# PROSODIC PATTERNS OF NOUN PHRASES IN ENGLISH, MANDARIN AND L2 ENGLISH

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## ABSTRACT

This study focuses on the prosodic patterns of noun phrases (NP) in English, Mandarin and L2 English so as to find out the prosodic similarities and differences between English and Mandarin as well as the effects of the prosody of L1 Mandarin on the acquisition of L2 English NP prosody. The results reveal that English NPs usually have one IP for the NPs with pre-modifiers and two IPs for those with post-modifiers, and the tonicity is on the head noun with a falling tone pattern of H*+L 0%. In contrast, Mandarin NPs are usually chunked into two or more IPs when there are one or more modifiers between the determiner and head noun, and the tonicity is usually on the modifiers with an up-stepped lexical tone on nucleus accented syllables. As for Mandarin speakers' L2 English NPs, they share more typical prosodic patterns of L1 Mandarin NPs demonstrating a strong transfer from L1 prosodic system.

**Keywords:** Noun phrases, Prosodic patterns, English，Mandarin， L2 English

## 1. INTRODUCTION

Prosody plays a key role in spoken language processing [1] [2]. Linguistically, prosody studies rhythm, stress, intonation, and related attributes in speech. Acoustically, it involves variation in syllable weight, length, loudness, and pitch. The details of a language's prosody depend upon its phonology and thus languages are roughly classified according to the distinctive prosodic features into two general categories known as stress-timed and syllable-timed. English is largely stress-timed [3] [4] whereas Mandarin is often regarded as syllable-timed [5] [6]. Noun phrases (NPs) are not only the most highly frequent lexical phrases in a language [7] but also serve as subjects and objects of a sentence carrying more important information in communication [8]. However, not much has been known about the similarities and differences in the NP prosody between English and Mandarin, nor about the effects of this cross-linguistic variation on the acquisition of L2 English prosody. Therefore, an experimental study focusing on the prosodic patterns of English, Mandarin and L2 English was devised and carried out so as to provide some theoretical and pedagogical implications for the learning and teaching of English and Mandarin as second languages.

Earlier work on prosody has explored two specific topics fruitful in prosodic research: the function of intonation and the nature of stress [9] [10], and examined the acoustic correlates of pitch, duration and intensity in accented contexts revealing that syllable duration, pitch variation, vowel quality and spectral balance are reliable cues in cuing the prosodic structure of an utterance [11] [12] [13]. Researchers and practitioners on English intonation have highlighted the role of three linguistic intonation systems known as three Ts, i.e., tonality, tonicity and tone [14] [15]. As this study is largely pedagogy-oriented, the framework of three Ts is adopted to analyze the prosodic features of target NPs with reference to syllable duration, pitch change, and intensity variation.

## 2. METHODOLOGY

### 2.1. Subjects

Twenty subjects participated in the experiments: 4 standard native speakers of RP English from the University of Cambridge (2M, 2F), 4 standard native speakers of Mandarin from Zhenjiang Radio Station (2M, 2F), and 12 Mandarin EFL learners randomly selected from 81 senior English majors form Jiangsu University of Science and Technology (JUST) (6M, 6F). The EFL learner subjects had received English education for an average of 13.4 years but never been to any English-speaking countries. As all of them have passed TEM 4, a national official English proficiency Test for English majors, they could be regarded as advanced Mandarin-speaking EFL learners in China and hence their prosodic patterns of NPs in L2 English can be assumed to present some typical prosodic features of China English.

### 2.2. Stimuli

The stimuli for the experiments are six English NPs and six equivalent Mandarin NPs (see Table 1).

They are divided into 3 categories: Type1: Det+[(Adv)+(Adj)]+headN (ENP/MNP1-3), Type2: NUM+（modifier N）+headN (ENP/MNP4-5), Type3: NUM+ headN + Prep.Phrase (ENP/MNP6).

