
Comparison of intonation patterns in Mandarin and English for a particular speaker

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Abstract

In this paper I will address two questions regarding intonation: first, what do intonation patterns look like in a specific variety of Chinese, and second, how does a native speaker of that language interpret intonation in English? This research indicates that this speaker's Chinese intonation patterns do not display the pitch register distinction posited for Beijing Mandarin. However, she does use both pitch range expansion and high boundary tones as methods for distinguishing statements from questions. Her English intonation system displays a much denser assignment of tonal targets than that of a native speaker of English. She demonstrates a potential knowledge of pitch accent for words spoken in isolation, but she continues to apply the same tonal pattern to individual words even in the context of a larger utterance, thus using a system that more closely represents lexical tone. However, she demonstrates knowledge of English boundary tones. Thus, this research provides evidence for the way in which specific aspects of one's native language may be systematically applied to a very different system.

1. Introduction: Lexical Tone vs. Intonation

Lexical tone is a particular tonal pattern assigned in the lexicon, and this assignment is contrastive. For example, in Mandarin the word 母亲 (mother) pronounced with a high level tone, is distinct from 母亲 (scold) pronounced with a falling tone. Intonation, on the other hand, is a tune assigned over an entire utterance. Rather than distinguishing lexical items, it distinguishes different meanings for sentences. The interpretation of an intonation pattern is determined in the lexicon, and the lexicon also provides a way of attaching the tune to a text, but the tune is not attached to any particular utterance in the lexicon. For

example, in English, a certain type of rising ending on an utterance indicates that it is a question.

It has been argued that the existence of lexical tone does not prevent the existence of intonation (see for example Ladd and Hirst and DeCristo). However, not much is known about how lexical tone and intonation interact. According to one view, both lexical tone and intonation patterns are specified as an abstract sequence of high and low tones (Ladd, Peng). These tones have no absolute physical value. Rather, they are implemented through the manipulation of pitch, the fundamental frequency (f_0) of the voice, which rises and falls to meet these tonal targets. Now, Chinese is a tone language, while English is an intonation language. That is to say, if Chinese has both tone and intonation, then Chinese assigns tonal targets on a lexical as well as phrasal level, while English only assigns an intonation tune on a phrasal level. Thus, in Chinese, the dual usage of tone leads to a more complicated picture than is found in English, making it more difficult to separate lexical tone from intonation. Moreover, it is not clear how a native speaker of a tone language would deal with tone in English, since English uses intonation but makes no specifications for lexical tone. This paper will investigate this issue.

2.1. Background: Lexical Tone in Mandarin Chinese

The first issue one confronts in examining what a Mandarin speaker does in English is to determine what she does in Mandarin. Moreover, in order to distinguish intonation from lexical tone movements, it is necessary first to examine the characteristics of lexical tone in isolation. Mandarin Chinese specifies four lexical tones. They will be referred to in this paper in the standard way: in isolation first tone is a high level tone (1), second tone is a mid-rising tone (2), third tone is a falling-rising tone (3), and fourth tone is a falling tone (4). In addition syllables may be lexically assigned a "neutral tone", or more accurately, they fail to receive a specification for lexical tone. This is generally the underlying tonal specification (or lack thereof) for syllables that are never stressed and for particles. Although these tones are known to vary greatly even over small geographic areas (Giet: 1946, 1950), it was found that the consultant's lexical tones, at least in careful speech in isolation, are in line with those of Beijing Mandarin. These tones will be transcribed in this paper as a numeral following the standard pinyin transcription of a word.

2.2. Background: Intonation in Mandarin Chinese

Research on intonation patterns in Mandarin is somewhat rare, and as a result there are few general conclusions as to what the intonation patterns are.

Moreover, the majority of the research has been carried out on Mandarin as spoken in Beijing.

Most notable among those making early auditory characterizations, Chao (1968) lists 13 basic intonation patterns for Mandarin Chinese. Many of these 13 intonation patterns are, however, emotive rather than purely linguistic distinctions. In addition, he maintains the idea that two particles in Chinese were phonetically realized only as a rising tone or as a falling tone at the end of a sentence in certain contexts. Chao also makes the observation that: 'In questions ending in the sentence intonation is usually fairly high ...' (801). Thus, Chao's observations argue that intonation in Mandarin can be realized either as a successive addition of intonation to the end of a lexical item, thus changing the shape of the lexical item, or as a simultaneous addition that will affect the entire sentence melody.

