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indirectly suggesting a pitch reset (as a null hypothesis is difficult to be proved statistically).

4. Concluding Remarks

We use the term "disfluent speech", but being disfluent is nothing but "human" (Shriberg 2001). It is common to observe these so-called ungrammatical sequences or performance in spontaneous, unprepared conversation, which rarely result in understanding problems for humans. But in automatic speech systems, it is extremely difficult to generate a cleaned up version from disfluent speech data. Maybe this is because we do not yet know enough about disfluent speech to make an automatic speech system "human-like" enough. More studies on Chinese tone errors and repairs in conversational speech are needed to shed light on how tones are associated with the segmental structure of Chinese spoken words. The prosodic patterns concerning Fo contours and duration in disfluent speech in Chinese may vary, if tone repairs are taken into account.

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Shu-Chuan Tseng

Disyllabification

The use of the notion of disyllabification as a development in the history of the Chinese language implies that there must have been a time in which the language was monosyllabic (Kennedy 1951; Chao 1968; Duanmu 2000). Whether earlier stages of the language were purely monosyllabic or not, recent studies show that Archaic (or Proto-) Chinese had a prosodic structure that differed from that of Medieval Chinese (100 BCE–100 CE) (Pulleyblank 1962, 1977–1978; Pan 2000; Zhèngzhāng 2003) (→ Medieval

Chinese, → Old Chinese Phonology, → Old Chinese Morphology, and → Old Chinese Syntax). For example, emphatic (that is, heavier) forms, as contrasted with non-emphatic (weaker) counterparts, as seen in (1), indicate that the mora, rather than the syllable, was the basis for determining the prosodic weight in Archaic Chinese (before 300 BCE, see Feng 2015). (Phonological reconstructions in this article are based on Baxter 1992; only the elements under discussion are given in reconstructed form.)

1. a. 吾喪<u>我</u>。
   *ŋa   sàng   *<u>ŋajʔ</u>.
   1SG   lost   1SG
   'I lost myself.'
   Zhuāngzǐ: Wéiwùlùn 莊子：齊物論
   (c. 369–286 BCE)

   b. <u>彼</u>丈夫也，<u>我</u>丈夫也，吾何畏<u>彼</u>哉？
   *<u>prjajʔ</u>   zhàngfu   yě,   *<u>ŋajʔ</u>   zhàngfu
   3SG   man   PRT   1SG   man
   yě,   *ŋa   hé   wèi   *<u>prjajʔ</u>   zāi?
   PRT   1SG   why   afraid   3SG   PRT
   '<u>HE</u> is a man, <u>I</u> am a man, how come I am afraid of <u>HIM</u>?'
   Mencius: Jìn Wéngōng 孟子：滕文公
   (c. 372–289 BCE)

When pronouns are used in stressed positions (the object position for example as in (1a)) or contrastively (as in (1b)), heavier forms such as *ŋajʔ (containing more than one mora) are favored over their lighter counterparts such as *ŋra (containing only one mora) for the first person pronoun.

Evidence supporting this analysis in terms of moras comes from the two-syllable per line structure of the earliest poems, such as in (2) (from *Wúyuè Chūnqiū* 吳越春秋).

2. 斷竹，續竹；飛土，逐肉。
   *tonʔ   *trjuk,   *zljok   *trjuk;   *pjəj
   cut   bamboo   connect   bamboo   fly
   *hlaʔ,   *drjiwk   *njuk.
   earth   chase   flesh
   'Cut a bamboo (and) string it (into a bow); fly the pellet (and) hunt animals.'

The oldest poem we know as in (2) indicates that one syllable could form an independent foot because no poetic lines are in general formed by fewer than two feet, and if *tonʔ *trjuk 斷竹 'cut bamboo' is a poetic line it must consist of two prosodic units (or two feet); if *tonʔ *trjuk has two prosodic units (feet), then *tonʔ and *trjuk must each be a prosodic unit. And then, if *tonʔ 斷 (or *trjuk 竹) is a syllable as is generally assumed in the literature and if it is also a prosodic unit (foot) as shown above, then one syllable must be a prosodic unit. Since there is no prosodic unit (foot) without a branching structure (by the relative prominence principle), the syllable *tonʔ and *trjuk must be analyzed as a branching prosodic structure. Since a syllable branching structure is analyzed in terms of moras in metrical theory, the archaic syllables of *tonʔ and *trjuk in the disyllabic poetic line are consequently also analyzed in terms of moras. This entails further that each syllable has at least two moras (or two moraic positions) in a poetic line formed by two syllables, giving rise to a moraic foot structure. This type of moraic foot structure was replaced by a syllabic foot structure later in the language (→ Old Chinese Phonology).

