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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 *ma* 'mother', pronounced with a high level tone, is distinct from *ma* '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 a 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 *ma* 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.

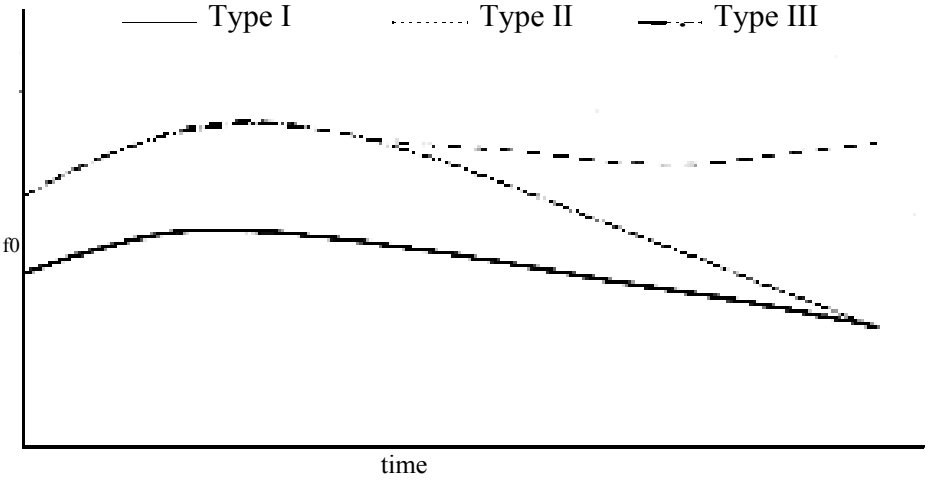


Figure 1: Shen's Intonation Tunes (26)

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 opinion of Shen's informants) she did not seem to think this would affect the way she read them, and so she did not change them. Seven statements were examined, all of which contained within the utterance only syllables of one lexical tone. In addition, the corpus included three different types of yes-no questions formed from these sentences. The first was unmarked questions, that is, questions that were lexically identical with the statements. Questions marked with the particle *ma*, a particle that is added to the end of a statement, made up the second set. In addition, there were four questions, one for each lexical tone, representing the A-not-A pattern, a question form that is formed by following the verb with its negation. Only those statements containing a direct object could fit this syntactic construction. Each statement consisted of either 4 or 5 syllables; the other sentences acquired more as was necessary. Each type was repeated three times for a total of 75 tokens. The pinyin transcriptions of these sentences, along with their English interpretations, is included in Appendix A.

The consultant was recorded using a Tascam DAT at 44.1k via a Shure headmounted microphone. The recording was done in a small classroom with a minimum amount of background noise. The speaker was previously asked to go through the lists and familiarize herself with them; words she was not comfortable with were changed. She was then presented with the lists, each one of which she read three times. She reported that she carried out the second reading of the Chinese sentences in a "different" manner, although she was unable to specify exactly what this manner was. To the ear of someone who knows only a little of the language, it sounded less formal than the others. The data was then transferred to computer files by way of Sound Edit and analyzed using Pitchworks on a Macintosh.

The theoretical model used for this paper is ToBI (Tone and Break Index), a system developed by Beckman and Pierrehumbert (1986). ToBI provides a method for marking high and low tonal targets in a sentence and distinguishing the varying combinations that may occur. This system was developed for American English with the theory that it could be extended to other languages as well. However, other languages use different features in determining intonation patterns, and as we shall see, one important feature this system lacks that of pitch range expansion; making use of this feature follows Svetlana Godevac's work on Serbo-Croatian.

4.1. Chinese Results: Register Tone

In order to compare this data to Shen's work, it is necessary make f_0 measurements at the beginning and end points of each utterance, as well as the high and low point of the pitch contour. The final results for this data are

calculated both with and without the particle *ma*, 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).

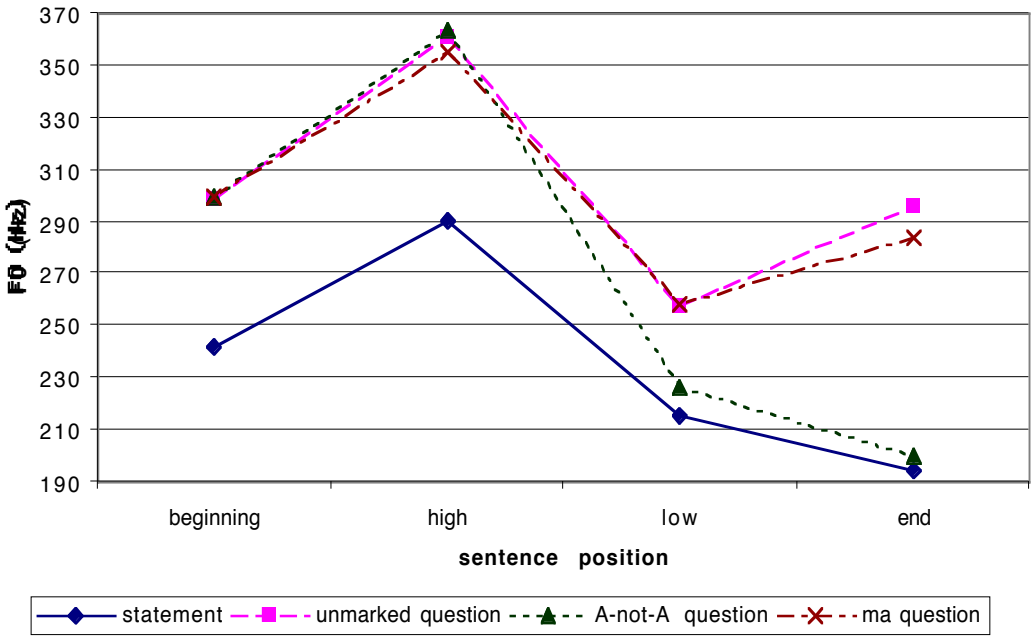


Figure 2: The average F0 of the beginning, end, high, and low tones in Shen's study (19)

Shen's data demonstrates a clear distinction between the high register of the unmarked and *ma* questions and the low register of statements, and it also shows the A-not-A questions beginning in the high register and ending in the low register. When the average values are taken for the Pang speaker, though, all four types of sentences fall within 20 Hz of one another at the beginning and high points, meaning that the difference is not perceptible and therefore probably not significant (Rossi (1971), referenced in Shen, 19). When the *ma* is excluded, *ma* questions are about 27 Hz higher than the others at the low point. Unmarked questions are the only type that distinguish themselves at the end point, being about 30 Hz higher than the others. Thus, on average, the consultant decidedly failed to display the same distinction in register tone that Shen's research demonstrated.

