

Is the Glass Half-Full, or Half-Empty? The Alternative Concept of Stress in Mandarin Chinese^{*}

Hana Trísková (廖敏)

Abstract: This study proposes an alternative view on Chinese stress. The focus is on the issue of phonetic weakening, instead of the issue of stress. The existence of word stress in Chinese is refused. The proposed hypothesis claims that in tonal Chinese, particularly in colloquial Mandarin of Beijing type, phonetic weakening plays a more important role than phonetic enhancement. It is quite rule-governed, and many of its instances have become phonologized/grammaticalized. The main source of phonetic weakening is semantic weakening, occurring at various linguistic levels. The author claims that knowing more about the contexts and functions of the weakening and its relationship with grammar and information structure may stimulate progress in studies of Chinese speech rhythm.

Keywords: Mandarin Chinese; *Putonghua*; phonology; prosody; stress; word stress; phonetic weakening; phonetic reduction

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1. Introduction

As the findings of cognitive linguistics show, **speech rhythm** has a significant function in oral communication: it is an important device facilitating perception of speech signal. The reason is that the human brain generally finds it hard to perceive and remember series of mutually undistinguished items lacking any patterns. Thus, in speech perception, it is much easier to make sense of configurations of stimuli of varying prominence, than to process an uninterrupted series of equally prominent syllables or words. This general principle is reflected in the speech rhythm of many natural languages (though more or less obviously). Everyday colloquial Mandarin of Beijing type undoubtedly displays clear speech rhythm. Zhu (1997: 228) points out: “If the places which should be stressed are pronounced as unstressed, or conversely, the places which should be unstressed are pronounced as stressed, then [undue] unstressed pronunciation sounds monotonous and dull, while [undue] stressed pronunciation may affect comprehension of the utterance meaning.” Interchange of variously prominent items in speech is commonly interpreted as interchange of stressed (strong) and unstressed (weak) syllables. This study attempts to show that the effect of speech rhythm can be equally well guaranteed by the interchange of “normal” and weak syllables (cf. Chao, 1968: 38, speaking of “reducing the degree of other normal stresses”).

Stress in Chinese is a controversial issue. “In fact, Chinese linguists disagree on both whether Chinese has stress, and if so, where it is.” (Duanmu, 2002: 125). The majority of linguists agree that Mandarin (unlike e.g. Cantonese) *has* stress, and that it is a useful concept. Unfortunately, “stress is the least discussed area in Chinese phonology” (Duanmu, 2001: 120). Research on Chinese stress is chiefly concerned with **word stress**, while fewer studies deal with **higher linguistic levels**. Cheng (1973: 63) admits: “Mandarin stress patterns beyond the level of words are not yet clear.” These patterns have still not been thoroughly explained ever since. A number of linguists study Chinese stress using formal approaches, such as metrical phonology, while the issue is still insufficiently treated in applied linguistics and L2 pedagogy.

Regarding stress in Mandarin, there is **general agreement** on some points:

- Mandarin has stress.
- It operates at all major structural levels: word, phrase and sentence levels.
- Phonetic cues of stress and non-stress are mainly manipulation of syllable duration and pitch range; further, segmental reductions may occur in unstressed syllables.
- Some morphemes are inherently unspecified for tone, carrying the lexical neutral tone.
- Tonal morphemes may be weakened or even lose their tones in particular contexts.
- The syllables pronounced in the neutral tone are unstressed.

However, **consensus is lacking** in major aspects of research on Chinese stress. Linguists still dispute its very nature and pertinent phonological interpretation. Why does Chinese stress resist explanation? There are several reasons for this:

- Chinese is rather heterogeneous. It encompasses many different language varieties, thus it is generally impossible to come up with global statements about Chinese stress as such.
- Chinese is a tone language, where F0 variation is used for tone contours. The means of expressing stress thus seem to be severely constrained, since pitch is one of the major cues for stress in languages. The relationship between tone and stress has to be explained.
- Stress patterns of many disyllabic tonal words may not be stable.
- Native speakers' judgements on stress are notoriously inconsistent.

Given the situation, it may be worth viewing the issue from yet another angle and seeing whether **an alternative analysis** could bring any considerable advantages or reveal any consistent patterns. Such an analysis is proposed in this study. Its main focus is not on the issue of *stressed* items, but rather on the issue of *unstressed*, or, more properly, *weakened* items. It claims that, in Chinese, phonetic weakening plays a

more important role than phonetic enhancement. I will give evidence that most cases of weakening are rule-governed. A crucial notion will be a “normal syllable” (a default phonetic form of a tonal morpheme which is neither weakened nor enhanced). I argue that the weakening of full pronunciation is mainly triggered by the weakening or loss of lexical meaning.

The present analysis was first outlined in Třisková (2016, 2017a). It was applied there to examine only Chinese monosyllabic tonal function words, newly termed as “the cliticoids” (e.g. prepositions, classifiers, etc.). In the present study, the scope is broadened to cover yet other linguistic levels. Note that the terms **de-stress** or **non-stress** were used in Třisková (2016, 2017a). However the present article generally avoids them or places them in inverted commas. These terms were found unfit. Why? The former implies that a *de-stressed* item was originally *stressed* before it became weak. The latter is a negation of the term *stress*. In fact, **I do not work with the concept of stress** (except for logical/contrastive stress). Yet, for ease of explanation, I use the common expressions “unstressed” and “non-stress” here or there. They refer to a syllable which is non-prominent, inconspicuous. Note that the Chinese term *qingyin* 轻音 (a translation of the English term “non-stress” or “unstressed syllable”) is not at odds with the present analysis. As such, it is rather neutral, simply meaning “light, weak sound”. The term *qingyin* may be treated as an equivalent of *qingdu* 轻读.

The variety of Chinese examined in this study is **Mandarin of Putonghua type**, as used by native Beijing speakers (further referred to as Mandarin). The focus is on colloquial speech delivered in natural tempo, which contains quite a few neutral-tone syllables and many tonally weakened syllables. Admittedly, my evidence is based on this particular variety of Chinese. Yet the basic principle—recognizing the phonological importance of phonetic weakening and abandoning the hunt for stressed syllables—may be pertinent for other varieties of Chinese too (and possibly for other tone languages). The observations are, among other sources, based on the **corpus of Oldřich Švarný**

(Švarný et al., 1991-1993^①). Example sentences presented in this article mostly come from this material. I record them in the prosodic transcription CHIPROT. Pinyin items are given in italics, except for the expression “Pinyin” and personal names. The tones are referred to as T1, T2, T3, T4 and T0.

The article is organized in the following sections. After the preliminaries (section 2), the state of affairs in connected Mandarin will be outlined (section 3). Then two possible approaches to the issue will be introduced (section 4). The essential hypothesis will be raised (section 5) and manifold functions of weakening at particular linguistic levels will be explored (section 6). Lastly, pedagogic consequences of the present analysis will be discussed, and the prosodic transcription CHIPROT will be outlined (section 7).

2. Preliminaries

Mandarin Chinese is a tone language. Except for a small number of toneless morphemes, such as the particle *de* 的, every Chinese syllabomorpheme (*yusu* 语素) is “born with a phonemic tone” (Tseng, 1990: 47). At the same time, Mandarin is mostly agreed to have stress.

Generally, linguists agree on the idea that the perception of stress is **based on contrast**. Stressed elements are perceived as more prominent than surrounding elements. In other words, **stress** cannot exist without **non-stress**. “Stress (重读) and non-stress (轻读) are two sides of a single issue. Stress means that a certain part of a sentence is more prominent, thus attracts the attention of a listener. Non-stress then means that particular words in particular positions in a sentence have their meaning changed, emptied or weakened. Both situations have some kind of semantic background.” (Zhu, 1997: 228). Thus, what matters in perception is the *relative contrast* between stressed and unstressed syllables. (Note that I do not distinguish between perceptual prominence

① This textbook exemplifies major grammatical phenomena of *Putonghua*. It is organized into ca. 260 paragraphs, supported by several thousands of the example sentences. These were recorded by a native Beijing speaker, Ms. Tang Yunling (唐云凌) Rusková. Oldřich Švarný (1920-2011) was a Czech sinologist, linguist and phonetician. He pioneered new approaches in research on Mandarin prosody and its teaching and inspired my own explorations in the field.

and phonological stress in this general introduction).

2.1 Perceptual/acoustic correlates of stress in Mandarin

The features contributing to stress and non-stress perception in various languages generally comprise pitch, length, loudness, and timbre. Their acoustic correlates are fundamental frequency (F0), duration, intensity, and spectrum (formant structure). They are used in mutual combination, being in a trade-off relationship.

It is well known that particular languages employ these features in their particular ways. Regarding **Mandarin**, the consensus among linguists, based on experimental research, is that stress and non-stress in Mandarin syllables are phonetically cued by the following parameters:

- syllable duration (long/short); horizontal dimension
- pitch range (expanded/compressed); vertical dimension
- loudness (increased/decreased); as a secondary feature
- segmental lenition (i.e. consonant and vowel reductions) in unstressed syllables

These conclusions can be found in Chao (1968: 35), Kratochvil (1968: 41), Shih (1988: 93), Shen (1989: 59), Lin (2007: 222), etc. Besides linguistic literature, they are also reflected in texts introducing Mandarin phonetics/phonology, e.g. Zhu (1997: 228-229), Lin & Wang (1992: 179), and in some general textbooks, e.g. Wang et al. (2002: 126).