The "one syllable-one foot" structure is consistent with both the written system of "one syllable-one character" and the morphological system of "one morpheme/word-one syllable" in Archaic Chinese (i.e., "each word consists of one syllable, neither more nor less"; Jespersen 1922:369).

Though disyllabic words did indeed exist in the early stages of the language (i.e., the Shāng-Zhōu Dynasties from the 17th–11th cents. BCE), they did not flourish until the Hàn Period (206 BCE–220 CE), as shown by statistics in Table 1.

"Total Comp" = Total compound words, "CC" stands for Coordinating Compounds, and MH for Modifier Head Compounds; from Feng (1997), based on Chéng (1982:112, 1985:337).

Different theories have been proposed to account for why disyllabification emerged in the history of Chinese and why it occurred specifically at that time (Chéng 1982). The most notable

theories can be summarized as follows. First, the emergence of disyllabification was due to an aesthetic reason (Hóng 1999:160–172), because the Chinese custom favors pairs of everything, so does the language, starting from paired phrases to paired words, and finally paired syllables, i.e., disyllabification. Another explanation for disyllabification that has been offered is a socioeconomic one (Chéng 1982): Hàn society had developed and thus flourished more than ever, and as a consequence, more words were coined to describe socioeconomic developments, resulting in disyllabic forms. A third proposal to explain the disyllabification development is that it is linguistically motivated. That is, two-syllable words are functionally motivated in order to make up for the loss of consonant clusters, a phonological change from Archaic Chinese to Medieval Chinese observed in the literature (Graham 1969:49). It is assumed that a syllable with consonant clusters may carry more information than one without. As the loss of clusters proceeded, the result was more monosyllabic homonyms that were presumably functionally overloaded: disyllabic forms were developed for disambiguation and meaning clarification. The same fact of syllable simplification motivates yet another proposal, called the "internal mechanism hypothesis". It hypothesizes that the loss of consonant clusters changed the phonological system of the language as a whole: first it reduced the weight of a syllable, with the result that the simplified syllable would no longer be able to form a foot (i.e., an independent prosodic unit), and secondly, the loss of the final consonant resulted in a tonal system (*-ʔ became a rising tone and *-s a falling tone; Haudricourt 1954; Baxter 1992; Yakhontov 1960; Pulleyblank 1962; Zhèngzhāng 2003), which eliminated the weight differences between heavy and light syllables that existed

before (see example (1)). The new prosodic system, which developed alongside the evolution of the new tonal system of Medieval Chinese, required disyllabic units that either forced monosyllabic words to become disyllabic compounds or to appear in disyllabic phrasal environments. This resulted, for example, in new morphosyntactic phenomena such as *qiàn-ǒu cí* 嵌偶詞 'monosyllabic word occurring in disyllabic template', such as *xiào* 校 'school' only appearing in disyllabic phrases like *cǐ xiào* 此校 'this school', *wǒ xiào* 我校 'my school', but not **wǒmen xiào* **我們校 'our school' (Feng 2009:149).

Currently, the following formations of disyllabification of monosyllabic forms in early Archaic Chinese are recognized:

3. a. Lexification of disyllabic phrases
    天子
    tiān   zǐ
    heaven   son
    'the son of heaven, emperor'
    b. Syllable split (into → binome)
    茨 蒺藜
    *dzjij →   *dzjit-rij
    'Terrestris'   'Terrestris'
    c. Affixation
    無-念
    *mrja-nəms
    prefix-miss
    'to miss (someone)'
    d. Parataxis and anagram
    衣裳   裳衣
    yī   shāng shāng yī
    shirt skirt   skirt   shirt
    'clothes'   'clothes'
    圖書   書圖
    tú-shū   shū-tú
    picture-book   book-picture
    'publications'   'publications'