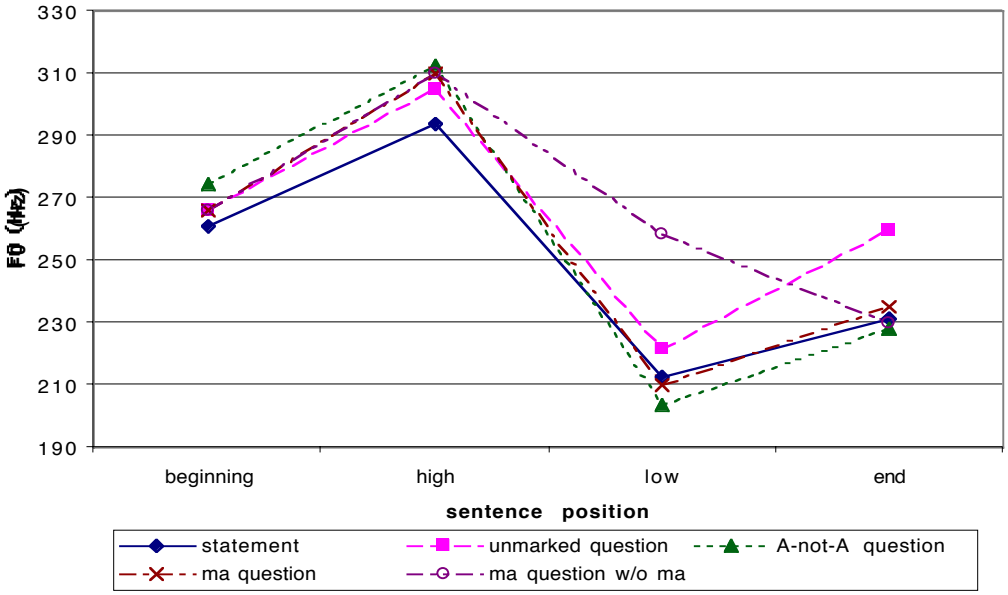
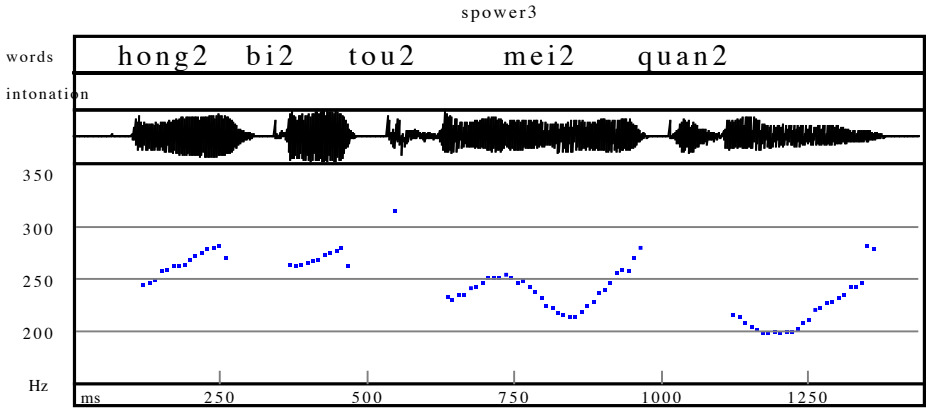


Figure 3: The f0 averages of the beginning, end and high and low points in the pitch contour of the present study

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.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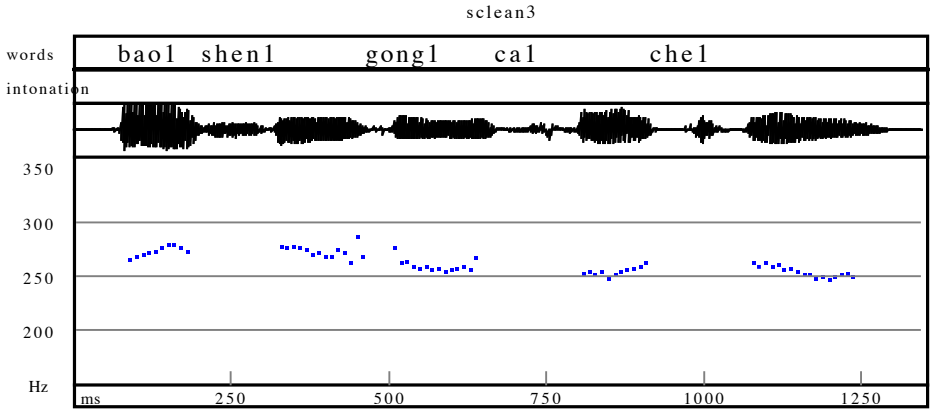
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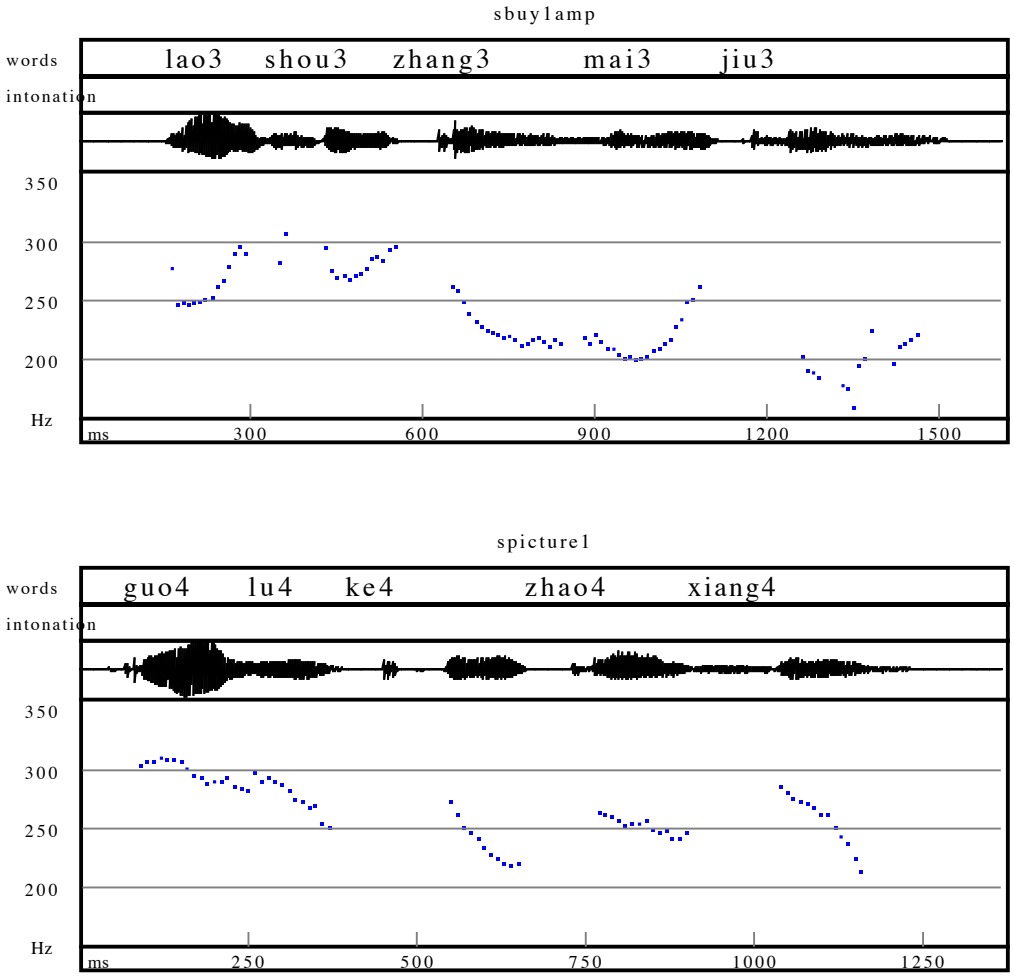


Figure 4: Chinese statements, 1st, 2nd, 3rd, and 4th tone

Most of the pitch movement within these utterances is the result of lexical tone, which may be modified by the surrounding lexical tones. There is also some indication of movement similar to Shen's Tune I (see Figure 1).

Observationally there are few differences between statements and unmarked questions. The primary difference is found in the potential existence of a high boundary tone, which manifests itself in slightly different ways depending on the lexical tone of the final word. In 1st tone sentences the last syllable (or two syllables) maintain their tonal shape from type A but are moved up about 20 Hz so that they are slightly higher than the third syllable, rather than slightly lower as they are in the statement, as seen Figure 5, c.f. Figure 4.