Later work, based on instrumental measurements, rejects the idea that intonation may be realized as the final addition of a high or low tone to the lexical tone of the final word of an utterance. Ho (1977), for example, demonstrates that the shape of a final lexical tone may be compressed or expanded, it nevertheless retains its final fall or rise in the context of a declarative, interrogative, or exclamatory utterance. Ho's data also shows a basic distinction in tone register between statements and questions; a much higher pitch is used throughout a question than in a statement.

More recently Shen (1990) has demonstrated that Beijing Mandarin is characterized by three basic intonation tunes, generalized in Figure 2.2.1.

Tune I is used for assertive intonation, Tune II for unmarked questions and particle questions, and Tune III for A-not-A questions. Thus, Shen concludes that the primary prosodic distinction between a statement and a question in Chinese is the significantly higher pitch at the beginning of an utterance. Certain types of questions then continue in a higher register throughout the utterance, while other types of questions fall to the same ending point as that of a declarative utterance. Thus, she concludes that it is the register rather than the contour of the pitch that has intonational significance for tone languages (72). She amends this statement, though, by pointing out that the general pitch contour shown above is a result of intonation and not a result of lexical tone (75), but she does not recognize any successive tone addition as being the result of intonation.

Kratochvil (1998) and Garding (1984) claim that Chinese intonation is characterized by a grid of two lines that may be narrowing or widening, rising or falling throughout the utterance. Between these two lines the tonal targets are placed. Kratochvil specifically mentions pitch range expansion as being an intonation pattern characterizing focus. Xu verifies this statement with his close examination of the effect of focus on short declarative sentences in Mandarin. In addition, he also demonstrates that the lexical tones remain distinctive even though they are modified as a result of the tonal context of both surrounding lexical tones and focus intonation, and he asserts that lexical tone and focus are the primary determiners of f_0 in short declarative Mandarin sentences.

With this background, then, it is not entirely clear what one should expect to find in Mandarin intonation. Moreover, the tendency to find great variety in lexical tone even over a small region and within the same dialect at least suggests the possibility that variety may exist in intonation patterns as well.

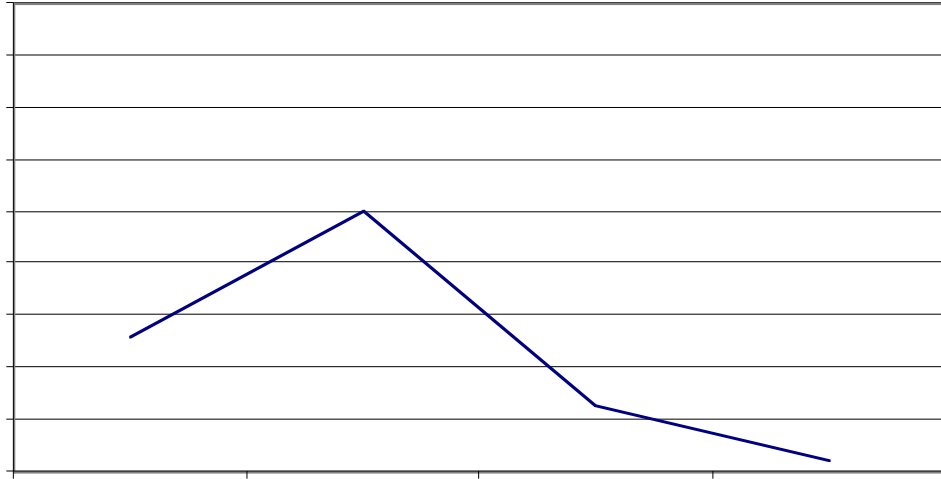
3. Methodology

The scope of this investigation is limited to a case study of a particular speaker of the variety of Mandarin Chinese that is spoken in Pang, a small village in Hebei Province, China, approximately 100 miles south of Beijing. The informant is a 23-year-old female who lived in this village until the age of 16 when she moved to New York State. She was educated in her village, and much of this education took place in standard Mandarin; moreover, her current use of Chinese is primarily among Mandarin-speaking students for whom the Beijing variety is prestigious. It is only in talking with her family, primarily by telephone, that she uses the Pang variety. Nevertheless, she states that her Chinese is strongly accented.

