Scott Ruddell
LING 111
Project

<center>Mandarin Chinese</center>

1. Introduction

Mandarin Chinese is a tonal language primarily spoken in China, Taiwan, Singapore, and by the large Chinese diaspora all over the world. In China, Mandarin Chinese serves as the standard dialect, which is based off of the Beijing dialect. Due to the large number of regional dialects in China, people must learn Mandarin in order to be able to communicate with those from other regions. However, influence from regional dialects also causes variation within Mandarin Chinese.

My consultant is a 21-year-old female and is from Ningbo, China, located in Zhejiang Province on the east coast of China near Shanghai. Although she does not natively speak the local dialect of Ningbo (a dialect of Wu), which her parents do speak, she can fully understand it. Additionally, she states that she speaks Mandarin with a Wu accent. Although I do not know to what extent this dialect influences her Mandarin, it is safe to say that her Mandarin would sound less like those from Beijing, and more similar to those from Shanghai (not to be confused with Shanghainese, the dialect of Shanghai). She speaks Mandarin every day to her parents (who reply back to her in the Ningbo dialect) and her friends.

100 initial words were initially observed, and an additional twelve words were included in order to better understand the phonemes of Mandarin. Finally, before delving into the analysis the sounds, it should be noted that in this paper I adopt the tone annotation method used in Pinyin, the official phonetic system for transcribing the Mandarin pronunciations of Chinese characters into the Latin alphabet. The diacritic markers are ˉ for a high tone, ´ for a rising tone, ˇ for a falling-rising tone, ` for a falling tone, and no diacritic for sounds with a neutral tone. These tones will be discussed further in section 4.

2. Vowels

In total, I was able to find eight distinct vowels in the speech of my informant along with two vowels which seemed to be in an allophonic relationship with two of those main eight vowels.

Additionally, I was able to find four different diphthongs in her speech as well as some allophonic variation within one of those diphthongs. Vowels and diphthongs mainly occurred in the syllable-final position or before the nasals [n] or [ŋ]. These vowels and diphthongs will be discussed in more detail in the sections below. Figure 1 displays the vowel chart and diphthongs found in the Mandarin speech of my consultant (Hereinafter Mandarin).

	Front	**Central**	**Back**
High	i y	ɨ	(ɯ) u
High-mid			
		ə	
Low-mid	ɛ		
	(æ)		ɔ
Low		a	
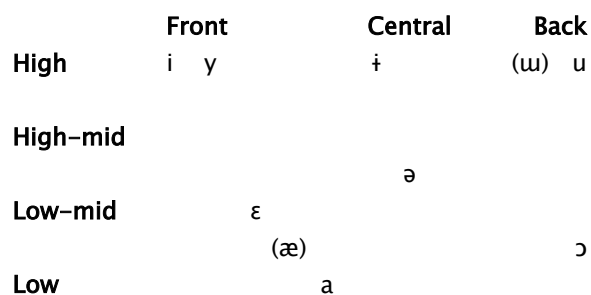
Diphthongs: [aʊ̯], [aɪ̯], [eɪ̯], [əʊ̯]/[ɔʊ̯]/[oʊ̯]
Figure 1: The vowels and diphthongs of Mandarin

2.1 Front Vowels

2.1.1 High Front Unrounded Vowel [i]

The high front unrounded vowel [i] occurred quite often in words that were observed. It occurred by itself in the word [ī] 'one,' and often in the syllable-final position in words such as [tɕʰí ý] 'other,' [pí tsɨ] 'nose' and [hū ɕī] 'breathe.' However, [i] was observed most often preceding the velar nasal [ŋ] such as in the words [pīŋ] 'ice,' [ɕīŋ ɕiŋ] 'star,' and [īŋ wèɪ] 'because.'