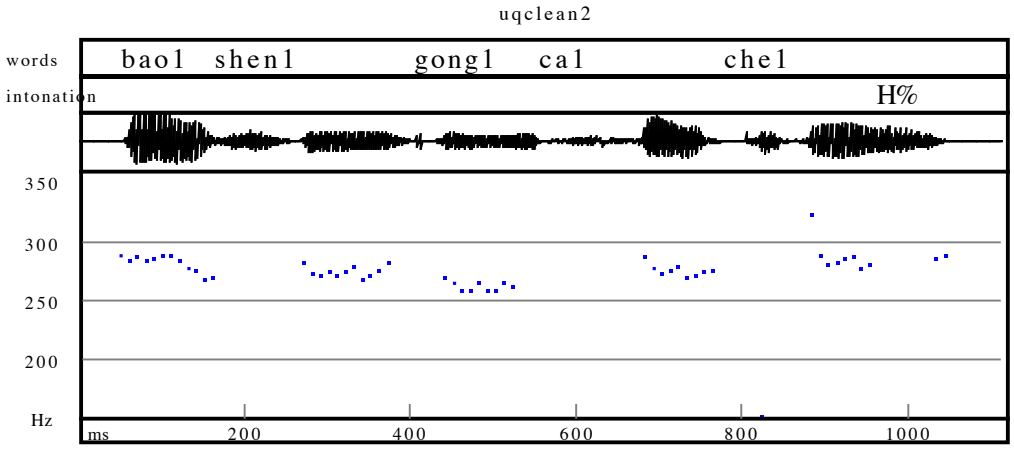
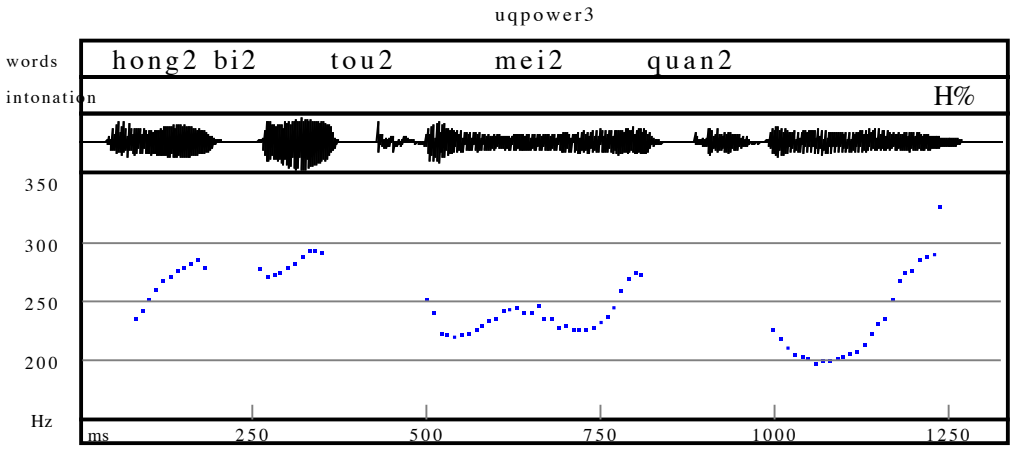


Figure 5: Unmarked question, 1st tone

In 2nd and possibly in 3rd tone sentences, the lexical final rising pitch is extended so that it rises more than it does in the statement equivalents. Often, but not always, this is perceptually more. 4th tone sentences display a leveled out fall instead of a fall with an even slope. These variations are shown in Figure 6.



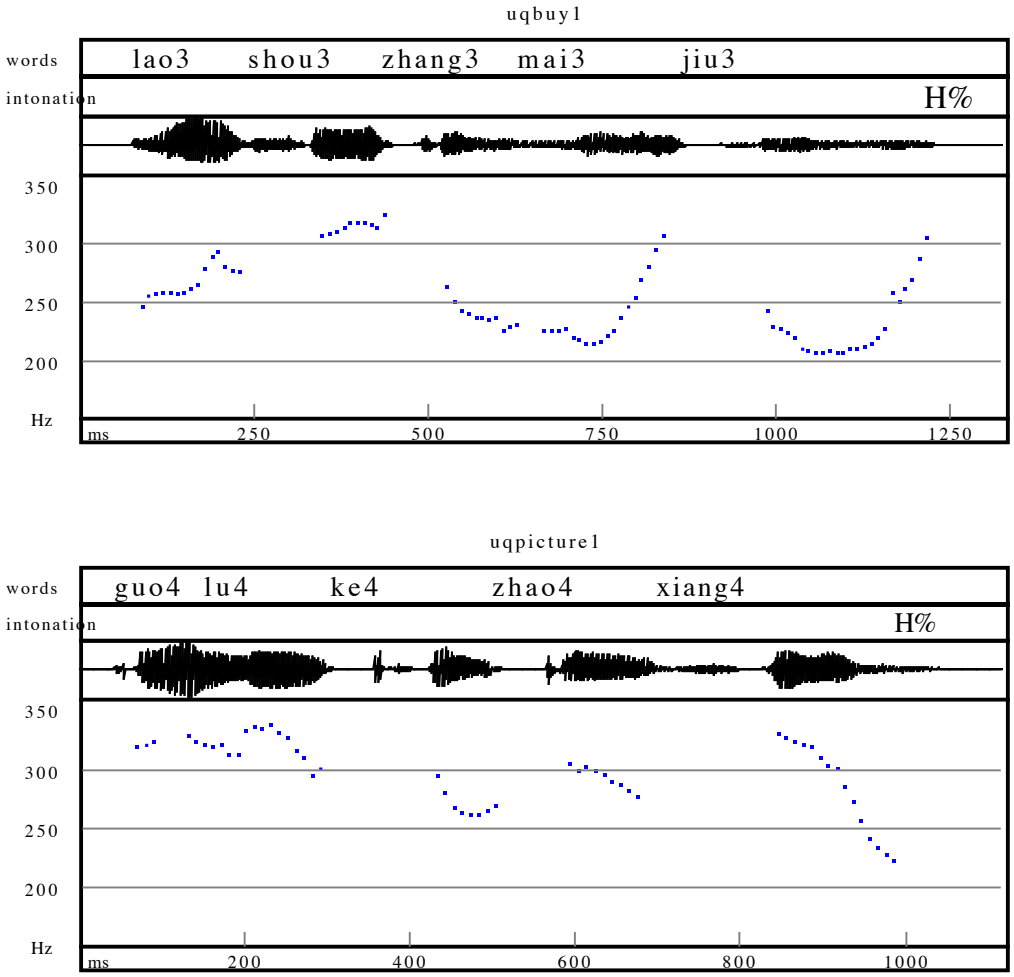


Figure 6: Unmarked questions, 2nd, 3rd, and 4th tone

This rise indicates the existence of a high intonational target which affects the realization of the final lexical tones in various ways. Although the lexical tones are modified in different ways, though, there is always a higher pitch involved.

The question particle *ma* has an underlying neutral tone, and it has been theorized that it receives its tonal pattern from the sentence intonation (see Shen (39) and Ladd). However, for this data it is clear that while intonation may play a role, the preceding lexical tone plays the primary role in determining the pitch of assigned to *ma*. In general the *ma* questions are most comparable to unmarked questions, although here again the exact way in which this holds true is dependent on the final lexical tone assignment in the utterance. In 1st tone sentences the *ma*

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

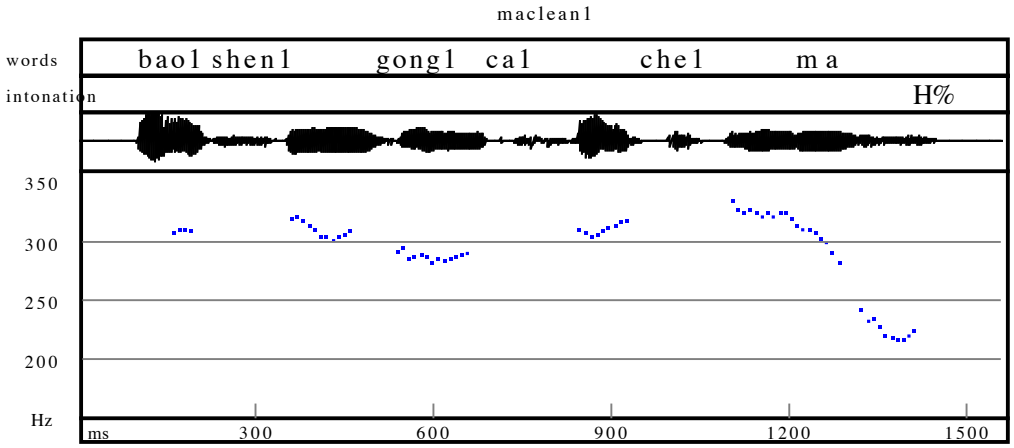


Figure 7: *Ma* Question, 1st tone

In 2nd tone sentences, the *ma* also displays a fall at the end, but only of about 30 Hz. The first part of the *ma* continues the rising pattern of the final 2nd tone syllable, which in turn more closely resembles the rise occurring in the context of the statement than in the unmarked question (Figure 8, c.f. Figures 5 and 6).