In my investigation of her Chinese intonation patterns I made use of a portion of the sentences Shen used in her experiment. Although my speaker

found many of them odd grammatically and/or semantically (in contrast with the

calculated both with and without the particle , as the pitch assigned to it varied depending on the lexical tone of the preceding syllable. When the average was taken for all the sentences and plotted using Excel, the results decidedly do not agree with Shen's data. Charts are pictured below (Figures 2 and 3).



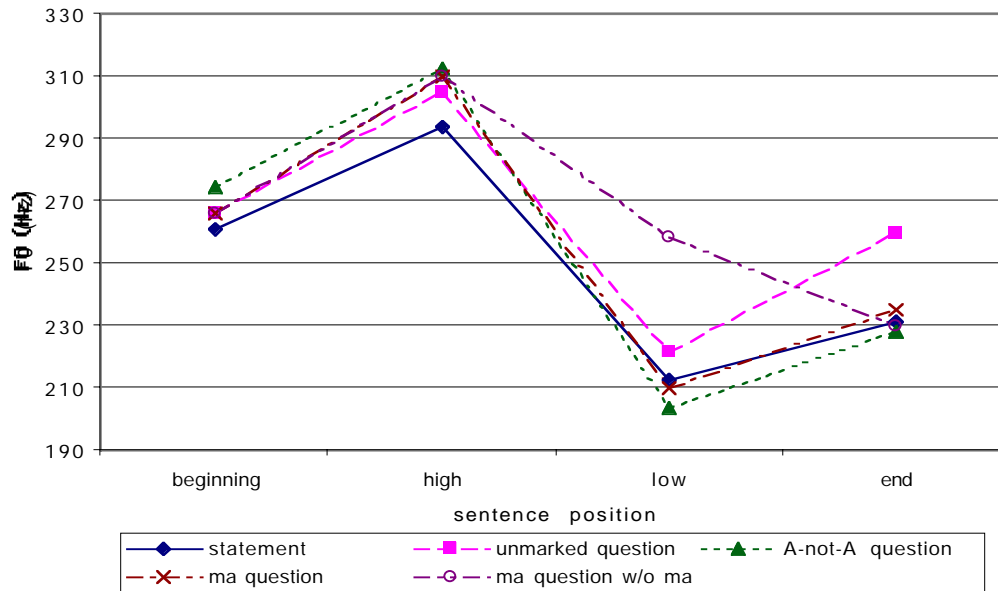


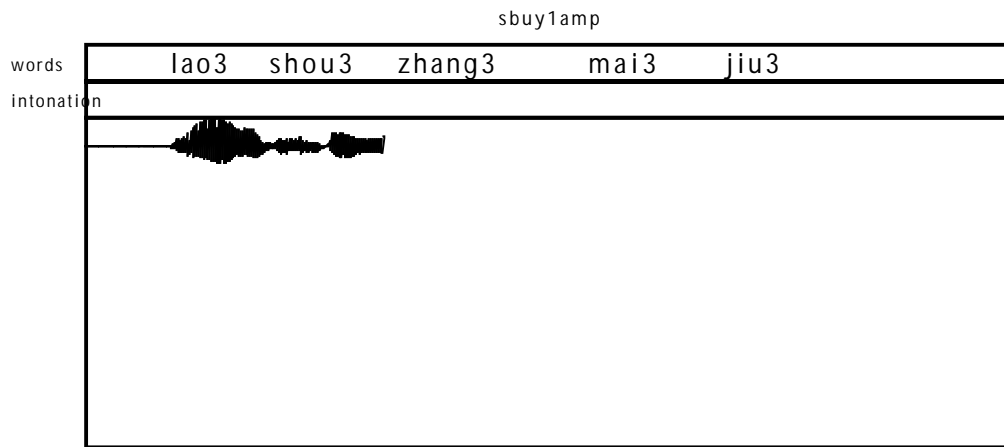
Figure 3: The f0 averages of the beginning, end and high and low points in the pitch contour of the present study

Since these sentences are carefully regulated for tone, and since the speaker stated that at least one of the readings was completed in a different manner from the others, it is to some degree questionable how accurate the results taken from the averages are. Since, however, normal speech is not regulated for tone and since many different manners of speaking can be adopted, the averaged results probably most accurately reflect normal speech. Nevertheless, the given measurements of fundamental frequency do not characterize well the intonation patterns of the Pang speaker, and thus observational generalizations are used.

