to move house”
	sao di	shua ya	xi lian
	sweep floor	brush teeth	wash face
	“to sweep the floor”	“to brush teeth”	“to wash face”

If such items are excluded, then the percentage of disyllabic verbs in (7a) will be down to 14%.

In contrast, there are 135 verbs that refer to politics and legislature activities, most of which were introduced in the past century. Of the 135, only 3 are monosyllabic, which make up 2%. Further evidence for the lack of monosyllabic words in the new vocabulary can be seen in Li and Bai (1987) and Yu (1993), which record new expressions (including some phrases, such as [wu gaizi] “hold the lid (hide problems)”) that appeared in recent years. Their results are summarized in (9).

(9) Lack of monosyllabic words in the new vocabulary

	Year introduced	Total terms	% monosyllabic
Li & Bai (1987)	mostly since 1949	982	0%
Yu (1993)	1992	448	0%

In both studies, there is a total lack of monosyllabic words in the new vocabulary.

3. Previous Analyses

Many researchers have offered explanations for the disyllabic phenomenon in Chinese. In this section I review four previous approaches. For exposition, I call them (a) the homonym-avoidance approach, (b) the speech-tempo approach, (c) the grammatical approach, and (d) the rhythm approach. A fifth approach, the morphologization theory, will be discussed in section 5. These approaches are not all proposed by different people. For example, Guo (1938) suggests that both (a) and (b) play a role, Lü (1963) suggests that both (b) and (c) play a role, and N. Li (1990) suggests that both (c) and (d) play a role. I show that none of the approaches, nor a combination of them, can explain the disyllabic facts adequately.

3.1. The homonym-avoidance approach

The homonym-avoidance approach is the most popular theory. It has been suggested by Guo (1938), Wang (1944), Karlgren (1949), Lü (1963), Li and Thompson (1981), and many others, and can be described by the quotations in (10).

(10) Statements of homonym avoidance theory

Lü (1963:440), “Why is there a strong tendency for disyllabic words in modern Chinese? The large number of homonyms should be an important factor. Because of sound change, many characters that used to sound different historically have

now become homonyms, and the creation of disyllabic forms is a compensating measure.”

Li and Thompson (1981:14), “The threat of too many homophonous syllables has forced the (Chinese) language to increase dramatically the proportion of polysyllabic words, principally by means of the compounding process...”

The loss of syllabic contrast in modern Chinese is quite dramatic. For example, Middle Chinese (about 600 AD) had over 3000 syllables (including tonal contrasts), but modern Standard Chinese (Mandarin) has just over 1300. Thus, over a period of a thousand years, Chinese lost well over 50% of its syllables. This has given rise to a large number of homonyms. For example, modern Standard Chinese has about 7000 characters (excluding 2000 relatively rare ones), most of which are monosyllabic morphemes (see Guojia Yuyan Wenzhi Gongzuo Weiyuanhui 1989). This gives an average of 5.4 morphemes per syllable. In addition, because the distribution is not even, some syllables represent a lot more morphemes than others do. For example, [yi4] ([yi] with the fourth tone) represents 63 common morphemes (or about 90 morphemes if rare words are included).

Given the large number of homophonous morphemes, many of which are independent words, it is not hard to imagine situations in which ambiguity arises and disyllabic expressions are used to avoid it. This scenario can be illustrated with an example from English. In some American English dialects, *pin* and *pen* are both pronounced as [pɪn] (Bill Baxter p.c.). If one wants to ask for a pen, and if there is a possible confusion with a pin, one can use a disyllabic word and say, “Can I have an ink-pen?” According to the homonym-avoidance approach, this kind of innovation must have been what happened in Chinese. Because there are so many homonyms, Chinese speakers have to avoid ambiguity on a regular basis. As a result, many

disyllabic words have been created.

Although the homonym-avoidance approach seems plausible, there are several problems. First, there is no proof of any disyllabic word that has been introduced and then lexicalized because of homonym-avoidance. Specifically, although there are many homonyms in the vocabulary, most can be disambiguated by context. For example, it is very rare that the English homonyms *sun* and *son*, or *bear* and *bare*, will cause ambiguity in speech. In addition, when ambiguities do arise in context, each speaker can easily resort to a variety of ways to clarify them. It is unlikely, therefore, that the entire speech community has come to agree on a single way of disambiguating each of the many homonyms.

Second, there is evidence that many words remain monosyllabic, even though they have many chances of causing ambiguities. For example, in modern Chinese “he”, “she”, and “it” are homophones; they are all pronounced as [ta1] ([ta] with the first tone). In writing they are distinguished by different characters, which means that speakers are aware of their differences. Since they are among the top fifty most frequently used words in Chinese (see He and Li 1987), their chances of causing ambiguities should be rather high. However, all the three remain monosyllabic. Similarly, most native verbs have remained monosyllabic, as seen in (6). This fact is not expected by homonym-avoidance.

Third, as Lü (1963) points out, most of the increase in disyllabic words took place in the past 100 years or so, during which period there has been little change in the phonology of Chinese. This fact cannot be explained by homonym-avoidance.

Fourth, many proponents of homonym-avoidance, such as Karlgren (1949) and Dobson (1959), assume that classical Chinese mostly consisted of monosyllabic words. However, by the time Chinese characters were created, which must have preceded the oldest written records (the oracle bones of 1400 BC), Chinese already had numerous homonyms. This is evidenced by the

fact that over 80% of Chinese characters are partly phonetic. For example, the character for “to shampoo” is made of a semantic part and a phonetic part. The semantic part is the character for “water”. The phonetic part is the character for “wood”, because “to shampoo” and “wood” sound the same. Now since over 80% of Chinese characters were made this way, it means that at least 80% characters sounded similar or identical to another character. In other words, there must have been plenty of homonyms from the beginning. This raises the question of why people did not create disyllabic words to avoid ambiguity then. The answer, as suggested by Guo (1938), must be that classical written texts did not reflect the spoken language (in part because of the scarcity of writing materials, and in part because characters offer more distinctions than speech). Indeed, even so, many disyllabic words can still be found in classical texts, as Guo documents extensively, not because of homonym-avoidance, but because of rhythmic considerations (see below). In any case, there is no evidence that classical spoken Chinese mostly consisted of monosyllabic words.

