Prosodically-driven morphosyntactic change?
Revisiting the history of Chinese disyllabic words[*]

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Abstract The Chinese vocabulary underwent a salient diachronic change from monosyllabicity to disyllabicity. Some previous studies attribute this to the Disyllabification Tendency (DT) in Middle Chinese, while others doubt this hypothesis. In this paper, I revisit the historical development of three types of disyllabic unit—disyllabic root, compound, and phrase—and re-evaluate their relationships with DT. It will be shown that only two subtypes (rhyming disyllabic root and coordination compound) have been motivated or influenced by DT, while all other disyllabic units have their independent development paths.

1 Introduction

As a general impression, Modern Chinese (MC) has abundant disyllabic words.[1] According to Hu (1981), 80% of the Mandarin vocabulary is disyllabic. By contrast, the Old Chinese (OC) vocabulary is predominantly monosyllabic (and monomorphemic) (Cheng 1992a, Wang 1997, Feng 2000a). See (1) for example.

(1)   Syllable number contrast in Old and Modern Chinese

OC	*zhì*	*shè*	*xiāo*	*jì*	*nú*
MC[2]	*xióng-mǎ*	*cí-mǎ*	*zhuàng-mǎ*	*kuài-mǎ*	*liè-mǎ*
	"male-horse"	"female-horse"	"strong-horse"	"fast-horse"	"slow-horse"

OC	*zǎo*	*huì*	*mù*	*yù*	*xǐ*
MC	*xǐ-shǒu*	*xǐ-liǎn*	*xǐ-tóu*	*xǐ-zǎo*	*xǐ-jiǎo*
	"wash-hand"	"wash-face"	"wash-hair"	"wash-body"	"wash-foot"

In (1), OC has a unique word for each type of horse and each major activity of washing, while MC consistently uses disyllabic words to express the same concepts.

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[1] I use the pre-theoretical term "disyllabic word" because these are generally perceived as words, though strictly speaking there is no unanimous definition for the notion "word" (cf. Packard 2000).

[2] Unless specified, the MC examples in this paper are from Standard Mandarin (STM), and unless necessary (e.g. in Section 3), I abstract away from OC pronunciations and transliterate historical data with *pīnyīn*.

This contrast is clear and has received much attention (i.a. Pan 1989, Shi 1989, Cheng 1992a, Guo 1997, Liu 2000, 2003). According to Wang (2004, 2005), the development of Chinese word-formation is essentially a change from monosyllabicity to multisyllabicity.

As to the cause of this change, Cheng (1992a), Feng (2000a), Shi (2002) inter alia argue that it is a phonological shift in Middle Chinese (MidC) known as the Disyllabification Tendency (henceforth DT), which is claimed to have reshaped the Chinese lexicon. Feng (1997, 2000a) further argues that the influence of phonology (especially prosody) goes beyond lexicon into syntax (i.e. prosody feeds syntax). On the other hand, there are also researchers (e.g. Pan 1989, Guo 1997) that doubt the alleged cause-and-effect relationship between DT and the disyllabicity boom, as disyllabic words already exist in non-negligible numbers before the advent of DT. According to Tang (2007), the first disyllabicity boom in Chinese history happened in Eastern Zhou Dynasty (8-3c. BC). This well predates the critical period of DT (5-12c. AD) as specified in Shi (2002).

Since both sides have supporting evidence, the dispute is hitherto unsettled. One reason for this unsettledness is the nonhomogeneity of the term "disyllabic word", which more accurately should be called "disyllabic unit". There are three types of disyllabic unit in Chinese that are often perceived as words: *i*) those with unanalyzable internal structure, e.g. *pú-tao* "grape", *ii*) those with analyzable structure and idiosyncratic meaning, e.g. *lùn-wén* "argue-text; paper", and *iii*) those with analyzable structure and compositional meaning, e.g. *xióng-mǎ* "male-horse". I respectively refer to these as disyllabic roots, compounds, and phrases. A major concern of this paper is whether DT has affected all the three types of disyllabic unit and, if yes, whether it has affected them in the same way. While previous studies are mostly descriptive and/or functionalist, I will pursue a formal (generative) approach. In particular, I will answer two bigger questions: *i*) how large a role has DT played in the development of Chinese disyllabic words (I keep using this pre-theoretical term for expository convenience when no ambiguity arises)? *ii*) how can this role be incorporated in a Minimalist framework? The first question will be broken down to several smaller questions in the main text, and the second one will be addressed wherever theoretical account is in need.

This paper is structured as follows. Section 2 lays out the theoretical framework and major assumptions to be adopted. Section 3 introduces the background of the Disyllabification Tendency. Section 4 argues against the alleged lexicon-reshaping power of DT from synchronic and diachronic perspectives. Section 5 and Section 6 respectively re-evaluate the role of DT in the development of disyllabic roots/compounds and phrases. Section 7 concludes.

2 Theoretical framework

2.1 The model

The theoretical framework of this paper is the Minimalist Program (Chomsky 1995) and its subsequent developments, in combination with Distributed Morphology

(DM, Halle & Marantz 1993, 1994 et seq.). I assume the following grammatical architecture for human language.
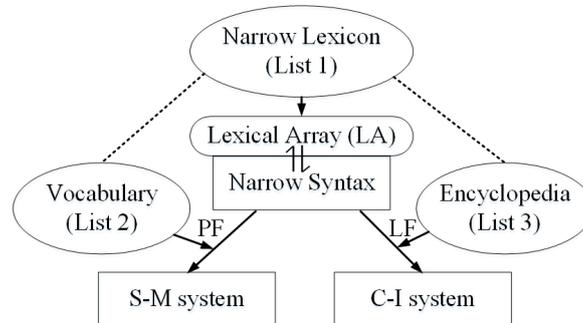
Figure 1 Grammatical architecture

Narrow Syntax is the core component of the human language faculty as well as its only generative engine (Single Engine Hypothesis, Marantz 2001). It is minimally the recursive application of the binary combinatorial operation Merge. The input of Merge comes from the presyntactic Narrow Lexicon (List 1) which stores grammaticalized functional categories (formal feature bundles or "f-morphemes") and lexicalized substantial concepts (roots or "l-morphemes"). I follow the bare root view and assume that a root by itself cannot head or label (Chomsky 2013, Alexiadou 2014); in order to become an eligible syntactic object it must be categorized by a special type of f-morpheme called "categorizer", written as little x (e.g. v, n). [3] Root categorization is adjunction (Pair Merge) (Marantz 2013).

List 1 items are selected into a RAM-like space called Numeration or Lexical Array (LA) and wait there to be merged. When an LA is exhausted, part of the existing derivation is transferred to the PF and LF interfaces for phonological and semantic interpretation. In the derivation of a complete sentence, there can be multiple LAs, each defining a spell-out phase (Chomsky 2000, 2001). Phase-based cyclic spell-out reduces the computational burden. Each phase has a defining category, and categorizers are also phase heads (Marantz 2001). Moreover, there can be multiple derivational workspaces, including a main workspace (the clausal spine) and one or more "satellite" workspaces (e.g. that of a DP, cf. Fowlie 2013). A satellite workspace must be finalized by a phase head and put back into the LA (or "renumerated", Johnson 2003) before it can be merged onto the clausal spine. As such, phase-based derivation is also recursive (like Merge), with the product of one LA being able to feed the construction of another.

In addition to the presyntactic lexicon, there are two postsyntactic lexicons: Vocabulary (List 2) stores phonological exponents for syntactically manipulated morphemes, and Encyclopedia (List 3) stores fixed meanings for certain syntactic products. After interface interpretation, the linguistic representations will eventually

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[3] Throughout this paper I use little xs in the DM sense, i.e. as categorizers rather than functional (shell) categories above lexical V/N. I use alternative notation for the latter, e.g. Kratzerian Voice for Chomskyan v (though even these two may not be fully equivalent, see i.a. Harley 2013, Legate 2014 for discussion).

be internalized (comprehended) by the conceptual-intentional (C-I) system and, when needed, externalized (uttered/signed) by the sensorimotor (S-M) system. As such, what the human language faculty generates is primarily an "inner mental tool" (Berwick & Chomsky 2016: 164), while the externalized signals are merely a secondary utility for communication.

2.2 The lexicon and compounding

The Minimalist Program has convincing explanations for both synchronic language variation and diachronic language change. Baker (2008) raises the Borer-Chomsky Conjecture (BCC):

(2)   The Borer-Chomsky Conjecture (Baker 2008: 156)
      "All parameters of variation are attributable to differences in the features of particular items (e.g., the functional heads) in the lexicon."

Restricting variation to the lexicon minimizes complication to the syntax. However, as standard Minimalism does not (yet) have an equally minimalist theory of the lexicon, the latter may lapse into a warehouse of stipulations. Recently, neo-constructionism (DM being an instantiation)[4] endeavors to transcode lexical information into syntax by postulating functional hierarchies in the V-domain (see D'Alessandro, Franco & Gallego 2017 for a most recent overview). This represents the general idea of split-X (X a core syntactic category, e.g. split-Infl in Pollock 1989, split-C in Rizzi 1997) which extends the functional lexicon and promises nice accounts for grammatical variation and change (cf. Roberts & Roussou 2003, Roberts to appear).

What is less clear in standard Minimalism is how to delimit the non-functional (i.e. root) part of the lexicon, especially when it comes to the interaction among multiple roots as in idiomatization and compounding. Surely every idiomatic meaning needs to be listed, but considering the amount of idioms and compound words a language may have, such a lexicon inevitably contains many copies of the same root, e.g. one for the root word itself, one for compound A, another one for idiom B, and so forth. In an all-in-one lexicon, the only way to get around this clumsiness is to have a generative lexicon, where roots can be combined before entering syntax.

DM promises alternative solutions to compound word formation (e.g. Harley 2009, De Belder & van Koppen 2016). In this paper I derive compound words based on the bare root view and the multiple-workspace hypothesis as outlined in the last section. Since compounds involve new meanings but no new roots, it is plausible that their lexicalization only extends the encyclopedic but not the narrow or phonological lexicon. As such, the grammar can first combine roots (and whatever f-morpheme necessary) in syntax in the usual way and then retrieve the listed compound meaning at the interface (see more details in Section 5.2). For example, the Chinese subject-verb compound rì-chū "sun-exit; rises the sun" can be derived as follows.

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4   Other neo-constructionist theories include Hale & Keyser's (1993) l-syntax, Borer's (2005) exo-skeletal syntax, Pylkkänen's (2008) applicative syntax, Ramchand's (2008) first-phase syntax, etc.

(3) a. Select v, $\sqrt{\text{CHU}}$ from List 1 and construct LA$_1$ {v, $\sqrt{\text{CHU}}$}.

   b. Merge v and $\sqrt{\text{CHU}}$ in Workspace$_1$.

   c. The v phase is completed and LA$_1$ exhausted; spell it out and label it as <V>$_{\text{CHU}}$.

   d. Meanwhile, derive <N>$_{\text{RI}}$ in the same way via LA$_2$ in Workspace$_2$.

   e. Renumerate <V>$_{\text{CHU}}$, <N>$_{\text{RI}}$ and select v; construct LA$_3$ {v, <V>, <N>}.[5]

   f. Merge <V> and <N> in Workspace$_3$, and then merge in v.

   g. The v phase is completed and LA$_3$ exhausted; spell it out, label {<V>, {<V>, <N>}} as <V>.

   h. The compound derivation is completed; renumerate <V>$_{\text{RI-CHU}}$ into the next LA...

Whenever a categorizer phase is spelled out, a List 3 entry (if existent) is retrieved. This applies to (3c, d, g). Consequently, apart from the compound meaning, the individual components' meanings are also grasped by native speakers. Such layered knowledge gives speakers huge flexibility in creating and manipulating compound words. Note that theoretically the separate workspace can involve one, two or even more roots; as long as it is finalized by a categorizer, its internal size makes no difference to the main workspace (i.e. the spine). However, there may be morphophonological or processing restrictions on the recategorizee, so we do not see 100-root compounds very often. In Chinese, the restriction is partly prosodic (Feng 1997), e.g. there are more disyllabic compounds and quadrisyllabic idioms (e.g. *yí-rì-sān-qiū* "one-day-three-autumn; extremely missing someone") than those with other syllable numbers.

In the above model, compounding (and idiom formation more generally) is a distributed process, where root number is determined at the pre-syntactic lexical selection stage, when syllable number is still unknown. As such, a syllable-sensitive phenomenon like DT is easier to occur when there is a stable ratio between root and syllable units, which is true for Chinese (mostly 1:1). But as this ratio is valid for both OC and MC, we need to review more phonological details to explain the mechanism of DT and its relevance in the development of word formation.

3 Phonological change from OC to MidC

3.1 Syllable structure change

Table 1 is a periodization of the Chinese language (adapted from Shi 2002, Zheng 2002, Wang 2004). Note that both OC and MidC differ significantly from MC. In Chinese terminology, Old, Middle, Early Modern, and Modern Chinese are respectively named *shànggǔ* "upper-old", *zhōnggǔ* "middle-old", *jìndài* "recent-age", and *xiàndài* "current-age" (Wang 2004).

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[5] Here if n is selected instead of v the result would be a compound noun "sunrise", which also exists in Chinese.

Period	Time
Pre-Old Chinese (POC)	14c. BC–11c. BC
Early Old Chinese (EOC)	10c. BC–7c. BD
Late Old Chinese (LOC)	6c. BC–3c. AD
Middle Chinese (MidC)	4c. AD–12c. AD
Pre-Modern Chinese (PMC)	13c. AD–15c. AD
Early Modern Chinese (EMC)	16c. AD–19c. AD
Modern Chinese (MC)	1919 AD–present

Table 1 Historical periodization of the Chinese language.

There is much phonological change from OC to MidC, featuring a significant simplification of syllable structure, as in (4) (Feng 2000a, Zheng 2003) (M=Medial vowel[6], E=Entering tone[7]).