Let us review the phonetic properties of stressed and unstressed syllables in Mandarin.

Stressed syllables are agreed to have longer duration and expanded pitch range; consequently, they are able to display a full tone. Further, the syllable may be relatively loud. The vowels and consonants tend to be fully pronounced (e.g. *shàng* 上 [ʃǎŋ]⁴).

Unstressed syllables are agreed to have shorter duration and compressed pitch range; consequently, an unstressed tonal syllable is not able to display a full tone. It has a weak tone, or even no perceivable tone. Further, the syllable may be less loud. Its

segments tend to be reduced, or occasionally even deleted.^① See e.g. Lin (2007: 99). The importance of shortened duration was pointed out already in Lin (1962: 302).

At this point, let us make a short comment on the type of Chinese speech rhythm. While e.g. Cantonese is agreed to be **syllable-timed**, there is no agreement on whether Mandarin is stress-timed or syllable-timed (cf. e.g. Mok, 2009). Judging from the features described above, the properties of Mandarin remind us of a **stress-timed language** (such as English). However, although phonetic reductions of unstressed syllables are observed here (similarly to English), the label of a stress-timed language does not seem appropriate, at least within the present analysis (see below). The term “stress” will be reserved just for emphasis. Thus, colloquial Mandarin may be tentatively labelled as a “reduction-timed language”.

2.2 Relationship between stress and tone

The question of the relationship between stress and tone is rather complex, but many linguists would agree with the description found in Coster & Kratochvil (1984: 120): “The primary tone is expanded or suppressed in all its acoustic-perceptual dimensions by the degree of stress imposed upon it.”^② See also in Chao’s analogy: “Stress, therefore, can be pictured by stretching the tone graph on an elastic background” (Chao, 1968: 35). The situation can be illustrated using a metaphor: **phonetically, tone is a servant of stress** (or more exactly, of prominence). On the other hand, as Kratochvil (1968: 41) points out, “the two features are subordinate in the phonemic structure of the language, tone being the condition of stress, and not vice versa.” Thus **phonemically, tone is a master of stress**.

① Segmental lenition in unstressed syllables affects both vowels and consonants. It may involve: lax articulation, undershooting of articulatory targets such as vowel centralization (*lāba* 喇叭 [la:ħa] → [la:ħə]), vowel devoicing (*dòufu* 豆腐 [toofu] → [toofɥ]), voicing of voiceless consonants (*tāde* 他的 [t^ha:tə] → [t^ha:də]), turning falling diphthongs into monophthongs (*nǎinai* 奶奶 [namai] → [namə]), and deleting terminal nasal consonants (*shàng* 上 [šãŋ] → [šã] or [šã̃]). Note that the monophthong [ə] is generally permitted only in atonic syllables.

② The authors continue: “An exaggerated tone (i.e. one with a more pronounced pitch contour and greater pitch deviation, louder and longer than usual) signals a high degree of stress, while a suppressed tone signals a low degree of stress, down to a complete neutralization of tonal distinctions.”

2.3 Degrees of phonetic weakening

This study is interested in weak, “unstressed” syllables (轻音 or 轻读音节). Therefore, let us look more closely at the relationship between “stress” and tone in such syllables. In reality, the process of phonetic weakening, reduction (弱化), is a **stretchy continuum** (cf. Wang, 2016: 32). On top of the suprasegmental aspect, the weakening may also comprise segmental lenition or deletion. For the moment, let us focus only on the suprasegmental aspect. Gradual shortening of syllable duration and pitch range compression leads to gradual tone weakening. Yet it is useful to distinguish three categories of tone weakening:

1. **weakened tone**: the tone is weak, reduced, yet still perceivable (recoverable weakening)
2. **neutralized tone** (tone neutralization, 声调中和化): the underlying tone is lost without a trace in speech in particular contexts (recoverable in some cases)
3. **lexical neutral tone** (toneless morphemes): no underlying tone (fully lexicalized/grammaticalized/phonologized weakening)

Needless to say, **the borderline** between toneless syllables/morphemes (3.) and tonally neutralized syllables (2.) is not clear-cut. Chen (1984: 300, also 318) complains: “Dictionary listings of the lexical neutral tone items are simply chaotic.” One of the reasons is that weakening is subject to language change. This issue will not be discussed here. It belongs to studies on language development, language standardization (轻声规范), and, by extension, to language pedagogy (see e.g. Wang, 2016). Further, the borderline between tonally neutralized syllables (2.) and weak-tone syllables (1.) may also be vague (Is the tone still perceivable, or totally gone?). This, however, is less crucial. It is mainly a fine phonetic variation and does not concern phonology. Yet we should be aware of the cases where tone neutralization is obligatory (e.g. the second syllable in *kànkàn* 看看, see below).

2.4 The neutral tone

Before we continue, we have to deal with the term “neutral tone”, or *qingsheng* 轻

声. Generally, a neutral-tone syllable is understood to be a syllable realized without any perceivable tone. Its **phonetic properties** are short duration and segmental reductions; its pitch is decided by a preceding tonal syllable and by intonation. See Lee & Zee (2014: 378) or Cao (2002: 111).

There are two kinds of neutral tone (see e.g. Lin & Wang, 2013: 165). First, there is a certain number of toneless morphemes which are always pronounced in the neutral tone (the particles *de* 的, *ma* 吗, or lexical suffixes such as *zi* 子). They carry the **lexical neutral tone** (*cihui qingsheng* 词汇轻声).^① Further, some morphemes carry an underlying lexical tone, yet they are pronounced in the neutral tone in particular contexts (e.g. the second syllable in *kànkàn* 看看). These are **tonally neutralized syllables**. As Wang & Huang (1981: 59) point out, neutral tone is an inherent part of *Putonghua* and cannot be ignored.

The author of the term is Yuen Ren Chao. He originally used the term *qingyin* 轻音. From the mid-1930s (e.g. Chao, 1948: 27, 1968: 36) he replaced it with the term “neutral tone”, *qingsheng* 轻声. Chao subsumed both toneless morphemes and tonally neutralized syllables under the neutral tone. Later on, both terms occurred in the literature and were used in a variety of ways (as discussed e.g. by Lu & Wang, 2012: 3-5).^② One way or the other, neutral-tone syllables are agreed to be **unstressed**. Yip (2002: 182) writes: “All researchers agree that toneless syllables are unstressed.” Regarding cause-and-effect relationships, there is also an agreement: “Mandarin neutral tone... is induced by the lack of stress.” (Lin, 2001a: 51). Diachronically, the emergence of the neutral tone is thus explained by **permanent stress loss**. “Neutral tone is induced by being in an unstressed position for an extended period of time.” (ibid 86).

This study views *qingsheng* as a special subgroup of *qingyin*. If the utmost phonetic

① Wang (2016: 26) distinguishes unpredictable, *lexical* cases of neutral-tone words (不可以类推的) 词汇轻声词 as opposed to predictable, *grammatical* cases of neutral-tone words (可以类推的) 语法轻声词.

② Their meanings were sometimes equalled (e.g. Lin & Wang, 1992: 179), sometimes mixed up, and sometimes kept as separate concepts: *qingsheng* belongs to the level of tones, standing in opposition to four lexical tones, while *qingyin* belongs to the level of *yudiao* 语调, standing in opposition to *zhongyin* 重音. Most authors (in line with Chao) distinguish obligatory *qingsheng* 必读轻声, and optional *qingsheng* 可读轻声 (Wang, 2016).

weakening becomes grammaticalized, tone deletion ceases to be context-dependent and enters the lexicon. Lexical neutral tone became part of Chinese phonology and of the tonal system. A complex relationship between *qingsheng*, *qingyin* and *fei zhongyin* 非重音 is explored by Kratochvil (Ba, 1987: 335). See also Chen (1984). A noteworthy study on the relationship between the neutral tone and stress is Liang (2003).

3. The state of affairs in connected Mandarin

In speech, some of the tonal morphemes are more or less **fully pronounced**, some of them may become more or less **weakened**, and some of them may carry **emphasis**. **Toneless** morphemes finish the picture. Unquestionably, syllables of continuous Mandarin display variations in their prominence, resulting in diverse rhythmic patterns. It seems that it should not be difficult to find support for the existence of stress in perception tests.

3.1 Troubles with stress perception

Oddly, linguists have discovered that native speakers have a hard time distinguishing various degrees of stress besides the neutral tone and emphasis. Their judgements on stress are **highly inconsistent**. Chao (1968: 38) explains: “Another reason for not recognizing a phonemic medium stress is the difficulty of obtaining agreement among native speakers of Peiping...” Similarly, Peng (2005: 245) states: “Most native speakers of standard Mandarin deny any differences in stress level beyond the palpable contrast between (all) full-toned syllables and the neutral-tone syllables.” Chen (2001: 286) speaks of “the phonetic elusive nature of stress”. Duanmu (2001: 121) wonders: “A second hypothesis [i.e. Chinese *has* stress] may seem counterintuitive: if speakers do not feel stress, how can they be using it?”