Fifth, homonym-avoidance does not explain why the need to avoid ambiguity has not prevented the loss of syllabic contrasts. Indeed, it begs the question of why Chinese started as a monosyllabic language in the first place.

Sixth, there are restrictions on the use of disyllabic words, which again cannot be explained by homonym-avoidance. For example, consider the [M N] (modifier-noun) pattern in (11) and the [V O] (verb-object) pattern in (12).

(11) Restrictions on word length in [M N] compounds

	[M	N]
[2 2]	mei-tan	shang-dian
[2 1]	mei-tan	dian
*[1 2]	mei	shang-dian
[1 1]	mei	dian
	coal	store
	“coal	store”

(12) Restrictions on word length in [V O] phrases

	[V	O]
[2 2]	zhong-zhi	da-suan
*[2 1]	zhong-zhi	suan
[1 2]	zhong	da-suan
[1 1]	zhong	suan
	plant	garlic
	“(to) plant	garlic”

When both M and N have a monosyllabic form [1] and a disyllabic form [2], there are four possible combinations: [2 2], [2 1], [1 2], and [1 1]. But while three of them are good, [1 2] is bad. Similarly, of the four possible combinations in [V O], only three are good. Moreover, what is striking here is that the bad pattern in [M N] is the opposite of that in [V O]. As noted by Lü (1963), this contrast is quite general: in [M N], [1 2] is usually bad, and in [V O], [2 1] is usually bad. Native intuition on such cases is quite sharp. However, the homonym-avoidance approach cannot account for such facts.

Finally, the homonym-avoidance approach predicts a correlation between the number of

homonyms and the number of disyllabic words. The more homonyms there are, the more likely disyllabic words would be created, and vice versa. However, there is no evidence for such a correlation. For example, Lü (1963:440) and Dai (1990:23) suggest that, because Cantonese has a larger syllable inventory than Mandarin (about 1800 in Cantonese vs. about 1400 in Mandarin), there should be fewer disyllabic words in Cantonese than in Mandarin. But no evidence has been shown for the prediction. On the other hand, the words in (13) have no homonyms, yet they still have disyllabic forms, as shown in (14), where the digits indicate tone types.

(13) Words without homonyms

hou3	chong3
“to yell”	“to spoil”

(14) Disyllabic forms of the words in (13)

hou3-jiao4	chong3-ai4
yell-call	spoil-love
“to yell”	“to spoil”

Similarly, the syllable [bao2] represents only two words, the noun “hail” and the adjective “thin”. Since they hardly occur in the same environment, there is little chance they would be confused with each other. Nevertheless, “hail” still has a disyllabic form, as shown in (15).

(15) Monosyllabic Disyllabic

bao2	bing1-bao2
hail	ice-hail
“hail”	“hail”

Such examples show that there must be other reasons that motivate the creation of disyllabic words.

3.2. The speech-tempo approach

Guo (1938) notes the fact that many Chinese words have elastic length, varying between monosyllabic and disyllabic, as seen in section 2.1. He further points out that the elasticity existed even in the earliest written texts. To explain it, Guo suggests that word length elasticity is motivated by the tempo of speech: at points where the tempo is fast, one uses monosyllabic words, and at points where the tempo is slow, one uses disyllabic words.

There are three problems with Guo's proposal. First, it does not explain why disyllabic vocabulary is increasing in modern Chinese. Second, it does not specify at which points the tempo can be fast and at which points the tempo can be slow. Third, there is no explanation for the restrictions on word length, as seen in (11) and (12). For example, there is no explanation why M and N can both be spoken slowly, giving [2 2], or both quickly, giving [1 1], or M slowly and N quickly, giving [2 1], but not M quickly and N slowly. Nor is there any explanation for the asymmetry between [M N] and [V O].

3.3. The Grammatical Approach

By 'grammatical approach' I refer to those analyses that attempt to explain the use of a disyllabic word in terms of grammatical or semantic considerations. For example, N. Li (1990) notes a number of interesting examples. Consider (16) and (17) first.

- (16) mai/*mai-zang le si mao
bury Asp dead cat
"buried a dead cat"
- (17) *mai/mai-zang le jiu shehui
bury Asp old society
"buried the old society"

According to Li, although both [mai] and [mai-zang] mean “to bury”, they have a subtle semantic difference, namely, [mai] means to bury something concrete, while [mai-zang] means to bury something abstract. Therefore, [mai-zang] cannot be used with “cat”, as shown in (16), and [mai] cannot be used with “old society”, as shown in (17). Next, consider (18) and (19).

(18) mai/gou-mai le yi dun zhi

buy Asp one ton paper

“bought a ton of paper”

(19) mai/*gou-mai le yi zhang zhi

buy Asp one sheet paper

“bought a sheet of paper”

Again, while both [mai] and [gou-mai] mean “to buy”, the latter has the additional meaning of “(to buy) in large quantities”. Therefore, [gou-mai] cannot be used with “a sheet of paper”, as shown in (19).

The examples in (16)-(19) show that some monosyllabic-disyllabic pairs are not completely synonymous. However, other monosyllabic-disyllabic pairs cannot be accounted for this way. N. Li is aware of this fact and suggests that in some cases there is a grammatical difference between a monosyllabic-disyllabic pair. Consider (20) and (21).

(20) huai ren pian/qi-pian le wo-men

bad person cheat Asp us

“The bad person cheated us.”