Table 1: Stimuli for the experiments

| No | English NPs | No | Chinese NPs |
|----|-------------|----|-------------|
| ENP1 | a teacher | MNP1 | 一位老师 |
| ENP2 | a nice teacher | MNP2 | 一位漂亮的老师 |
| ENP3 | a very nice teacher | MNP3 | 一位非常漂亮的老师 |
| ENP4 | fourteen teachers | MNP4 | 十四位老师 |
| ENP5 | fourteen women teachers | MNP5 | 十四位女教师 |
| ENP6 | fourteen teachers from China | MNP6 | 十四位来自中国的老师 |

Notes: ENP=English NP   MNP=Mandarin NP

### 2.3. Data collection and analysis

The speech corpus of RP speakers was recorded at the Phonetics Laboratory in the University of Cambridge, while those of Standard Mandarin native speakers and Mandarin EFL learners were recorded at the Phonetics Laboratory in JUST. The recorded data were then annotated and analyzed by the researchers via Cool Edit Pro V2.1 and Praat 5240-win32.

Although the tone system of Mandarin is an interface between lexical tone and intonation tone, we assume Mandarin could be somewhat similar to English to such an extent that the same criteria could be adopted to compare and contrast their prosody [16] [17]. So, the annotation was undertaken based on the elements of IViE, ToBI and 3Ts [18], which included 4 tiers as follows: Orthographic Tier, Syllable Tier, Prominence Tier (i.e., prominent syllables with nucleus accents), and Phonological Tier (i.e., the tone tier describing the intonation patterns by linguistic description). The 'wav' files were annotated and labelled based on both audio judgments and acoustic correlates of syllable duration, pitch change, and intensity variation. Tonality, tonicity and tone were respectively marked in the number of IPs, last accented syllable in an IP, and tone patterns consisting of nucleus tone (fall: H*+L: rise: L*+H; and fall-rise: HL*+H) and boundary tone (H%, L% and 0%). Lastly, the results of three Ts parameters were calculated and analyzed in the tokens of each of the subject group and their percentage in the group population (e.g. 4/100% for RP speakers).

## 3. RUSULTS AND DISCUSSION

### 3.1 Prosodic patterns of NPs in English

As is showing in Table 2, in terms of tonality, all the 4 RP speakers (4/100%) chunked Type1 and Type2 NPs into 1 IP and Type 3 into 2 IPs. The difference may result from the position of head noun modifiers.

Type1 and Type2 have pre-modifiers whereas Type3 has post-modifiers.

In terms of tonicity and tone, RP speakers located their nuclear accent on the first syllable of the head noun TEACH-er with the tone pattern of H*+L 0% and H* H*+L 0%. To highlight the nuclear accent, the pitch was significantly up-stepped or down-stepped so as to achieve its utmost prominence (see Fig 1-6). These go well with the findings in previous studies [19] [20] [21].

Table 2: Prosodic patterns of NPs in English

| Type | No | Tonality | Tonicity & Tone |
|------|-----|----------|-----------------|
| Type 1 | ENP 1 | 1 IP | a **TEACH**er<br>H*+L     0%          (4/100%) |
| | ENP 2 | 1IP | a nice **TEACH**er<br>H*+L 0% (4/100%) |
| | ENP 3 | 1 IP | a **ver**y   nice   **TEACH**er<br>H*          H*+L     0%   (1/25%)<br>H*       *  ^H*+L    0%   (1/25%)<br>H*          ^ H*+L   0%   (1/25%)<br>H*          ! H*+L   0%   (1/25%) |
| Type 2 | ENP 4 | 1 IP | **four**teen **TEACH**ers<br>H*     H*+L     0%     (3/75%)<br>H*    ! H*+L      0%     (1/25%) |
| | ENP 5 | 1 IP | **four**teen women **TEACH**ers<br>H*              H*+L 0%   (3/75%)<br>H*             !H*+L 0%   (1/25%) |
| Type 3 | ENP 6 | 2 IPs | **four**teen **TEACH**ers<br>H*     H*+L 0%          (4/100%)<br>from **CHIN**a<br>H*+L 0%          (4/100%) |