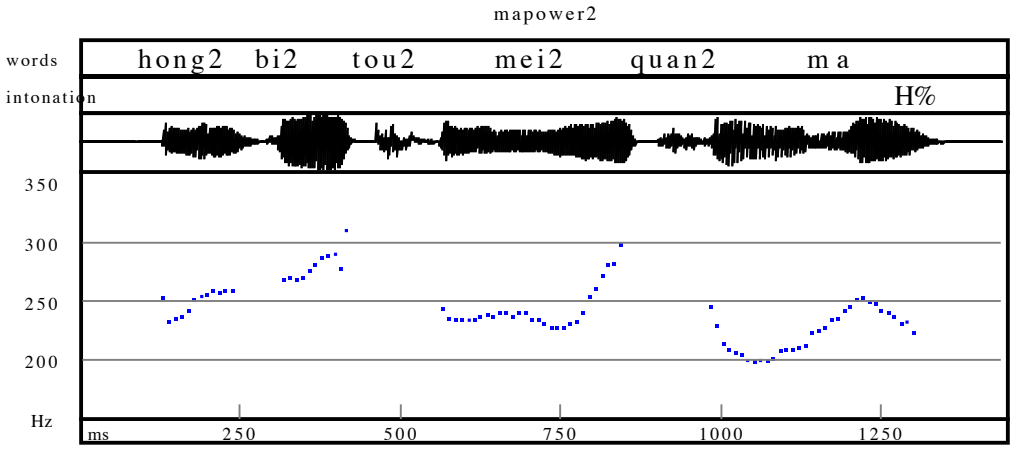


Figure 8: *Ma* question, 2nd tone

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 *ma* question.

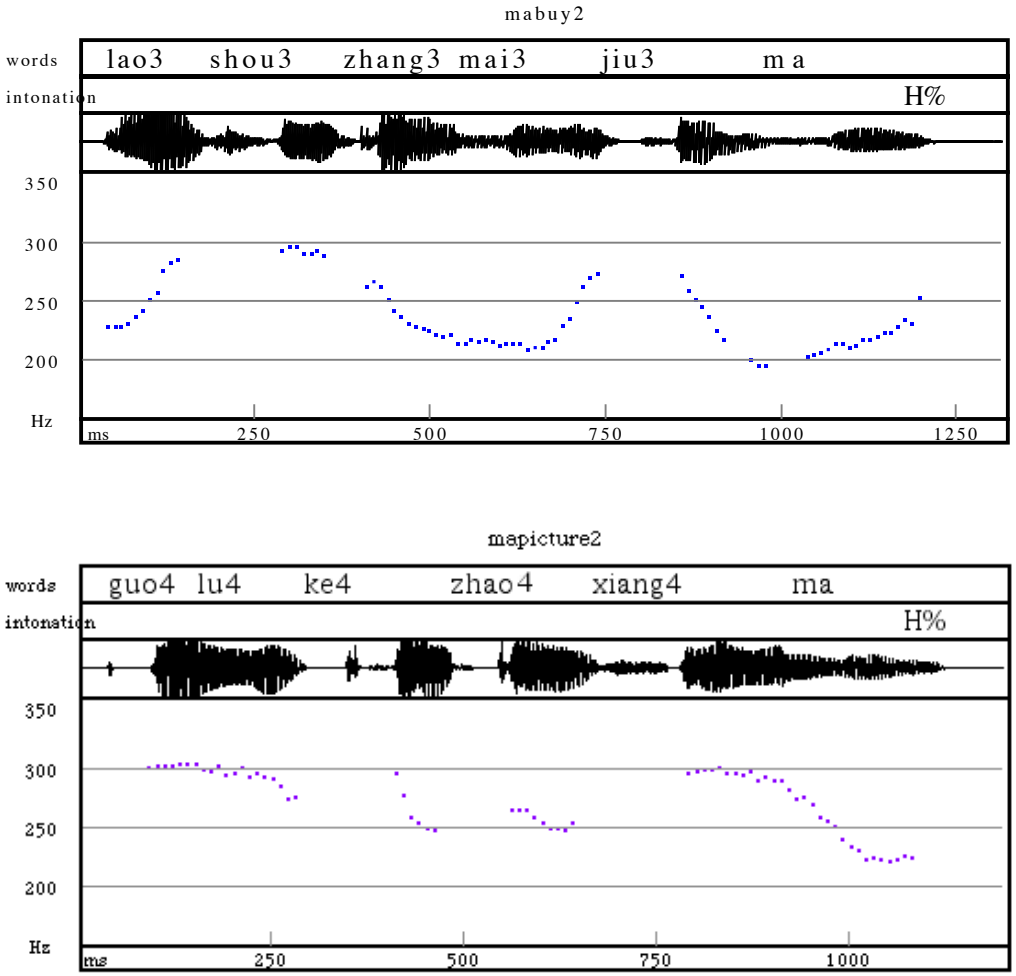


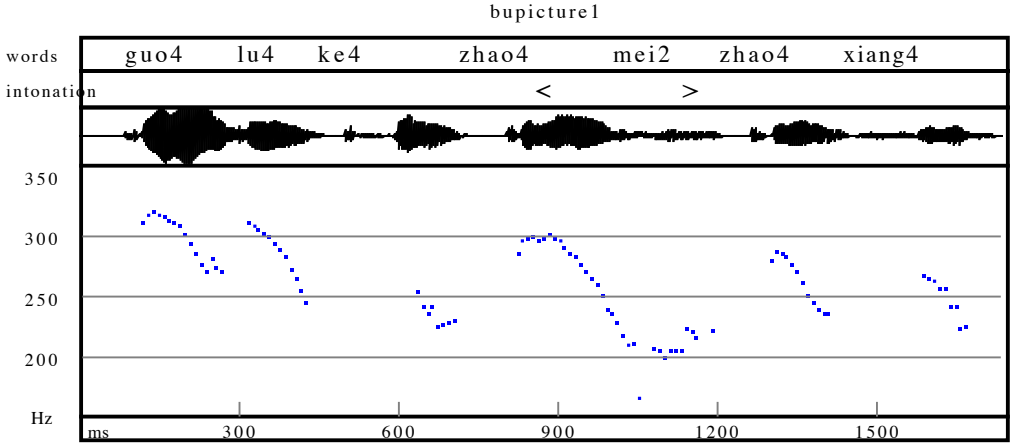
Figure 9: *Ma* questions, 3rd and 4th tone

Thus, the evidence indicates that for these three types of sentences the pitch movement is primarily determined by lexical tone assignments, combined with the existence of a high boundary tone for the questions. The odd interaction of this boundary tone with the final lexical tone and with the particle *ma* has previously been documented for Mandarin speakers (Shen, 41), but it remains

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 *mei2* 'not' relatively flat, while for 1st tone, a level tone, the fall takes place in *mei* 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.