(21) huai ren de *pian/qi-pian

bad person 's cheat

“bad person's cheating”

In (20) both [pian] and [qi-pian] mean “to cheat”. Unlike the cases in (16)-(19), there is no

apparent difference in meaning between the two forms, and both can take the object “us”. However, in (21) one must use [qi-pian] and not [pian]. N. Li suggests that this is because the disyllabic form is preferred in a nominal position. (22) is a further example.

- (22) di-ren de gong-ji/*gong
 enemy 's attack
 “enemy’s attack”

Although both [gong] and [gong-ji] mean “to attack”, in the nominal position in (22), only the disyllabic [gong-ji] can be used.

N. Li’s proposal is reiterated by Liu (1992), who proposes that monosyllabic verbs “cannot be nominalized”. Consider (23) and (24), adapted from Liu.

- (23) zhong-zhi/zhong shu-cai
 plant vegetable
 “to plant vegetables”
- (24) zhong-zhi/*zhong fang-fa
 plant method
 “(the) planting method”

In (23) both [zhong-zhi] and [zhong] mean “to plant”. However, in (24) only “zhong-zhi” can be used. According to Liu, this is because the modifier in (24) is a nominal, which requires a disyllabic form.

The grammatical approach has both theoretical and empirical problems. Theoretically, why should a nominal verb require, or prefer, a disyllabic form? There is no explanation. Empirically, there is no evidence that a nominal verb must be disyllabic. For example, consider the examples in (25) and (26).

(25) ta si le
 he die Asp
 “He died.”

(26) ta de si
 he ‘s die
 “his death”

[si] “to die” is a verb in (25) and a nominal in (26). However, it is monosyllabic in both cases. This is generally true for verbs that do not have a disyllabic form. Even for verbs that do have a disyllabic form, the disyllabic form cannot always be used in a nominal position either. This can be seen in (27), which is identical to (22) except that (27) has an extra modifier [meng] “fierce”.

(27) di-ren de meng gong/*gong-ji
 enemy ’s fierce attack
 “enemy’s fierce attack”

While “attack” must be disyllabic in (22), it cannot be disyllabic in (27), even though it is a nominal in both cases. This is unexpected if a nominalized verb must be disyllabic. Finally, consider (28), which is identical to (24), except that “method” is monosyllabic [fa] in (28) but disyllabic [fang-fa] in (24).

(28) zhong-zhi/zhong fa
 plant method
 “(the) planting method”

Unlike in (24), where “plant(ing)” must be disyllabic, in (28) it can be either monosyllabic or disyllabic. Now, if “plant(ing)” is a nominal, as assumed by Liu, and if a nominal verb must be disyllabic, it is unexplained why “plant(ing)” can be monosyllabic in (28).

3.4. The rhythm approach

Both N. Li (1990) and Liu (1992) are aware that grammar cannot account for all word length variations, such as those mentioned above. As a result, they suggest that in two-word expressions there is a rhythmic preference for [1 1] or [2 2]. Let us call it the rhythm approach, an idea that is also proposed by Lü (1963).

There are two problems with the rhythm approach. First, it does not specify what rhythm is. Second, it does not explain the restrictions on word length, as seen in (11) and (12). In particular, since neither [1 2] nor [2 1] satisfies the ideal rhythm [1 1] or [2 2], one would expect both [1 2] and [2 1] to be bad. However, while [1 2] is bad for [M N], [2 1] is good. Moreover, in [V O], the reverse happens: [2 1] is bad and [1 2] is good. The asymmetry between [M N] and [V O] is a mystery in the rhythm approach (as well as in other approaches discussed above).

4. The present analysis

A proper analysis of disyllabic words in Chinese needs to address four major questions, shown in (29).

(29) Questions to be addressed

- a. What is the reason for the restrictions on disyllabic words?
- b. Why do so many words have elastic length?
- c. Why is word length elastic throughout the history of Chinese?
- d. Why is there an increase in disyllabic words in modern Chinese?

In this section I argue that the answer to the questions involve both metrical and functional considerations.

4.1. Metrical consideration

Duanmu and Lu (1990) first proposed that metrical structure can influence word length. Their central claim is given in (30).

(30) Constraint on word length choice:

In a two-word construction, the word with more stress should not be shorter than the word with less stress.

With regard to stress assignment (above the word level), Duanmu and Lu (1990) note that they are dependent on the syntax. For example, consider the English examples in (31), where *x* indicates main stress.

(31) Phrasal stress vs. compound stress

Phrases	Compounds
<i>x</i>	<i>x</i>
[V O]	[M N]
buy houses	White House
watch birds	bird watching

In English, main stress is on Y in an [X Y] phrase, and main stress is usually on X in an [X Y] compound. Based on such evidence, Duanmu and Lu (1990) propose the stress assignment in (32).

(32) Non-head Stress (NHS):

In a syntactic head-nonhead relation, the syntactic nonhead is assigned greater stress than the syntactic head.

An idea similar to (32) is proposed by Cinque (1993), who considers it to be a universal rule for stress assignment in compounds and phrases (see also Duanmu 1999b for word and compound stress in Mandarin Chinese, and Cinque 1993 for other structures in English). Let us now

consider [V O] and [M N] in Chinese, shown in (33) and (34).

(33) NHS in a [V O] phrase

	Head	Nonhead
		x
	[V	O]
[2 2]	zhong-zhi	da-suan
*[2 1]	zhong-zhi	suan
[1 2]	zhong	da-suan
[1 1]	zhong	suan
	plant	garlic
	“(to) plant	garlic”

(34) NHS in an [M N] compound

	Nonhead	Head
		x
	[M	N]
[2 2]	mei-tan	shang-dian
[2 1]	mei-tan	dian
*[1 2]	mei	shang-dian
[1 1]	mei	dian
	coal	store
	“coal	store”

In [V O], O has greater stress than V, so O should not be shorter than V. [2 1] is bad because V is longer than O. In [M N], M has greater stress than N, so M should not be shorter than N. [1 2] is bad because N is longer than M. The same analysis applies when M is a (nominal) verb, as

shown in (35).