(4) EOC: (C)(C)C(C)(C)V(C)(C)

  LOC: (C)C(M)(M)V(C)

  MidC: C(M)(M)V(E)

  MC: (C)(M)V(E)

Following are some representative examples (tones marked by superscript LRDE[8]).[9]

(5) Examples of syllable structure change in the history of Chinese

Morpheme	**OC**	**MidC**	**Mandarin**	**Compare**
輸 "lose"	[*hljo][10]	[*ɕɨoᴸ]	[ʂuᴸ]	[ɬuᴸ] (Dianbai Min)
爺 "grandfather"	[*l(j)aː]	[*jiaᴸ]	[ieᴸ]	[zaᴸ] (Shenzhen Hakka)
馬 "horse"	[*mraːʔ]	[*mɣɛᴿ]	[maᴿ]	[mʌɣᴿ] (Baoshan Wu)
手 "hand"	[*hnjɯwʔ]	[*ɕɨu̯ᴿ]	[ʂou̯ᴿ]	[niw] "finger" (Thai)
二 "two"	[*njis]	[*n͡ʑiɯᴰ]	[ɚᴰ]	[ȵiᴰ] (Suzhou Wu)
味 "flavor"	[*mɯds]	[*miuɨiᴰ]	[uei̯ᴰ]	[mei̯ᴰ] (Guangzhou Yue)
白 "white"	[*braːg]	[*bɣɛkˀᴱ]	[pai̯ᴸ]	[pakˀᴱ] (Guangzhou Yue)
角 "angle"	[*kroːg]	[*kɣʌkˀᴱ]	[t͡ɕiau̯ᴿ]	[kɔkˀᴱ] (Hongkong Yue)
歲 "age"	[*sqʰwads]	[*siuɛtˀᴱ]	[suei̯ᴰ]	[hueᴰ] (Shantou Min)

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[6] Gliding vowel between onset and nucleus, e.g. [u̯] in Mandarin [tʰu̯anᴸ] "sphere; lump".

[7] Unreleased final stops [-pˀ, -tˀ, -kˀ, -ʔ], e.g. Cantonese [saːtˀᴸ] "kill".

[8] Level *píng*, Rising *shǎng*, Departing *qù*, and Entering *rù* are the four diachronically consistent tone classes. Each class subsumes two types *yīn* "dark" and *yáng* "light". Tone class (lexical-phonological) should not be confused with tone value (phonetic); the same tone class may have different values in different varieties (Yuan 1980), e.g. the dark level tone (*yīnpíng*) is realized as 55 in Beijing Mandarin, 44 in Chengdu Mandarin, 32 in Nanjing Mandarin, 213 in Jinan Mandarin, etc. I abstract away from the tone values and only mark the tone classes.

[9] Historical pronunciations based on Zheng's (2003) reconstruction (www.eastling.org.oc); dialectal pronunciations cited from Xiaoxuetang online database (xiaoxue.iis.sinica.edu.tw).

Three changes are manifested in (5). First, consonant clusters are prevalent in OC but absent in MidC. The complex onsets are reduced to single ones, and the final consonants are reduced in both number (e.g. [-ds]>[-t] in "age") and quality (e.g. [-g]>[-kˀ] in "white/angle"). This simplification continues till today. Out of the six MidC final consonants ([-m, -n, -ŋ, -pˀ, -tˀ, -kˀ]), only two ([-n, -ŋ]) remain in Standard Mandarin (STM); some MC varieties have further lost [-n] after certain vowels, as in (6) (cf. Yuan 1980, Lin & Wang 1992).[11]

(6) | **Morpheme** | OC | MidC | Yue | STM | TYJ | YZW | SZW |
|---|---|---|---|---|---|---|---|
| 三 "three" | [*suːm] | [*sɑmᴸ] | [samᴸ] | [sanᴸ] | [sæ̃ᴸ] | [sæ̃ᴸ] | [sɛᴸ] |

Second, OC only has simple vowels ([i, ɯ, u, e, a, o], Zheng 2003) which are contrasted in length (e.g. [o] in "lose" vs. [oː] in "angle"), while MidC lacks vowel length contrast but develops a larger inventory of both main and medial vowels, e.g. [aː, oː]>[ɛ, ʌ] (main) and [r]>[ɣ] (medial) in "horse/white/angle". With the loss of the entering tone, some rimes become diphthongs, e.g. [ɛkˀ]>[ai̯] in "white", [ʌkˀ]>[au̯] in "angle", and [ɛtˀ]>[ei̯] in "age". In short, while the consonant system is simplified from OC to MidC, the vowel system is complicated.

Third, tones are absent in OC but present in MidC (Feng 2000a, Zheng 2003). The OC contrast that later develops into tones is *shū* "smooth" vs. *cù* "abrupt" (≈ sonorant vs. obstruent coda). In (5), "lose" and "grandfather" are smooth, while the rest are abrupt. When the final consonants are simplified, unreleased stop codas become the entering tone in contrast to the level tone (vowel/nasal codas), and the codas [-ʔ, -s] respectively become the rising tone (e.g. "horse/hand") and the departing tone (e.g. "two/flavor"). The level, rising, and departing tones are preserved in Mandarin, but the entering tone is lost and distributed into the other three tone classes, as in "white" (E>L), "angle" (E>R), and "age" (E>D). The above three phonological changes—*i*) simplification of consonants, *ii*) complication or vowels, and *iii*) establishment of tones —together lead to a redistribution of syllable structure, as in Figure 2.
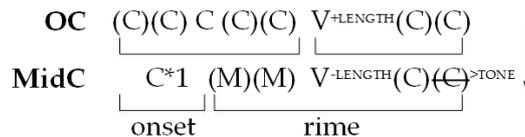
Figure 2   Syllable structure change from OC to MidC

### 3.2 Prosodic structure change

The phonological simplification and syllable structure change eventually led to a change in prosodic structure. In Prosodic Morphology (McCarthy & Prince 1996), a prosodic word (PrWd) minimally contains one metrical foot (Ft), which in turn

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[10] Boldface marks the base consonant C in a (C)(C)C(C)(C) cluster.
[11] TYJ=Taiyuan Jin, YZW=Yangzhou Wu, SZW=Suzhou Wu.

contains two branches—either two syllables (σ) or two moras (μ) (Foot Binarity Condition), as in (7a). A mora is a rime element that contributes to syllable weight (the onset is irrelevant, Prince 1980). Different languages have different sensitivity to syllable weight. Quantity-sensitive languages have multimoraic syllables and distinguish syllable weight, where a minimal prosodic word (MinPrWd) is bimoraic, e.g. ENG *cat* (7b); quantity-insensitive languages only have monomoraic syllables and do not distinguish syllable weight, where a MinPrWd is disyllabic, e.g. JAP *neko* "cat" (7c).

(7)   a. Minimal Prosodic Word   b. English *cat*   c. Japanese *neko*
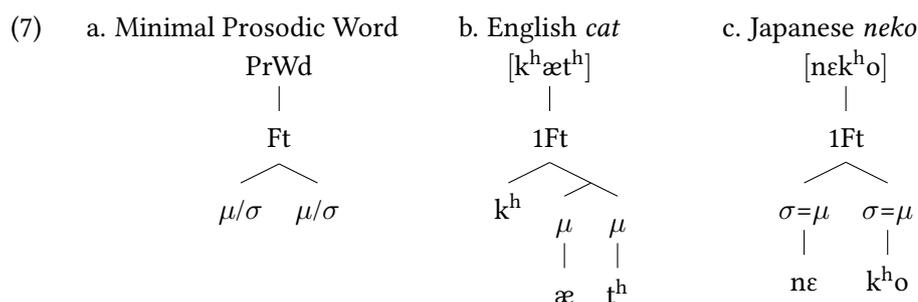
Feng (1997, 2000a,b) argues that Chinese shifted from quantity-sensitive to quantity-insensitive by the end of LOC. That is, a MinPrWd is bimoraic in OC (like English) but disyllabic from MidC on (like Japanese). For example, OC [*mraː?] "horse" contains two moras[12] and is a well-formed PrWd on its own (8a), whereas the exponents of same morpheme in MidC ([*mɣɛ^R]) and Mandarin ([ma^R]) only contain one mora (the medial vowel is not a complete mora) and are not well-formed PrWds (8b-c).

(8)   a. OC [*mraː?]   b. MidC [*mɣɛ^R]   c. Mandarin [ma^R]
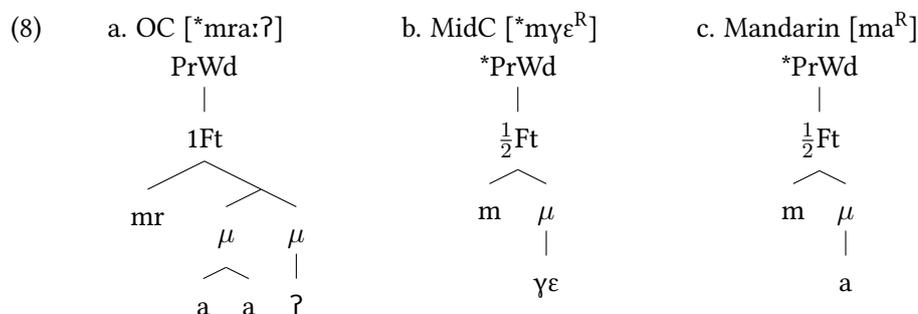
According to Feng (2000a,b), two main factors have contributed to this shift. First is the reduction of mora number in a syllable, e.g. from [*mraː?] to [ma^R], the number of terminal nodes is reduced from three to one. Second is the suprasegmental control of the tone system. Since tones have fixed suprasegmental lengths independent of the segmental syllable structure, the mapping between metrical unit and rime element is reshaped. In OC, each terminal node in a rime corresponds to a moraic unit and each unit has equal length. This 1:1 mapping is broken in MidC, where all rimes are averaged to approximately the same length.

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[12] Syllable structures are strictly binary-branching (Prince 1980), where only the topmost branching (i.e. the immediate two constituents of the rime) count towards metrical weight.

As such, a minimal fixed-length metrical unit is a mora in McCarthy and Prince's system but a tone (τ) in Feng's system, as in (9a,b). This is clear in Mandarin, where within the same tone class, the length (ℓ) of a monomoraic syllable and that of a multimoraic syllable are the same, e.g. $\ell_{[ɤ^D]\ \text{"hungry"}} = \ell_{[ɕiau^D]\ \text{"laugh"}}$, $\ell_{[ta^L]\ \text{"answer"}} = \ell_{[t^huan^L]\ \text{"lump"}}$ (9c,d).[13] As such, the prosodic word shift from OC to MidC is not merely one from bimoraic to disyllabic (pace Feng), but more essentially one from segmentally-defined (bimoraic) to suprasegmentally-defined (bitonal).

(9) a. Segmental Ft   b. Suprasegmental Ft   c. Mandarin   d. Mandarin
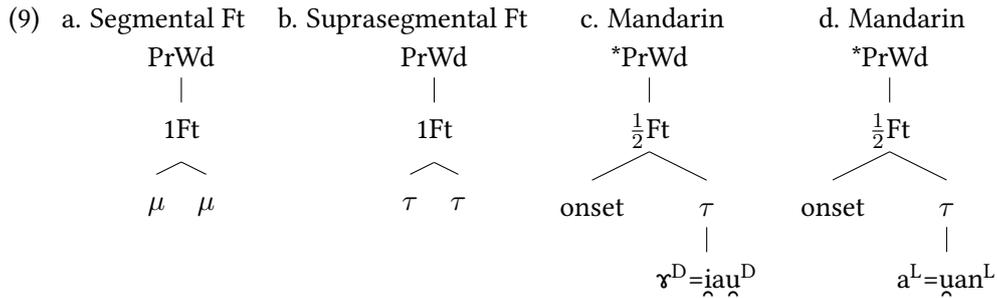
In sum, the phonological simplification from OC to MidC led to significant changes in syllable structure and prosodic structure, with segmental foot (1Ft=2μ, 1μ≤1σ) being replaced by suprasegmental foot (1Ft=2τ, 1τ=1σ). Consequently, new strategies were needed for the sake of prosodic well-formedness. There are three possible ways to do this. First, two adjacent syllables can be combined into a complete PrWd at PF, e.g. Mandarin *mǎ-jiào* "horse-neigh". Second, in new word creation, priority can be given to disyllabicity, e.g. *xī-guā* "west-melon; watermelon". Third, the first two strategies can be combined, with frequently adjacent monosyllabic morphemes being idiomatized, e.g. *chī-fàn* "eat-staple food; have a meal". As the first strategy on its own is a purely PF effect with no bearing on the lexicon, in the literature DT mainly refers to the second and the third strategies.

4 The role of the Disyllabification Tendency

4.1 Not a synchronic restriction

As aforementioned, the common assumption about DT is that it reshaped the Chinese lexicon from predominantly monosyllabic to predominantly disyllabic. However, it should be noted that, synchronically speaking, disyllabicity is not a restriction but a tendency, i.e. the lexicon reshaping is not complete. Besides, even as a tendency it is not a well-observed one. A closer examination of MC reveals the following facts among others. First, the basic vocabulary of MC is still largely monosyllabic (Huang & Liao 2007, Li 2011), as in (10).

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[13] Feng (2000a: 22) gives an SLA example: American students learning Mandarin tend to pronounce the [i̯] in [ai^D] "love" too clearly (as [a-i]), which sounds like [ai^D-i^L] "love-aunt".

(10) a. Nature: *tiān* "sky", *dì* "earth", *fēng* "wind", *shuǐ* "water", *huǒ* "fire";
  b. Daily life: *mǐ* "rice", *miàn* "flour", *cài* "vegetable", *bù* "cloth", *chē* "vehicle";
  c. Body: *tóu* "head", *liǎn* "face", *xīn* "heart", *shǒu* "hand", *jiǎo* "foot";
  d. Verbs: *xiǎng* "think", *zǒu* "walk", *ài* "love", *chī* "eat", *zuò* "do";
  e. Numbers: *yī* "one", *èr* "two", *sān* "three", *sì* "four", *wǔ* "five";
  f. Animals: *niú* "bovini", *yáng* "ovis", *jī* "chicken", *māo* "cat", *gǒu* "dog", etc.

Second, although the vast majority of MC morphemes are inherited from OC, new morphemes can still be created, especially in specialized areas like chemistry. However, most (if not all) of the newly coined morphemes are monosyllabic rather than disyllabic, as in (11).