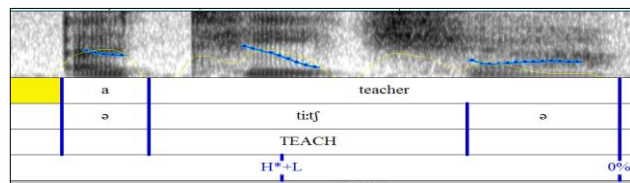Notes: !=downstep   ^ = upstep   4/100%= 4 subject which holds 100% of the population


Figure 1: Tonality, tonicity and tone of *a teacher* by a female RP speaker
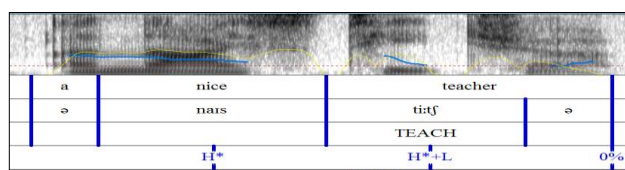

Figure 2: Tonality, tonicity and tone of *a nice teacher* by a female RP speaker
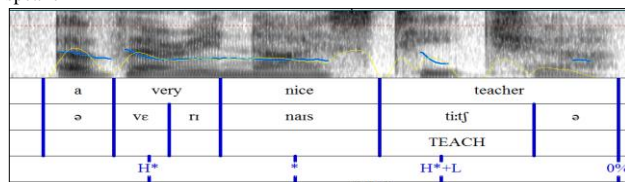

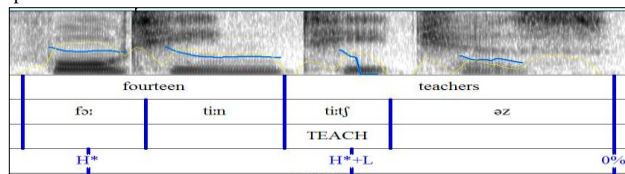Figure 3: Tonality, tonicity and tone of *a very nice teacher* by a female RP speaker


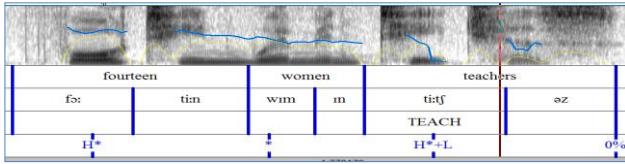Figure 4: Tonality, tonicity and tone of *fourteen teachers* by a female RP speaker

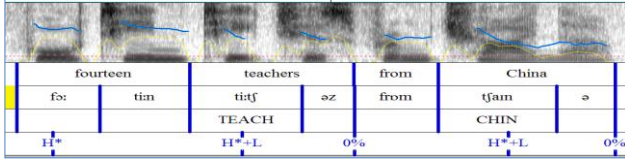Figure 5: Tonality, tonicity and tone of *fourteen women teachers* by a female RP speaker


Figure 6: Tonality, tonicity and tone of *fourteen teachers from China* by a female RP speaker

**3.2 Prosodic patterns of NPs in Mandarin**

As is shown in Table 3, Mandarin native speakers tend to chunk the simplest NP consisting of a compound determiner (Number + quantifier) plus a head noun (MNP1: 一位老师 *a teacher*) in 1 IP and all the other NPs with modifiers except a compound determiner into 2 IPs. This indicates that the determiner becomes an independent IP when there are one or more modifiers between the determiner and the head noun. This may largely depend on the syllable-timed rhythm of Mandarin, which requires more energy in the articulation of each syllable and more pauses during the syllables.

In terms of tonicity, all the native speakers of Mandarin accented the compound determiner within an independent IP (in MNP1). When the number of the compound determiner is one character like "一 yi1", the following quantifier "位wei4" is accented; and when the number is two-character prosodic word like "十 shi2 四 shi2si4", the second character of the number i.e., "四 si4) is accented instead of the quantifier "位wei4". As for the second