(35)	Nonhead	Head
	x	
	[M	N]
[2 2]	zhong-zhi	fang-fa
[2 1]	zhong-zhi	fa
*[1 2]	zhong	fang-fa
[1 1]	zhong	fa
	plant	method
	“planting	method”

Again, [1 2] is bad because M is shorter than N. The other three patterns are good. Thus, the word length preference has nothing to do with the grammatical category of the words. Whether M is a noun or a verb, [1 2] is generally bad for [M N] and [2 2], [2 1], and [1 1] are generally good.

It will be noted that (30) holds only for words that have flexible lengths, so that the optimal length pattern(s) are used. For words that do not have flexible lengths, there is no choice of word length, and rhythmically poor patterns still occur. Consider (36) and (37).

(36)	Good [V O] that is [2 1]
	x
	[V O]
	jia-gong lü
	process aluminum
	“to process aluminum”

(37) Good [M N] that is [1 2]

×

[M N]

xin si-ji

new driver

“new driver”

As seen earlier, [2 1] is bad for [V O], yet (36) is [V O] and [2 1] but still good. This is because [jia-gong] “to process” does not have a monosyllabic form and [lü] “aluminum” does not have a disyllabic form. Thus, (36) is the only way to express the given meaning (or the best way available). Similarly, we have seen that [1 2] is bad for [M N], yet (37) is [M N] and [1 2] but it is good. Again, this is because [xin] “new” does not have a disyllabic form, and [si-ji] “driver” does not have a monosyllabic form. Thus, (37) is the only way (or the best way available) to express the given meaning. Let us now look at further examples. Consider (21), repeated in (38).

(38) huai ren de *pian/qi-pian

bad person 's cheat

“bad person’s cheating”

Here the syntactic structure is [[X de] Y]. If we assume that the syntactic head is the particle *de*, the immediate nonhead is X, and the outer nonhead is Y. Thus, Y will bear main stress. This explains why a disyllabic form is preferred in the Y position. The same analysis applies to (22). Now consider (26), repeated in (39).

(39) ta de si

he 's die

“his death”

This structure is again [X de Y]. Although the Y position has a monosyllabic word, (39) is still

good. This is because the word [si] “die” does not have a synonymous disyllabic form (there is a disyllabic word [si-wang], which is not quite synonymous to [si]), so there is no better form to choose from.

The metrical approach also offers an answer to (29b) and (29c). First, because some positions prefer a monosyllabic word and some positions prefer a disyllabic word, it is natural that many Chinese words developed a short form and a long form. In particular, an originally monosyllabic word can acquire a disyllabic form, as shown in (40), and an originally disyllabic word can acquire a monosyllabic form, as shown in (41).

(40) Word lengthening

Monosyllabic --> Disyllabic

mei, tan mei-tan

“coal”, “charcoal” “coal”

(41) Word shortening

Disyllabic --> Monosyllabic

lun-chuan lun

wheel-ship (wheel)

“powered ship” “powered ship”

In (40), [mei] “coal” and [tan] “charcoal” are independent words. When they are used together they do not mean “coal and charcoal”, but simply “coal”. In other words, [mei tan] is just a disyllabic form of “coal”. In (41), [lun chuan] is the original word for “wheelboat”, which is subsequently extended to all powered ships. Its short form [lun] (which can still mean “wheel”) is developed afterwards. With regard to the question in (29c), the metrical approach predicts that, if the stress pattern in (32) is universal, as Cinque (1993) argues, it must have existed all along. Thus, it is natural that word length elasticity has existed throughout the history of Chinese.

While the metrical consideration can explain the presence of elastic word length and restrictions on its use, it cannot explain why disyllabic words are increasing in modern Chinese. This question is addressed in the next section.

4.2. Functional consideration

By functional consideration I refer to cases where disyllabic (or longer) words are created for ease of communication. Some such examples are shown in (42).

- (42) Origins of disyllabic (or longer) words
- a. The source is a disyllabic (or polysyllabic) name
zhi-jia-ge
“Chicago”
 - b. The source word is made of two morphemes
dian-shi
electric-vision
“television”
 - c. The word is a description of the original object
tian dian lun chuan
sweet snack wheel-ship
“dessert” “powered ship”

A word can also be introduced in more than one way. For example, there are two words for “computer”: [ji-suan ji] “computing machine” and [dian nao] “electric brain”. The former is a translation of the source morphemes, and the latter is a description of the object. Similarly, there are two words for “laser”, [ji guang] “surge light” and [lei she]. The former is a description of laser, and the latter is a borrowing of the sounds.

It is hard to imagine how a word can be introduced as a monosyllabic one in the cases in (42). For example, changing a disyllabic name to a monosyllabic one will make the loan word sound too far away from the original. Similarly, every existing monosyllabic word already has a specific referent, and using it to refer to a new object will be confusing. For example, Chinese has a native word [chuan] for a boat or an unpowered ship. If a steamboat is also referred to as [chuan], then the listener cannot tell whether the referent is a traditional Chinese ship or a steamboat. Under such considerations, the cases in (42) must be introduced with disyllabic (or longer) words in any language.

Sometimes new characters are created to accommodate new words. For example, most new chemical elements are named by creating a new character, which usually consists of two parts. One part is phonetic, representing the sound of the syllable. The other part is categorical, with either the symbol for “gas”, denoting a gas, or the symbol for “gold”, denoting a metal, or the symbol for “stone”, denoting a non-metal solid. However, this method is rarely used outside of chemical elements. Besides, there is a reason why chemical elements are introduced as monosyllables. By convention, chemical elements are abbreviated as one or two letters in formulas and the Periodic Table. It will be very cumbersome to read the name of a formula by pronouncing the full names of the elements in it, and no language does it that way.