(11) a. Elements: *qīng* "hydrogen", *yà* "argon", *diǎn* "iodine", *lǜ* "chlorine";
  b. Compounds and ions: *tāng* "carbonyl", *qiú* "mercapto", *qíng* "cyanogen", *nài* "naphthalene", *ǎn* "ammonium", *shén* "arsonium";
  c. Thermodynamics: *hán* "enthalpy", *shāng* "entropy", *yòng* "exergy", etc.

This is not because disyllabic morphemes cannot be created—there are many of them, e.g. *hélán* "Holland", *kělè* "cola", *niúdùn* "Newton (unit)"—but rather suggests there is no language-wide prosodic preference or restriction in the creation of new morphemes.

Third, the disyllabicity effect is more salient in Standard Mandarin than in other Chinese varieties, including Mandarin dialects (cf. Xiong 1989, Dong 2002a, Li 2002b, Qian 2010). (12) are exemples from three non-Mandarin Chinese varieties (Yue, Min, Wu) and one non-Standard Mandarin variety (Dongying, DY).[14] Many familiar words are disyllabic (compounds) in STM but monosyllabic in other varieties.

(12) Cross-dialectal contrast in word syllable number

Yue	**STM**	**Min**	**STM**	**Wu**	**STM**	**DY**	**STM**
[fɔŋ^L]	*fáng-jiān*	[pʰu̯e^D]	*bèi-zi*	[tsʰã^L]	*chuāng-hu*	[yæ^R]	*yǎn-jīng*
	"room"		"quilt"		"window"		"eye"
[kʰu̯ɐn^L]	*qún-zi*	[bu̯e^R]	*wěi-bā*	[ya^D]	*bà-ba*	[h̩^{L}]	*ér-zi*
	"skirt"		"tail"		"dad"		"son"
[hei̯^{D}]	*diàn-yǐng*	[pʰu̯e^L]	*pí-fū*	[ɦã^D]	*liú-xíng*	[mɒ^L]	*mā-ma*
	"film"		"skin"		"popular"		"mom"

Fourth, the disyllabicity effect is more salient in high (e.g. formal, literary) registers than in low (e.g. casual, quotidian) registers (see Feng 2010 for the grammatical significance of register variation in Chinese). As in (13), the same concept is often lexicalized monosyllabically in low registers but disyllabically in high registers (Feng 2006, Wang 2014).

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[14] The Yue and (Southern) Min data are respectively from Qian (2010) and Xiong (1989). The (Shanghai) Wu data are provided by Mengmi Lyu (native speaker, p.c.). The Dongying Mandarin data are my own (native speaker).

Prosodically-driven morphosyntactic change?

(13)

	Concept	Low register	High register
	"river"	*hé*	*hé-liú*
	"abandon"	*diū*	*diū-qì*
	"wide"	*kuān*	*kuān-kuò*

(14) is an illustration of the register variation. "River", "village", and "end" are all monosyllabic in the quotidian (low) register but disyllabic in the literary (high) register. In all the three cases, disyllabicity is achieved by coordination compounding, i.e. *cūn-zhuāng* "village-village", *jìn-tóu* "end-end", *hé-liú* "river-current". I will return to this point in Section 5.4.2.

(14) a. **Cūn tóu** *yǒu tiáo* **hé**.   (quotidian)
village end have CL   river
"There's a river near the end of the village."

   b. **Cūn-zhuāng** *de* **jìn-tóu** *yǒu yì-tiáo* **hé-liú**.   (literary)
village-village GEN end-end have one-CL river-current
"There's a river near the end of the village."

Both the cross-dialectal and the cross-register variations can be more complicated. First, some concepts are monosyllabic in STM but disyllabic in other varieties, e.g. STM *bèn* vs. Tianjin Jin [pəʔ-ləng] "silly" (I will return to this point in Section 5.1).[15] Second, while the literary register features disyllabicity, the elegant register (another high register) is again heavily monosyllabic[16], e.g. the spoken-register *bà* "dad", *mā* "mom" become *fù-qīn* "father", *mǔ-qīn* "mother" in the literary register and *fù* "pater", *mǔ* "mater" in the elegant register. These complications further confirm our conclusion that disyllabicity is at best a context-dependent preference rather than a language-wide general pattern.

Since (10)-(12) are not occasional but prevalent phenomena, we face two questions: *i*) how could a prosodic tendency like DT be context- and even concept-sensitive? *ii*) if such sensitivity were built into DT, how much could we still attribute the lexicon change to such a frequently "suppressed" mechanism? These questions lead us to the conclusion that even if DT had really reshaped the Chinese lexicon, the details of this process need more careful investigation.

4.2 Not a diachronic motivation

Above we have seen that DT is not a synchronic restriction on word formation or creation, next I will demonstrate nor is it a diachronic motivation for the appearance of disyllabic words. According to Shi (2002), DT entered its embryonic stage in 7c. BC (the end of EOC, cf. Table 1) and matured in 2c. AD (the end of LOC), with 5-12c. AD (MidC) being its critical period. This is reflected in the statistics in Table 2 (Guo 1997, Shi 2002, Li 2011, Qiu 2012), which shows that the maturation and critical

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[15] There is a distinction between disyllabicity in STM and that in non-standard varieties, with the former featuring compounds and the latter unanalyzable roots.

[16] Probably because it preserves (and imitates) OC features, including monosyllabicity.

period of DT overlaps with the biggest increase in the percentage of disyllabic words.

Period	Time	Disyllabicity
Late EOC-LOC	7c. BC-5c. BC	16%
	4c. BC-2c. BC	20-30%
Late LOC-middle MidC	1c. BC-7c. AD	53%
Middle MidC-EMC	8c. AD-early 20c. AD	73%
MC (Mandarin)	20c. AD-present	84%

Table 2   Percentage of disyllabic words in the history of Chinese.

The statistics in Table 2 led researchers to conclude that the disyllabicity boom in Chinese history had been motivated by DT. However, at least two facts suggest otherwise. First, the disyllabicity percentage in late EOC (16%) is very high for the embryonic stage of DT. Considering the syllable structure change did not happen until LOC (Section 3.1), and the tone system that played a crucial role in the prosodic structure change did not appear until MidC (3c. AD, Zheng 2002, 2003), it is unexpected that a disyllabification embryo could create a 16-30% effect (known as the first disyllabicity boom, Tang 2007). The pre-DT disyllabicity boom suggests DT is not the only factor that could motivate such a change.

Second, studies show that disyllabic words already exist in even more ancient documents, such as the oracle bone inscriptions of POC (14-11c. BC) and the bronze inscriptions of EOC (10-7c. BC) (Wang 1992, Guo 1997; more details in Section 5.1), both of which predate the first disyllabicity boom and the embryonic stage of DT and are further evidence that disyllabic words are not necessarily all results of the prosodic shift. The long history of disyllabic words is theoretically not surprising, because while monosyllabic words become prosodically ill-formed after the shift, the well-formedness of multisyllabic words is not affected—they merely change in the number of feet (and thus PrWds) they contain (e.g. 2>1 in the case of disyllabic words).

In sum, disyllabic words are an independent phenomenon in the history of Chinese. They are not motivated by the prosodic shift, but have always been there as a part of the language. Next, I will examine the historical development of the three types of disyllabic unit and re-evaluate their correlation with DT.

5 The historical development of disyllabic words

Whie in previous sections I have loosely used "disyllabic word" for "disyllabic unit", this section requires more strict terminology. It is not easy to distinguish words and phrases in Chinese, partly due to the lack of overt morphology, and the difficulty is even more clear for OC data (Cheng 1992b, Wu 2001, Tang 2002), because among others we also lack verifiable phonological cues. For the current purpose, I mainly

rely on semantic diagnostics to distinguish disyllabic words and phrases. That is, words are essentially idioms (a view also held in Marantz 1995[17]) whereas phrases are fully compositional. By this standard, disyllabic roots and compounds are words, while disyllabic phrases (as the name suggests) are phrases. I leave disyllabic phrases until Section 6 and focus on disyllabic words for now.

5.1 Disyllabic compounds and roots

The earliest disyllabic words in the POC oracle bone inscriptions and the EOC bronze inscriptions are exclusively compounds, as in (15).

(15) a. Proper nouns: *fù-hǎo* "wife-good (queen's name)", *huán-shuǐ* "Huan-water (river name)", *zuò-cè* "make-book; an official historian position", *xiǎo-chén* "small-subject; an official governing position";

     b. Others: *tiān-zǐ* "heaven-son; king", *zuǒ-yòu* "left-right; liegeman, assist (the ruler)".

The disyllabic compounds in this period are categorially unbalanced, with the majority being proper nouns (names and positions), as in (15a). There are occasionally also verbs, but compound verbs at this stage are predominantly (if not exclusively) exocentric, as in "left-right; assist". Compound categories other than N/V are scarce (see Section 5.4 for more discussion).

In late EOC-LOC, disyllabic roots begin to show up (Wang 1992, Cheng 1992b, Tang 2002, 2007). That is, disyllabic roots appeared later than disyllabic compounds. There are two subtypes of disyllabic root: those with prosodic rhyming and those without it. Rhyming disyllabic roots are mostly stative predicates where the two syllables are prosodically paired, as in (16)-(18) (all from *SJG*, 7c. BC).

(16) a. *Lín chōng* **xián-xián**   *chóng yōng*   (Duplication)
      Lin Chong shaking and thundering Chong wall

      yán-yán.
      tall and big
      "War chariots are shaking and thundering, and the wall of Chong State tall and big."

     b. *Táo zhī* **yāo-yāo,**   **zhuó-zhuó**   *qí huá.*
      peach GEN luxuriant and beautiful shining and brilliant its flower
      "The peach trees are luxuriant and beautiful, and their flowers shining and brilliant."

(17) a. **Cēn-cī**   *xìng-cài,*   *zuǒ yòu cǎi zhī.* (Same onset)
      uneven and irregular nymphoides left right pick it
      "The nymphoides are uneven and irregular; (the girl) picks them here and there."

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[17] Thanks to Víctor Acedo-Matellán for this reference.

b. *Yōu-zāi   yōu-zāi,   **zhǎn-zhuǎn**   fǎn-cè.*
miss-SFP miss-SFP rolling about and cannot sleep roll over
"I miss her, oh I miss her; I keep rolling about and cannot sleep."

(18) a. **Yǎo-tiǎo**   *shū nǚ, jūn-zǐ   hǎo   qiú.*   (Same rhyme)
gentle and graceful fair girl gentleman good partner
"The gentle and graceful fair lady makes a good partner for the gentle-man."

b. *Zǐzhòng zhī zǐ,   **pó-suō**   qí xià.*
Zizhong GEN child whirling and dancing its beneath
"The daughter of the Zizhong family is whirling and dancing beneath (the tree)."

In (16), two identical syllables are juxtaposed and allegedly form a single root.[18] In (17), the two syllables in a disyllabic unit share the same onset, e.g. *cēn-cī* (OC [*srum-sral]); in (18), they share the same rhyme, e.g. *yǎo-tiǎo* ([*qiːwʔ-lᵈeːwʔ]) (the rhyming is often preserved in MC). Rhyming disyllabic roots are prosodically melodious and mostly appear in literary works with rhyming requirements (Li 2011). In comparison, non-rhyming disyllabic roots do not have such aesthetic decoration; they are either plainly disyllabic (19a) (Pan 1989) or formed by splitting monosyllables (19b) (Zheng 2003).

(19) a. Plainly 2σ: [*baː-lᵈuː] "grape", [*gaː-lᵈeːb] "butterfly";
b. Split-σ: [*pɯ-rud]=[*prud] "pen", [*pʰɯ-rɯ]=[*pʰrɯ] "leopard cat".[19]

This syllable-splitting strategy is still active today, especially in non-standardized Chinese varieties, as in Taiyuan Jin (TYJ) (20a) and Fuzhou Min (FZM) (20b) (Li 2002a); there are also fossil words in Standard Mandarin (mainly in casual registers) (20c).[20]

(20) a. TYJ: [pəʔ-ləŋ]=[pə̃] "silly", [tʰuəʔ-luæ̃]=[tʰuæ̃] "lump";
b. FZM: [pa-laʔ]=[paʔ] "swing", [mɛ-lɛ]=[mɛ] "squat";
c. STM: *kū-long*=kǒng ([*kʰloːŋʔ]) "hole", *gā-lá*=xià ([*qʰraːs]) "corner".

In sum, between the two types of disyllabic word, disyllabic compounds might be as old as the Chinese language, and it is the disyllabic roots that may have been motivated by DT.

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[18] I follow the literature (e.g. Cheng 1992b) on this point but do not exclude the possibility that some reduplications may be compounds or even phrases, e.g. *zhuó* "burning, bright" is semantically related to *zhuó-zhuó* "shining and brilliant". What matters to us is that reduplication is a possible way to get a disyllabic root, at least when no semantic connection can be established between the disyllabic unit and itscomponent syllables, e.g. *yán-yán* "speak-speak; tall and big" (the character for "speak" is used merely to represent the sound).

[19] There is an opposite view in the literature (e.g. Pan 1989) that the split-syllable roots are in fact contracted syllables, e.g. [*prud]<[*pɯ-rud]. I stay away from the dispute and merely contrast them with the plainly disyllabic roots.

[20] NB the split-onset in OC is replaced by split-rime in MC, probably due to the phonological simplification (there are no longer complex onsets to split).

5.2 Compounding and Disyllabifying

Another implication from the above discussion is that the development of disyllabic compounds and that of disyllabic roots are independent from each other. This is reasonable as they involve different derivational mechanisms, which I respectively call (morphosyntactic) compounding and (phonological) disyllabifying and define in (21). While compounding is not a new term, the definition below is made along the lines of the theoretical model in Section 2, which has not been put forward to my best knowledge.

(21)   a.   **Compounding:** Adding a new meaning in List 3 for a syntactic product derived from existing roots, with their individual lexical entries unaltered. The compound meaning is activated when the roots (together with whatever accompanying f-morphemes) are spelled out in the same phase (canonically a categorizer phase).[21]

   b.   **Disyllabifying:** Adding a new disyllabic exponent in List 2 for a new or existing root, thus creating or rewriting its lexical entry. The new exponent is activated when the root is spelled out in a categorizer phase.