4.2. Chinese Results: Boundary Tone and Pitch Range

The following four pitch tracks demonstrate the pitch movements for a statement consisting of each of the four tones.

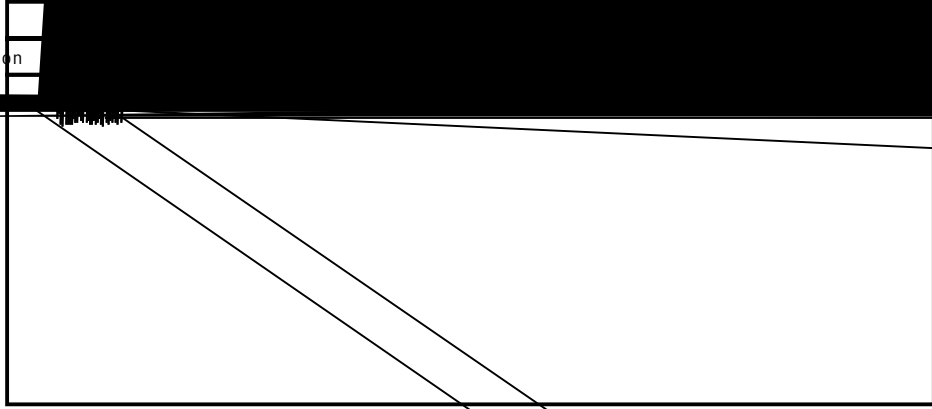
11 250 z 250 500 500 750 750 1000 1000 1250 1250 m s g o n g 1 c a 1

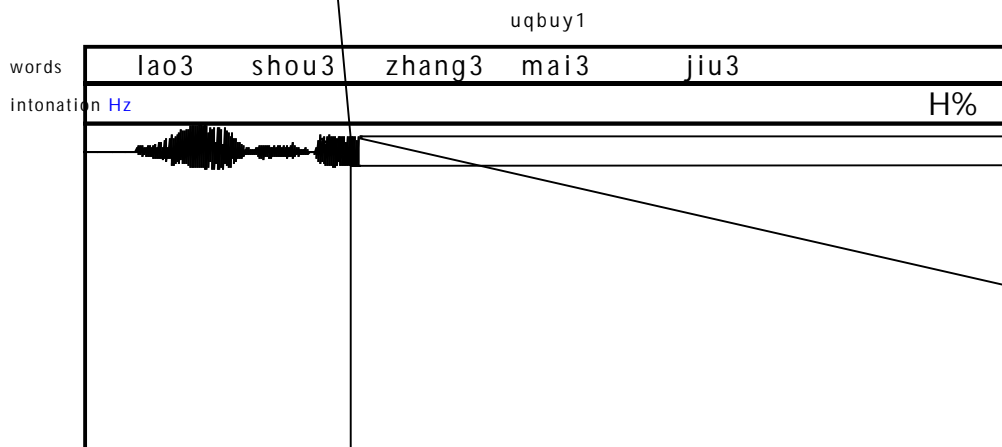


33

words

intonation



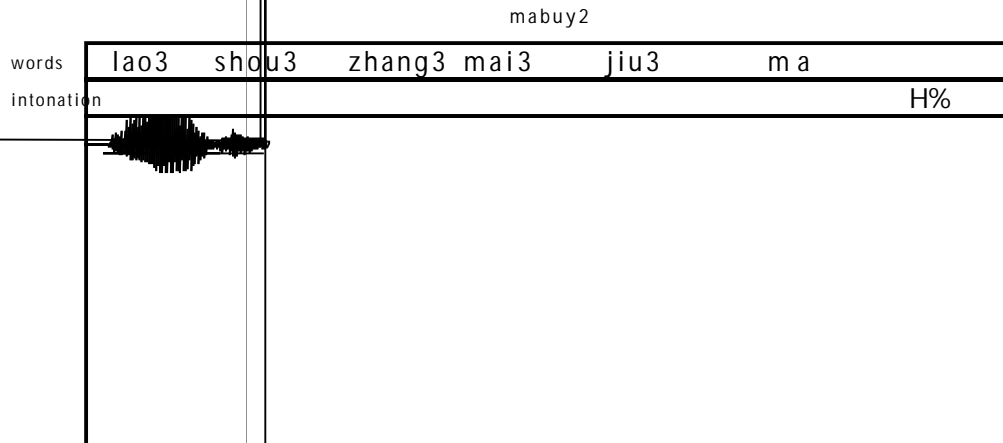


demonstrates a fall of about 125 Hz, whereas the sentence apart from the follows the same pattern as the unmarked question does (Figure 7, c.f. Figure 6).