Sometimes a foreign word is introduced as a disyllabic word, yet often another morpheme is still added. (43) shows an example.

- (43) ji-pu che
 Jeep car
 “Jeep”

The addition of [che] “car” is not due to the possibility of ambiguity, since [ji-pu] only means “Jeep” in Chinese. However, for a person who does not know what a Jeep is, the extra

morpheme [che] will tell him/her that it is a kind of car. Similarly, consider (44).

- (44) pi jiu
 beer wine
 “beer”

For beer, a new Chinese character [pi] has been created. There should, therefore, be no ambiguity with other words in writing. In speech, there should hardly be any ambiguity either, since although there are 20 or so words that sound the same as [pi] (with the same tone), none of them refers to a beverage. Nevertheless, [jiu] “wine (alcoholic drink)” is added to [pi]. The reason, it seems, is partly similar to that for (43), namely, for someone who does not know what beer is, [jiu] will provide adequate indication that it is a kind of alcoholic beverage.

The above discussion shows that functional considerations are clearly involved in the increase of disyllabic words in modern Chinese. However, such considerations have nothing to do with the fact that Chinese has a fairly small syllable inventory and many homonyms. For example, for the cases in (42), any language would have created disyllabic or longer words. Similarly, (43) and (44) show that although the purpose of adding an extra syllable/morpheme is to make the meaning clearer, it is often not because there is a potential homonym, but because the new word might not otherwise be properly understood.

5. Further issues

In this section I discuss two further pieces of evidence for the present analysis. The first is the variation in the percentage of monosyllabic words in different word categories. The second is the well-formedness of expressions that do not match the perfect metrical structure. In addition, I discuss the morphological approach to disyllabic vocabulary and show that it explains only a small number of disyllabic words at best. Finally, I discuss whether the present analysis is

affected by syllable structure in different Chinese dialects.

5.1. Monosyllabic words in different word categories

ZWGW (1959) divides 3624 commonly used Chinese words into 11 categories. The percentages of monosyllabic words in those categories vary sharply, as shown in (45).

(45) Percentages of monosyllabic words in the common vocabulary

Category	Total	Mono.	% Mono.
Noun	1690	262	16%
Verb	925	380	41%
Adjective	451	140	31%
Adverb	194	41	21%
Classifier	112	106	95%
Numeral	68	33	49%
Pronoun	46	11	24%
Preposition	47	32	68%
Conjunction	45	7	16%
Aspect	21	20	95%
Exclamation	25	14	56%
All	3624	1046	29%

Classifiers and aspect markers show the highest percentages of monosyllables, at 95% each. In contrast, nouns show only 16% monosyllables. Among lexical categories, there is also considerable variation. For example, there are only 16% monosyllables in nouns, but 41% in verbs. The variation calls for an explanation, but it has not been addressed in the literature.

I propose that the percentage of monosyllables in a word category is related to whether

the category usually serves as syntactic heads or nonheads. In particular, in the present analysis, syntactic heads have less stress than syntactic nonheads, therefore a category that usually serves as syntactic heads should contain more monosyllabic words than a category that usually serves as syntactic nonheads. (46) shows how the present analysis compares with the data at the first approximation.

(46) Syntactic functions and percentages of monosyllables

a. Syntactic nonheads: more stress and fewer monosyllables

Noun	16%
Adjective	31%
Adverb	21%

b. Syntactic heads: less stress and more monosyllables

Classifier	95%
Preposition	68%
Aspect	95%

c. Unaccounted for

Verb	41%
Numeral	49%
Pronoun	24%
Conjunction	16%
Exclamation	56%

Nouns usually occur as the object or the subject, both of which are nonhead positions. Similarly, adjectives usually occur as modifiers of nouns, and adverbs usually occur as modifiers of verbs, so both occur in nonhead positions. (46a) shows that these three categories indeed show the lowest percentages of monosyllables. Next consider heads. In current syntactic theory, functional

categories are heads of syntactic projections. Classifiers are heads of classifier phrases, prepositions are heads of preposition phrases, and aspect markers are heads of aspect or inflectional phrases. (46b) shows that these three categories indeed have the highest percentages of monosyllables.

Still unaccounted for are the five categories in (46c). Since the syntactic status of exclamations is unclear, I shall not discuss them. In the pronoun category, ZWGW (1959) includes not only regular pronouns such as [wo] “I” and [ni] “you”, but also demonstratives such as [zhe ge] “this one” and [na yang] “that way”, question words such as [na ge] “which one” and [duo shao] “how many”, and other words such as [bie ren] “other people” and [dajia] “everybody”. Obviously, this is not a homogeneous category, and I shall not discuss it further. The numeral category also contains some arbitrary items. For example, besides the numbers 1 through 10, it also includes 11 through 20, and then the tens (30, 40, ...100), but not other numbers in between. Thus, nothing specific will be said about this category. Finally, the category “conjunction” is also questionable. It contains a few true conjunctions, such as [he] “and” and [er] “but”. However, it also contains many other items which might better be called adverbials, such as [tong-shi] “at the same time”, [jin-guan] “even though”, [jia-ru] “suppose”, [bi-ru] “for example”, [zhi-yao] “as long as”, etc. If such items are not syntactic heads, then their high disyllabic rate is expected.

Let us now consider the last category, the verb. In the present analysis, verbs mostly occur as the head of a verb phrase, and only occasionally as a nominalized subject or object, which will be nonheads. Therefore, verbs should mostly be monosyllabic. Before I discuss whether this is true, it is necessary to distinguish two kinds of vocabulary, the older native vocabulary, and the newer vocabulary.