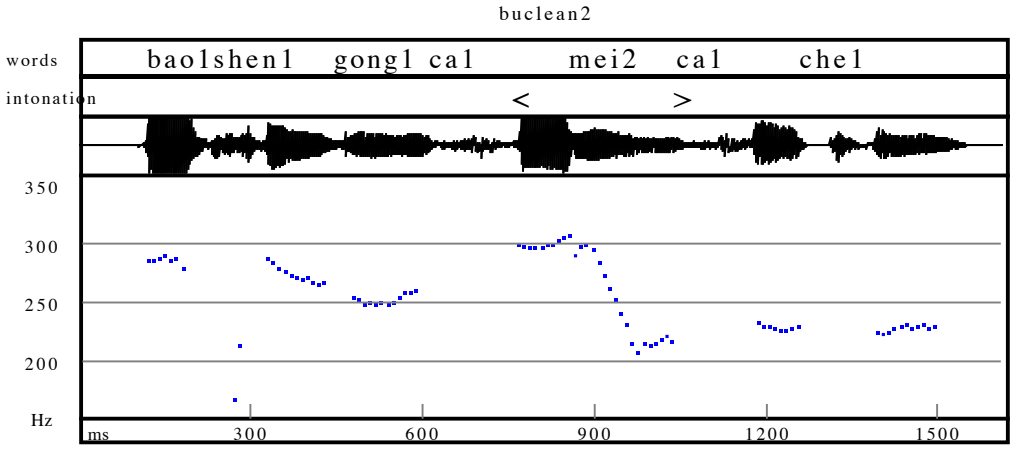
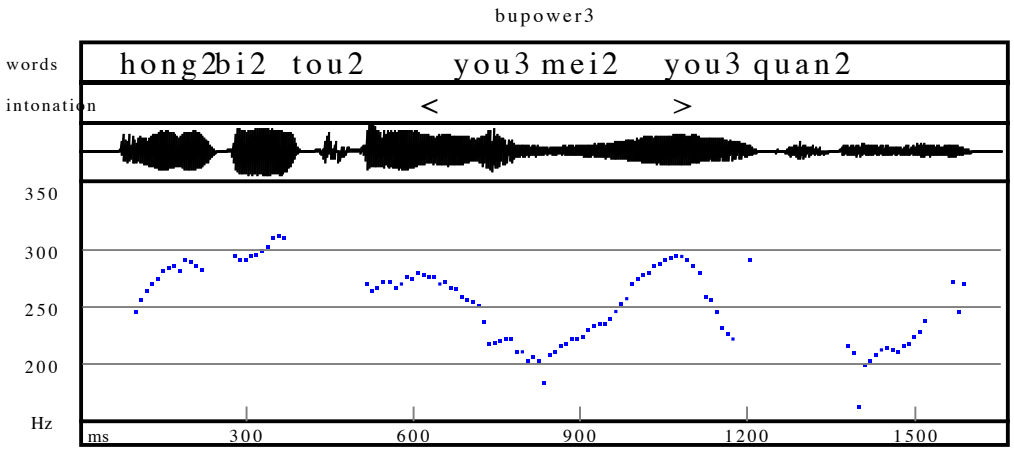


Figure 10: A-not-A questions, 4th and 1st tone

If, on the other hand, the verb is underlyingly 2nd or 3rd tone, its first occurrence begins at about the same height as it would for the equivalent statement and may fall slightly, but it fails to display a final rise that it does in the context of a statement (Figure 11, c.f. Figure 5). Rather, *mei2* 'not' displays a rise in f_0. The final verb differs despite the grammatically necessary shared tone. *You3* 'have' simply falls (it is used as the main verb in this pattern as the opposite of *mei2* 'not', the main verb used in the equivalent statement), while *mai3* 'buy' displays a falling-rising pattern beginning and ending at roughly the same f_0. This is most likely a result of the fact that *you3* tends to be much more strongly influenced by surrounding lexical tones than most words are.



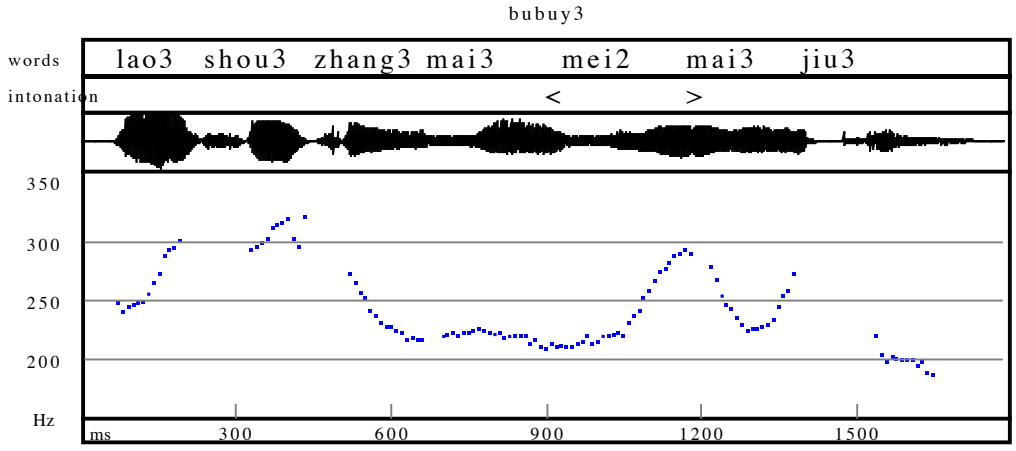


Figure 11: A-not-A questions, 2nd and 3rd tone

In either case, however, the feature of pitch range expansion is definitely apparent, especially in comparison to the equivalent statements (Figure 4).

4.3. Summary of Chinese Data

To summarize, this research uncovers several distinct intonation patterns for Pang Mandarin. Although statements do generally follow the pitch curve suggested by Shen (Figure 2.1), the pitch register distinction that she and others posited for Beijing Mandarin is not present. Rather, the consultant makes use of high boundary tones and pitch range expansion to distinguish various forms of interrogative utterances from declarative utterances. The realization of the boundary tone is particularly strongly affected by lexical tones in questions ending with *ma*, an effect that has been documented in various sources. This behavior seems to be best explained with a phonological rule altering the tonal specifications. The use of pitch range expansion has been demonstrated to be a result of focus in Beijing Mandarin (Kratochvil, Xu); it is impossible to tell from this research whether the A-not-A question is actually making use of focus, but nevertheless the intonation pattern is clearly demonstrated. It was impossible to describe the results of this pattern using standard ToBI notation; rather, a new feature needed to be added, that of pitch range expansion.

A variety of things could account for the difference between the consultant's speech and standard Beijing Mandarin, but the strongest possibility is the differences in the way the two varieties are spoken. Although the information was unavailable at the time the research was conducted, it was later discovered that questions are to some degree not even formed in the same way in the Pang

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.

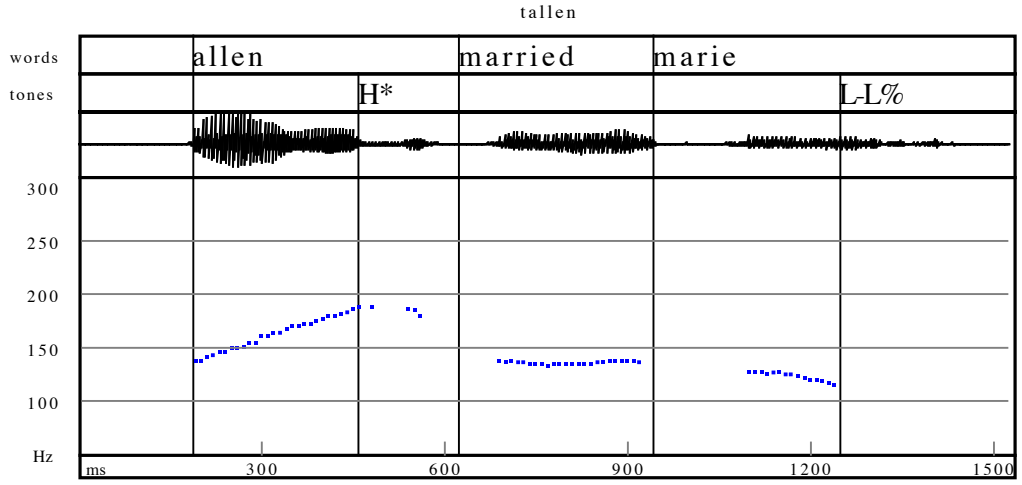


Figure 12: English declarative intonation

How, then, would a native speaker of Mandarin interpret this system?

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 to vary 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, '*Allen* married Marie', and a basic question, 'Did *Allen* marry Marie?' are displayed.