The above definitions mainly rely on the distributed nature of the lexicon as advocated in DM. When a traditional lexical entry is split into three independent parts, we can flexibly modify one part without modifying the others. A caveat is that by doing so we inevitably complicate the linking relationships among the distributed lexicons (which is not a problem in Lexicalism). How can the interfaces successfully retrieve the stored sounds and meanings for specific chunks? For example, how does spell-out know that $[k^h \text{æ} t^h]$ and "cat" correspond to $[_N \sqrt{\text{CAT}}\text{-}n]$ rather than $[_V \sqrt{\text{RUN}}\text{-}v]$ (or more abstractly $[_N \sqrt{19}\text{-}n]$ rather than $[_V \sqrt{214}\text{-}n]$)? We have to assume that the mappings between syntactic representations and their idiosyncratic sounds/meanings are also somehow stored, either as part of the postsyntactic lexical entries or as some sort of cross-lexicon link such as the # indices in Harley (2014) (the concrete index values do not matter; 19 and 214 are random illustrations). As such, when we attempt to eliminate redundant lexical entries in the pre-syntactic lexicon, the redundancy reappears in the post-syntactic lexicons, i.e. the overall necessary amount of lexical information is not reduced but conserved from Lexicalism to DM.

In (22)-(24), I illustrate the two strategies in (21) with the three examples *tiān-zǐ* "heaven-son; emperor" (compound), *pú-tao* "grape" (plainly disyllabic root), and *bú-lǜ* "pen" (split-syllable root). For each example suppose two states S_0 and S_1, with S_0 being the state where the word does not exist and S_1 the state where it exists.

(22)   a. S_0.

   b.   The concept EMPEROR is already realized in the language as $\sqrt{\text{DI}}$ /dì/ "emperor".

---

[21] This definition can be extended to words and phrasal idioms. Words, compounds, and idioms are all syntactically derived chunks with special List 3 entries activated at phase level. They are different in the type of phase head involved, i.e. initial categorizer for simple words, recategorizer for compounds, and non-categorizing phase heads for phrasal idioms.

c. For some independent (and maybe non-linguistic) reason, *tiān* "heaven" and *zǐ* "son" are combined into the phrase "heaven's son", which refers to the emperor.

d. The List 3 entry "emperor" is linked to this combination, so that when the two roots $\sqrt{\text{TIAN}}$ and $\sqrt{\text{ZI}}$ (with whatever accompanying f-morphemes) are transferred in the same *n*-phase, the meaning "emperor" is retrieved.

e. S_1.

(23) a. S_0.

b. The concept GRAPE needs linguistic realization; there are infinite options.

c. For whatever reason, /pú-tao/ is chosen, which happens to have two syllables.[22]

d. When /pú-tao/ becomes fixed for "grape", it becomes a List 2 entry; meanwhile, the meaning "grape" becomes a List 3 entry, and a new root $\sqrt{\text{PUTAO}}$ is added to List 1.

e. S_1.

(24) a. S_0.

b. The concept PEN is already realized in the language as $\sqrt{\text{BI}}$ /bǐ/ "pen".

c. For whatever reason[23] , a dyllabic exponent is created for the same root, i.e. /bú-lǜ/.[24]

d. The new exponent enters List 2 and is linked to the existing $\sqrt{\text{BI}}$ and "pen".

e. S_1.

The lexical entries for the three disyllabic words at S1 (which are the entries to be reconstructed by the language acquirers) are represented in (25).[25]

(25)

	List 1	**List 2**	**List 3**
tiān-zǐ	–	–	"emperor"$_{(\xrightarrow{\text{LINK}} \sqrt{\text{TIAN}} + \sqrt{\text{ZI}})}$
pú-tao	$\sqrt{\text{PUTAO}}$	/pú-tao/	"grape"
bú-lǜ	–	/bú-lǜ/$_{(\xrightarrow{\text{LINK}} \sqrt{\text{BI}})}$	–

In the lexicalization of *tiān-zǐ*, only a new List 3 entry is needed (together with a new spell-out link); in that of *bú-lǜ*, only a new List 2 entry is needed (also with a new spell-out link). As such, compounding and disyllabifying represent two types of lexicalization, respectively targeting List 2 and List 3. By comparison, in order

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[22] According to Sheng (1983), *pú-tao* "grape" is a loan word from Central Asia.

[23] The reason may be partly dialectal variation. XU Shen annotates in *Shuōwén Jiězì* "Explaining Graphs and Analyzing Characters" (early 2c. AD) that "*bǐ* ([*prud]), the instrument used for writing, is called *bǐ* in Chu area, *bú-lǜ* ([*pɯ-rud]) in Wu area, and *fú* ([*pɯd]) in Yan area". Apparently the development of complex onsets is different in different regional varieties.

[24] Or (24b) and (24c) may be reversed if one assumes the contracted-syllable hypothesis (cf. fn. 19).

[25] NB the List 2 exponent and List 3 meaning are retrieved when the List 1 roots and categorizer (here *n*) are merged in syntax and spelled out; roots on their own do not correspond to the post-syntactic realizations.

to lexicalize *pú-tao*, three new entries (together with the inter-entry links) need to be created, and all the three lists are targeted. Occasionally compound words can also have prosodic rhyming, e.g. *xián-xiá* ([*greːn-graːs]) "free-leisure; free time", *gāng-qiáng* ([*klaːŋ-gaŋ]) "firm-strong; unyielding", but rhyming compounds, being compounds, should have no significant difference from non-rhyming compounds in their lexicalization pattern (26), with the rhyming effect being only a result of presyntactic root selection (and ultimately planning).

(26)

	List 1	**List 2**	**List 3**
xián-xiá	–	–	"free time"$_{(\overset{\text{LINK}}{\longrightarrow} \sqrt{\text{XIAN}} + \sqrt{\text{XIA}})}$
gāng-qiáng	–	–	"unyielding"$_{(\overset{\text{LINK}}{\longrightarrow} \sqrt{\text{GANG}} + \sqrt{\text{QIANG}})}$

The above discussion demonstrates the mutual independence of compounding and disyllabifying, even when they work in tandem. A further piece of evidence for this independence is the fact that rhyming compounds only appeared in late LOC, when disyllabifying and compounding had been separately productive for several centuries (Pan 1989, Liu 2000). This means that for either of the two mechanisms, the other's influence is merely additional and secondary.

If, as we concluded in Section 4.2, DT is the motivation for disyllabifying but not compounding, and if the prosodic shift had reshaped the Chinese lexicon, then there should be abundant disyllabic roots in MC or at least a clear boom of them in history. However, neither is attested in the data. Synchronically, there are only 595 disyllabic roots collected in the *Modern Chinese Dictionary* (5th edition) (Cao 2010), which is less than 1% of the overall word entries (ca. 65,000). Diachronically, while the overall number of disyllabic words increased by almost 50% from OC to MidC (cf. Table 2), the percentage of disyllabic roots remained quite stable—4.8% in OC and 4.2% in MidC (Li 2011). As such, the claim that DT has motivated the disyllabicity boom is hard to maintain, or at least one could argue that the prosodic shift alone is not enough to reshape the Chinese lexicon.

5.3 Interim summary: the cost and economy of word-creation

To recapitulate our discussion so far: the Chinese vocabulary underwent a diachronic change from monosyllabicity (OC) to disyllabicity (MC), and a prosodic shift took place in LOC-MidC where the MinPrWd changed from bimoraic to bitonal (mostly disyllabic). However, there is no guaranteed cause-and-effect relationship between DT and the disyllabic word boom, as the disyllabic compound boom had already begun before the prosodic shift, and the disyllabic roots never had a boom. The separate development of disyllabic compounds and disyllabic roots is borne out in their theoretical independence—compounding targets List 3 while disyllabifying targets List 2. Building on the previous sections, we can now narrow down our research question from (27a) to (27b).

(27) a. Did the Disyllabification Tendency motivate the disyllabic word boom?
      b. Did the Disyllabification Tendency influence the disyllabic compound boom?

We already know the answer to question (27a) is "no". Nevertheless, "no motivation" does not equal "no relation", and the prosodic shift may still be a relevant factor in the compound boom, hence question (27b). To answer it, we need to further examine the development of compound words, but before doing that, I will first discuss another factor that may have contributed to the compound boom, i.e. economy.

The creation of a new word W is essentially the establishment of a relation R_W between an exponent E and a concept C, i.e. a Saussurean pair. In the current framework, this is mediated by some morphemic chunk (M), either a single root or a more complex syntactic product (28).

(28) $$R_W = E \text{ (List 2)} \underset{\text{syntax}}{\overset{\text{M (List 1)}}{\rightleftharpoons}} C \text{ (List 3)}$$

Before R can be created among E, C, and M, the latter three must first be made available. In the creation of a new word, while a new R is always necessary (as each W is defined by a unique R), none of E, C, and M has to be new; they can be reused instead. When we reuse a C, we are creating a second exponent for an existing word, as in split-syllable words; when we reuse E/M, we are utilizing existing exponents/morphemes to express new meanings, as in polysemous or compound words. Material creating vs. reusing is a difference in lexicon alteration, and presumably a word-creation strategy that reuses existing material is more economical than another one that creates everything from scratch.

In addition, the reuse of C is different from that of E/M, because the former always entails a specific C (e.g. before creating a split-syllable word, the speaker already knows which word he is operating on) whereas the latter has a much larger E/M space to search through (e.g. in order to create a new word meaning "kitten" there are infinite possible candidates of sound/root combinations), and choosing among the possible options also requires effort. Assuming that this effort is in direct proportion to the amount of restriction imposed on the choosing process, we could say that, mutatis mutandis, a word-creation strategy S is more economical if it allows more E/M-choosing freedom. So, an economical S should minimize alteration to the lexicon and minimize restriction on sound/morpheme choice. Moreover, a desirable S should also enable the language to express some new concept, as a most fundamental purpose of word creation is to express new concepts.[26] With the above in mind, now we can evaluate the cost and economy of the word-creation strategies discussed in the last section, as in Table 3.

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[26] NB the word-creation economy gauges discussed here only apply to the creators but not to the acquirers, as, on the one hand, when a word already exists in the Primary Linguistic Data (PLD), the acquirer does not have the infinite options to lexicalize a concept that the creator used to have, and on the other hand, the acquirer does not necessarily acquire E/M before W, e.g. they may well first meet *popcorn* before *pop* or *corn*.

		Lexicon alteration?	Free E/M choice?	New C?
Disyllabifying	Plainly 2σ-root	Lists 1, 2, 3	yes	yes
	split-σ root	List 2	no	no
Free compounding		List 3	yes	yes
Rhyming-compounding		List 3	no	yes

Table 3   The cost and economy of word-formation strategies.

Free compounding wins out as the most economical among the four strategies no matter there is any prosodic tendency like DT or not. When DT is present, free compounding is the most economical "response" to it; when DT is absent, it is not a "response" to anything but still the most economical strategy—or even the only one, considering disyllabifying itself may have been motivated by the prosodic shift. In short, we do not need to rely on DT to account for the compound boom.

Moreover, the compound boom did not only happen to disyllabic compounds, but also to multisyllabic ones. According to Qiu (2007), trisyllabic compounds underwent a similar development path from OC to MC, with a clear boom in PMC-EMC, despite the lack of a Trisyllabification Tendency. This, together with the fact that the booming period of trisyllabic words is later than that of disyllabic words (MidC), suggests that compounding has its own development pattern (disyllabic>trisyllabic), and that this pattern has more to do with the increasing vocabulary need than with any particular prosodic tendency.

In sum, DT did not motivate the disyllabic compound boom; the general principle of economy did. Next I will turn to explore the answer to question (27b).

5.4 The structure and category of disyllabic compounds

5.4.1 OC: mainly V-O compound noun

Recall that I take a syntax-all-the-way-down approach to word formation (Section 2), i.e. the internal structure of a compound is no more than syntactic structure. In MC, compounds can assume various structural relations (e.g. head-complement, modifier-head, coordination) and categories (e.g. N, V, A), as in (29).

(29)   MC compounds

	N	**V**	**A**
Head-comp	*sī*$_V$-*jī*$_N$ "control-machine; driver"	*chī*$_V$-*fàn*$_N$ "eat-staple food; have a meal"	*yǒu*$_V$-*xiàn*$_N$ "have-limit; limited"
Mod-head[28]	*shū*$_N$-*zhuō*$_N$ "book-table; desk"	*biàn*$_A$-*fǎng*$_V$ "all over-visit; travel all over"	*xuě*$_N$-*bái*$_A$ "snow-white; very white"
Coordination	*fù*$_N$-*mǔ*$_N$ "father-mother; parents"	*gōng*$_V$-*dǎ*$_V$ "attach-strike; attack"	*gān*$_A$-*jìng*$_A$ "dry-clean; clean"

However, such diversity had not always been there. The earliest compounds in POC-EOC are exclusively nouns and limited to the two structures V-O (a subtype of head-comp) and mod-head (Liu 2003), as in (30).

(30) POC-EOC compounds (repeated from (15a))

          N

V-O   *zuò*$_V$-*cè*$_N$ "make-book; an official historian position"

Mod-head *xiǎo*$_A$-*chén*$_N$ "small-subject; an official subject position"

In LOC, coordination compounds appear but compounds overall are still predominantly nouns and adjectives (Cheng 1992b, Liu 2003), as in (31).

(31) LOC compounds (in addition to V-O and Mod-head)

               N   **A**

Coordination *zhǎo*$_N$-*yá*$_N$ "claw-tooth;warrior"   *yǒng*$_A$-*jiǔ*$_A$ "long-long; long (time)"

There is also V-V coordination in LOC, but V-V compounds in this period are almost exclusively used as nominalized constituents (32a) and stative/mediopassive predicates (32b).

(32) a. *Yǒu guò   zhě fá   zhī yǐ **fèi-wáng***   (*GZ*, ca. 4c. BC)
      have mistake NMLZ punish them with deposition

     zhī   rǔ.
     GEN humiliation
     "Punish those who make mistakes with the humiliation of deposition."

   b. *Jīn tiān xià   mí   shuāi, shèng wáng* (*LSCQ*, 3c. BC)
     now sky under more and more decline sage   king

     *zhī dào **fèi-jué.***
     GEN way abandon-extinguish
     "Now the whole world is in constant decline; the sages' way of governing is gone."