ZWGW (1959) divides most word categories into several semantic groups. Some groups

contain both old and new vocabulary. For example, the noun group “household items” contains old words such as [zhuo-zi] “table” and [chuang] “bed”, and new words such as [fei-zao] “soap” and [ya-gao] “toothpaste”. Some groups contain mostly old vocabulary, such as the noun groups “plants”, “animals”, and “body parts”, or the verb groups “arm and hand movements”, “leg and foot movements”, and “daily activities”. Some groups contain mostly new vocabulary introduced in the past hundred years or so, such as the noun group “political, legal, and economic terms” and the verb group “political, legislative, and social activities” (cf. Liu et al 1984). (47)-(49) show a comparison between old and new vocabularies in nouns and verbs.

(47) % of monosyllabic words in old and new verbs

a. Old verbs (bodily and daily activities)

Total	% Monosyllabic
280	73%

b. New verbs (political and legislative activities)

Total	% Monosyllabic
135	2%

(48) % of monosyllabic words in old and new nouns

a. Old nouns (time, animals, plants, natural foods, body parts, kinship terms)

Total	% Monosyllabic
453	17%

b. New nouns (political, legal, and economic terms)

Total	% Monosyllabic
106	5%

(49) Comparison between verbs and nouns

	Old	New
verbs	73%	2%
nouns	17%	5%

The data shows that (i) in the new vocabulary both verbs and nouns are overwhelmingly disyllabic, and (ii) in the old vocabulary verbs are mostly monosyllabic but nouns are mostly disyllabic. In the present analysis, both (i) and (ii) are expected. In particular, for general reasons that hold for any language, most new words must be created as disyllabic (or longer), as discussed in section 4.2. In addition, nouns are mostly disyllabic because they generally occur in stressed positions, and verbs are mostly monosyllabic because they generally occur in unstressed positions.

In summary, the present analysis offers a good account of the variation in the percentage of monosyllabic words across different word categories. I am not aware any alternative account in other approaches.

5.2. Metrical structure and degrees of well-formedness

It was discussed earlier that, for words with flexible length, [M N] prefers [2 2], [1 1], [2 1], but not [1 2], and that [V O] prefers [2 2], [1 1], [1 2], but not [2 1]. However, there are some further subtle differences between [M N] and [V O], as noted by Lu and Duanmu (1991) and summarized in (50) and (51).

(50) Well-formedness for [M N]

a. [2 2] is always good

meit-an shang-dian	kun-nan wen-ti
coal store	difficult problem
“coal store”	“difficult problem”

b. [1 1] is always good

mei dian	nan ti
coal store	difficult problem
“coal store”	“difficult problem”

c. [2 1] is sometimes good

mei-tan dian	?*kun-nan ti
coal store	difficult problem
“coal store”	“difficult problem”

d. [1 2] is usually bad

*mei shang-dian	?*nan wen-ti
coal store	difficult problem
“coal store”	“difficult problem”

(51) Well-formedness for [V O]

a. [2 2] is always good

zhong-zhi da-suan	zun-jing lao-shi	da-sao shang-dian
plant garlic	respect teacher	sweep store
“plant garlic”	“respect teachers”	“sweep the store”

- b. [1 1] is sometimes good
- | | | |
|----------------|--------------------|-------------------|
| zhong suan | zun shi | *sao dian |
| plant garlic | respect teacher | sweep store |
| “plant garlic” | “respect teachers” | “sweep the store” |
- c. [1 2] is sometimes good
- | | | |
|----------------|--------------------|-------------------|
| zhong da-suan | *zun lao-shi | ?*sao shang-dian |
| plant garlic | respect teacher | sweep store |
| “plant garlic” | “respect teachers” | “sweep the store” |
- d. [2 1] is usually bad
- | | | |
|-----------------|--------------------|-------------------|
| *zhong-zhi suan | *zun-jing shi | *da-sao dian |
| plant garlic | respect teacher | sweep store |
| “plant garlic” | “respect teachers” | “sweep the store” |

I am not aware of any previous account of such patterns. In the present analysis, there is a possible solution. First, consider the metrical structure of [M N] and [O V] in detail. (52) shows the four cases of [M N].

(52) Metrical structure of [M N]

x			x			x	
x	x	x	x	x		x x	
(SS)	(SS)	(S S)	(SS)	(SØ)		(S)(SS)	
[2	2]	[1	1]	[2	1]	[1	2]
				Zero		Clash, Binarity	

In [2 2], there are two binary feet (assuming left-headed word and compound stress, see Duanmu 1999b) and no violation of metrical constraints. In [1 1], there is one binary foot and again no violation of metrical constraints. In [2 1], M forms a binary foot. N can also form a binary foot

with a zero syllable, indicated by [∅], which is realized as a silent beat or a lengthening of the syllable. The notion of a zero syllable is not new but has been suggested by many linguists, such as Abercrombie (1967), Liberman (1975), Selkirk (1984), Hogg and McCully (1987), and Burzio (1994). In [1 2], N forms a binary foot. Since main stress is on M, it must also form a foot.

Assuming that the zero syllable is available in final position only, M cannot form a binary foot. This causes a violation of Binarity (feet should be binary), as well as a violation of (stress) Clash (stresses should not occur on adjacent syllables). Now if Clash is a strong constraint and if Zero (avoid zero syllables) is a soft one (in the sense of Optimality Theory, cf. Prince and Smolensky 1993), then it is predicted that [2 2] and [1 1] are always good, [2 1] is sometimes good, and [1 2] is usually bad. This agrees with the pattern in (50). Next consider the four cases of [V O], shown in (53).