Table 3: Prosodic patterns of NPs in Mandarin

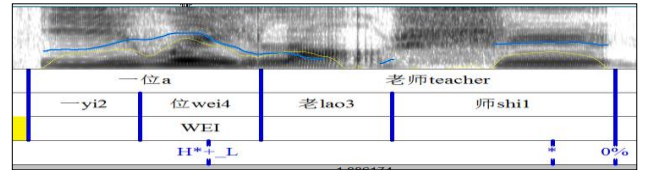| Type | No | Tonality | Tonicity & Tone |
|------|-----|----------|------------------|
| Type 1 | MNP 1 | 1 IP | 一**位** 老 师<br>yi2**WEI**4 lao3shi1<br>H*+L * 0% (4/100%) |
| | MNP 2 | 2 IPs | 一**位** **漂**亮的 老 师<br>yi2**WEI**4 **PIAO**4liang0de0 lao3shi1<br>H*+L 0% H*+L *0% (4/100%) |
| | MNP 3 | 2 IPs | 一**位** **非**常 **漂**亮的 老 师<br>yi2**WEI**4<br>fei1chang2**PIAO**4liang0de0lao3shi1<br>H* 0% ^H*+L !H*+L * 0% (2/50%)<br>H* 0% ^H*+L H*+L * 0% (2/50%) |
| Type 2 | MNP 4 | 2 IPs | 十**四** 位 老师<br>shi2**SI**4wei4 lao3shi1<br>H*+L * 0% (3/75%)<br>H*+L 0% (1/25%) |
| | MNP 5 | 2 IPs | 十**四** 位 **女** 老师<br>shi2**SI**4wei4 **NV**2 lao3shi1<br>H*+L 0% L*+H *0% (4/100%) |
| Type 3 | MNP 6 | 2 IPs | 十**四**位<br>shi2**SI**4wei4l<br>H*+L 0%<br>来自 **中**国的 老师<br>lai2zi4**ZHONG**1guo2de0 lao3shi1<br>^H*+L *0% (4/100%) |

Notes: !=downstep ^ = upstep


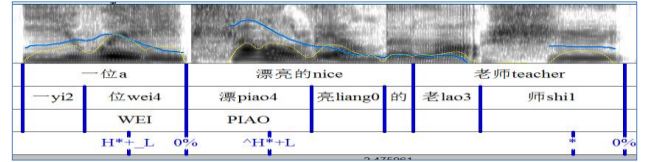Figure 7: Tonality, tonicity and tone of 一位老师by a female Mandarin speaker


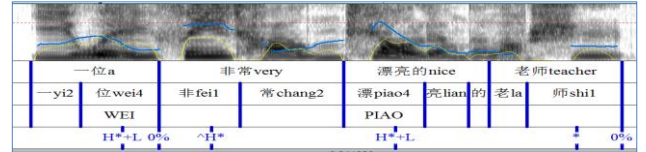Figure 8: Tonality, tonicity and tone of 一位漂亮的老师by a female Mandarin speaker


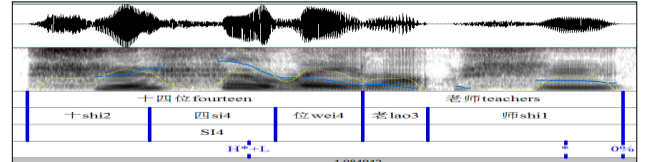Figure 9: Tonality, tonicity and tone of 一位非常漂亮的老师by a female Mandarin speaker


Figure 10: Tonality, tonicity and tone of 十四位老师by a female Mandarin speaker
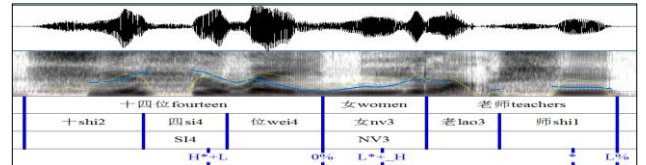

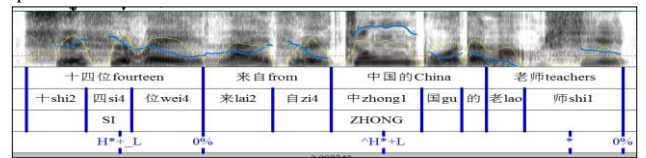Figure 11: Tonality, tonicity and tone of 十四位女老师by a female Mandarin speaker


Figure 12: Tonality, tonicity and tone of 十四位来自中国的老师by a female Mandarin speaker

IP made of a modifier and a head noun, it is always the key morpheme of the pre-head modifier such as 漂亮 (NICE) /非常漂亮(very NICE)/女(WOMEN)/中国(CHINA) that carries the accent, whereas the head noun 老师（teacher） is unaccented. This tonality pattern of pre-head modifiers typically differs from that of the NPs in English, where the head noun is always accented.