In (32a), the V-V compound *fèi-wáng* "lit. abandon-exile" is used as a noun meaning "deposition, demotion" which modifies another noun *rǔ* "humiliation". In (32b), *fèi-jué* "abandon-extinguish" is intransitivized, meaning "be abandoned and extinguished". So LOC V-V compounds are not really canonical verbs. Further evidence for this is that they rarely co-occur with negation, prohibition, and interrogation (Liu 2003), which contrasts them sharply with canonical verbs, as in (33).

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[28] NB the mod-head compounds are tricky because they are neither fully compositional nor fully idiomatic; instead, they are compositional in a (semi-)idiomatic way. For instance, a "book-table" is arbitrarily a table used for studying/working, but not e.g. one for writing books or one made of books; however, this arbitrariness seems to be one of the modifier rather than the head or the mod-head combination, for a "book-table" is still a table, and the same modifier can be reused to form new words such as *shū-fáng* "book-room; a room used for studying/working". This suggests that many mod-head units may not be true compounds (as defined in this paper) but a separate type of complex word (also see fn. 29, 30).

(33) a. *Suī   jiǔ   bú   **fèi**.*   (*ZZ*, late 4c. BC)
though long not abandon
"It won't be abandoned however long time has passed."

b. *Hú   **qǔ**   hé   sān   bǎi   chán xī?*   (*SJG*, 7c. BC)
why take grain three hundred CL   SFP
"Why do they take hundreds of acres of grains home?"

c. *Bǎi   mǔ zhī tián, wù   **duó**   qí   shí.*   (*MZ*, 3-2c. BC)
hundred acre GEN field don't deprive their time
"There are hundreds of acres of fields; don't deprive farmers of their farming time."

In (33a), the verb *fèi* "abandon" follows and is negated by the negative particle *bù* "not"; in (33b), the verb *qǔ* "take" follows the *wh*-word *hú* "why" in the interrogative clause; in (33c), the negative imperative particle *wù* "don't" precedes the verb *duó* "deprive" and expresses prohibition. These examples reveal that the verbal extended projection in LOC includes Mod, Neg, and C. Since V-V compounds in this period do not co-occur with these categories, they do not form an equivalent class with canonical verbs. This said, OC does have non-V-V compound verbs (though only rarely) and mod-head complex verbs[29], as in (34).

(34) a. *Fǔ   xiàng tiān   dì   zhī yí,   yǐ*   (*YJ*, 9c. BC)
help assist heaven earth GEN appropriateness in order to

*   **zuǒ-yòu** mín.*
left-right people
"(Rulers should) help create appropriate natural conditions to govern the people."

b. *Zǐ zhī **yàn-jū**,   shēn-shēn   rú   yě, yāo-yāo*   (*LY*, 5-3c. BC)
Sir GEN casual-live comfortable ADJ SFP serene

*   rú   yě.*
ADJ SFP
"When Confucius is not at the royal court, he lives in a comfortable and serene way."

Zuǒ-yòu "left-right; govern" in (34a) is a compound verb with an N-N coordination structure, and *yàn-jū* "casual-live; stay away from the royal court, live at home" is a complex verb with a mod-head structure. [30] In sum, compounding is much less

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[29] I distinguish between compound verbs and complex verbs, though this distinction is of less importance in this paper. Compound verbs, as defined here, are necessarily idiomatic and derived by recategorization (Section 5.2), while complex verbs include any non-simple verbal units, which can be compositional and do not necessarily rely on recategorization. As such, compound verb is a subtype of complex verb.

[30] *Yàn-jū* "casual-live" is not a bona fide phrase because its meaning is not fully compositional, i.e. not merely "live casually" but necessarily "(officials) live away from the royal court". If this concept were lexicalized in English (as one verb), it might be something like "casual-live", simiar to *doublecheck, handwrite, brainwash*, etc. I leave the formation of such complex words to future research (see Song 2016, 2017 for preliminary discussion).

common in OC than it is in MC, with the only mature and bona fide compounding structure being [_N V-O].

5.4.2 MidC: coordination compound boom

Compared with OC, the most salient new development of compounding in MidC is the appearance of V-V compound verbs, which are mostly coordination compounds, as in (35).[31]

(35) a. *Huáng líng **dàn-yù**.*   (*JS*, 3c. AD)
         god   spirit give birth-give birth
         "(She) was born by the God."

    b. *Shí   ēn   zhī hòu, bù zhī **bào-dá** dāng*   (*SS*, 5c. AD)
        recognize grace GEN thick not know pay back should

        zài   hé   qī.
        be at what time
        "Your grace of recognition is too huge. I don't know when I could pay back."

    c. ***Jī-lǚ***   *zhī jiāo-tài, **yān-liú** jiàn*   (*JK*, 8c. AD)
        live away-travel know interact-state strand-stay see

        sú-qíng.
        vulgar-feeling
        "Reside abroad and know human relations; leave home and see human feelings."

In (35a-c), synonymous verbal pairs are coordinated to yield generalized meanings, as in (36).

(36)   Meaning generalization in coordination compounds

V	V	Compound
dàn "give birth, bear"	*yù* "give birth, nurture"	"give birth"
bào "report"	*dá* "answer"	"pay back, requite"
jī "live away from home"	*lǚ* "travel away from home"	"reside away from home"
yān "strand, drown"	*liú* "stay, remain"	"leave home for a long time"

Coordination compounds like these are very productive in Chinese. Peculiarly, with the appearance of V-V coordination compound verbs, the originally productive compositional V-V coordination structure died out. Examples like (37) are very common in OC but rarely occur after MidC (Shi 2002, Xiao 2006, Wu 2013). It seems V-V coordination is pushed out of compositional syntax and relocated in the word-formation domain. In Section 6, I will argue that this has to do with the appearance of V-V resultatives.

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[31] NB although V-V resultatives like *dǎ-suì* "hit-broken" are also an important development in MidC and often considered compounds elsewhere, in this paper I treat them strictly as phrases (see Section 6 for discussion).

(37) a. *Chén zú   wáng, chǔ **kè   yǒu**   zhī.*   (*ZZ*, late 4c. BC)
Chen eventually perish Chu capture occupy it
"The State of Chen eventually perished; the State of Chu captured and occupied it."

b. *Lǐmù shù   **pò   zǒu**   qín jūn.*   (*ZGC*, 2c. BC)
Limu repeatedly break make flee Qin army
"Limu defeated the army of Qin and made them flee for several times."

c. *Huàng jí   shǐ-huàn **yāo   jī   pò   zǒu***   (*SGZ*, 3c. AD)
Huang and Shi Huan intercept attack break make flee

zhī.
him
"Huang and Shi Huan intercepted, attacked, defeated him and made him flee."

The peculiarity of coordination compounds is reflected in two more aspects. First, they are the latest compounding structure to appear. While compounding as a word-creation strategy had matured in POC-EOC, coordination compounding only appeared in LOC-MidC. Second, coordination compounding usually generalizes an average meaning out of two synonyms, but this mechanism is not particularly practical in communication, because very often there is no additional information conveyed. For example, the interpretations of the sentences in (35) do not change if we replace the disyllabic compounds with their monosyllabic components, as in (38).

(38) a. *Huáng líng **dàn**.*
god   spirit give birth
(She) was born by the God."

b. *Shí   ēn   zhī hòu, bù zhī **bào**   dāng zài héqī.*
recognize grace GEN thick not know requite should be at when
"Your grace of recognition is too huge. I don't know when I could pay back."

c. ***Jī**   zhī jiāo-tài,   **yān** jiàn sú-qíng.*
live away know interact-state strand see vulgar-feeling
"Reside abroad and know human relations; leave home and see human feelings."

Comparing (38) and (35), *dàn* and *dàn-yù* both mean "give birth" (here used mediopassively, i.e. "be born"); *bào* and *bào-dá* both mean "requite"; *jī* and *jī-lǚ*, *yān* and *yān-liú* also express the same meanings.[32] As such, coordination compounding may have appeared not as a means to lexicalize new concepts (as in other compounding structures), but for some different reason. A further comparison of (38) and (35) reveals that despite the lack of meaning change, the sentences in (35) are prosodically much more elegant. (35ab) can be evenly parsed into disyllabic units,

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[32] (38c) is not as good as (38ab) because *jī* and *yān* are not used in their basic meanings ("bridle" and "submerge"), and their coordinating sisters help make the intended non-basic meanings more salient.

and (35c) has two five-character verse lines of the metrical pattern XX-X-XX, where each hyphen-separated slot, in addition to being subject to a series of prosodic requirements, also forms a syntactic constituent (the monosyllabic slot is usually the main predicate).[33] The prosodic elegance of (35) over (38) may well be a result of DT, for only when disyllabicity becomes the prosodic standard can it become a metrical norm. Since this metrical norm is frequently (though not exclusively) satisfied by coordination compounding, we can conclude that the coordination compound boom is probably indeed a consequence of DT.

However, there is a remaining puzzle. Remember the three other prosodically-driven word-creation strategies we have seen in Sections 5.2 and 5.3—plain disyllabifying, split-syllable disyllabifying, and rhyming compounding (Table 3). If the metrical requirement in MidC is merely disyllabicity, why didn't these other strategies boom as well? We already know the two disyllabifying strategies and rhyming compounding did not boom for economical limitation, but free compounding does not have this problem, and if economy is all that matters, then the only strategy that could ever boom is free compounding (as it did). So, is there something in coordination compounding that makes it more advantageous than the other compounding structures (head-comp and mod-head)?

The answer is "no" from a practical (e.g. communication) perspective but "yes" if we put the strategy back to its developing contexts, i.e. written texts with metrical requirements or preferences. If coordination compounding is driven by purely metrical need, then ideally it should not affect the amount of meaning the author intends to convey; otherwise the satisfaction of the metrical requirement would be at the cost of semantic alteration. With this in mind, we find the other compounding structures always bring about extra meanings (as the individual components' meanings are also retrieved in their separate spell-out cycles, cf. Section 2.2), whereas coordination compounding, with its meaning generalization mechanism, cancels this side effect. It is probably the "1+1=1" characteristics of coordination compounding that makes it an ideal strategy to fulfill the purely metrical need of disyllabicity.

To sum up this section, while compounding as a general word-creation strategy has boomed for economical reasons, the particular type of compounding structure, coordination compounding, has developed as a consequence of DT, though this consequence is more salient in the written register. We have repeatedly seen the register sensitivity of disyllabicity, which suggests that the lexicon-reshaping power of DT, if any, may merely be a result of the rise of the lexical/grammatical norms of a certain register to (prescriptive) dominance (for whatever reason).

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[33] Such "regulated verses" greatly boomed in MidC (especially 7-10c. AD) and became an important part of the written language with long-lasting impact. Since the grammar of Standard Mandarin is based on the written vernacular language used in literary works (early 20c. AD, Huang & Liao 2007), it is possible that some metrical characteristics of the historical written languages have been retained.

6 DT and disyllabic phrases

6.1 Revisiting "disyllabic phrase boom"

In the last section, I have examined the historical development of disyllabic roots and compounds. In this section, I will turn to disyllabic phrases and investigate their correlation with DT. First of all, recall our initial comparison in (1) which revealed the syllable number contrast between OC and MC. More examples are given in (39) (cf. Zhang 1993, Li 2009).

(39) a.   **OC**   *jiā*   *bā*   *zhì*   *tún*   *fén*
           MC   *gōng-zhū*   *mǔ-zhū*   *dà-zhū*   *xiǎo-zhū*   *yān-zhū*
                 "male-pig"   "female-pig"   "big-pig"   "small-pig"   "castrated-pig"

     b.   **OC**   *niàn*   *sà*   *xì*   *xū*   *yuán*
           MC   *èr-shí*   *sān-shí*   *sì-shí*   *wǔ-shí*   *liù-shí*
                 "twenty"   "thirty"   "forty"   "fifty"   "sixty"

     c.   **OC**   *kūn*   *yuè*   *bìn*   *bì*   *èr*
           MC   *tì-fà*   *kǎn-jiǎo*   *tī-xī*   *xuē-bí*   *gē-ěr*
                 "cut-hair"   "cut-foot"   "cut-knee"   "cut-nose"   "cut-ear"

As we can see, OC has unique single-root morphemes for pigs, numbers, punishments, etc., while all these concepts are expressed by compositional phrases in MC: the different pigs in (39a) are expressed by mod-head units similarly to the horses in (1); the numbers in (39b) are formed by mod-head units with explicit arithmetics, e.g. *èr-shí* "2*10; 20"; the punishments in (39c) are expressed by V-O phrases with V specifying the punishing activity and O the affected body part (Chinese has multiple verbs for "cut" based on the manner).

As aforementioned, this contrast between OC and MC is very clear. In addition, the most salient (and most often cited) examples of the disyllabicity boom are also such disyllabic phrases instead of the disyllabic words discussed in Section 5 (despite the commonly accepted term "disyllabic word boom"). This is a striking observation, because if many of the reported cases of disyllabic word boom are in fact disyllabic phrase boom, then DT would have control over not only word structure, but also phrase structure ("prosody feeds syntax" in Feng's words, cf. Section 1), which goes against the grammatical architecture in Figure 1. So, before investigating what could be the motivation for the disyllabic phrase boom, we need to first examine the boom itself in more details.

As it turns out, a closer look reveals several points seldom emphasized in the literature. First, the syllable number contrast is not necessarily 1:2. There are also concepts expressed by trisyllabic or even larger phrases in MC, as in (40).

(40) Multisyllabic compounds in MC

OC	*fēi*	*táo*	*jiāo*	*máng*
MC	*sān-suì-mǎ*	*sì-suì-mǎ*	*liù-chǐ-mǎ*	*bái-miàn-hēi-mǎ*
	"3-year-horse"	"4-year-horse"	"6-$\frac{1}{3}$m-horse"	"white-face-black-horse"
OC	*xī*	*zòng*	*è*	*mì*
MC	*sān-yuè-zhū*	*liù-yuè-zhū*	*wǔ-chǐ-zhū*	*bái-tóu-hēi-zhū*
	"3-month-pig"	"6-month-pig"	"5-$\frac{1}{3}$m-pig"	"white-head-black-pig"

Since the syllable number change did not only happen to concepts that could be expressed disyllabically in MidC-MC, its motivation is unlikely to be DT. On one hand, those initiating the change arguably could not foresee which concepts could (or could not) be expressed disyllabically after the change, so if disyllabicity were the purpose of the syllable number change, multisyllabic patterns would not be options in the first place. On the other hand, if DT were the reason behind this change, the result would be well-formed as long as it has two syllables, which means there should be at least some (if not many) disyllabic-root results. However, this is not observed in the data (here or elsewhere). The disyllabic phrases in question are exclusively compound-like.[34] As such, disyllabicity may not be the guiding rule of the change, and the syllable number contrast may be superficial.