(53) Metrical structure of [V O]

	x				x
x	x		x	x	x
(SS)	(SS)		S (S∅)	S (SS)	(SS) (S∅)
[2	2]		[1	1]	[2
			1	2]	1]
			Stray, Zero	Stray	Zero, Weak Foot

[2 2] is again good, with no violation of metrical constraints. In [1 1], the main stress is on O, so [1 1] cannot form a trochee. Instead, O can form a binary foot with a zero syllable. But V cannot form a binary foot, since it is not final and a zero syllable is not available. Thus, [1 1] violates Zero and Stray (there should be no stray syllables; all syllables should be footed). In [1 2], O forms a binary foot, and V remains unfooted (for lack of the zero syllable). Thus, [1 2] violates Stray. Finally, in [2 1], V forms a binary foot, and O forms a binary foot with a zero syllable. However, as Burzio (1994) argues, a foot with a zero syllable is a weak foot, which will lose

main stress to a strong foot. Thus, [2 1] violates two constraints, Zero and Weak Foot (a weak foot cannot carry main stress when it occurs next to a strong foot). It will be noted that [1 1] does not violate Weak Foot, since O is the only foot available. Now if Weak Foot is a strong constraint and Zero and Stray are soft constraints, it is predicted that [2 2] is always good, [1 1] and [1 2] are sometimes good, and [2 1] is usually bad. This agrees with the pattern in (51).

In summary, the metrical approach offers a reasonable explanation for a set of fine differences in well-formedness between [M N] and [V O]. No previous analysis has offered a comparable account of such facts.

5.3. Morphologization and bound morphemes

Dai (1990) suggests that Chinese is undergoing a process of morphologization, by which historically free words are becoming bound roots and affixes. The process is described in (54) and diagramed in (55).

(54) Dai (1990:20), “a syntactic coordinate phrase (A, B) first becomes a compound (A-B), then one of its component is morphologized to a bound morpheme (A-B or A-B), and finally the other one is, too (A-B).”

(55) A, B --> A-B --> A-B or A-B --> A-B

It is probably true, as Dai argues, that Chinese does have some morphology, despite the popular conception to the contrary. For example, Baxter and Sagart (1997) argue that Old Chinese had prefixes, infixes, and suffixes. Similarly, the diminutive suffixation of [-er] in Beijing Mandarin can also be considered a morphological process. The question here is: to what extent can morphologization explain the behavior of disyllabic words in Chinese?

Dai suggests that the first step, the creation of compounds (A, B --> A-B), is triggered by homonym-avoidance, which I have argued against. However, Dai brings up an important fact

that the two parts of a disyllabic compound are not always free. This fact calls for an explanation. I will compare two proposals, the morphologization analysis and the present analysis.

According to Dai, a nonfree morpheme is either a root or an affix. Because what used to be free words have now become nonfree, the process is called morphologization. The result is that many morphemes cannot occur alone any more, which gives rise to disyllabic words in Chinese.

Most of Dai's examples are verbs. However, it has been shown in section 5.1 that the majority of old verbs remain monosyllabic, and that the majority of disyllabic verbs are found in the new vocabulary. For example, [fu-xi] "repeat-practice (review)" and [jian-xi] "see-practice (practice as an intern)", cited by Dai (1990:23), are both recent loans from Japanese (see Gao and Liu 1958:82). It is worth noting that Japanese borrowed many words from classical Chinese to make their own compounds, many of which were loaned back into Chinese in the past century (see Gao and Liu 1958, Liu et al 1984). It is natural that, for some such compounds, one or both parts can no longer be used separately (for the intended meaning). It is not obvious, therefore, to what extent morphologization can account for monosyllabic and disyllabic verbs overall.

Dai (1990:35) suggests that the morphologization analysis can apply to other word categories in Chinese. Indeed, in many disyllabic native nouns one part is not free, and in many others neither part is free. (56) shows some examples where both parts are bound.

(56) A-B (neither A or B is free)

lao-hu	lao-shu	lao-shi	lao-di
old tiger	old mouse	old teacher	old brother"
"tiger"	"mouse"	"teacher"	"brother"

In (56), the A part is semantically empty, namely, the original meaning "old" is not present in the

compound (indicated by parentheses). Dai suggests that in such cases A is a prefix, which is a bound morpheme with no concrete meaning, and B is a root, which is a bound morpheme with concrete meaning.

There are several problems with the above analysis. First, [lao] is needed only by some monosyllabic nouns. It is not needed by disyllabic nouns. A real morphological affix should not be sensitive to word length. Second, an affix usually serves a specific function. It either adds some meaning, such as *un-* in the English word *unlike*, which adds the meaning ‘not’, or it serves a grammatical function, such as *-ness* in the English word *quickness*, which changes an adjective to a noun. But [lao] in (56) serves no grammatical function, nor does it add any meaning. Third, a bound root usually requires an affix on a specific side, i.e. either on the left (prefix) or on the right (suffix). If the nouns in (56) require a prefix, they ought to require one all the time. However, as soon as a noun combines with another syllable, either on the left or on the right, no prefix is needed any longer. This can be seen in (57).

(57)	bai-hu	meng-hu	hu-kou	hu-shan
	white-tiger	fierce-tiger	tiger-mouth	tiger-mountain
	“white tiger”	“fierce tiger”	“tiger mouth”	“tiger mountain”

Fourth, many disyllabic words do not fit Dai’s proposal. For example, consider some A-B compounds in (58), where A is bound and B is free.

(58)	<u>A</u> -B (A is not free)			
	li-yu	shan-yu	hua-shu	song-shu
	carp-fish	eel-fish	birch-tree	pine-tree
	“carp”	“eel”	“birch”	“pine”

jiu-cai	qin-cai
leek-vegetable	celery-vegetable
“leek”	“celery”

In such compounds, the meaning of the B part is redundant. But one cannot consider the B part to be a suffix, since it is a free word, and it is not needed for disyllabic nouns. Clearly, the B part is used for the sole purpose of making disyllabic nouns. Similarly, consider the place names in (59), where both parts are bound.