maclean1

words	bao1 shen1	gong1 ca1	che1	ma
intonation				H%

For 3rd and 4th tone sentences, Figure 9, the *ma* is simply assimilated into the sentence final tonal pattern of the unmarked question. Thus, the tonal pattern assigned to the last syllable in an unmarked question (4th tone) or statement (3rd tone) will instead be assigned to this syllable combined with the *ma* in the context of a question.

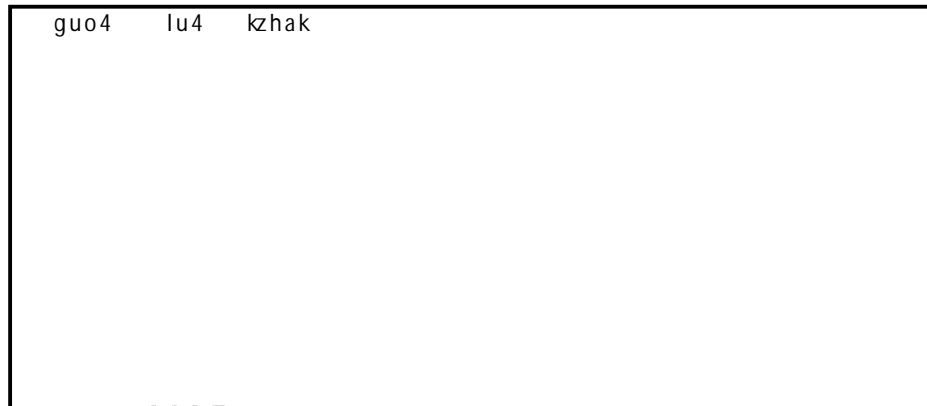


unexplained. The only feasible explanation in light of any of the current intonation models is that the pitch is the result of the application of a phonological rule on the tonal tier which alters the tonal specifications.

The A-not-A sentences display a clearly different intonation pattern than do the declarative sentences. This manifests itself as a widening of the pitch range for some combination of the verb, the negation word, and the following verb. As this is not explicable in the standard ToBI model, which makes specifications only for H and L, the added feature of pitch range expansion is necessary, transcribed as < > (Godevac).

If the verb is underlyingly 1st or 4th tone, its first occurrence is considerably higher than the preceding word. Following Kratochvil's model, these syllables begin at the high point of the expanded pitch range. For 4th tone, a falling tone, the fall takes place in the first occurrence of the verb, leaving the rest of the phrase relatively flat, while for 1st tone, a level tone, the fall takes place in the second occurrence of the verb and the first occurrence of the verb is flat, as seen in Figure 10. It seems that along with the widened pitch range there is a necessity to cover the entire range, but the exact way in which this happens is a function of lexical tone.