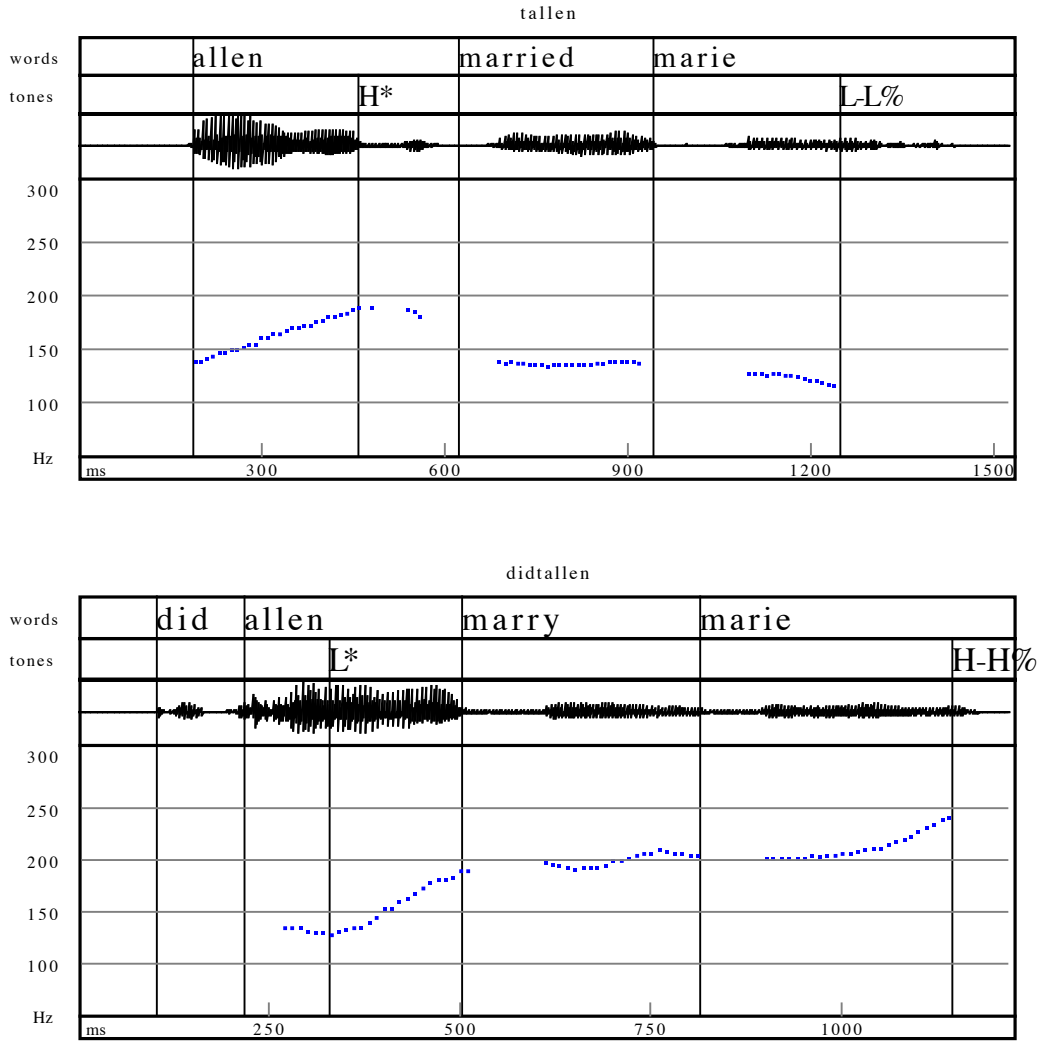


Figure 13: Statement vs. question, English speaker

As is typical of short utterances in English, each of these utterances consists simply of a pitch accent, a phrase tone, and a boundary tone. The word 'Allen' is emphasized, making both of these focus constructions and thus aligning the pitch accent with 'Allen'. They are distinguished from one another in opposite choices for pitch accent as well as opposite choices for phrase and boundary tones. The boundary tone distinction gives rise to the well known rising endings for English questions. The same two sentences spoken by the Chinese speaker appear as follows:

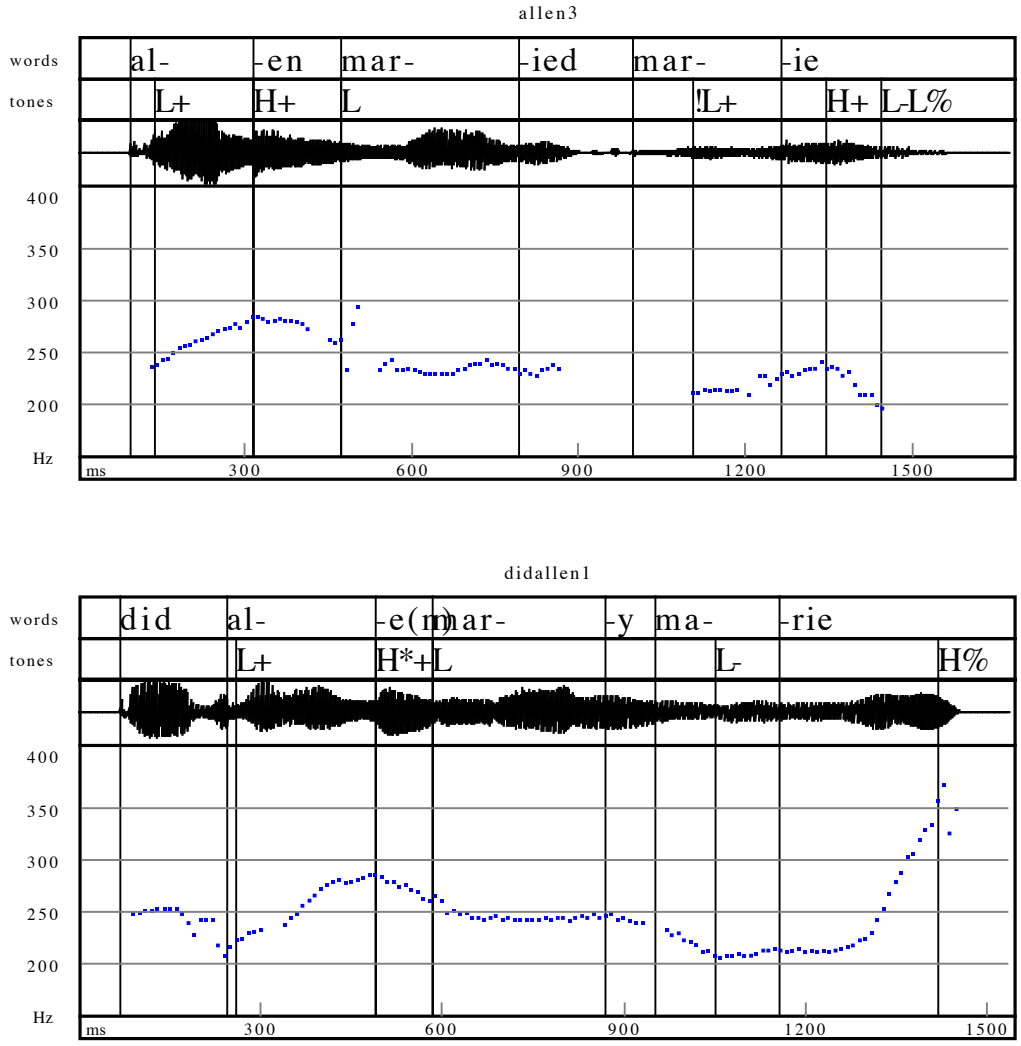


Figure 13: Statement vs. question, Chinese speaker

These two pictures may be taken as typical of the consultant's English speech, in that all but two of the statements display this same general pattern as do all the questions. As in English, the statement displays a falling ending while the question displays a rising ending. Although the consultant does apply boundary tones in Chinese, these boundary tones are much more drastic than anything demonstrated in her Chinese speech, and thus she is applying knowledge of an English intonation pattern. However, the way in which she is applying it looks much different than the way a native speaker of English applies this same pattern.

The rise of the question does not occur until the final syllable, no matter where the prominent syllable in the utterance might be. Thus, if the pitch trace is seen as an interpolation between two tonal targets, it is apparent that the previous tonal target must also occur within either the ultimate or penultimate syllable of the utterance. Moreover, there is generally a much greater amount of pitch movement occurring within the utterance for the Chinese speaker than there is for an English speaker, indicating a denser assignment of tonal targets.