(59) A-B (neither A or B is free)

Sha-Shi	Tong-Xian	Fa-Guo
Sha-City	Tong-County	France-Nation
“Sha”	“Tong”	“France”

Once again, the B part is semantically redundant. But again, one cannot consider the B part to be a suffix, since it is not required for disyllabic place names, as shown in (60), where parentheses indicate optionality.

(60)

Shanghai (Shi)	Daxing (Xian)	Aiji (Guo)
Shanghai (City)	Daxing (County)	Egypt (Nation)
“Shanghai”	“Daxing”	“Egypt”

In addition, the B part in (59) can occur as the A part of a compound, as shown in (61).

(61)

shi-zhang	xian-zhang	guo-fang
city-head	county-head	nation-defense
“mayor”	“county head”	“national defense”

In summary, if there is a morphologization process in Chinese, it must still be at its initial stage. Most disyllabic words cannot be explained by bound roots and affixes. In addition, morphologization offers no account of other facts such as the restrictions on word length and the

variation in the percentage of monosyllabic words across different word categories.

Let us now consider how the present analysis accounts for bound morphemes. There are three different cases. First, a small number of morphemes might be considered affixes, such as personal name prefixes [lao] (for an older person) and [xiao] (for a younger person), and the diminutive suffix [-er] in Beijing Mandarin. However, even here the uses are sometimes restricted and very often idiosyncratic. For example, [lao] and [xiao] are not added to names with two syllables, such as *Sima* or *Ouyang*. Similarly, not all small things are added [-er], and not all things to which [-er] is added are small.

In the second case, some compounds have been used for such a long time that one of its parts is no longer used alone. (62) shows two examples.

(62)	Compound	Modern parts	Historical parts
	yi-shang	yi, (shang)	yi, shang
	“clothes”	“clothes”, (not in use)	“upper clothing”, “lower clothing”
	jiang-jun	(jiang), jun	jiang, jun
	“general”	(not in use), “army”	“lead”, “army”

Historically, both parts of [yi-shang] “clothes” can be used separately. However, in modern Chinese [shang] is not used alone any more. Similarly, the first part of [jiang-jun] “general” used to be a verb “(to) lead (army)”, but it is no longer a verb in modern Chinese. This case can also include some recent loan compounds from Japanese (originally made of classical Chinese words), such as that in (63) (cited in Gao and Liu 1958:84).

(63)	Compound	Modern parts	Historical parts
	fen-xi	fen, (xi)	fen, xi
	“analyze”	“divide”, (not in use)	“divide”, “split”

While both [fen] and [xi] can be used as verbs historically, only [fen] can in modern Chinese ([xi] can be used in compound verbs only), and its meaning is somewhat different from “analyze”. Overall, however, this case does not include many disyllabic words.

In the third case, a monosyllabic word cannot be used alone purely because of the metrical requirement that a minimal word must be disyllabic. This case includes the majority of ‘bound’ words. (64) shows two examples.

(64)	*hu	lao-hu	meng-hu	hu-jiao
	tiger	(old)-tiger	fierce-tiger	tiger-roar
	“tiger”	“tiger”	“fierce tiger”	“tiger roar”
	*jin	huang-jin	chun-jin	jin-kuang
	gold	(yellow)-gold	pure-gold	gold-mine
	“gold”	“gold”	“pure gold”	“gold mine”

Both [hu] “tiger” and [jin] “gold” must be used in combination with another word (which itself may or may not be used alone). When no other word is required by the meaning, a semantically empty word is usually added, shown in parentheses. In other words, in the present analysis the fact that many disyllabic words contain a semantically empty part is expected: the extra morpheme is added for phonology and not for morphology or semantics.

5.4. Disyllabic words and syllable structure

There is an apparent problem (thanks to a Diachronic reviewer) between the present metrical analysis, given in section 5.2, and that of Duanmu (1993). In the present analysis disyllabic feet are the reason for word length variation. This means that all Chinese dialects are syllable counting. However, in Duanmu (1993) it was argued that all Chinese dialects are mora

counting. In dialects like Shanghai, all syllables are underlyingly light, so a foot usually consists of two syllables. In dialects like Mandarin, most syllables are heavy (bimoraic), so a foot usually consists of one heavy syllable. If the present analysis is correct, about half of Mandarin syllables should be unstressed and hence lose their underlying tones, which is not true. If Duanmu (1993) is correct, dialects like Mandarin should not need disyllabic feet or show word length variation, which is not true either.

The problem just mentioned derives from a traditional assumption that a language is either mora counting or syllable counting, but not both. However, there is no reason to uphold that assumption. Instead, there is evidence that Chinese is both mora counting and syllable counting, so is English. Interested readers are referred to Duanmu (1999a), where the issue is discussed at length.

6. Conclusions

I have presented data that, if compounds are properly included, most words in modern Chinese are disyllabic (or longer). In addition, while there is an increase of disyllabic words in the new vocabulary, there is no evidence that most words in historical spoken Chinese were monosyllabic.

I have also argued that, unlike the popular belief, homonym-avoidance does not play a clear role in the increase of disyllabic words in Chinese. Instead, the increase is mainly due to an increase in new words, whereby disyllabic (or longer) words are introduced either because they are polysyllabic names in the first place, or because they require two or more morphemes independent of the borrowing language.

Finally, I have argued that word lengths are constrained by metrical structure, in that some positions prefer a disyllabic word and some positions prefer a monosyllabic word. This

analysis explains the well-formedness of various length patterns in different syntactic structures, the percentages of monosyllabic words in different word categories, the existence of a large number of words that have both a monosyllabic form and a disyllabic form, the fact that many monosyllabic words cannot be used alone, and the fact that one part of many disyllabic compounds is semantically empty.

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