bupicture1



buclean2

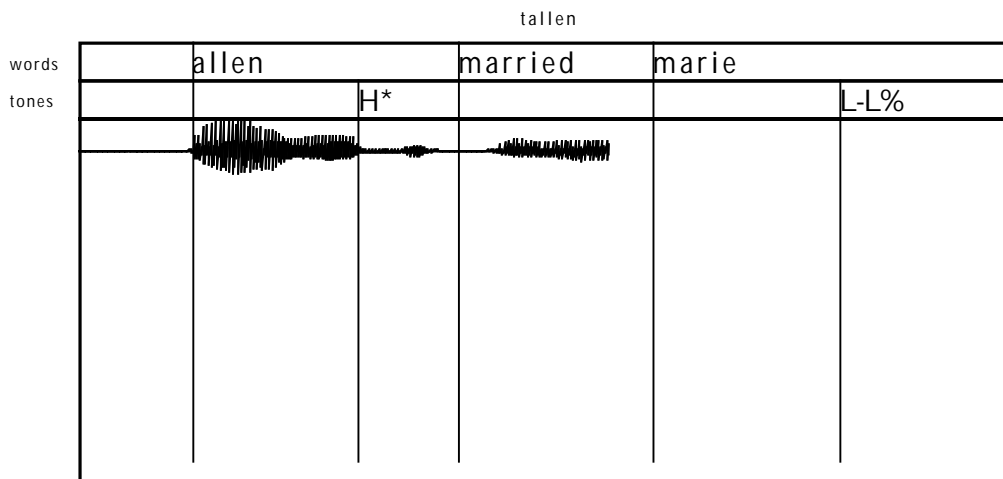
1	mei2	ca1	che1
<			>

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variety as they are in the Beijing variety, and thus there is a strong possibility that the intonation reflects the Pang variety.

5. English Background

It will become immediately clear to the reader who is familiar with English intonation patterns that the patterns discovered for Chinese are much different than those found in English. According to the ToBI system, English intonation tunes can be transcribed with three different kinds of tone: a pitch accent, a phrase tone, and a boundary tone. Each of these can be specified as either high or low, and minimally an utterance must contain one of each type (see Pierrehumbert & Beckman (1986), Ladd, and Hayes). A pitch accent (*) is aligned with a prominent syllable in the utterance, while the phrase (-) and boundary (%) tones occur at the edge of a domain. For example, a standard English declarative intonation tune is H* L-L%, as shown in the Figure 12, *Allen married Marie*. The focus is on *Allen*, moving the pitch accent to the first word in the utterance from its default position on the final word. All other pitch movement in the sentence is simply a result of movement toward the three tonal targets.



6. Methodology


The English sentences were designed to be grammatically equivalent to the Chinese sentences as much as possible, this seeming to be the best possible way of determining whether similar strategies were used in the two languages or not. Thus, I used basic statements; unmarked, or echo, questions; basic yes-no questions using "did", and yes-no questions with "or not" added to the end. The words making up the sentences were chosen with an attempt to minimize the number of non-sonorants and the location of the stress. There were six sentences in each category, all of which were basic SVO sentences consisting of three to five words in their statement form. Each was repeated three times for a total of 72 tokens. In addition, a word list was recorded of English words one to four syllables in length with varying locations of stress. The sentences were recorded at the same time and in the same manner as the Chinese sentences were. A male monolingual native speaker of English, age 23, was also recorded simply for the sake of comparison.

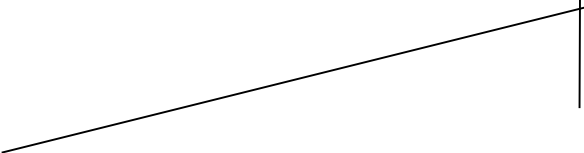
7.1. English Results

It was found that the Chinese speaker used the same general intonation patterns for the statements and "or not" questions and for the "did" and unmarked questions. As a result, only the intonation patterns of the statements and the "did" questions will be analyzed.

For the sake of comparison, the pitch track of a native speaker of English for a basic statement, "John married Marie" and a basic question, "Did John marry Marie?" are displayed.

tallen

words	allen		married	marie	
tones		H*			L-L%
					

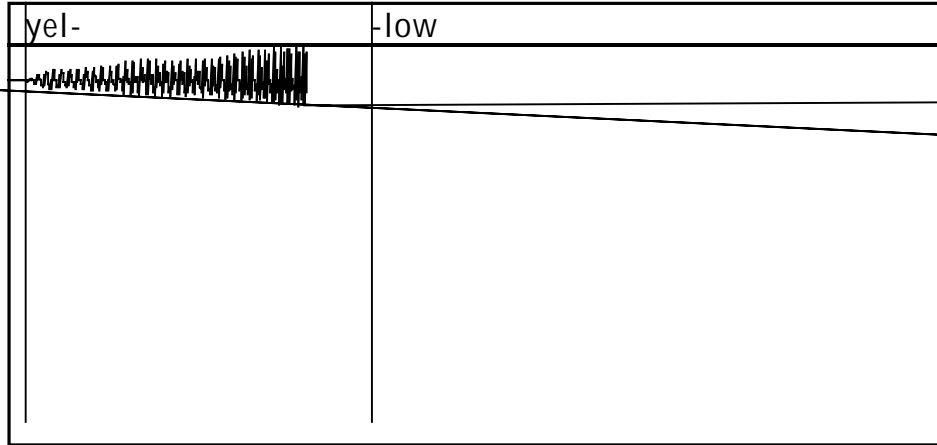


In isolation, the consultant consistently applies a rising tone to the stressed syllable and a falling tone to the final syllable of a word. This pattern will be