Second, the contrast is not a language-wide phenomenon, but only occurs to certain concepts. We have seen in Section 4.1 that many basic concepts remain monosyllabic in MC, e.g. *tiān* "sky", *mǐ* "rice", *tǒu* "head", etc. Note that these unsurprisingly can also be expressed disyllabically (and in more than one way), e.g. *tiān-kōng* "sky-sky; sky", *dào-mǐ* "paddy-rice; rice", *nǎo-dài* "brain-bag; head", but they are different from the concepts in (1) in that their disyllabic versions are often restricted to certain registers (e.g. *tiān-kōng* and *dào-mǐ* are formal, and *nǎo-dài* is very casual) (a point already discussed in Section 4.1). I remain agnostic as to which concepts are more affected and why[35], but merely use this unbalance as an counterargument against the hypothesis that DT is the motivation for the observed contrast.

Third, since we just need two free monosyllabic morphemes to get a disyllabic phrase, it certainly can also be formed in OC. Therefore, what we have been calling "disyllabic phrase boom" may not really be a boom of disyllabic phrase (=disyllabic non-terminal constituent), but in fact one of some smaller set. Consider the examples in (41).

(41) a. *Zǐ yuē: kě yě.*   (*LY*, 5-3c. BC)
        Sir say okay SFP
        "Confucius says: that's okay."

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[34] They are "compound-like" because they share the same internal structures with compounds (which are simply syntactic structures) and "phrases" because they have no idiomatic meanings (i.e. no extra List 3 listemes or recategorization).

[35] The reason is more likely to be sociocultural than linguistic.

b. *Dì   bēng.*   (*SJI*, 1c. BC)
   emperor die
   "The emperor died."

Zǐ-yuē in (41a) and *dì-bēng* in (41b) are both well-formed disyllabic non-terminal constituents consisting of a subject (more exactly topic) and a predicate, so is *kě-yě* in (41a), which consists of a predicate and an affirmative sentence final particle (SFP). Crucially, these concepts are never expressed by single roots, neither in OC nor in MC. Even in languages where multiple grammatical categories can be compacted into a "big word", they still do not get compacted into a single root, as in Nahuatl (42a) and Korean (42b).

(42) a. *Toonal-kisa.*   (Telelcingo Nahuatl)
          sun-emerge
          "The sun comes out."   ([Haugen 2008](): 133)

      b. *Ilum-un   Kim Suni-yey-yo.*   (Korean)
          name-TOP Kim Suni-be-SFP
          "My name is Kim Suni."   ([Sohn 2015](): 184)

In (42a), the subject "sun" is incorporated into the verb, but "sun" and "emerge" are still two separate roots; in (42b), the copula *yey* and the polite final particle *yo* are suffixed to the predicate, but they are still separately recognizable components. It is quite unimaginable that meanings conveyed by subjects or discourse particles be expressed in the same root as their predicates, because that would call for a unique root for each possible subj-pred combination or the polite version of each possible predicate.[36] Note that this does not rule out the possibility of e.g. lexicalizing dedicated predicates for special subjects. For example, *bēng* "die" in (41b) is only used for emperors, and there are a series of "die" verbs in OC for people from different social hierarchies, such as *hōng* for feudal princes, *zú* for senior officials, etc. However, in order to specify a concrete argument for the predicate (e.g. the one who actually dies), a separate subject is still needed. In other words, concepts like subject, copula, and politeness may be expressed analytically or synthetically, but we do not expect them to be compacted into single unanalyzable roots together with other substantial concepts.

The same is not true for concepts like "male-horse", "wash-hand", etc., which do enjoy the possibility of single-root expression. This is probably because they are a different type of complex concept: a male horse is still a horse (a nominal), and washing hand is still an activity of washing (an event)—no new syntactic label is introduced in their derivation. Thus, I propose the distinction between the disyllabic phrases in (1)(39)(40) and those in (41)(42) is one of labeling, as in Tabel 4.

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[36] NB for the single-root scenario to work, each conceptually fused root has to be arbitrarily unique in form; otherwise speakers would recognize deviant patterns and break the single-root scenario.

	σ1	σ2	phrase
"male-horse"	A	N	N
"wash-hand"	V	N	V
"sir-say"	N	V	C
"okay-SFP"	V	?	C

Table 4 Labelling of disyllabic phrases.

As Table 4 shows, the initial lexical category is retained in "male-horse"-type phrases but changed in "sir-say"-type phrases. I remain agnostic to the category of SFPs (they may well be categoryless, cf. Biberauer to appear), which has no bearing on the fact that the lexical category (V) is not retained at phrase level (C) (also note that there is more structure in "sir-say" and "emporer-die" than meets the eye, as [N V] on its own cannot yield a label C). Without further complication, I preliminarily conclude that only disyllabic phrases with endocentric lexical labels can be compacted into single roots, i.e. those that are completely derived in the lexical domain (e.g. VoiceP in Harley 2014). This conclusion well distinguishes our data, as illustrated in (43).

(43) a. "male-horse"   b. "sir-say"
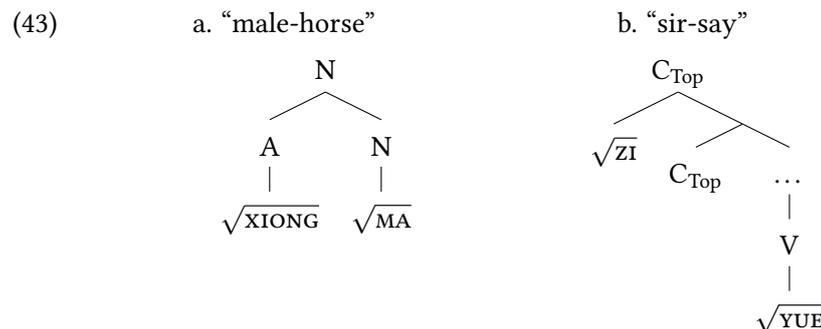
We can now say that the syllable number change only affects the lexical domain but not above. As such, the observed contrast is morphosyntactically relevant rather than purely phonological. Unlike disyllabic words, however, disyllabic phrases are not a result of word-creation strategy alternation (e.g. $1\sigma \rightarrow 2\sigma$, $1\sqrt{} \rightarrow$ multi-$\sqrt{}$), but one of word status loss ($X^0 \rightarrow \neg X^0$): when an OC root becomes obsolete, it is not replaced by a new root or recategorized root combination, but by a full-fledged syntactic phrase.[37]

6.2 Root number change and analyticity

In the last section, I argued DT is not the motivation for the disyllabic phrase boom based on three reasons: *i*) the OC vs. MC contrast is not necessarily $1\sigma \rightarrow 2\sigma$; *ii*) it

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[37] Since compounding before recategorization is simply syntactic structure building, the difference between disyllabic compounds and phrases only lies in the (non-)existence of cross-workspace recategorization.

only occurs to certain concepts; and *iii*) it only affects the lexical domain. In this section, I further argue the observed contrast is in fact one of root number, i.e. OC mono-root→MidC-MC multi-root.

The reason is threefold. First, whatever the syllable number contrast is, the concepts in (1)(39)(40) are always mono-root in OC and multi-root in MC, i.e. the root number contrast is a more consistent delimitation of the data. Second, assuming that a formal operation can only refer to information included in its operands, root number change can refer to properties of roots, while syllable number change (if the term really means what it says) can only refer to properties of syllables. As such, it is the former but not the latter that can be applied to individual concepts or concept groups (ultimately roots or root groups[38], as only already lexicalized concepts can be subject to change) such as socioculturally important concepts, frequently used concepts, and so on; hence the explanatory adequacy of the root number change hypothesis. Third, since only a subset of disyllabic phrases are affected by the observed contrast, and this subset corresponds to a well delimited domain on the syntactic tree, morphosyntax is a more plausible place to look for an explanation than phonology.

If the change in question is essentially one of root number, and if this change is not motivated by DT, then what else could be the motivation? For the concern of this paper, i.e. whether DT has motivated the disyllabicity boom (Section 1), a negative answer is already enough. So here I only make a preliminary proposal for the true motivation and leave the details to future research. The proposal is that another general change in Chinese history—the synthetic-to-analytic drift (cf. Huang 2015)—motivated a lexicalization pattern change where certain concepts previously lexicalized as single roots got reassociated with alternative compositional expressions (call this "analytic re-lexicalization").[39] Since DT did not motivate the disyllabic phrase boom, now we can ask the narrower-scope question in (44).

(44)   Did the Disyllabification Tendency influence the disyllabic phrase boom?

Since different disyllabic phrases involve different syntactic structures, this question cannot be readily answered in one go. In the remainder of this section, I will examine the development of two types of disyllabic phrase—V-O predicate and V-V resultative (both of which have been claimed to be consequences of DT in the

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[38] NB this does not go against our basic assumption of distributed lexical information (Section 2), for, as discussed in Section 5.2, while the concrete exponents and concepts are stored in separate lists, their links to the roots are specified on the roots. From another perspective, such specification is also necessary on the roots' side, as otherwise we would end up with a whole list of identical roots, which amount to only one root if a lexicon list is a set. Admittedly, similar cross-lexicon links must also be specified for exponents and concepts, but this is always done to entire entries (sets) rather than their component parts. It is a coincidence that in Chinese most exponents are monosyllabic, but this does not make exponents and their component syllables equivalent entities, e.g. the List 1-List 2 link for *tiān* "sky" is between $\{\sqrt{\text{TIAN}}\}$ and $\{[t^h\text{i̯an}^L]\}$ but not between $\{\sqrt{\text{TIAN}}\}$ and $[t^h\text{i̯an}^L]$ (a syllable outside a lexical entry is just a noise).

[39] Remember that the prosodic shift in Chinese history had been motivated by phonological change; similarly, the analyticity shift should have its own motivation, too. While this is beyond our scope, a legitimate speculation is that analyticity is parameterizable in an emergent fashion (Biberauer & Roberts 2015).

literature, cf. e.g. Dong 2002b, Shi 2002)—for the possible influence of DT over the disyllabic phrase boom.

6.3 V-O predicates

V-O predicates are complex predicates consisting of a verb and an object. Previous studies of them are mainly focused on two subtypes: *i*) the often idiomatic[40] "separable words"[41] (Hu & Fan 1996, Dong 2002b, Ma 2009), e.g. *chī-jīng* "eat-surprise; be surprised"; *ii*) the light verb constructions (Feng 2005, Huang 2015), e.g. *dǎ-yú* "hit-fish; (to) fish". The former appeared in 10-13c. AD and boomed in 14-17c. AD (Li & Chao 2007), while the latter originated in 9-10c. AD and became productive in 10-13c. AD (Zhuang 2014). In short, the booming period of these two types of V-O predicate is late MidC-PMC, i.e. after the critical period of DT.

When it comes to the "wash"-type V-O predicates, however, the literature does not tell us much about their historical development. This is understandable as it is not easy to investigate how particular concepts are expressed in a certain language variety without the help of native speakers or good dictionaries. Nevertheless, we can get a broad picture of this by examining the development of individual morphemes, for once an old root falls out of use, the concept associated with it must seek alternative expression. With this in mind, I conducted an exhaustive search of the five OC "wash" roots in the Academia Sinica Diachronic Corpora. As it turns out, their stand-alone uses became obsolete in MidC, and their V-O uses developed in late MidC-PMC and boomed in EMC. That is, the "wash"-type phrases developed in the same period as separable words and light verb constructions. Since a fundamental argument for the cause-and-effect relationship between DT and the disyllabicity boom is their chronological overlapping (Section 1), the non-overlapping of DT and V-O predicates means they have no direct correlation. (45) shows the development of the OC root *mù* "wash hair".

(45) a. *Sān rì ér shí, sān yuè ér **mù**.* (*LĴ*, 1c. BC; OC)
three day CONJ eat three month CONJ wash hair
"(After parent's death one can) eat after three days and wash hair after three months."

b. ***Mù** tóu sàn fà ér chū.* (*SSXY*, 5c. AD; MidC)
wash head hang loose hair CONJ exit
"(He) washed his hair and came out with the hair hanging loose."

c. *Yǒng **mù** huáng-wáng zhī chǒng.* (*FSA*, 8c. AD; MidC)
forever bath emperor-king GEN favor
"Bath in the imperial favor forever."

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[40] NB being idiomatic does not make these compounds, as they are not syntactic atoms, which means there is no cross-workspace recategorization.

[41] They are "separable" in that V and O can be separated by other syntactic constituents, e.g. *chī-jīng* "be surprised" vs. *chī-le yì jīng* "eat-ASP one surprise; got surprised".

d. *Gòng* **mù** *wéi-xīn zhī zé.*   (*WDSPH*, 13c. AD; PMC)
together bath reform GEN favor
"Together bath in the benefits of reform."

e. **Mù**-*shǒu fén-xiāng.*   (*XYJ*, 16c. AD; EMC)
wash-hand burn-incense
"Wash hands and burn incense."

In (45a), *mù* is used in its original literal meaning "wash hair" which is necessarily intransitive, hence the impossibility of any V-O construction. In (45b), it is still used for the activity of washing hair but "hair" is no longer a part of the root's concept entry, and thus the verb becomes transitive. In (45c,d), *mù* develops the metaphoric meaning "bath in, receive (favor)" and takes NP complements. However, there is no clear V-O disyllabicity in this period. In (45d), it is used literally again but also generically, so it can form a V-O predicate with "hand". In this period, the *mù*-O phrases show a clear disyllabic tendency, but only when *mù* means "wash"; when it is used metaphorically, the V-O phrases are still mostly multisyllabic, as in (46).

(46) *Jiào tā* **mù** [O*nà cì-tāng-jiàn-fǎng de*   (*QLD*, 18c. AD)
call he bath that bestow-money-build-edifice GEN

     huáng-ēn] *ba.*
     emperor-favor SFP
"Let him bath in the imperial favor of fortune and fame."