This puzzling fact is usually attributed to the **tonal character of Chinese**. Li (1981: 40) argues: “The existence of tones leads to the fact that the phonetic conspicuousness of stress in Chinese is not as apparent as in English or Russian.” Duanmu (2002:142-143) appeals: “If both English and Chinese have stress, we must explain why it is

phonetically more obvious in English than in Chinese... The key, I suggest, lies in the fact that Chinese is a tone language but English is not... there is no fundamental difference between the realization of stress in English and SC.” This is in accord with my own view (see section 2.1). Further, Duanmu speaks of major phonetic cues for stress in both languages: F0 contour, followed by duration. However, “SC is a tone language, in which the most important phonetic cue for stress, F0 contour, is taken up for lexical contrast and so cannot be freely altered to indicate stress.” (ibid 144). It is undoubtedly true that F0 cannot be freely altered in Chinese, but a syllable can still be modified in various ways. First, syllable duration, which *can* be freely altered, is a rather important cue (according to Lin, 1983: 140, a more important cue in perception than pitch). Duanmu’s argument, “since length is used to distinguish full syllables (long) and weak syllables (short), it cannot be used to indicate stress either” (Duanmu, 2001: 121), sounds circular. Secondly, a certain variation of pitch range may be used; it is not exclusively reserved for *contrastive* stress, as Duanmu seems to suggest. Wang & Chu (2008: 144), disagreeing with Duanmu, point out that in the case of F0 modifications, there is no contradiction between tone and stress, as they operate at different linguistic levels.

And, most importantly, F0 contour and syllable duration can be **used negatively**. That is, utilization of pitch range flattening and syllable shortening (together with segmental lenitions) may efficiently guarantee variation in syllable prominence. This study hypothesizes that, while native speakers may not be sensitive to “stress”, they may be rather sensitive to “non-stress”. This is certainly a task for future perception tests.

3.2 Ratio of weak syllables in speech

The proportion of toneless/weakened items in speech and the degree of their weakening depends on a particular variety of Chinese. As Chao (1968: 38) reminds us, it is most typical of the Beijing dialect. Lin & Wang (1992: 182) write: “In connected speech, averagely one unstressed syllable occurs in every 6-7 syllables.” Other authors give yet higher figures. Švarný (1991a: 210) claims that in his corpus (Švarný, 1998-

2000) **ca. 30 percent of syllables are atonic**. About half of them are toneless syllables, the other half are neutralized syllables (see also Švarný, 1991b: 241). Moreover, many other syllables have their tones weakened. Similarly, Duanmu (2002: 257) points out that: “The proportion of syllables that are unstressed and toneless in connected speech is rather large. For example, in the corpus of Duanmu et al. (1998), about one-third of all syllables are unstressed and toneless.”^①

Apparently, in colloquial Mandarin, tonal distinctions seem to be left out of the game in many syllables of connected speech—either completely, or partly. Liang (2003: 62) hypothesizes: “Chinese displays a notable and clear tendency towards tone neutralization. The role of tones in connected speech is all the more decreasing... and the role of stress in the Chinese phonological system becomes more and more important.” We may paraphrase Liang’s statement in the following way: “The role of ‘non-stress’ in the Chinese phonological system is becoming more and more important.”

3.3 Research on phonetic weakening

A major chapter in research on Chinese stress and non-stress (轻重音) is undoubtedly the neutral tone (see section 2.4). The literature on this topic is relatively rich. However, the neutral tone is only one part of a more complex issue: there are yet more instances of weak, “unstressed” syllables, which are less overtly rule-governed. Cao Jianfen has urged linguists to enhance research on non-stress, arguing that lack of understanding on this issue negatively influences areas such as **speech synthesis** or **L2 teaching** (Cao, 2007). She complains that the sound may be rather monotonous in synthesized speech, lacking a relative difference between fully articulated syllables and reduced syllables. She writes: “The major attention is on resolving local word stress and main stress in a sentence, while the massive occurrence of the words pronounced without stress, or of unstressed syllables, is neglected.” Cao concludes that “at the time being, we still lack a

① On the other hand, there are hardly any weakened items e.g. in Cantonese. Besides dialectal difference, there are other factors influencing the ratio of weak syllables in speech: speech style (formal versus colloquial), speech rate, cross-speaker variation, etc. Weakening is much less frequent in Taiwan *Guoyu*, as opposed to *Putonghua*.

comprehensive knowledge of the rules of stress and non-stress distribution in Chinese, especially knowledge of the occurrence of non-stress.”

Yet, apart from the neutral tone, the question of phonetic weakening has rarely been studied in detail. This results in confusion as to what tends to be pronounced as weak, why, when, to what extent, and whether this pronunciation is obligatory or not. Rare **attempts at a taxonomy** of items which become regularly unstressed can occasionally be found. Lin (1962) provides an early example. He distinguishes between “structural non-stress” 结构轻音 (e.g. *de* 的) and “intonational non-stress” 语调轻音 (e.g. personal pronouns *wǒ* 我, *nǐ* 你, *tā* 他, some adverbs such as *jiù* 就, or the copula *shì* 是) (ibid 304). Lin’s treatment must be appraised. To my knowledge, no similarly detailed analysis has shown up since. A newer, short version can be found in Lin & Wang (1992: 181) or Lin & Wang (2013: 168). Let us present here six categories of grammar-related (i.e. “structural”) non-stress outlined by Lin and Wang:

1. modal particles (e.g. 吧, 吗, 呢, 啊)
2. suffixes (e.g. 们, 子, 头, 么)
3. particles 的, 得, 地 and 了, 着, 过
4. place words (monosyllabic postpositions) 上, 里
5. second syllables in reduplicated monosyllabic verbs (e.g. 说说)
6. directional complements (e.g. 出去, 拿来)^①

Such classifications, or more exactly lists, share **several problems**. First, they list side-by-side instances of the *lexical* neutral tone (such as *de* 的), and instances which are regularly *neutralized* or just *tonally weakened* (such as *shàng* 上, *lǐ* 里). Second, it is not clear what kind of unit is being classified. The authors do not make a distinction between monosyllabic *words* (such as modal particles), and *bound morphemes* (such as suffixes or directional complements), listing them side by side. Particular linguistic

① Note that those *resultative* complements which are pronounced as atonic, such as 见, 住, 开, 到, etc. mentioned by Lin (1957: 71), are missing here. Also, classifiers or prepositions are not listed (Zeng, 2008: 102 lists them).

levels are not distinguished.^① Rare attempts at a hierarchical classification are not entirely consistent (e.g. Cao, 2002: 113).

To sum up, listings of regularly unstressed items tend to be rather unsystematic and incomplete (see Třísková, 2016: 128). Research on the phenomenon of phonetic weakening in a broader context, including its relationship to grammar, information structure, pragmatics etc., still seems to be in its infancy, despite the fact that it is relevant for many areas, e.g. speech synthesis/recognition, corpus linguistics or second language teaching. Authors concerned with the question of weakening in some detail are not numerous. Let us review some of them: Lin (1957; 1962), Li (1981), Chen (1984), Coster & Kratochvil (1984), Kratochvil (Ba, 1987), Liang (2003), Wang (2016).

4. Two kinds of phonological analysis

As shown above, linguists agree on the **phonetic cues** of stress in Mandarin. However, **phonological interpretation** of the phonetic material is far from reaching a consensus. As Chen (2001: 286) writes, “the phonological status of stress in Chinese is controversial, to say the least.” In fact, we can look at the issue from two different points of view. To demonstrate my phonological concept clearly, I take the liberty of using a wine glass metaphor.

4.1 Wine glass metaphor

For the purposes of demonstration, we shall need two wine glasses: one glass is filled with wine; the other is empty or almost empty. The **full glass** represents a syllable which is fully pronounced, perceptually prominent, salient (commonly labelled as a “stressed syllable”). The **empty glass** (or almost empty / half-full glass) represents a syllable which is perceptually weak, inconspicuous (commonly labelled as an “unstressed syllable”). What is the wine, then? In fact, rather than homogeneous wine, it is a cocktail

^① For instance, Zeng (2008: 102) has 14 categories. She lists the negative *bù* 不 in A-not-A questions as one category; the previous category is the second syllable in disyllabic nouns, such as *māma* 妈妈; the next category is the second syllable in quadrisyllabic expressions, such as *māmāhūhū* 马马虎虎.

of features (see section 2.1 above).

Let us examine the disyllabic rhythmical pattern of the **trochee** ●●. The first syllable is phonetically prominent, strong; the second syllable is non-prominent, weak. For instance, **Tuesday**, *zhīdào* 知道 (as in 我知道), *hřebík* “the nail” (Czech). In our metaphor, the trochee pattern is represented as a full glass, followed by an empty (or almost empty) glass:

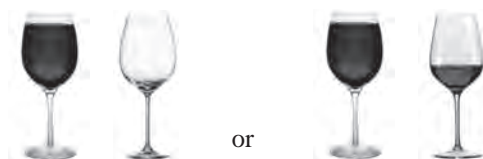


Fig. 1 a trochee

The question arises as to how to analyze the situation phonologically. In principle, there are two possible approaches. I shall label them as Analysis A, and Analysis B.