A two syllable word with initial stress is best fitted to this prosodic pattern; it always contains the rise on the first syllable and fall on the second, with the syllable boundary occurring at the peak.

yellow3

words



marie2

words

ma-

-rie



8. Concluding Remarks

Before making any conclusions it is necessary to reemphasize the scope of this study, which was a case study of one speaker conducted as a preliminary examination of the issues involved. Thus, the patterns displayed cannot be considered normative for either Pang Mandarin or for English as spoken by a native speaker of Chinese. In order to further determine these patterns it would be necessary not only to record more speakers of the Pang variety but also to elicit the information in a more natural manner rather than by having the informant read from a list. Moreover, continued research should attempt to determine the results of stress and examine how these patterns appear in sentences of longer length and of varied lexical tone.

These things aside, though, this research definitely emphasizes the vast amount of work left to be done on Chinese. If intonation patterns can vary fundamentally within one dialect over a small geographic area, then certainly statements made about the Chinese spoken in Beijing can hardly be considered to be normative, even though this variety is the prestigious one and taught in schools.

This research also demonstrates the power of prosody in speech. In her English speech, the consultant appeared to continue to make use of an intonation system that more closely resembled that of her native language than it resembled English. Not only was the tonal assignment much denser than that of a native English speaker, but the tonal patterns were assigned to lexical items even when the lexical items were within the context of a larger utterance. As a result, this research indicates that it is possible for a speaker to interpret an unfamiliar and distinct intonation system in the same way she interprets the intonation system of her native language. Thus, it not offers evidence for the way in which a specific speaker can carry over specific aspects of her native language to a language that uses very different systems from her own, but it ultimately offers insight into the question how languages interact and affect one another.

Acknowledgements

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Appendix A

Chinese Sentences (from Shen, 81-83)

A. Statements

1. Ta1 gao1sheng1 shuo1. ÔHe speaks loudly.Õ
he loudly speak
2. Nian2ji2 cai2jue2. ÔThe school grade makes a ruling.
school grade make ruling
3. Lao3 gu3dong3 jiang3. ÔThe conservative old man is speaking.Õ
old conservative man speak
4. Bao1shen1gong1 ca1 che1. ÔThe indentured laborer cleans the car.Õ
indentured laborer clean vehicle
5. Hong2 Bi2tou2 mei2 quan2. ÔRed NoseÕ does not have power.Õ
red nose not power
6. Lao3 shou3zhang3 mai3 jiu3. ÔThe old senior officer buys wine.Õ
old senior officer buy wine
7. Guo4lu4ke4 zhao4xiang4. ÔA passerby takes pictures.Õ
passerby take picture

B. Unmarked Questions

1. Ta1 gao1sheng1 shuo1? ÔHe speaks loudly?Õ
he loudly speak
2. Nian2ji2 cai2jue2? ÔThe school grade makes a ruling?
school grade make ruling
3. Lao3 gu3dong3 jiang3?ÔThe conservative old man is speaking?Õ
old conservative man speak

4. Bao1shen1gong1 ca1 che1? ÔThe indentured laborer cleans the car?Õ
indentured laborer clean vehicle
5. Hong2 Bi2tou2 mei2 quan2? ÔÓRed NoseÓ does not have power?Õ
red nose not power
6. Lao3 shou3zhang3 mai3 jiu3? ÔThe old senior officer buys wine?Õ
old senior officer buy wine
7. Guo4lu4ke4 zhao4xiang4? ÔA passerby takes pictures?Õ
passerby take picture