2.1.2 High Front Rounded Vowel [y]

The high front rounded vowel [y] was not seen as a much as its unrounded counterpart and seemed to occur in a smaller range of environments. It occurred by itself in words such as [ý] 'fish' and [y̌] 'rain' as well as in the syllable-final position such as [ny̌ z̀ə̀n] 'woman' and [lỳ sə] 'green'. However, unlike [i], [y] was never followed by a consonant in the words observed.

2.1.3 Mid Front Unrounded Vowel [ɛ]

[ɛ] occurred very often in the list of words (in 19 out of the 112) and was observed to have a very specific environment in which it occurs: namely, following palatal segments. More specifically, [ɛ] occurred following four segments (not including aspirated/unaspirated contrast):

the palatal approximant [j], the labial-palatal approximant [ɥ], the alveolo-palatal fricative [ɕ], and the alveolo-palatal affricate [tɕ], Examples of these are listed below:

[j]: [jɛ́n] 'salt,' [njɛ́n] 'year,' [páɪ tjɛ̄n] 'day,' [tă ljɛ̀] 'hunt'

[ɥ]: [ɥɛ̌n] 'far,' [ɥɛ̀ ljāŋ] 'moon,' [ɕɥɛ̌] 'snow'

[ɕ]: [ɕɛ̌] 'blood'

[tɕ]: [tɕɛ̄n tə] 'sharp,' [tòʊŋ tɕɛ̌] 'freeze'

Issues

Two points must be mentioned with regard to this observation: (1) in cases where [ɛ] was preceded by an alveolo-palatal consonant ([ɕ] and [tɕ]), it was difficult to tell whether there was [j] between the consonant and the vowel (this applies to vowels other than [ɛ] as well), or if it just sounded like there was a [j] due to the transition from the palatal place of articulation. (2) Although [ɛ] seemed to be primarily preceded by [j], many of the examples came from C[j] combinations. I do not refute the possibility that these segments are more accurately transcribed as being palatalized with [ʲ] rather than with the independent segment [j].

2.1.4 Low Front Unrounded Vowels [a] and [æ]

The vowel [a] was another very commonly observed vowel with a similar range of environments as [i]. Although it did not occur standing alone as its own syllable in the words in the list, it occurred in the syllable-final position and before the nasals [n] or [ŋ]. Some examples are: [tà] 'big,' [wán] 'play,' and [tʂʰáŋ] 'long.' Additionally, [a] occurred with the retroflex approximant [ɻ] in the words [àɻ] 'two' and [ăɻ twɔ̄] 'ear.'

[æ], usually difficult to differentiate from [a], seemed to have a very specific environment in the speech of my consultant. Specifically, this vowel only occurred when it preceded [n] and when it was a falling tone. Some examples are: [tæ̀n] 'egg,' and [kʰæ̀n] 'see.'

Issues

Out of all of the monothongs, these two vowels were the most troublesome to distinguish. There seemed to be somewhat of a spectrum of variety in tongue height between [a] and [æ]. Some vowels fell in the middle of this spectrum, making it nearly impossible to categorize. For

this reason, suspicions were raised that these two vowels are not separate phonemes. I could not find any minimal pairs for these two vowels (when I attempted to ask the consultant if there was a [tàn] in Mandarin, she simply corrected my pronunciation and said there was [tæ̀n]). Furthermore, the data set is too small to determine whether there is complementary distribution between [a] and [æ] (it also lies outside the scope of this paper). Therefore, I have marked the less-common [æ] with parentheses in the vowel chart, indicating that it is in free variation with [a].

2.2 Central Vowels

2.2.1 High Central Unrounded Vowel [ɨ]

[ɨ] occurred exclusively in the syllable-final position, often a part of the syllable [tsɨ] which always follows nouns such as in [kwɤ̀n tsɨ] 'stick,' and [ʈʂòŋ tsɨ] 'seed.' Secondly, it often occurred after retroflex affricates and the alveolar fricative such as in [ʈʂʰɨ] 'eat,' [ʈʂɨ̄ tàʊ] 'know,' [sɨ̌] 'die,' and '[sɨ] 'four.'