4.2 Analysis A

This kind of analysis begins with **two empty glasses**, then the first glass is filled:



Fig. 2 Tuesday

Analysis A is commonly used in Western linguistics while examining non-tone languages. All syllables are viewed as being **originally unstressed** (“empty glasses”), then some of them **become stressed, i.e. enhanced**, for particular reasons, e.g. word stress. Unstressed syllables are regarded as standard, normal, regular, default, unmarked. Stressed syllables are regarded as marked: a syllable is enhanced, or has some extra feature or quality added.

The following English example sentence is composed of four syllables. The syllable “en” becomes prominent, because it is assigned word stress. The remaining syllables are unstressed:

(1) I envy you. → I **envy** you.

This kind of analysis is mostly concerned with **stress**. Major questions being asked are:

- Which syllables bear stress?
- Why are they stressed? (rules for stress assignment, especially rules for word stress in particular languages, e.g. envy ●● → **envy** ●●; forget ●● → **forget** ●●)
- What do they sound like? (acoustic/perceptual correlates of stress in particular languages)

4.3 Analysis B

Applying this kind of analysis, conversely, we begin with **two full glasses**, then the second glass is emptied:



Fig. 3 *zhīdào* 知道

In this view, all syllables may be viewed as **originally fully pronounced**, then some of them become **weakened, reduced** (“emptied”) for particular reasons. Full syllables are regarded as standard, normal, regular, default, unmarked. Weakened syllables are regarded as marked. In some cases (e.g. in some high-frequency function words), weakening may become conventionalized. In such words/morphemes, weak pronunciation becomes default.

Let us give a Chinese example. The phrase below is composed of three syllables/words:

(2) 这个人 *zhè gè rén* → *zhè gè rén*

The syllable “gè”, representing the morpheme 个 (a classifier), carries the lexical T4, but it is commonly pronounced in the neutral tone. The reason is that gè 个 is a high-frequency function word with hardly any semantic content.

Let us point out that both Analysis A and Analysis B comprise the concept of **emphasis, or logical/contrastive stress**. Emphasis does not considerably change the phonological picture. It can be generally placed on any word or morpheme, if a speaker so wishes. It works more or less similarly in all languages, resulting in enhancement of particular phonetic features of a word in question (these features are language-specific). Emphasized syllables are exceptional, or marked in any case. They can be depicted as an extraordinarily big wine glass:



Fig. 4 It's **TUES**day! (emphasis)

We used two wine glasses for a demonstration—one full and one empty. The surface form is the same: a trochee. However, the underlying path leading to this result is obviously different in both approaches. **Analysis A** was originally developed for non-tone languages. It has been commonly applied in examining the issue of prominence patterns in Mandarin Chinese. However, Chinese happens to be a tone language. Research on Chinese stress does not seem to have arrived at any kind of broad consensus to date. Let us explore whether **Analysis B** would be more beneficial for getting to the root of the issue.

5. The hypothesis

In this section, the hypothesis which underlies Analysis B will be proposed. The concept of a “normal” syllable will be introduced. The issue of weakening will be outlined. Various pieces of evidence for the hypothesis will be submitted.

5.1 The proposal of the hypothesis

The tones have a **distinctive function**, distinguishing among morphemes with different meanings (e.g. *shī* 诗, *shí* 石, *shǐ* 史, and *shì* 是). By virtue of this, it is quite vital for the tones to be “in action” in connected speech. We may assume that all tonal

morphemes essentially have an ambition to have their tones recognizable in perception^① (while not needing to be particularly enhanced; that would require extra energy).

In spite of the important function of lexical tones, we observe that in some varieties of Mandarin, **phonetic weakening** of tonal morphemes occurs quite often in connected speech. Weakening deprives particular syllables of some of their original, inherent features present in the lexicon. This may complicate perception of lexical tones, or even preclude it. The listener must then rely on context and his/her previous knowledge of Chinese to reconstruct the tone (and the segments). The question arises: what are the reasons leading the speaker to weaken some of the originally tonal syllables, if it complicates perception of tones? Are there any significant benefits or essential functions of this phenomenon?

The hypothesis raised here is as follows. In Chinese, phonetic weakening does not occur accidentally. It is a serious event with rather consistent reasons. It cannot be explained solely by the inclination of the speaker to save energy and time here or there. In most cases, phonetic weakening is far from random; it is rule-governed, carrying a considerable functional load. A tonal morpheme must have good reasons (grammatical, phonological, rhythmical, informational, pragmatic) to weaken/drop its tone in speech. Thus, *full* pronunciation of a tonal morpheme should be viewed as default, *unmarked*, regular, normal (正常) form, while a *weakened* pronunciation should be regarded as *marked* form.

Wang & Feng (2006: 8) point out that if the phonological theory cannot accurately and objectively reflect the linguistic intuition present in the natural language of a majority of native speakers, and if it is not based on a detailed examination of substantial experimental data, then it can hardly avoid subjectivity, and may even be suspected of being unscientific. The presented alternative analysis, labelled above as Analysis B, is claimed to reflect the **intuitions of native speakers** more appropriately than Analysis A.

① Note that the tones, contour tones in particular, need certain minimal syllable duration and minimal pitch range, should they be duly perceived. This phenomenon is called *glissando threshold* (*glissando* is a term used in music; it refers to a glide from one pitch to another). Due to these physiological constraints, the tones are more demanding than segmental material (which is shared by both tone and non-tone languages).

It may be more pertinent for the Chinese language **due to its tonal character**. The main questions to answer are:

- Which syllables/morphemes/words become weakened in connected speech?
- Why are they weakened? (What are the functions of weakening, its rules, distribution, contexts, relationship to grammar, information structure and pragmatics?)

I shall not be concerned with the question of *how* the weakened syllables sound. Fortunately, there is a reasonable consensus on this issue, as shown above. In what follows I will not be much interested in the *lexical* neutral tone, because it is a matter of the lexicon and thus can be predicted (certainly with some reservations).

5.2 The concept of the normal syllable

The proposed analysis comprises a crucial notion of a “normal syllable” which has already been mentioned above. A **normal syllable**, *zhengchang yinjie* 正常音节, is defined here as a regular, ordinary tonal syllable, which is fully pronounced, though not particularly enhanced. Two normal syllables may neighbor one another (note that no such thing as “stress clash” is considered). Surface phonetic variation occurs in underlyingly normal syllables. As an example, let us take the word *huǒchē* 火车 embedded in the following sentence:

(3) *Zhè-shì huǒchē.* 这是火车。

Let us assume this is a simple declarative sentence, involving no emphasis. The word *huǒchē* 火车 consists of **two normal syllables**. If the sentence is uttered, there may be no perceptible difference between both syllables, or one of the syllables may be perceived as slightly more prominent. This is just a surface variation which is not very significant. What is essential for the rhythmical pattern of the utterance, though, is the weak character of the copula *shì* 是, which is *not* a normal syllable (see below).

The concept of the normal syllable is in line with Yuen Ren Chao’s solution found in his volume *A Grammar of Spoken Chinese*. Chao claims: “There are physically many perceptible degrees of stress, but phonemically we have found it best to set up no more than **three degrees of stress**: normal, contrastive and weak... All syllables that have

neither weak nor contrastive stress are said to have **normal stress** (正常重音).” (Chao, 1968: 35). According to Chao, particular degrees of prominence in normally stressed syllables are just phonetic. They may be viewed as “**allophones of one phonemic normal stress**” (ibid).

The reader may ask why I do not accept Chao’s original term, “normal stress”. The reason is as follows: the term itself contains a contradiction. If an item is stressed, it implies it is enhanced, boosted in some way or another. Thus, it ceases to be “normal”, regular. Therefore I prefer to use a neutral term, “syllable,” instead of “stress.” If Chao’s “stress” is converted into “prominence” (“normal prominence”, “weak prominence”...), this would bear on the *perceptual* aspect, not on the underlying characteristics.

5.3 The trigger of phonetic weakening

Inevitably, a question must be raised: if weak(ened) syllables commonly occur in Mandarin, what are the reasons for their weakening? In *toneless* morphemes/words, the answer is self-evident: they have no lexical meaning. Kratochvil (1968: 84-85) points out that toneless items share a morphological characteristic: they are morphemes with a “high degree of grammatical formalization... atonicity is in fact the regular phonemic feature of this high degree of formalization.” His examples are markers, affixes, non-morphemes (in polysyllabic words), or constituents of some high-frequency compounds. Similarly, Liang (2003: 62) views **grammaticalization** (together with disyllabicization) as a diachronic source of tone/stress loss: “The process of grammaticalization can perfectly manifest the relationships between grammar, phonetics and lexis. Usually a frequently used word stands at its input, while the output is a grammatical marker. Moreover, without exception, [grammaticalization] is accompanied by a weakening of phonetic form. This is a common feature in the development of the grammar of human languages.” To sum up, complete loss of tone is a phonetic result of loss of lexical meaning, of formalization, which became part of both grammar and phonology.