Although the patterns shown in the statement above might occur for an English speaker if both 'Allen' an d 'Marie' were stressed in the utterance 'Allen married Marie', certainly this sort of pattern would not occur in a longer utterance. However, for the Chinese consultant, this pattern becomes even more prominent in longer utterances.

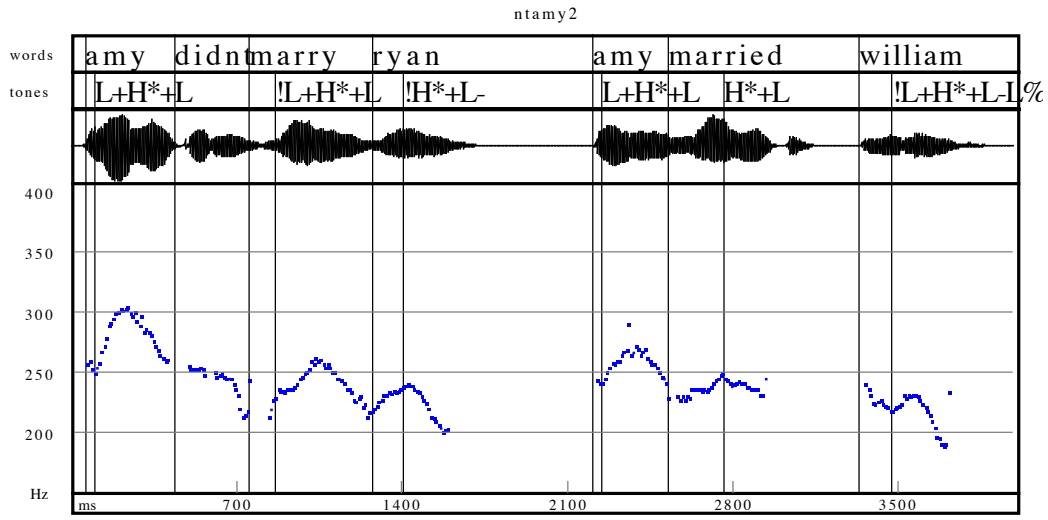


Figure 14: Longer utterance demonstrating dense assignment of tonal targets, Chinese speaker

Not only does she again demonstrate a much greater amount of pitch movement, implying a much denser assignment of tonal targets, but she tends to repeat the same L+H+L pattern, downstepped throughout the utterance, most often applying it to individual lexical items. Throughout the data this L+H+L pattern is consistently applied to every "important" word in an utterance, unless the pattern is overridden by a high boundary tone. Minimally, important words include nouns and some verbs. This is certainly not typical of English intonation. However, it will be demonstrated that this pattern is arguably based on the consultant's interpretation of the tonal pattern she assigns to a word in isolation in the same way that lexical tone is interpreted in her native language of Chinese.

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 shown for one and two syllable words. A one syllable word will usually receive a rising, then falling tone, although in a few tokens the rise was less than 20 Hz, and thus below the perceptual threshold. The rise is approximately 1/3 to 1/2 the change as is the fall.

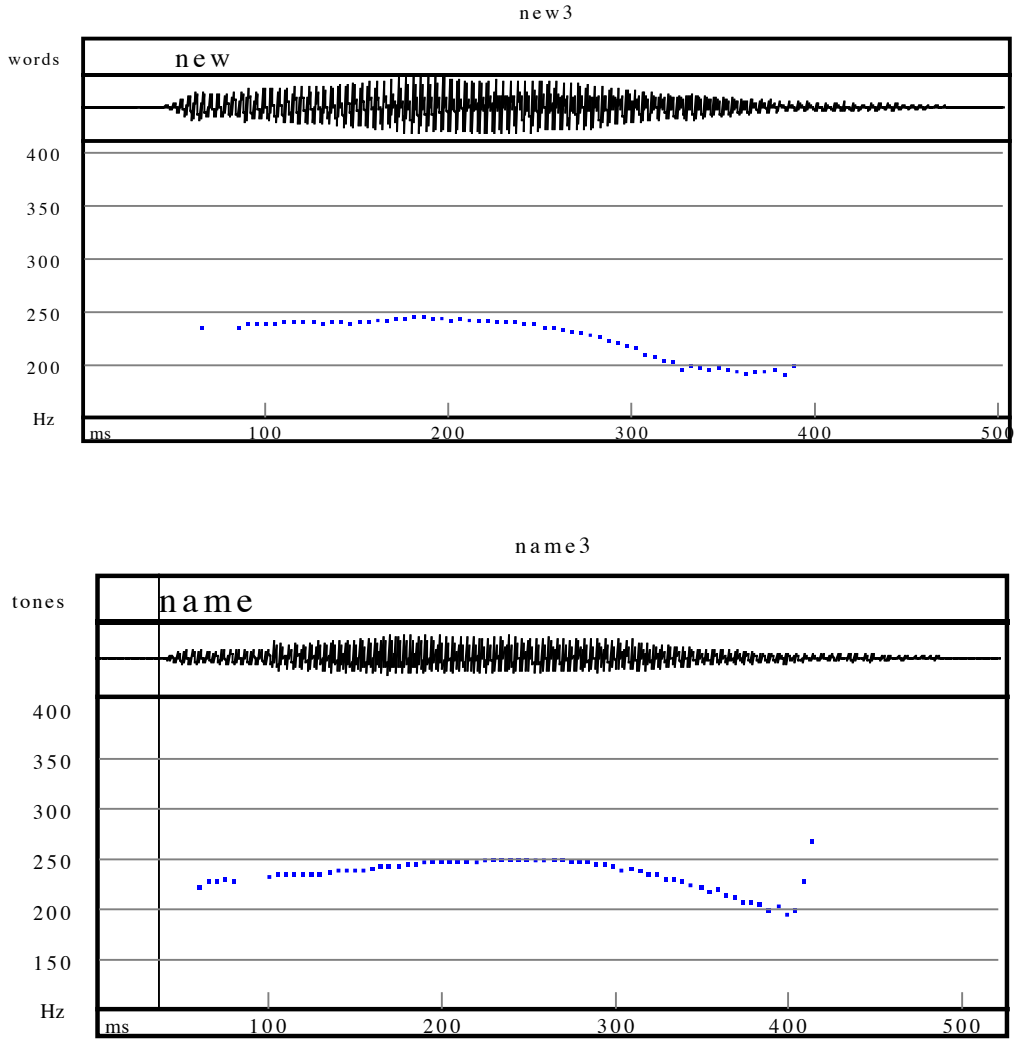


Figure 15: One syllable words in isolation, Chinese speaker

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.

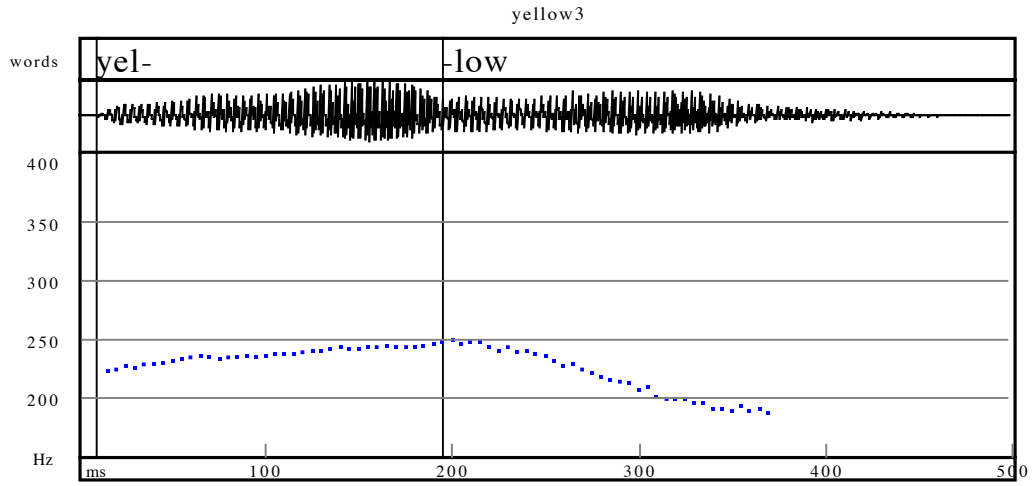


Figure 16: Two syllable word, stress initial in isolation, Chinese speaker

A two syllable word with ultimate stress presents more difficulty. The first syllable is assigned a flat or slightly falling tone from which the second syllable rises and then falls. This fall is cut short in only one of the two syllable words among the data, ‘unite’; however, it is also the only word ending in a stop, and this is likely to be the cause.