Table 1. Percentage of CC and MH compounds in Confucius, Mencius and Lùnhéng

Chronology	Texts	Total Comp	Total CC	%	Total MH	%
c. 550 BCE	*Confucius*	180	48	26.7	67	37.2
c. 300 CE	*Mencius*	333	115	34.5	100	30
c. 100 CE	*Lùnhéng*	2088	1401	67.24	517	24.76

e. Polar compound and partial compound (using one meaning of the two parts)

動靜   肆諸<u>市朝</u>
dòng-jìng   sì-zhū   <u>shì-cháo</u>
active-quiescent   kill.it-at <u>market-(imperial) court</u>
'activity'   'To execute him at the market (cf. Execution is not allowed in the imperial court).'

f. Disyllabic names/binomes (insects, plants and mimetic words, Baxter 1992)

展轉   輾轉反側
zhǎnzhuǎn   zhǎnzhuǎn fǎn cè
'turn over'   'turn over and over'

Taking all the examples into consideration, the internal mechanism hypothesis seems quite plausible as an explanation for the rise of disyllabification specifically during the Hàn era, that is, before the completion of the four tone system by the Wèi Jìn Period. This is so because it offers a principled reason for the change: the newly developed tone-bearing syllables can no longer naturally and systematically differentiate the weight between syllables in terms of moras. The simplification of the syllable inevitably weakened the moraic foot system of Archaic Chinese, thus giving rise to the new disyllabic foot structure in Medieval Chinese.
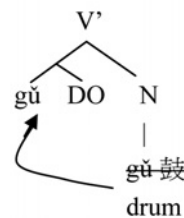
The rise of disyllabification has changed the appearance of the language in many ways. First, it has increased vocabulary in the language. After the Hàn, commonly used monosyllabic words mostly have a disyllabic counterpart (synonyms), named *dān shuāng yīnjié duìyìng cí* 單雙音節對應詞 'pairs of monosyllabic and disyllabic words' (Zhū 1992; Feng 1997), such as *shā* 殺 'kill' → *shā-lù* 殺戮 /kill-kill/ 'kill'; and *fěi* 誹 'slander' → *fěibàng* 誹謗 /libal-slander/ 'slander'. Although trisyllabic forms also developed during the Eastern Hàn (25–220 CE), disyllabic compounds have ever since remained overwhelmingly the majority throughout Chinese history.

Second, disyllabification has affected the morphology of Chinese. Derivational and probably inflectional morphology in Archaic Chinese was disappearing while disyllabic compounding started to increase from the Warring States

Period onwards (c. 475–221 BCE) and flourished during the Hàn (206 BCE–220 CE), when trisyllabic compounds also started to appear (Hú 2002; Féng 2008), giving rise to the *prosodic word* effect that compounds are minimally formed by two and maximally by three syllables in Chinese, i.e., *sàng jiā zhī quǎn* 喪家之犬 /lost home SUB dog/ 'stray dog' in the Spring and Autumn Period (770–476 BCE) became *sàng jiā quǎn* 喪家犬 /lost home dog/ 'stray dog' in Eastern Hàn. Only during or after the Six Dynasties (c. 420–589 CE) does the standard prosodic word (formed by a disyllabic foot) start to be also compounded, giving rise to what is later called four syllable idioms or *sì zì chéng yǔ* 四字成語 (Zhāng 1999), which are mostly used for formal and elevated registers.

A newly recognized effect of disyllabification is a change in medieval syntax (Feng 2014a). Disyllabic phrasal units are now required in the context of monosyllabic light verbs, which may be the reason for the syntactic change from phonetically unrealized light verb syntax in Archaic Chinese to phonologically realized light verb syntax in Medieval and Modern Chinese (Feng 2014b): to form a disyllabic unit, the light verb is made overt. For example:

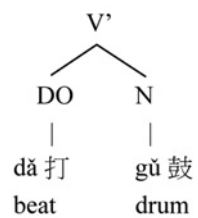4. phonologically realized light verb   phonologically unrealized light verb

齊王鼓。
Qíwáng gǔ.
Qí.king drum
'The King of Qí beat a drum.'
Zuǒzhuàn 左傳 (c. 300 BCE)