As for the tone, a complicated issue for tone languages, the phrasal tone of Mandarin NPs is in fact a combination of lexical tone and phrasal tone, which is known as small rips of lexical tones plus big waves of intonation tone [22] [23]. For accented Tone 4 (high fall) word such as 位wei4 in MNP1-3, 四si4 in MNP4-6 and 漂piao4 in MNP2-3, the tone patterns are usually H*+L 0% with a much up-

stepped high onset. For accented Tone 3 word (mid-fall-rise), such as 女nv3 followed by another Tone 3 word 老lao3 in MNP5, the tone pattern is high rise L*+H 0% instead of HL*+H L% due to the prevailing effect of tone Sandhi in Mandarin. For accented Tone 1 characters, such as 中zhong1 in MNP6, the tone is greatly up-stepped high (^H*) or up-stepped high fall (^H*+L). This is in line with previous findings that the tone of accented words mainly remains its lexical tone with exception to tone Sandhi but with exaggeratedly onset by up-stepping the tone level [24][25] (See Fig 7-12).

### 3.3 Prosodic patterns of NPs in L2 English

Table 4: Prosodic patterns of NPs in L2 English

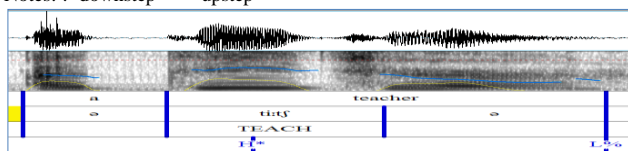| Type | No | Tonality | Tonicity & Tone | | |
|---|---|---|---|---|---|
| Type 1 | L2ENP1 | 1 IP | a **TEACH**er | | |
| | | | H* | L% | (8/67%) |
| | | | H*+L | 0% | (4/33%) |
| | L2ENP2 | 1IP | A **NICE** teacher | | |
| | | | L*+H | * L% | (9/75%) |
| | | | a nice **TEACH**er | | |
| | | | L*+H H* | L% | (2/17%) |
| | | | L*+H !H*+L | 0% | （1/8%） |
| | L2ENP3 | 1 IP | a **VER**y nice **TEACH**er | | |
| | | | H*+L 0% H* | L% | (7/58%) |
| | | | H*+L *0% ! H*+L | 0% | (5/42%) |
| Type 2 | L2ENP4 | 1 IP | four**TEEN** teachers | | |
| | | | H*+L | * 0% | (9/75%) |
| | | | four**TEEN** **TEACH**ers | | |
| | | | H*+L0% !H*+L | 0% | (3/25%) |
| | L2ENP5 | 1 IP | four**TEEN** women **TEACH**ers | | |
| | | | H*+L% H* | L% | (7/58%) |
| | | | four**TEEN** **WO**men teachers | | |
| | | | H*+L0% L*+H | *L% | (5/42%) |
| Type 3 | L2ENP6 | 2 IPs | four**TEEN** teachers | | |
| | | | H*+L * 0% | | (12/100%) |
| | | | from **CHIN**a | | |
| | | | H*+L 0% | | (12/100%) |

Notes: != downstep   ^ = upstep


Figure 13: Tonality, tonicity and tone of *a teacher* by a female Mandarin L2 English speaker
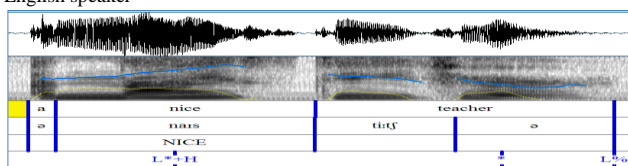