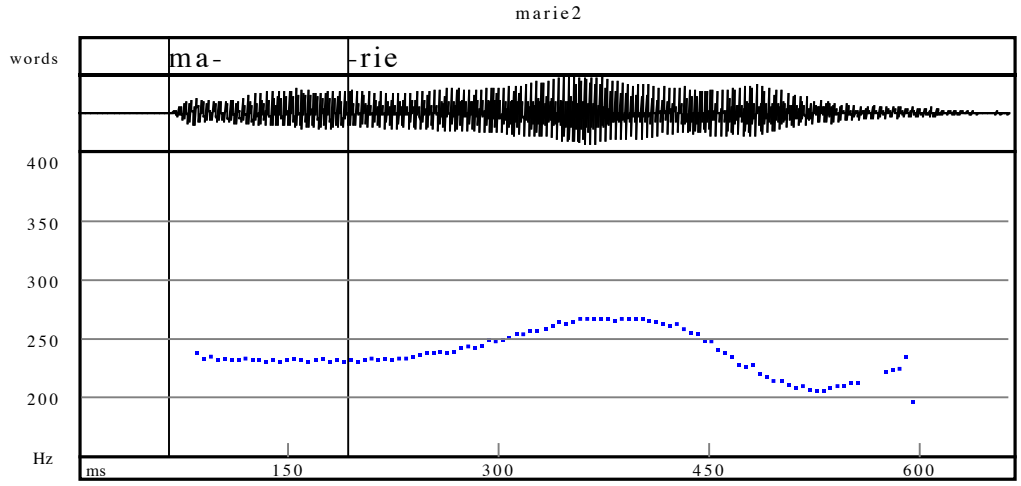


Figure 17: Two syllable word, stress final in isolation, Chinese speaker

For a native speaker of English the stress patterns of a word in isolation are lexically determined, and stress plays an important role in assigning intonation in connected speech (Hayes). The intonation tune assigned to a word in isolation, on the other hand, does not carry any lexical significance. Rather, in isolation, a word is assigned one of the English intonation patterns that could be assigned to any other utterance; most significantly, it must consist of a pitch accent, a phrase tone, and a boundary tone. However, in Chinese, the underlying tones are both lexically determined and contrastive, and thus for the Chinese speaker these are important when assigning tonal patterns in connected speech. As a result, connected speech maintains a dense pattern of tonal targets, many of which are derived from the tonal targets associated with a lexical item in isolation. The consultant, in fact, uses the second of these strategies in assigning tunes to connected speech in English, thus providing very different intonation curves than one sees from native speakers of English. Moreover, she assigns these patterns very confidently; in only a few cases did the intonation pattern show any variance among the three utterances of a sentence.

Thus, although the consultant is applying knowledge of English intonation patterns to words spoken in isolation, she does not interpret a longer utterance in terms of pitch accent; rather, she repeatedly applies the intonation pattern of a word spoken in isolation to many words occurring within a longer utterance, as she would in Chinese. The only exception is found in the realization of a high boundary tone, probably a result of knowledge of English, which will override this pattern at the end of an utterance.

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.

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Thanks to: Joyce McDonough, for all her input; the Chinese consultant, who wishes to remain anonymous, for allowing me to analyze her speech; Tim Nyberg, the “typical” English speaker; Patricia Harmon, for her encouragement, food, prayers, and decision that Lattimore was a perfectly nice place to spend many hours of her time; Dan Yee for the same and for his input on the presentation. Hi Mom and Dad! Above all, *soli Deo gloria*.

Appendix A

Chinese Sentences (from Shen, 81-83)

A. Statements

1. Ta1 gao1sheng1 shuo1. 'He speaks loudly.'
   he loudly speak

2. Nian2ji2 cai2jue2. 'The school grade makes a ruling.
   school grade make ruling

3. Lao3 gu3dong3 jiang3. 'The conservative old man is speaking.'
   old conservative man speak

4. Bao1shen1gong1 ca1 che1. 'The indentured laborer cleans the car.'
   indentured laborer clean vehicle

5. Hong2 Bi2tou2 mei2 quan2. '"Red Nose" does not have power.'
   red nose not power

6. Lao3 shou3zhang3 mai3 jiu3. 'The old senior officer buys wine.'
   old senior officer buy wine

7. Guo4lu4ke4 zhao4xiang4 . 'A passerby takes pictures.'
   passerby take picture

B. Unmarked Questions

1. Ta1 gao1sheng1 shuo1? 'He speaks loudly?'
   he loudly speak

2. Nian2ji2 cai2jue2? 'The school grade makes a ruling?
   school grade make ruling

3. Lao3 gu3dong3 jiang3? 'The conservative old man is speaking?'
   old conservative man speak

4. Bao1shen1gong1 ca1 che1? 'The indentured laborer cleans the car?'
   indentured laborer clean vehicle

5. Hong2 Bi2tou2 mei2 quan2? '"Red Nose" does not have power?'
   red nose not power

6. Lao3 shou3zhang3 mai3 jiu3? 'The old senior officer buys wine?'
   old senior officer buy wine

7. Guo4lu4ke4 zhao4xiang4 ? 'A passerby takes pictures?'
   passerby take picture

C. 'Ma' Questions

1. Ta1 gao1sheng1 shuo1 ma? 'Does he speak loudly?'
   he loudly speak ?-part.

2. Nian2ji2 cai2jue2 ma? 'Does the school grade make a ruling?
   school grade make ruling ?-part.

3. Lao3 gu3dong3 jiang3 ma? 'Is the conservative old man speaking?'
   old conservative man speak ?-part.

4. Bao1shen1gong1 ca1 che1 ma?
   indentured laborer clean vehicle ?-part.
   'Does the indentured laborer clean the car?'

5. Hong2 Bi2tou2 mei2 quan2 ma? 'Does not "Red Nose" have power?'
   red nose not power ?-part.

6. Lao3 shou3zhang3 mai3 jiu3 ma? 'Does the old senior officer buy wine?'
   old senior officer buy wine ?-part.

7. Guo4lu4ke4 zhao4xiang4 ma? 'Does a passerby take pictures?'
   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 'needle'
2. an1 'saddle'
3. lei2 'thunder'
4. fen2 'grave'
5. lan2 'blue'
6. tui3 'leg'
7. yang3 'admire'
8. wa3 'shingle'
9. jian3zi 'scissors'
10. bi3 'brush'
11. xian4 'thread'
12. jin4 'enter'
13. hong2 'rainbow'
14. dui4zi 'right'
15. shan4zi 'fan'
16. mei4zi 'younger sister'
17. bing4 'disease'
18. fan4 'meal'
19. jin4 'near'
20. gui4zhao2 'butterfly'
21. bi4zi 'fine tooth comb'
22. dou4zi 'bean'
23. tu4zi 'rabbit'
24. mao4zi 'hat'
25. ma1 'mother'
26. ma2 'hemp'
27. ma3 'horse'
28. ma4 'scold'
29. ma question particle
30. na2 'carry'
31. na3 'which'
32. na4 'stammer'
33. ren2 'person'
34. ba2 'pull out'
35. ba3 'bridle'
36. ba4 'dam'
37. la1 'garbage'
38. la3 'trumpet'
39. la4 'spicy'
40. wa1 'frog'
41. mai3 'buy'
42. mai2 'bury'
43. mai4 'sell'
44. wa2 'baby'
45. wa4zi 'socks'

Appendix D

English Words

1. Marie
2. lemonade.
3. new
4. melon
5. unite
6. alien
7. alumni
8. remember
9. mole
10. yellow
11. animal
12. malaria
13. meal
14. name
15. long
16. llama
17. banana

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