The above examples tell us: *i*) disyllabicity is a comparatively late pattern in V-O predicates; *ii*) disyllabicity in V-O predicates only occur to specific concepts. In short, disyllabicity is not tied to V-O predicates. As such, a prosodic tendency about the former is at best parallel to the latter but cannot exert any steering impact on it. On the other hand, a more likely contribution to the latter's development lies in the semantic shift in OC roots. See Table 5 for example.

	<1c. AD	1-7c. AD	7-18c. AD
mù	"wash hair"		"wash (body part); receive (favor)"
yù	"wash body"		"wash (body part); bath"
xǐ	"wash foot; purify; demote"	"wash; purify"	"wash"
zǎo	"wash hand" (rare)		verbal meaning obsolete
huì	"wash face" (N/A)		

Table 5 The historical development of "wash" roots.

As in Table 5, except *huì* which does not appear in the corpora at all (though it is attested elsewhere), all the other roots went through some semantic shift in late MidC-PMC, either changing from specific to generic (*mù, yù, xǐ*) or becoming

completely obsolete (*zǎo*). Concomitantly, the washing activities got re-lexicalized analytically (though not necessarily in their MC forms[42]). The following analytic expressions show up in the corpora (mainly PMC-EMC):

(47) a. Hair: *mù/xǐ-tóu* "wash-head", *mù/xǐ-fà* "wash-hair";
      b. Body: *yù-shēn* "wash-body", *xǐ-yù/zǎo* "wash-wash→wash-a wash"[43];
      c. Foot: *xǐ-jiǎo/zú* "wash-foot";
      d. Hand: *mù/yù/xǐ-shǒu* "wash-hand";
      e. Face: *sǎ*[44]/*mù/xǐ-miàn* "wash-face", *xǐ-liǎn* "wash-face".

Since V-O expressions only become possible when Vs gain transitive uses (by losing their conceptually incorporated objects), the semantic genericization of OC roots counts as a crucial step in the development of V-O predicates. It is likely that the various genericized morphemes had competed with one another in PMC-EMC before one of them eventually got standardized in MC. Till today there is still much cross-dialectal variation as to which morphemes are used in the re-lexicalized analytic expressions, e.g. "wash face" is *xǐ-liǎn* in Standard Mandarin, [da^D-mi^{D}k^{h}oŋ^D] "wash-face" in Shanghai Wu, and [k^{h}a^L-miι^D] "wipe-face" in Suzhou Wu.[45] Whichever morpheme is used, the meaning shift of individual roots is arbitrary and a purely semantic issue free from prosodic influence.

So, DT has neither motivated nor influenced the development of V-O predicates. Might it have facilitated their further evolution then? According to Dong (2002b), Shi (2002), Liu (2003), frequent adjacency under DT can lead to lexicalization. I argue this cannot be true for the V-O phrases in question. First, they are fully compositional and thus not lexicalized. Their perceived unition is merely phonological. Second, they are not all equally frequent, e.g. in our PMC-EMC corpus query, *xǐ-liǎn* "wash-face" appears 77 times, *xǐ-zǎo* "wash-a wash" 41 times, and *xǐ-jiǎo* "wash-foot" 10 times. Despite the frequency disparity, however, they are equally well-perceived phonological words, and so is any V-O combination even if it has never been heard before, e.g. *xǐ-pí* "wash-skin" and *xǐ-zhǐ* "wash-paper". In sum, the influence of DT over the development of V-O predicates is limited to the prosodic level and does not concern morphosyntax or the lexicon.

6.4 V-V resultatives

V-V resultatives are causative-resultative constructions consisting of two freely selected lexical verbs, the first denoting a cause and the second a result[46], e.g.

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[42] Remember that there are infinite possible component options for free compounding (Section 5.3).

[43] *Xǐ-yù/zǎo* was originally a V-V compound but then got reanalyzed as a V-O phrase meaning "take a bath".

[44] *Sǎ* "lit. pour, spray" is another (lesser used) generic word for "wash" in EMC.

[45] The Shanghai Wu data is provided by Mengmi Lyu. The Suzhou Wu data is provided by Ping Zhu and Jiayao Qi.

[46] The second components are often translated into English as adjectives or participles, but I treat them all as verbs because *i*) they cannot appear in commonly assumed adjectival patterns like degree modification (e.g. **dǎ-hěn-pò* "hit-very-break; hit very broken") and comparative construction (e.g. **tī-zāng-guò-nítǔ* "kick-dirty-than-dirt; kick dirtier than dirt"); *ii*) in our theoretical framework, assuming a primitive "adjective" identity requires a formalized adjectivizer, i.e. an [A] feature, but the justifiability

(48)   a.   *dǎ-pò* "$\sqrt{\text{HIT}}$-$\sqrt{\text{BREAK}}$[47]; hit sth. and consequently it gets broken";

         b.   *tī-zāng* "$\sqrt{\text{KICK}}$-$\sqrt{\text{DIRTY}}$; kick sth. and consequently it gets dirty";

         c.   *qì-kū* "$\sqrt{\text{ANGER}}$-$\sqrt{\text{CRY}}$; anger sb. and consequently they cry", etc.

While V-V resultatives form a broad research topic on their own (see i.a. Sybesma & Shen 2006, Shi 2007, Huang 2010 for lexicalist perspectives and i.a. Lin 2004, Kan 2007 for neo-constructionist perspectives), in this section I only discuss their potential correlation with DT. According to Shi (2002) (and Liu 2003, Xu 2006), V-V resultatives developed as a consequence of DT, mainly because they came into being in the critical period of DT and became a productive construction after that. In Section 6.1, I have argued that the disyllabic phrase boom is not DT-driven in general. As V-V resultatives are a subtype of disyllabic phrase, the arguments there also hold for them. In this section I will first provide further evidence for this conclusion and then explore the possible influence of DT in the development of V-V resultatives (or the lack thereof).

6.4.1 V-V resultatives are not a consequence of DT

Remember that the disyllabic phrase boom we are discussing is based on the syllable/root number contrast between OC and MC. This marks an important difference between disyllabic words and phrases: disyllabic words are often the first linguistic instantiations of the relevant concepts, whereas disyllabic phrases are usually not—they merely replace earlier expressions instead. As such, attributing the disyllabic phrase boom to DT amounts to attributing the replacement to it, which entails that the original expressions should be prosodically ill-formed after the prosodic change (Section 3). Also note that DT cannot change the conceptual-categorial properties of its operands, e.g. "cat" cannot become "dog" (or "wild cat"), and N cannot become V (or vice versa). So, if V-V resultatives are a consequence of DT, they should be replacements for some monosyllabic conceptual-categorial equivalents in OC. However, such equivalents do not exist. The closest systematically productive semantic counterpart we can find for V-V resultatives in OC is the type of event structure alternation in (49).

(49)   a.   *Qín zhàn shèng wèi,* [$_{\text{CAUS}}$***zǒu**_i*-CAUS$_\emptyset$]   (*ZZJ*, early 2c. BC)

            Qin attack win   Wei   run

            mèngmǎo [$_V$ ***zǒu**_i*].

            Meng-Mao

            "The State of Qin attacked and beat the State of Wei, making Mengmao run away."

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of such an atomic categorial feature is less clear than that of [V] and [N] (cf. Baker 2003, Panagiotidis 2014), and for the sake of Occam's Razor (as well as Feature Economy, Roberts 2017) I only assume a minimal inventory of formal features. I am not the first one to treat the Chinese counterparts of English (and other IE) adjectives as verbs (see i.a. Li & Thompson 1981, Tang 1998).

[47] I use roots to gloss V-V resultatives because voice information is significant for their interpretation and full-fledged English verbs (e.g. "hit-break" or "hit-be broken") often involve voice specification not present in the Chinese forms. Using root glosses can help us keep the lexical morphemes pure and avoid misunderstanding caused by inaccurate translation.

b. *Jì* [$_{CAUS}$***lái***$_i$-CAUS$_∅$] *zhī* [$_V$ ~~lái~~$_i$], *zé* (*LY*, 5-3c. BC)
already come they then

[$_{CAUS}$***ān***$_i$-CAUS$_∅$] *zhī* [$_V$~~ān~~$_i$].
settle they

"Since you have already made them come, you should also make them settle down."

In (49), the lexical verbs "run", "come", and "settle" are base-generated at a lower position and ajoined to the null CAUS head (an instantiation of Voice) via head movement. Based on the above-mentioned characteristics of DT, I argue that V-V resultatives are not a replacement for this OC construction in response to DT for two reasons. First, V-V resultatives are conceptually richer, as they specify not only the result, but also the cause by root. For example, while *zŏu* "make run away" in (49) only denotes an abstract causativity, a V-V resultative version of it, such as *găn-zŏu* "$\sqrt{\text{EXPEL}}$-$\sqrt{\text{RUN}}$" or *dă-zŏu* "$\sqrt{\text{BEAT}}$-$\sqrt{\text{RUN}}$", also specifies the type/manner of the causing event. Second, a comparison of the monosyllabic causative expressions in (49) and the monosyllabic "horse/wash" expressions in (1) (which are truly replaced by their disyllabic counterparts) reveals a significant distinction: the latter are monosyllabic at the phase level, whereas the former are not—they are always spelled out together with at least a complement instead, as in (50).

(50) a. *mŭ yuē **zhì*** b. ***zŏu** mèngmăo*
"male is called stallion" "make Mengmao run away"
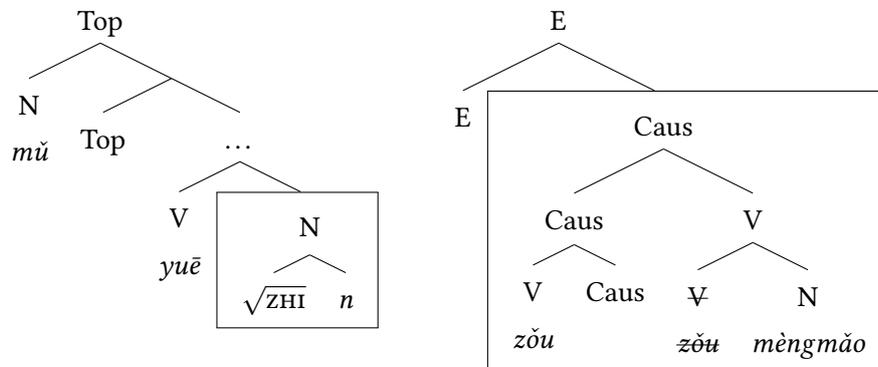
In (50a), before the framed N can be merged onto the clausal spine as the complement of V, it must first be derived in a separate workspace (a nominalizer phase). Since there is only one monosyllabic root in the lexical array of this separate workspace, the spelled-out string fail to satisfy the Binary Foot Condition (Section 3.2), and the only way to restore the prosodic well-formedness is to make the nominalizer phase disyllabic, as in *xióng-mă* "male-horse".[48] In (50b), by contrast,

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[48] Alternatively the monosyllabicity can be saved at the next phase, when there will be more material in the lexical array (remember that disyllabicity can be achieved by joining adjacent syllables at PF, cf. Section 3.2); this is what happens in (50b). Such a "delayed restoration" strategy independently supports our stance that DT does not necessarily lead to a disyllabic word boom.

there is no cross-workspace derivation involved in the Caus-V part[49], and the entire constituent labeled Caus is spelled out together in an event-demarcating phase (call it EP for convenience, cf. Travis 2010). As such, even though the verb itself is monosyllabic, the prosodic ill-formedness can be canceled at PF by joining V and N. Note that such joining does not always yield a disyllabic string, e.g. *zǒu mèngmǎo* (trisyllabic), but as long as there is some root under N (or whatever other complement), the E-phase necessarily contains at least two syllables and satisfies the prosodic condition. In short, the monosyllabic causative expressions are not ill-formed after the prosodic change and therefore should not be affected by DT to such an extent that a V-V resultative boom must take place as a resort.

Further evidence for this conclusion is that not only causative verbs, but also ordinary in-situ verbs in general (including light verbs and auxiliaries) in general are quite tolerable as monosyllabic constituents in MC, even in the heavily disyllabic registers as in (51) (literary).

(51) a. *Cūn-zhuāng de   jìn-tóu **yǒu** yì-tiáo hé-liú.*   (=14b)
          village   GEN end   have one-CL river
          "There's a river near the end of the village."

      b. *Tāmen **shì dàng**-zhe xiǎo-chuán **chàng**-zhe yàn-gē   **qù** de.[51]*
          they   be row-ASP small-boat sing-ASP   gorgeous-song go REL
          "They went there rowing on a small boat and singing gorgeous songs."

In (51a), all other constituents except the verb *yǒu* "have" are disyllabic (and the monosyllabic verb does not sound odd at all). Likewise, (51b) also consistently uses disyllabic nouns but monosyllabic verbs, including the lexical verbs *dàng* "row", *chàng* "sing", *qù* "go" and the auxiliary verb *shì* "be".[52] The prosodic well-formedness of MC monosyllabic verbs confirms the lack of reason to replace the OC monosyllabic causative expressions with disyllabic ones. Since there is nothing in OC for V-V resultatives to replace in the name of DT, we cannot say the former is a consequence of the latter.

6.4.2 The influence of DT is insignificant

To recapitulate, V-V resultatives are not replacements for earlier constructions (hence the impossibility of DT as a motivation) but should have their own development path. Next I will turn to examine this path for possible DT influence. According to Shi (2002), V-V resultatives have developed from reanalysis of adjacent larger constituents, as illustrated in (52).

(52) a. *Yán qín zì   jǔ   zhuī zì   **jī**.   Shǒu **suì**.*   (*LH*, 1c. AD)
          say bird self raise awl   self strike head smash
          "Allegedly the bird raised an awl and struck itself. Its head got smashed."

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[49] Of course the N constituent still needs to be pre-derived, but this detail does not concern us here.

[51] Taken from the literary essay *Moonlight Over the Lotus Pond* (1927) by ZHU Ziqing.

[52] NB the ASP and REL markers lack full lexical tones and do not constitute a branch in prosodic structure, i.e. items like *dàng-zhe* and *qù-de* do not make minimal prosodic words despite their disyllabicity (cf. Feng 2000a).

b. *Guǒ* ***zhèn*** *bǎi* *fěn* ***suì****.* (*SSXY*, 5c. AD)
really shake cypress powder smash
"(The lightning) really shattered the cypress into pieces (like powder)."

c. *Qí* *fù* ***dǎ-suì*** *le* *gè* *rén* *yí-jiàn jiāshì.* (*ZZYL*, 13c. AD)
his father hit-smash ASP CL person one-CL utensil
"His father smashed a utensil of someone else."