C. ÔMaÕ Questions

1. Ta1 gao1sheng1 shuo1 ma? ÔDoes he speak loudly?Õ
he loudly speak ?-part.
2. Nian2ji2 cai2jue2 ma? ÔDoes the school grade make a ruling?
school grade make ruling ?-part.
3. Lao3 gu3dong3 jiang3 ma? ÔIs the conservative old man speaking?Õ
old conservative man speak ?-part.
4. Bao1shen1gong1 ca1 che1 ma?
indentured laborer clean vehicle ?-part.
ÔDoes the indentured laborer clean the car?Õ
5. Hong2 Bi2tou2 mei2 quan2 ma? ÔDoes not ÓRed NoseÓ have power?Õ
red nose not power ?-part.
6. Lao3 shou3zhang3 mai3 jiu3 ma? ÔDoes the old senior officer buy wine?Õ
old senior officer buy wine ?-part.
7. Guo4lu4ke4 zhao4xiang4 ma? ÔDoes a passerby take pictures?Õ
passerby take picture ?-part.

D. A-not-A Questions

1. Bao1shen1gong1 ca1 mei2 ca1 che1?
indentured laborer clean not clean vehicle
 Does the indentured laborer clean the car, or not?
2. Hong2 Bi2tou2 you 3 mei2 you3 quan2?
red nose have not have power
 Does Red Nose have power, or not?
3. Lao3 shou3zhang3 mai3 mei3 mai3 jiu3?
old senior officer buy not buy wine
 Does the old senior officer buy wine, or not?
4. Guo4lu4ke4 zhao4 mei2 zhao4 xiang4?
passerby take not take picture
 Does a passerby take pictures, or not?

Appendix B

English Sentences

A. Statements

1. Melanie won a new car.
2. Allen married Marie.
3. Mary remembered the alien.
4. Leah will unite the women.
5. A llama is a mammal.
6. Annie made the lemonade.

B. Unmarked Questions

7. Melanie won a new car?
8. Allen married Marie?
9. Mary remembered the alien?
10. Leah will unite the women?

11. A llama is a mammal?
12. Annie made the lemonade?

C. "Did" Questions

13. Did Melanie win a new car?
14. Did Allen marry Marie?
15. Did Mary remember the alien?
16. Will Leah unite the women?
17. Is a llama a mammal?
18. Did Annie make the lemonade?

D. "Or not" Questions

19. Did Melanie win a new car, or not?
20. Did Allen marry Marie, or not?
21. Did Mary remember the alien, or not?
22. Will Leah unite the women, or not?
23. Is a llama a mammal, or not?
24. Did Annie make the lemonade, or not?

Appendix C

Chinese Words

1. zhen1	ŃneedleŃ	36. ba4	ŃdamŃ
2. an1	ŃsaddleŃ	37. la1	ŃgarbageŃ
3. lei2	ŃthunderŃ	38. la3	ŃtrumpetŃ
4. fen2	ŃgraveŃ	39. la4	ŃspicyŃ
5. lan2	ŃblueŃ	40. wa1	ŃfrogŃ
6. tui3	ŃlegŃ	41. mai3	ŃbuyŃ
7. yang3	ŃadmireŃ	42. mai2	ŃburyŃ
8. wa3	ŃshingleŃ	43. mai4	ŃsellŃ
9. jian3zi	ŃscissorsŃ	44. wa2	ŃbabyŃ
10. bi3	ŃbrushŃ	45. wa4zi	ŃsocksŃ
11. xian4	ŃthreadŃ		
12. jin4	ŃenterŃ		
13. hong2	ŃrainbowŃ		
14. dui4zi	ŃrightŃ		
15. shan4zi	ŃfanŃ		
16. mei4zi	Ńyounger sisterŃ		
17. bing4	ŃdiseaseŃ		
18. fan4	ŃmealŃ		
19. jin4	ŃhearŃ		
20. gui4zhao2	ŃbutterflyŃ		
21. bi4zi	Ńfine tooth combŃ		
22. dou4zi	ŃbeanŃ		
23. tu4zi	ŃrabbitŃ		
24. mao4zi	ŃhatŃ		
25. ma1	ŃmotherŃ		
26. ma2	ŃhempŃ		
27. ma3	ŃhorseŃ		
28. ma4	ŃscoldŃ		
29. ma	question particle		
30. na2	ŃcarryŃ		
31. na3	ŃwhichŃ		
32. na4	ŃstammerŃ		
33. ren2	ŃpersonŃ		
34. ba2	Ńpull outŃ		
35. ba3	ŃbridleŃ		

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