Besides *toneless* morphemes, there are *tonal* morphemes/words, which may become weakened in speech here or there. We may ask the same question: why do

they become weakened? The answer is analogous: most often it is a result of partial or complete loss of semantic content. In this case, though, it is context-dependent and in many cases recoverable. To sum up, in agreement with Kratochvil and Liang, this study assumes that the weakening of full, “normal” pronunciation is mainly **triggered by weakening/loss of lexical meaning**, or by formalization.^① This phenomenon can be viewed as a clear example of a bidirectional relationship between prosody and grammar, explored by Feng (2012; 2017). “A full understanding of human language, syntax and morphology must take prosody into account...” (Feng, 2012: 2)

5.4 The weakening is a continuum

As shown above, the situation cannot be described by means of a simple dichotomy: “stressed–unstressed”, “tonal–toneless”, or “strong–weak” syllables. Phonetic weakening is a continuum (see section 2.3). The same holds for the loss of semantic content: it is a continuum too. The utmost case of such “semantic bleaching” (语义虚化) is the lexical neutral tone (the utmost formalization; fully grammaticalized/phonologized weakening).

The importance of distinguishing **different degrees of formalization** is emphasized by Kratochvil (1968: 84). He reminds us that “Several MCS morphemes reached the highest degree of formalization, such as the most common word-formative suffix -z, the grammatical suffix *-le...* and the marker *de*.” In other words, in *tonal* items (where the degree of formalization is not so high as to drop the lexical tone), the weakening is gradual. Let us give some examples.

- In some cases, tone neutralization is directly **obligatory**. For instance, the negative *bù* 不 in 来不来 *lái bu lái?* and in *qǐbùlái* 起不来. The context may be morphological, for example, the second syllable in monosyllabic reduplicated verbs: *kànkān* 看看 (see section 6.3), or the second syllable in some high-frequency

① It must be pointed out there may be yet other sources of phonetic weakening, particularly the requirements of speech rhythm which favours the interchange of differently prominent items and may prefer particular patterns, or inflecting semantic structure of a phrase/word: 皮鞋厂 is *píxié chǎng* (2+1), not **pí xiéchǎng* (1+2). Another source may be fast casual speech; the speaker may be sick, sleepy, bored, drunk, etc. These sources are not studied here.

disyllabic words: *dòufu* 豆腐. In such cases, the underlying tone can be recovered very rarely, e.g. under extraordinary emphasis, or in highly emotional speech.

- In some cases, the requirement of weakening is **less strict**. The item can restore the full pronunciation in some contexts. For instance, the classifier *gè* 个 is mostly pronounced as atonic. Yet sometimes it may receive full pronunciation (我要一个!) (see section 6.2).
- In some cases, the weakening is only **contextual** and easily recoverable. It may be just mild. For instance, it may be a repeated or post-focal content word. The item may recover its full pronunciation under emphasis, at slower speech tempo or in another context (see section 6.4).

5.5 The weakening is rule-governed and multi-layered

Semantic/phonetic weakening is not random—it is rule-governed. Its sources should be sought at **various linguistic levels**. One phonetic surface form (such as the neutral tone) may have different underlying sources, coming from different structural levels. Yip (2002: 184) writes: “Consider cases where full-toned syllables have neutral-toned variants. This can happen either for morphological reasons (such as reduplication), lexical reasons (as in some particular compound), or phrasal reasons (as with object pronouns).” This multi-layeredness is also noticed by Wang (2016: 31-32): “Within the commonly accepted category of so-called grammatical neutral tone, some ‘neutral tones’ do not in fact belong to the lexical level. In *Putonghua*, due to the influence of factors such as semantics and speech rhythm, syllables with normal stress may largely differ in the degree of their prominence in fluent speech.” Wang’s examples are 上, 下, 里, 不 in 好不好, 一 in 想一想. “Phonologically they should all belong to normal stress, yet they may become more or less weakened in connected speech. Thus, labelling these cases as ‘variable’ (轻重两可) not only shows respect for the facts of language, but also stems from the needs of theory.” Wang advocates solving these cases at the level of utterance, instead of the lexical level. The phrasal level should be further considered. Particular levels will be discussed in section 6.

5.6 Evidence for the hypothesis

Various pieces of evidence can be found to support the proposed hypothesis:

- Existence of the **lexical neutral tone**. It has a heavy functional load in Mandarin.
- **Tone weakening/neutralization**. In colloquial Mandarin, there is a considerable ratio of tonally weakened or tonally neutralized syllables in connected speech.
- **No consensus** among linguists. There is no commonly accepted theory of Chinese stress. Linguists argue about what *stress* is, yet they agree on what *non-stress* is: the neutral tone.
- **Inconsistent judgements** on stress. The judgements on stress among native speakers, examined in perception tests, lack a reasonable degree of agreement.
- **Variability** of so-called word stress. If we leave aside disyllabic words such as *māma* 妈妈 or *háizi* 孩子 with a stable stress pattern (trochee), all other disyllabic words, i.e. those with two tonal syllables, are subject to some degree of variability depending on the context.
- **Chinese cover term**. The Chinese cover term for stress and non-stress is *qingzhongyin* 轻重音, not **zhongqingyin* 重轻音. This may imply that 轻 is more essential in Chinese than 重.
- **Speech synthesis**. Due to insufficient attention to phonetically weakened syllables, the level of naturalness of synthesized speech may not be satisfying, as Cao (2007) observes.
- **Pedagogic practice**. Distribution, production and perception of “unstressed” syllables is one of the sore points among L2 learners of spoken Mandarin.

6. The functions of phonetic weakening

As already mentioned in section 5.5, surface distribution of the weak(ened) syllables is an outcome of the influence of hierarchically organized underlying factors, rooted in the morphological, lexical, syntactic and information structure. In other words, phonetic weakening is active at **various structural levels**: those of morphemes, words, phrases, sentences/utterances, and discourse. It fulfills important linguistic functions

at each of the levels. There is an aspect shared by all levels: phonetic weakening is most often related to some kind of **semantic weakening**, i.e. weakening/loss of lexical meaning. The process of phonetic weakening is largely **rule-governed** and, therefore, predictable. In what follows we shall examine four particular issues:

1. word stress (?) and two puzzles related to it
2. monosyllabic tonal function words
3. obligatory weakening of tonal morphemes in some structures between word and phrase
4. discourse level and information structure

6.1 Word stress (?)

Word stress is an essential issue in research on stress in non-tone languages. It acts as a major (though not unique) factor determining the distribution of stressed syllables in speech. No wonder the issue of *ci zhongyin* 词重音 is the most debated issue in studies on Chinese stress. There are a lot of arguments going on, yet there is one point, seemingly self-evident, shared by all linguists: they are searching for the **stressed syllable(s)** in polysyllabic (and particularly disyllabic) words. Lin (2001a: 86) writes: “Given that the vast majority of Mandarin words are composed of two syllables, the question of word stress mostly centers around which of the two syllables bears stress. There are two possibilities: 1) left stress... and 2) right stress.” Thus, commonly accepted patterns are the trochee (前重, 左重, 重轻) and the iamb (后重, 右重, 中重). Some authors divide the trochee into neutral-tone words (重轻, 无调左重) and the tonal trochee (重中, 带调左重). An intermediate level of stress (中), refused by Chao (1968: 38), is accepted by e.g. Li (1981: 40), Yin (1982), or Xu (1999: 117) (Xu even suggests distinguishing 次轻 as a subtype of 中 in 重中 type of words, *ibid* 113-114), while it is criticized by e.g. Chen (1984: 311) or Wang (2016: 32). Some authors accept the “indefinite” pattern 重重 (see below). Some authors accept the variable pattern (see below).

Regarding the distribution of these patterns in the lexicon, linguists have suggested various solutions, which are often contradictory (see Chen, 2001: 289 for a review).

Some claim that disyllabic words are principally iambic (traditional position); others claim that they are principally trochaic, e.g. Lin (2001b). According to Paul Kratochvil, Mandarin is marching from iamb to trochee (“stress shift”: Kratochvil, 1974: 453; Ba, 1987: 339). This idea is supported by Wang & Chu (2008: 141), or Wang & Feng (2006: 17). It claims that Chinese word stress develops in the following direction: 右重 → 左重 → 轻声词 (while a loose syntactic structure changes into a tight lexical structure). There is at least one clear point of agreement among linguists: disyllabic neutral-tone words, *qingsheng ci* 轻声词, such as *háizi* 孩子, are agreed to be trochees.^①

Let us look more closely at the **iambic pattern** (右重, 后重, 中重). Some authors accept the indefinite pattern (重重或同重, 前后不分, 前后等重) as an alternative to the iamb, because there are cases without any clear stress differences, both syllables being perceived as equally prominent. Their number is not negligible. Wang & Chu (2008: 143) found out that the percentage of such cases in their data is more than 40%, no matter if they are followed by a prosodic juncture or not (see their Table 1). Also, Wang & Feng (2006: 17) suggest that the indefinite (不分) type may be the most common type. They come up with an innovative solution. They propose (p. 19, Table 15) to subsume the tonal trochee (带调左重) and neutral-tone words (无调左重) under one major trochee pattern (左重). The trochee is viewed as the only pattern of lexical stress in Chinese. All other cases do not have lexical stress. If they have any prominence pattern, its sources are elsewhere than at the lexical level: “The trochee is a lexical stress, while all forms other than the trochee are decided by non-lexical factors.” This progressive concept breaks with the tradition. The traditional approach views distinguishing between tonal (带调) and toneless (无调) syllables as the very first step in examining Chinese stress; thereafter it is preoccupied with deciding among 重, 中, 轻 degrees of stress (cf. *ibid* p. 17, Table 11). Wang and Feng’s innovative proposal has

① The set of disyllabic neutral-tone words is not stable. Some authors claim that historically their number increases. Lin (2001b: 157) holds that *tone neutralization rule* is diffusing throughout the Mandarin lexicon. Conversely, Wang (2016: 31) observes a decreasing number of neutral-tone words, caused by “spreading of *Putonghua*, rapid increase of migrants to Beijing and other social factors.”

much in common with my solution proposed below.