Figure 14: Tonality, tonicity and tone of *a nice teacher* by a female Mandarin L2 English speaker
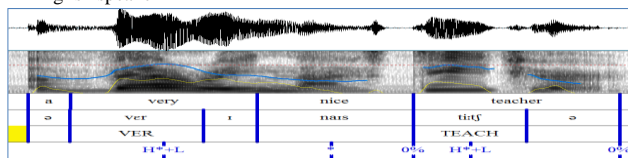

Figure 15: Tonality, tonicity and tone of *a very nice teacher* by a female Mandarin L2 English speaker
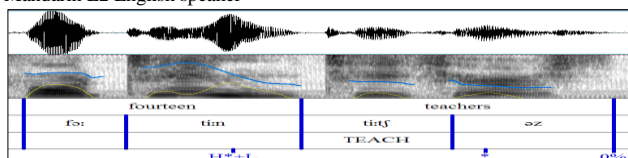

Figure 16: Tonality, tonicity and tone of *fourteen teachers* by a female Mandarin L2 English speaker
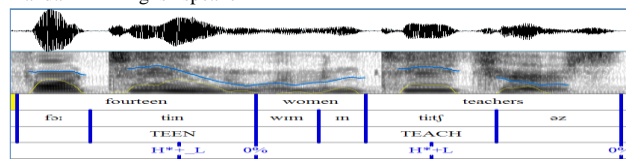

Figure 17: Tonality, tonicity and tone of *fourteen women teachers* by a female Mandarin L2 English speaker
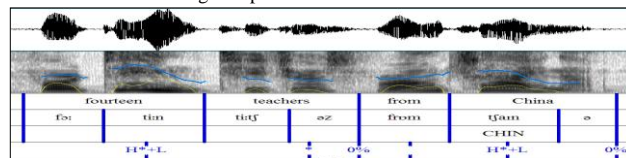

Figure 18: Tonality, tonicity and tone of *fourteen teachers from China* by a female Mandarin L2 English speaker

As is shown in Table 4 and Figure 13-18, Mandarin EFL learners tend to chunk *a teacher*, *a nice teacher*, *fourteen teachers* into 1 IP and *a very nice teacher, fourteen women teachers* and *fourteen teachers from China* into 2 IPs. The 1-IP group consists of 3 to 4 syllables while the 2-IPs has 5 syllables, indicating that Mandarin EFL learners' chunking is constrained by the number of syllables as a result of syllable-timed tone language and that they prime to chunk the pre-head modifiers into an independent IP if the modifiers consist of two or more words /syllables. This is quite deviated from the prosodic norm of English NPs, which seldom splits the pre-head modifiers from head nouns in an IP. In terms of tonality and tone, Mandarin EFL learners tend to locate nuclear accent on the pre-modifiers such as in *a **NICE** teacher* (L2ENP2) (67%), *four**TEEN** teachers* (L2ENP4) (75%), ***WO**men teachers*(42%). About half of the subjects were able to realize falling tone H*+L properly, however, the tone pattern is deviated from that of L1 English. For example, L2 EFL learners all pronounced the nucleus accented *syllable* of *a **NICE** teacher* in a rise tone L*+H instead of high level tone H*, and that of *a TEACHer* in H* L% instead of H*+L 0%. They seemed to have difficulties to produce high level tone H* when the vowel of the accented syllable is not a high-close one /iː/. All these prominent variations could be accounted for from their L1 Mandarin prosody demonstrating strong transfer from L1 Mandarin prosody [26].

### 4. CONCLUSION

To conclude, English NPs usually have one IP for NPs with pre-modifiers and two IPs for those with post-modifiers, and the tonicity is on the head noun with falling tone patterns of H*+L 0%，whereas Mandarin NPs are chunked into two or more IPs when there're one or more modifiers between the determiner and head noun and the tonicity is usually on the modifiers with greatly up-stepped lexical tone of nucleus accented syllables. As for Mandarin L2 English NPs, they shared more typical prosodic patterns of L1 Mandarin NPs on tonality, tonicity and tone, demonstrating a strong transfer from L1 prosody system.

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