(52) shows the development of *suì* "$\sqrt{\text{SMASH}}$" from an independent verb to a resultative component. (52a) has two adjacent but separate clauses, respectively conveying a cause (the bird strikes its head) and a result (the bird's head gets smashed). (52b) is a single clause with two separate predicates, also conveying a cause (the lightning shatters the cypress) and a result (the cypress gets smashed). (52b) differs from (52a) in that its two predicates share a common argument (the cypress). These two stages have nothing to do with DT despite the chronological overlapping; the only possible place for DT to exert its influence is somewhere between (52b) and (52c). Note that (52c) is already a mature V-V resultative construction with a perfective aspect marker *le* which got grammaticalized from the resultative component *liǎo* "$\sqrt{\text{END}}$" in around 9c. AD (Shen & Xuan 2012). If DT had influenced the development of the V-V resultative construction, the influence point should be somewhere before it matured, i.e. at least some time before the grammaticalization of *le*. The examples in (53) are from this period.

(53) a. *Zōng-qīn* *bìng-jiē* ***tiǎn-miè****.* (*HHS*, 5c. AD)
clan-relative together-all extinguish-perish
"(His) clan relatives were all extinguished."

b. *Qī-qì* *zàn* *zài* *rì* *zhōng,* *kǒng* *qí* (*QMYS*, 6c. AD)
lacquer-ware shortly be-at sun middle fear it

zhì-huài*.*
burn-bad
"(People see) lacquerware shortly under the sun and fear it may be ruined."

There is indeed something different in the pre-maturation V-V resultatives. Unlike *dǎ-suì* "$\sqrt{\text{HIT}}$-$\sqrt{\text{SMASH}}$" in (52c), *tiǎn-miè* "$\sqrt{\text{EXTINGUISH}}$-$\sqrt{\text{PERISH}}$" and *zhì-huài* "$\sqrt{\text{BURN}}$-$\sqrt{\text{BAD}}$" in (53) do not have to be interpreted in a cause-result (subordination) relation, but can also be interpreted as the coordination of a passivized transitive verb and an intransitive verb, i.e. "get extinguished and perish" and "get burned and go bad". In fact, coordination is the standard interpretation for juxtaposed lexical verbs in OC, as in (54).

(54) a. ***Náo-luàn*** *wǒ* *tóng-méng,* ***qīng-fù*** *wǒ* (*ZZ*, late 4c. BC)
harass-chaotic our same-ally fall-turn over our

guójiā.
nation
"(They) harass and make chaotic our allies, make fall and overturn our nation."

    b.   *Tàn bēng,   jìn **yā-sǐ**.*   (*LH*, 1c. AD)
         coal collapse all crush-die
         "The coal collapsed; (the people) all got crushed and died."

In (54a), *náo-luàn* "$\sqrt{\text{HARASS}}$-$\sqrt{\text{CHAOTIC}}$" coordinates "harass" and the causativized "be chaotic", yielding the overall reading "harass and make chaotic"; *qīng-fù* "$\sqrt{\text{FALL}}$-$\sqrt{\text{TURN OVER}}$" coordinates two causativized verbs "fall" and "turn over", yielding the overall reading "make fall and overturn". In (54b), *yā-sǐ* "$\sqrt{\text{CRUSH}}$-$\sqrt{\text{DIE}}$" coordinates passivized "crush" and intransitive "die", yielding the overall reading "get crushed and die". In all these cases, the voice specifications of the coordinated verbs are matched with each other in accordance with the clausal configuration, which means the coordinated constituents involve not only V, but also Voice. The V-V strings in (53) can either be interpreted in the same way as (54b) (OC style) or in the newly developed cause-result fashion (V-V resultative). The two interpretations correspond to the two syntactic structures in (55).

(55)   a. V-V Coordination (OC)   b. V-V Subordination (resultative)
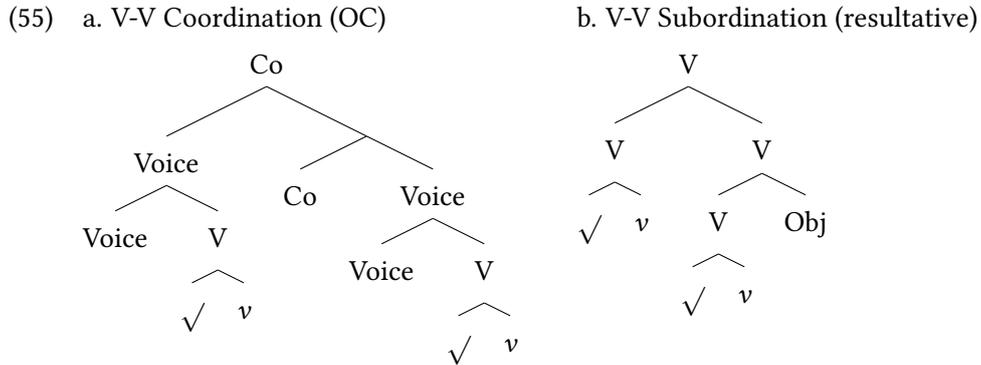
The structural ambiguity in (55) is a crucial step in the development of V-V resultatives, as it creates indeterminacy in the PLD and forces acquirers to make a choice. History tells us the subordination structure won out while the coordination structure died out in compositional syntax and got pushed into the word-formation domain (cf. Section 5.4.2). Leaving the details aside, if this "ambiguity"-stage is still free from DT influence, then we can conclude the development of V-V resultatives has not been influenced by DT. To investigate the situation, I split this stage into three sub-stages: *i*) the ambiguity appears, *ii*) acquirers make a choice, and *iii*) the ambiguity disappears. Since the second and the third sub-stages are unequivocally a matter of syntax (possibly involving parameter setting), I further narrow down our search domain to the first sub-stage, and now the question effectively becomes:

(56)   Did the Disyllabification Tendency influence the appearance of the V-V ambiguity?

As we already know, the ambiguity appeared in the accidental adjacency of the previously separate cause and result predicates, which has nothing to do with prosody. After the prosodic shift disyllabic strings do become more prone to be parsed as standard prosodic words (which could in turn facilitate further lexicalization, cf. Section 6.3), but this is irrelevant to the rise of the ambiguity in question

which is between two types of fully compositional phrase rather than between phrases and words.

In the entire development process of V-V resultatives, the only incident that may have been influenced by DT is the lexicalization of the originally compositional V-V coordination structure, which consequently become coordination compounds. In Section 5.4.2, we have already identified coordination compounds as a consequence of DT and elaborated on one source for their appearance, i.e. written registers with metrical requirement. Here we can identify another source for them, i.e. V-V coordination strings pushed out of compositional syntax. However, note that this incident can only facilitate the interpretation of accidentally adjacent cause and result predicates, but cannot create the necessary condition for V-V resultatives to become an independently productive construction. To achieve this effect some formalization must take place in the narrow lexicon. I leave the technical details to future research.

In sum, DT did not influence the appearance of V-V ambiguity in MidC and therefore did not influence the development of the V-V resultative construction, at least up till its maturation in late MidC. Although we cannot readily conclude that it has not influenced the construction's later booming in EMC-MC either, we can say that its influence (if any) is at best insignificant, for once a compositional construction becomes part of regular syntax, with the necessary categories formalized and parameters set, the systematicity of syntax alone is enough to account for its productivity.[53]

To summarize this section, DT is not the motivation for the disyllabic phrase boom in the history of Chinese, and although disyllabic phrases like V-O predicates and V-V resultatives have been claimed to be consequences of DT, closer examinations suggest they have not been influenced by the prosodic tendency.

7 Concluding remarks

In this paper, I have revisited the historical development of Chinese disyllabic words and re-evaluated their alleged cause-and-effect relationship with the Disyllabification Tendency (DT). I divided the relevant disyllabic words (more exactly "disyllabic units") into three types—disyllabic root, disyllabic compound, and disyllabic phrase—and examined their development paths one by one. In a nutshell, none but two subtypes of disyllabic unit (rhyming disyllabic root and coordination compound) has been motivated or influenced by prosody.

First, non-rhyming disyllabic roots (Section 5.1) are either loan words or consequences of the phonological simplification. They have never had a boom and are not the focus of our discussion. Second, compounding (especially free compounding) as a general word-creation strategy has boomed in the increasing need of a larger vocabulary because of its high economy (Section 5.3). An important background factor for the compound boom is the overwhelming monosyllabicity of Chinese morphemes. Third, phrasal (re-)lexicalization of complex substantial

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[53] For instance, we do not need to resort to prosody to explain the productivity of V-O phrases like *watch TV*, relative clauses like *a girl that sings*, D-N phrases like *the cat*, etc.

concepts ("compound-like phrase" for short) has boomed as a consequence of the typological shift to high analyticity (Section 6.2). Importantly, for both strategies disyllabicity is a coincidence rather than a necessity; there are plenty of multisyllabic compounds and compound-like phrases. It is an interesting fact that both booms took place in MidC (though not exclusively), which is the critical period of DT. However, the chronological overlapping does not guarantee a cause-and-effect relationship, especially because quite a few other significant changes also occurred during the same period (cf. Shi 2002). It is true that DT has had important impact on the Chinese languages, but more often than not the impact stays at the prosodic level without alteration to morphosyntax and (ultimately) the lexicon.

As for the two subtypes that have been motivated or influenced by DT, rhyming disyllabic roots (Section 5.1) and synonymous coordination compounds (Section 5.4.2) are born in the metrical requirements of literary works and serve for aesthetic decoration; therefore, they are both more common in high registers than in low registers. For these items disyllabicity is their purpose. On the other hand, non-synonymous coordination compounds (often with temporal precedence) are consequences of an interpretational ambiguity in the development process of V-V resultatives (Section 6.4.2). They are pushed from compositional syntax (i.e. the clausal spine) into the word-formation domain (i.e. the categorizer phase) under the influence of DT. For these items disyllabicity is not a purpose but merely a frequent pattern.

Several theoretical points came up in the course of our discussion that are worth further investigation: *i*) the proposed theory of compounding (especially its cross-linguistic tenability); *ii*) analyticity in and beyond Chinese (its emergence and motivation); *iii*) the rise of V-V resultatives as a productive syntactic construction (the technical details). In addition, some relevant issues have not been properly addressed due to the scope limit. Among others, the distinction between compound word and complex word is intriguing, the systematic meaning generalizing mechanism of coordination compounding may be more than a matter of lexicalization, and the non-compounding word-formation strategies such as affixation (e.g. *lǎo-shī* "OLD-teacher; teacher") have been left out. I leave these issues to future research.

A HISTORICAL DOCUMENTS (IN CHRONOLOGICAL ORDER)

(1) *YJ. Yì Jīng* 易經 "Classic of Changes". 9c. BC.

(2) *SJG. Shī Jīng* 詩經 "Classic of Poetry". 7c. BC.

(3) *LY. Lún Yǔ* 論語 "Analects of Confucius". 5-3c. BC.

(4) *GZ. Guǎn Zǐ* 管子 "Writings of Master Guan". 4c. BC.

(5) *ZZ. Zuǒ Zhuàn* 左傳 "Commentary of Zuo". Late 4c. BC.

(6) *LSCQ. Lǚ Shì Chūn Qiū* 呂氏春秋 "Mr. Lü's Spring and Autumn Annals". 3c. BC.

(7) *MZ. Mèng Zǐ* 孟子 "Writings of Master Meng". 3-2c. BC.

(8) *ZZJ. Zhàn Guó Zòng Héng Jiā Shū* 戰國縱橫家書 "Letters of Strategists in the Warring States Period". Early 2c. BC.

(9) *ZGC. Zhàn Guó Cè* 戰國策 "Strategies of the Warring States Period". 2c. BC.

(10) *LJ. Lǐ Jì* 禮記 "Book of Rites". 1c. BC.

(11) *SJI. Shǐ Jì* 史記 "Records of the Grand Historian". 1c. BC.

(12) *LH. Lùn Héng* 論衡 "Discourse Balance". 1c. AD.

(13) *JS. Jiān Shì Fū Rén Mù Bēi* 菅氏夫人墓碑 "Gravestone of Madam Jian". 3c. AD.

(14) *SGZ. Sān Guó Zhì* 三國志 "Records of the Three Kingdoms". 3c. AD.

(15) *SS. Shàng Shū* 尚書 "Book of Documents". 5c. AD.

(16) *HHS. Hòu Hàn Shū* 後漢書 "Book of the Later Han". 5c. AD.

(17) *SSXY. Shì Shuō Xīn Yǔ* 世説新語 "A New Account of the Tales of the World". 5c. AD.

(18) *QMYS. Qí Mín Yào Shù* 齊民要術 "Essential Techniques for the Welfare of the People". 6c. AD.

(19) *FSA. Fuó Shuō Ē Mí Tuó Jīng Jiǎng Jīng Wén* 佛説阿彌陀經講經文 "Text of the Shorter Sukhāvatīvyūha Sūtra". 8c. AD.

(20) *JK. Jiǔ Kè* 久客 "Away from Home for Long". 8c. AD.

(21) *WDSPH. Wǔ Dài Shǐ Píng Huà* 五代史平話 "Tales from the Five Dynasties". 13c. AD.

(22) *ZZYL. Zhū Zǐ Yǔ Lèi* 朱子語類 "Classified Conversations of Master Zhu". 13c. AD.

(23) *XYJ. Xī Yóu Jì* 西遊記 "Journey to the West". 16c. AD.

(24) *QLD. Qí Lù Dēng* 歧路燈 "Lantern on the Forked Road". 18c. AD.

B Corpora

(1) Xiaoxuetang Online Database. http://xiaoxue.iis.sinica.edu.tw/.

(2) Academia Sinica Diachronic Corpora.

    a. <1c. AD: http://old_chinese.ling.sinica.edu.tw/.

    b. 1-7c. AD: http://middle_chinese.ling.sinica.edu.tw/.

    c. 7-18c. AD: http://early_mandarin.ling.sinica.edu.tw/.

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