Puzzle No. 1: Phonetic variation

In the past, as e.g. Chen (2001: 290) points out, word stress was often studied in isolated words, where the effect of phrase-final lengthening leads to iambic patterns. However, the stress pattern found in a citation form may change in connected speech. Some linguists, reflecting such variability, accept the **variable pattern** for some words: 轻重两可 (轻重 refers to the second syllable), e.g. Wang (2016: 32) who refuses 次轻. Phonetic variation is noticed in Duanmu (2014: 432). He observes that in T+T words, such as *dàxué* 大学, the iamb (i.e. 2-1), which is the most common stress pattern, occurs only in phrase-final positions. In other positions, only trochees (1-2) can be found. An example of such “position-sensitive stress shift” is: *dàxué* 大学 (2-1), but *dàxué jiàoshī* 大学教师 (1-2-2-1). Duanmu calls this “a puzzle”. However, the puzzle may be solved, if we identify the contexts and functions of such variation. Preserving full pronunciation of both morphemes—or, conversely, weakening of the second—may be (besides the presence/absence of prosodic juncture after the word) related to emphasis, syntactic function, information structure, speech rate, speech style, inherent structural properties of a word, etc. For instance, the word *gāngbǐ* 钢笔 may be alternatively realized as *gāngbǐ*, *gāngbǐ*. Let us give an example:

(4) *gāngbǐ* 钢笔

a. 这是钢笔。 *Zhè-shì gāngbǐ*.

This is an ordinary declarative sentence (e.g. the answer to the question *Zhè-shì SHÉNme?* 这是什么?). The word *gāngbǐ* would be pronounced either with both syllables equally prominent, or with the second syllable slightly more prominent.

b. 你的那支钢笔在哪儿? *Nǐde nà-zhī gāngbǐ zài-NĀR?*

In this question, the word *gāngbǐ* would be pronounced with the second syllable weaker than the first syllable. It may even be atonic. Weakening of the morpheme *bǐ* 笔 may signal: “no juncture, something will follow”, “absence of focus”, or “old information”.

The idea that stress patterns can be influenced by the presence or absence of prosodic juncture after the word is not new. Yet Wang & Chu (2008: 143) claim that,

as a whole, “the influence of prosodic juncture to the [actual] stress pattern of a word has its limits”, contrary to Chao’s view (1968: 35). They observe (see their Table 1) that, firstly, the average amount of words with the indefinite pattern (前后等重) is well over 40%, *regardless* of the type of prosodic juncture. Secondly, before *some* kind of juncture, there are still well over 20% of words which are left-stressed. Only if a disyllabic word is *not* followed by prosodic juncture (cf. the example *dàxué-jìàoshī*), is there a **clear reluctance to use the right-stress pattern**: only about 8% words have it (still there is no clear preference for the left-stress pattern: less than half words have it, the remaining words being indefinite). Thus, it seems that the factor changing the picture is not the *juncture*, but the *absence of juncture*! Also see Wang et al. (2003: 539).

One way or another, there are numerous factors which may influence the actual stress pattern of a disyllabic word in the utterance context.^① Wang & Chu (2008: 147) rightly suggest: “While deciding about a stress pattern of a word, a rather safe method is to make the investigation comprehensive, placing the word into various prosodic and semantic conditions.” Such an investigation was carried out by Švarný, who explored variable surface patterns of disyllabic words in the context of thousands of utterances, see below.

Puzzle No. 2: There is stress where there is a lack of stress

A long-established view on Chinese word stress was formulated by Chao (1968: 29): “A two-syllable compound or phrase will have a slightly greater stress on the second syllable, unless it is in the neutral tone.” Lin (2001b: 140) finds this statement contradictory. Commenting on the same issue, she writes: “Such a position contains a **paradox**. A fact concerning the neutral tone is that it is derived through a lack of stress. Given this, Chao’s remark amounts to saying that there is stress [on the second syllable] where one does not find an unstressed syllable.” (Lin, 2001a: 86). This seeming paradox actually touches on the root of the problem. It will disappear, if we give up searching for a *stressed* syllable in a disyllabic word, i.e. for “word stress”, and accept the idea of “word

① For instance, variation between iamb and trochee in the word *wénmíng* 文明 is noticed by Wang & Feng (2006: 10) (footnote 15). It is explained by the influence of speech style. Yet the position of the word and its syntactic function may play a more important role here.

non-stress”.

Proposed solution to the problem of “word stress” in Chinese

This study proposes abandoning the concept of word stress in Chinese, since it was primarily designed for non-tone languages and its application in Chinese appears to be cumbersome. In disyllabic Chinese vocabulary, it seems hard to find clear and consistently stable patterns across the lexicon, similar to patterns of word stress in non-tone languages.^① The solution of the problem may be found in Analysis B. It works with the concept of normal syllable (default form), which may become weakened. This approach can be applied at the lexical level. Thus, instead of asking which syllable(s) in a polysyllabic word is (are) **stressed**, we may ask a different question: which syllable(s) in a polysyllabic word is (are) **weakened**? In what context does it become weakened?

We can put it this way: the fact that the word *dòufu* 豆腐 is perceived as a trochee is not due to the fact the *first* syllable, *dòu* 豆, is “stressed”, pronounced with an extra salience (the original features becoming enhanced). Instead, it has to be attributed to the fact that the *second* syllable, *fu* 腐, is weak, “unstressed” (it has a neutral tone, short duration and possibly devoiced vowel; i.e. some of its inherent qualities were reduced or even taken off). In fact, T4 on the first syllable of *dòufu* may be realized as quite subdued, with a rather compressed pitch range and moderate duration, yet the word would be still perceived as a trochee (remember the relativity of phonetic prominence). Thus, among other things, Puzzle No. 2 is solved.

The importance of “non-stress” within polysyllabic words was already recognized by linguists, as emphasized by Lin & Wang (2013: 165). It is noticed e.g. by Wang et al. (2002: 126): “In Chinese, the notion of stress and non-stress (轻重音) is considerably different from the Western languages. In Western languages, the focus is on the notion of stress. With the exception of the stressed syllable(s), all remaining syllables contained in a word are weakly stressed (弱重音) or unstressed (非重音). Chinese is the other way

① “Chinese is a tone language, not a stress language. The most important suprasegmental features distinguishing the meaning in polysyllabic words are the tones of particular syllables, not the prominency relationship among the syllables. Therefore, vagueness of prominency patterns in words is normal.” Wang (2016: 31).

round: so called [sic!] stress (重音) in a word can only be [established] with regard and in opposition to non-stress (轻音); the stressed syllable does not have to be especially prominent (重读) at all.”

The idea of concentrating attention on the *second* (and possibly weakened) syllable in disyllabic words was probably first proposed by Švarný (1974, 1991a: 211, 1991b: 242). He explored variable surface patterns of disyllabic words, establishing 7 “**accentuation types.**” The criterium of the affiliation is the inherent degree of resistance of the *second* syllable against contextual weakening. The types are based on statistical data, analyzing all tokens of the word occurring in the large (non-electronic) corpus (Švarný, 1998-2000). One extreme type includes words such as *háizi* 孩子, which are always pronounced as trochees. The opposite extreme type includes words such as *kāihuì* 开会, which are nearly (!) always pronounced as iambs. The present analysis draws on Švarný’s idea, emphasizing the importance of the behavior of the *second* syllable.

A few paragraphs above we spoke about the **indefinite pattern** 重重 or 不分, which may be accepted as an alternative to the iamb. In case 重重 is the most common pattern, could we reverse our view and treat 重重 as the basic underlying pattern with 中重 as a mere surface variant? The proposed solution actually moves even two steps forward: (1) 不分 type (the spondee) is established as the basic one, instead of the iamb; (2) 不分 type is viewed as 常常 instead of 重重. A spondee, *bābā*, may alternatively surface as an iamb, *bābā*, but this is just a fine phonetic detail; there is no need to establish the iamb as a separate realization.