處處打鼓。
Chùchù <u>dǎ</u> gǔ.
everywhere beat drum
'… beat drums everywhere.'
Fóběnxíng jíjīng 佛本行集經 (c. 500 CE)

In the Chinese historical literature, it has been widely recognized that only after the Hàn, the new style of parallel prose called *piánwén* 駢文 developed. The grammar of parallel prose

is essentially based on the duplication of a disyllabic unit to versify parallel phrases between [σσ+σσ] or [σσ+σσ+σσ] antithesis, earning the local term four-six prose (*sì liù wén* 四六文, i.e., prose made by four or six syllable sentence pairs). For example, in the *Wúchéng Fù* 蕪城賦 'Rhapsody on the city overgrown with weeds', Bào Zhào 鮑照 (417–450) wrote:

Míyǐ píng yuán 彌迆平原 [σσ+σσ]
Smooth and gently sloping, a level plain,
Nán chí cāngwū zhànghǎi 南馳蒼梧漲海 [σσ+σσ+σσ]
Southward galloping to the Green Kola and the Swollen Sea,
Běi zǒu Zǐsè Yānmén 北走紫塞鴈門 [σσ+σσ+σσ]
Northward racing to the Purple Pass and the Goose Gate....

Although disyllabification has always been recognized as a prominent feature of the development of Chinese from the medieval to modern periods, it remains to be determined how this feature is further developed and whether or not Chinese is a disyllabic, monosyllabic, or polysyllabic language in terms of how its morphemes are formed. Note further that the term disyllabification does not mean that words after Medieval Chinese are made disyllabic like English *paper*, with two meaningless syllables, rather, for more than 67% of the relevant cases, the necessity of disyllabification results in words like *mailman*, that is, disyllabic compounds (Zhōu 1999). Obviously, the disyllabic compounds (including root plus suffix like *fáng-zi* 房子 'house', *hái-zi* 孩子 'child', and *zhuō-zi* 桌子 'table') could not have been formed if there had been no monosyllabic forms (either words or morphemes) in the language to start with. Whichever theory explaining disyllabification will turn out to be right, the phenomenon is bound to fascinate scholars for many years to come.

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Shengli Feng

Donkey Anaphora

"Donkey anaphora" refers to the relation between pronouns such as *it* and *he* and their antecedents in sentences like those in (1).

1. a. Every farmer who owns a donkey beats it.
   b. If a farmer owns a donkey, he beats it.

These pronouns do not have a referential pronominal interpretation like that of *it* in (2), where *it* refers to the cat mentioned in the previous sentence.

2. John owns a cat. Mary likes it very much.

In the case of (1), *it* does not refer to a particular donkey and *he* does not refer to a particular farmer. The preferred reading is that every farmer who owns at least one donkey beats every donkey he owns. This is a universal reading of *he* and *it*, even in the case of the conditional sentence in (1b). Given such a reading, *it* and *he* in (1) are also different from bound variable pronouns like *his* in (3), whose reference is dependent on *every boy*. *It* and *he* in (1) cannot be bound variable pronouns because their antecedents, *a donkey* and *a farmer* respectively, are not in a position where they can c-command these pronouns.

3. Every boy loves his pet.

Aside from the preferred universal reading indicated above, some cases of donkey anaphora yield existential readings, as in (4).

4. Every person who had a dime in his pocket put it into the meter.

In contrast to the universal interpretation of *he* and *it* in (1), *it* in (4) does not have a universal reading. Instead, the prefered reading of (4) is that every person puts *at least one dime* into the meter (not *every dime in his pocket*).

There are numerous studies of pronouns of the kind like *it* and *he* in (1) and (4), leading to lively discussions not only about the theoretical treatments and interpretations of such pronouns, but also about cross-linguistic instantiations about donkey anaphora.

1. E-type Pronoun *versus* Unselective Binding

Evans (1977, 1980) treats pronouns such as *it* and *he* in (1) as E-type pronouns, which are essentially definite descriptions. Under such a treatment, (1b) has the paraphrase as in (5).

5. If a farmer owns a donkey, [the farmer who owns a donkey] beats [the donkey that he owns].

Under an E-type pronoun analysis of donkey sentences, the indefinite noun phrases such as *a farmer* in (1b) are treated as existential quantifiers. See Lappin and Francez (1994) for a