Applying the foregoing premises, I propose **three underlying phonemic types** for disyllabic words: *bābā*, *bābā*, and *bāba* (in italics). I randomly use the syllable “ba” for illustration. They correspond to three types established in *Xiandai Hanyu Cidian* (XHC, 2014: 3): *bābā* (e.g. *huóchē*), *bā·bā* (e.g. *yīn·wèi*), *bā·ba* (e.g. *zhuō·zi*). Interestingly, XHC types also reflect the behavior of the *second* syllable. Regarding **surface realizations**, I consider only two of them: the **trochee** ●●: *bāba* or *bābā* (second syllable noticeably weakened), and the **spondee** ●●: *bābā* (no noticeably weakened syllable; note that the first syllable may never be atonic). Cf. Wang & Feng (2006: 19).

Realizations of the underlying type may vary. If the realization is “in-line” with the underlying type, it is kept in italics. If the realization diverges from the underlying type, I indicate it by the absence of italics in the table below (last two columns).

Table 1 “Word stress” types/realizations

XHC		Present analysis		
Type	Example	Type	Realizations	Example
bābā 重重	huǒchē 火车	Type (1): <i>bābā</i> 常常	<i>bābā</i> (in-line): may surface as an iamb	<i>huǒchē</i> 火车
			bābā (divergent) the second syllable may be completely atonic	huǒchē 火车
bā·bā 轻重两可	yīn·wèi 因为	Type (2): <i>bābā</i> 常·常	<i>bābā</i> (in-line): the second syllable may be completely atonic	<i>yīnwèi</i> 因为
			bābā (divergent): may surface as an iamb	yīnwèi 因为
bā·ba 必读轻声	zhuō·zi 桌子	Type (3): <i>bāba</i> 常·轻	<i>bāba</i> (in-line): obligatory	<i>zhuōzi</i> 桌子

After openly admitting the variability of realization in type (1) and type (2), we can proceed to explore the contexts and functions of such variation, and to solve Puzzle No. 1.

Due to permanent language change, varying dialectal background of the speakers, differences in speech styles, etc., the borderlines between the three types are not clear-cut. For instance, some words belonging to the most common type (1) in XHC, e.g. cuòwù 错误, sùdù 速度, yuànwàng 愿望 could (should?) be viewed as belonging to type (2): cuò·wù, sù·dù, yuàn·wàng. This is discussed by Wang (2016: 32). A few examples of type (2) recognized by XHC are dǐ·xì 底细, gāng·gāng 刚刚, lì·liàng 力量, qì·fēn 气氛, jiào·xùn 教训, zuò·fǎ 做法. The borderline between type (2) and type (3) is vague, too. Setting this borderline is a huge challenge for dictionary writers and linguists concerned with language standardization. Wang & Feng (2006: 10)

(footnote 14) recognize that the group of neutral-tone words is unstable, and that their standardization is a hard task.

Since the words with a stable stress pattern (type (3), i.e. neutral-tone words) make up only quite a small part of the Chinese lexicon, we can state that **Chinese does not have word stress** in a strict sense. This of course does not mean that the words do not assume various accentuation patterns in connected speech.

Finally, let us point out that while exploring word stress in Chinese quite a number of authors do not make a clear distinction between disyllabic *words* (双音词), and disyllabic *phrases* (双音词语, 双音组). However, these two structural levels should be kept separate, no matter that the boundary between word and phrase can be often vague in Chinese.

6.2 Monosyllabic tonal function words: the cliticoids

Cross-linguistically, function words tend to be weak, or unstressed, in speech. The reason is that they lack lexical meaning, their meaning being chiefly or entirely grammatical. They are typically (though not always) monosyllabic. We shall be interested only in monosyllabic Chinese function words. It is useful to categorize them into two groups: *toneless*, and *tonal*.

Monosyllabic **toneless function words** carry the lexical neutral tone. Thus, they are unstressed by definition. Consequently they have no choice: they always have to lean on the preceding word, behaving as clitics 附着词 (namely enclitics). Their number is rather limited:

- structural particles (结构助词) *de* 的, *de* 得, *de* 地
- aspect particles (动态助词) *le* 了, *zhe* 着, *guo* 过
- modal particles (语气助词) e.g. *ma* 吗, *ba* 吧, *ne* 呢 ...

All these items belong to Lin Tao's "structural non-stress" (Lin, 1962: 304). I use the label **clitics** for this group. I will not be concerned with them, because their weak pronunciation is stable and predictable (prolonging of modal particles belongs to the domain of intonation).

Monosyllabic **tonal function words** are more diverse in their prosodic behavior.

They carry lexical tone, thus have a chance to be prominent. However, this is often not the case. Usually, these high-frequency words are fully pronounced only if uttered in isolation, or if emphasized (assuming full form). In most contexts, they are regularly pronounced as weak clitics—either enclitics, or less commonly proclitics, leaning on their clitic host (assuming weak form). These words are worth examining, since they play an essential role in the rhythm of Mandarin utterance. They deserve to be established as a distinct category. I have coined a term for these words, reflecting their two-facedness: **the cliticoids** 类附着词 (see Třísková, 2016, 2017a). The group of cliticoids is not large. It comprises several dozen words:^①

- personal pronouns 人称代词 *wǒ* 我, *nǐ* 你, *tā* 他
- prepositions 介词 *zài* 在, *bǎ* 把, *gěi* 给 ...
- postpositions 方位词 *shàng* 上, *xià* 下, *lǐ* 里
- classifiers 名量词 *gè* 个, *běn* 本... ; *xiē* 些
- modal verbs 情态动词 *yào* 要, *huì* 会, *xiǎng* 想 ...
- three “be-verbs” *shì* 是, *zài* 在, *yǒu* 有 (exist)
- formal adverbs 副词 *jiù* 就, *hěn* 很, *dōu* 都 ...
- conjunctions 连词 *hé* 和, *gēn* 跟 ...

The inherent inclination to weak realization is not equally strong in the words listed above. For instance, prepositions are almost always weak, their emphasized form being extremely rare. On the other hand, fully pronounced or emphasized personal pronoun *wǒ* 我 may occur more frequently. Further note that phonetic reduction, occurring in weak forms of the cliticoids, is a variable continuum: its actual degree depends on the particular variety of Mandarin, on the speaker, speech tempo, speech style, communication situation, etc.

Several examples of weak forms (a.) and full forms (b.) are given below:

(6) *shì* 是 (copula)

a. *Tā-shì wǒde péngyou.* 他是我的朋友。 [ʃɿ], even [ʒɿ]

b. *Tā-SHÌ wǒde péngyou, méi-cuò!* 他是我的朋友, 没错! [ʃɿ:]⁴

^① Note that *not all* monosyllabic tonal function words have a weak form. Some may regularly have more or less full pronunciation (e.g. *zhè* 这). These items do not belong to the cliticoids.

(7) *dōu* 都a. *Lián-TĀ-dōu lái-le*. 连他都来了。 [d̥ɔ], [d̥ɬ]b. *Tāmen DŌU lái-le!* 他们都来了! [d̥ou]¹(8) *wǒ* 我^①a. *Gěi-wǒ*. 给我。 [wɔ], [wə]b. *Shì-WŎ!* 是我! [wɔ[^]]³

The cliticoids are very similar to **words with weak forms** found in English: articles (*a, an, the*), prepositions (*for, from, to...*), conjunctions (*and, as, but...*), personal pronouns (*you, he, her, us...*), modal verbs (*can, could, may...*), and auxiliary verbs (*am, is, are, has, do...*). These little high-frequency words (roughly about 50 items) have two distinct forms: **strong form** (full pronunciation; used in isolation or under emphasis), and **weak form** (considerably reduced; used in most contexts). For example, the preposition *for* is pronounced as [fɔːɪ] in isolation, but as [fə] in a prepositional phrase (*tea for you*). See Trísková (2016: 131).

6.3 Obligatory weakening of tonal morphemes in transitional structures

One of the most problematic issues in modern Chinese linguistics is the **definition of word**. The boundary between a word and a phrase in Chinese may often be vague. There are cases when a series of morphemes is highly conventionalized, yet should not be considered as a word (it cannot be looked up in a dictionary). On the other hand, it should not be considered as a phrase either, because the bond between the components is too tight. Such structures often contain a tonal morpheme which is obligatorily pronounced as atonic (it can be viewed as a morphophonemic variant of the full form). Main cases are listed below:

- **directional complements**, both simple and complex: 来, 去, 起来, etc.
e.g. *huílái* 回来, *chūqù* 出去, *zhànqǐlái* 站起来

① Note that personal pronouns *wǒ* 我, *nǐ* 你, *tā* 他 tend to be weak in all functions—not only as an object, but also as a subject, and as an attribute (as Lin, 1962: 304 reminds).

- some **resultative complements**: 见, 住, 到, 着 (*zháo*), 掉, 死, 开
e.g. *kànjiàn* 看见, *dǎkāi* 打开 (but *dǎdekāi* 打得开)
- morphemes *de* 得 / *bù* 不 in **potential complements**:
e.g. *dǎdekāi* 打得开, *dǎbùkāi* 打不开
- second item in **reduplicated monosyllabic verbs and adjectives**:
e.g. *kànkàn* 看看, *xièxiè* 谢谢, and *kànyīkàn* 看一看
- *bù* 不 in **yes-no questions** (for monosyllabic verbs and adjectives)^①:
e.g. *Tā lái-bù-lái?* 他来不来?

The presence of an atonic item in these structures contributes to their inner cohesion, giving them a stable prosodic shape and rhythmic pattern aiding perception. Neglecting the atonicity would be deemed odd by native speakers and may even cause confusion. Consider this: *Wó-xiáng qǐlái-le.* contrary to *Wó-xiángqǐlái-le.* (Both sequences are written as 我想起来了.)

Note that this study does not examine prominence patterns of trisyllabic or quadrisyllabic phrases/words composed of content morphemes, such as *shǒudiàntǒng* 手电筒.

6.4 Discourse level and information structure

The easiest targets of phonetic weakening are function words. Yet even a **content word** may become weakened. Generally, content (autosemantic) words tend to be fully pronounced in most contexts in order to transmit their lexical meaning to the hearer. However, sometimes a content word may have little semantic content, particularly if it is repeated, known from the previous context, or if it follows an emphasized word. This sort of weakening is rooted in the information structure. Consider the following examples:

(9) *qìchē* 汽车

Zhè-liàng qìchē // shì-wǒmende dì-Yí-liàng qìchē.

这辆汽车是我们的第一辆汽车。

① Atonic items in all kinds of verbal complements are treated in detail in Lin (1957).

(10) *yú* 鱼

a. *Tā-xǐhuan chī-yú-ma?* 他喜欢吃鱼吗?

b. *Tā-Xǐhuan chī-yú. Tā-bù-xǐhuan chī-RÒU.* 他喜欢吃鱼。他不喜欢吃肉。

While phonetic enhancement of the focused word is intentional, the weakening of a word following the focus is an accompanying phenomenon. Yet, it is not accidental: it helps to make the focused word even more conspicuous.

7. Pedagogic consequences and prosodic transcription

7.1 Pedagogic consequences

According to Cao (2007), teaching Chinese as L2 is one of the areas negatively affected by insufficient research on non-stress. “Be it a foreign accent (洋腔洋调) of the learners of Chinese as a second language, or a local accent (土腔土调) of the Chinese coming from various dialectal areas and learning *Putonghua*, one of the major reasons for their accent is a poor command of stress and non-stress; it is especially non-stress which is hard to handle for them.” While learning new vocabulary, the students first learn isolated words (单词) in their **citation forms**, with full tones and canonically articulated segments. This may not be overly difficult. However, while speaking, they should master **weakening** of particular words/syllables in utterance contexts. Let us give a simple example:

(11) *Tā zài jiā lǐ.* 他在家裡。

a. Isolated words: *tā* 他, *zài* 在, *jiā* 家, *lǐ* 里

b. Utterance: *Tā-zài jiā-lǐ.*

The task involves two difficult questions: **what** (what items should be weakened?), and **how**. The technical “know how” of weakening is a rather sophisticated skill. Some of the original features of syllables should be reduced or taken off. This involves both prosodic and segmental aspects: shortened syllable duration, compressed pitch range, lowered pitch level, and segmental lenition. Further, since the weak items cannot

stand on their own rhythmically, another skill the learners should master is to attach such items tightly to fully pronounced words, building the smallest prosodic units of connected speech—**prosodic words**. Besides speech production, the students may have problems with the perception of weakened syllables in the fluent casual speech of native speakers. To sum up, distribution, production and perception of “unstressed” items is one of the sore points of L2 learners of spoken Mandarin.

Certainly, the students should also learn how to **emphasize** a particular word or morpheme if needed. However, the students usually do not have problems exaggerating the tones. It should be remembered that native speakers of syllable-timed languages (such as my native language, Czech) may generally have difficulty in manipulating syllable duration. Vowel length is a distinctive feature in Czech.

If the learners strive for a rather **natural, fluent pronunciation** with some sort of speech rhythm, they have to face these challenges (see Třísková, 2017b, 2017c). A pedagogical approach based on the interchange of normal and weakened items (rooted in Analysis B) produces quite natural results in students’ pronunciation, as attested in my pedagogic practice (Charles University in Prague, Masaryk University in Brno). The approach based on the traditional Analysis A, working with stressed and unstressed items, leads to less natural outcomes. For instance, consider the example given above: *Tā zài jiā lǐ*. If a student is told that the pattern is S-U S-U, that is the words *tā* 他 and *jiā* 家 should be pronounced as stressed, he/she may produce them as unnaturally reinforced, with exaggerated tones, overly loud and long. Even the words *zài* 在 and *lǐ* 里 may be overly enunciated (due to a “lexical tone fascination”).

7.2 Chinese Prosodic Transcription (CHIPROT)

The above-described concept can be conveniently applied in the design of prosodic transcription. Such transcription, named CHIPROT (CHInese PROsodic Transcription) is being developed and tested by the author of this article. Its current form was used for transcribing the sentence examples presented above. It is applied in the textbook Třísková, 2020 (book in progress). The concept of CHIPROT is based on the assumptions that:

- Tonal morphemes should be treated as inherently, underlyingly “normal” 正常, i.e.

as fully pronounced, though not enhanced (*bā*). Occasionally they may become emphasized (*BĀ*). *Normal syllables may the neighbor* (e.g. *zhè-shì fànwǎn*. 这是饭碗。).

- Some tonal morphemes may become weakened/neutralized in particular contexts for particular reasons (*bā*). Some cases of weakening are predictable from the lexicon (e.g. the cliticoids), while some are predictable from grammar (*bù* 不 in *lái-bù-lái?* 来不来?). Yet some cases of weakening are context-dependent (e.g. the second *qìchē* in the example No.9: *Zhè-liàng qìchē//shì wǒmende dì-YÍ-liangqìchē*).

The proposed transcription was primarily conceived for pedagogical purposes: teaching Mandarin prosody. It may find applications in yet other areas, such as corpus linguistics. The transcription procedure may be designed as a series of steps and to a large extent automated, since a large number of cases (i.e. syllable prominence) can be predicted.

8. Conclusion

This study claims that phonetic weakening, or reduction, plays a more essential role in Chinese than phonetic enhancement, or “stress”. Weak syllables (instead of “stressed” syllables) assume the role of the essential guarantors of Mandarin speech rhythm. The crucial notion of the present analysis is **a normal syllable** (an ordinary, fully pronounced syllable), which may become weakened or occasionally enhanced under certain conditions in connected speech. An important task appears to be to fully understand *why* some tonal words or morphemes become weakened in speech, i.e. to reveal the rules and functions of phonetic weakening. In Mandarin Chinese, linguists should be encouraged to explore “**non-stress**” **assignment**, instead of **stress assignment**. The weakening should be recognized as an important part of phonology (the lexical T0 has already made it).

Such an understanding may result in a well-structured **classification of regularly weakened items**. It should be hierarchical, taking into account particular structural levels. It should distinguish independent words from bound morphemes, and the lexical

neutral tone from the neutralized tone. The next step would be to specify the conditions under which particular items become weakened, and to what particular degree. Also, the degree to which a native speaker may be expected to weaken such items should be traced. This concept may find its application in some sort of prosodic transcription, taking a normal syllable as a default form and labelling the weakened syllables.

The proposed hypothesis **does not work with the concept of stress** (except for emphasis). It is claimed to reflect the **intuitions of native speakers**, being pertinent for the Chinese language **due to its tonal character**. This naturally implies that native speakers should be more sensitive to weakened syllables than to “stressed” syllables. As e.g. Chao (1968: 38) points out, perception tests show a good degree of agreement among native speakers on neutral-tone syllables. Testing other weak syllables is a task for the future. Assumedly, the rate of agreement on weak syllables (i.e. weakened, neutralized, and toneless syllables) and normal syllables should be quite convincing.

The author hopes that this alternative view on Chinese stress may help reveal the key to the issue in future research. It could be applied in speech synthesis to increase the degree of naturalness of synthesized speech. It could also be quite beneficial for language teaching. Li (1981: 40) points out: “If we establish the concept of stress in Chinese, we can rationally explain... many phonetic phenomena.” We can paraphrase it in the following way: “If we establish **the concept of weakening** in modern Chinese and reveal its functions at various linguistic levels, we can rationally explain many phonetic and phonological phenomena.”

三十輻，共壹轂，當其無，有車之用。故有之以為利，無之以為用。

(老子，篇 XI)

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玻璃杯半满抑或半空？ 汉语重音的另类观

廖 敏

捷克科学院东方研究所

摘 要 本文是以另一种视角来看普通话的轻重音问题。重点在语音弱化（轻音、轻读）而非语音增强（重音、重读）。本研究提出的假设如下：在汉语里，尤其在普通话日常口语中，语音弱化的作用比语音增强的作用更为关键。语音弱化表现出相当的规则性。许多案例已经被语法化、规律化。语音弱化的主要来源是各种语言层面发生的语义弱化、虚化。假如我们对语音弱化的各种语境和功能了解加深，认识语音弱化和语法结构及信息结构的关系，那么可以促进我们对普通话言语节奏的研究取得进步。

关键词 汉语 普通话 音系学 语音学 韵律 重轻音 词重音 语音弱化

Hana Trísková

Oriental Institute, the Czech Academy of Sciences, Prague

triskova@orient.cas.cz