2.2.2 Mid Central Vowel [ə]

[ə] was the most common vowel observed, found in 28 of the 112 words. It often occurred in the segment [tə] which was found in all adjectives and in the segment [sə] which was found in all colors. Some examples are [tsāŋ tə] 'dirty,' [ɥɛ́n tə] 'round,' [páɪ sə] 'white,' and [hēɪ sə] 'black.' Like other vowels, in addition to the syllable final position, it occurred before the nasals [n] and [ŋ] such as in [hɤ̌n twɔ̄] 'many' and [fɤ̄ŋ] 'wind.'

2.3 Back Vowels

2.3.1 High Back Rounded Vowel [u] and Unrounded Vowel [ɯ]

The high back round vowel [u] occurred only in the syllable-final position (including standing alone by itself) in words such as [fù tɕiŋ] 'father,' [pʰí fū] 'skin,' and [tɔ̀ʊŋ u] 'animal.' Interestingly, [u] seemed to be possibly in complementary distribution with [ɯ], such that [ɯ] occurs only when a syllable has a neutral tone, and [u] occurs everywhere else. However, data for this is too limited and therefore cannot be confirmed. The one example of this was [tɕɑ̀ŋ fɯ] 'husband,' where I could see during the interview with my consultant that she did not round her lips like when uttering [u].

2.3.2 Mid Back Rounded Vowel [ɔ]

Although I first interpreted this sound as [o], after carefully listening to the recordings after the interview repeatedly, I noticed a lot of similarities in this sound to the East Coast American-English [ɔ]. Not including the diphthong in which this segment occurs (which we will look at in the next section), this sound solely occurred after (C)[w] combinations. Some examples are [hǎn twɔ́] 'many,' [ʂwéɪ kwɔ̌] 'fruit,' [ʦwɔ̀] 'sit.'

2.4 Diphthongs

As stated in 2, Mandarin displayed four distinct diphthongs: three which were straight forward and one which appeared to show some variation. We will first look the straight-forward diphthongs.

[a͡ʊ]

[a͡ʊ] occurred in the syllable-final position in words such as [ɕàʊ] 'laugh,' [hǎʊ] 'good,' and [pʰjāʊ fú] 'float.' This sound was fairly easy to identify because it sounded similar to the English [a͡ʊ].

[a͡ɪ]

This diphthong was also similar to the English [a͡ɪ] and was therefore straight-forward. Some examples are [láɪ] 'come,' [xwàɪ] 'bad,' and [hǎɪ] 'sea.'

[e͡ɪ]

Once again we have another diphthong that is also in the English phonetic inventory. Examples of words that include this diphthong are [ʂwéɪ kwɔ̌] fruit, [hēɪ sə] 'black,' and [īŋ wèɪ] 'because.'

[ə͡ʊ]/[ɔ͡ʊ]/[o͡ʊ]

It is here where things became difficult in terms of distinguishing diphthongs. There were three different variations which I seemed to be able to hear. However, the problem is, these different variations occurred between what I presumed to be same individual meaning. For example, the word [kǔ tʰə́ʊ] 'bone' contains a syllable that is nearly identical to [tʰɔ́ʊ] 'head.' Based on the similarity of sound and related meaning, it is safe to assume that these are the same

meaning. However, when listening closely, I observed a slight difference both by ear and by the spectrogram. There could be various reasons for why this difference occurs, such as the effects of the preceding sound in the case of [kǔ tʰə́ʊ] 'bone.' A similar occurrence was observed with the words [ljóʊ tɔ̀ʊŋ] 'flow' and [hə́ ljə́ʊ] 'river,' except in this case the variation was between [oʊ͡] and [əʊ͡] respectively.

Based on the data I have collected alone, it would be impossible to make a generalization about this variation (in fact it could even be random), but it is also impossible to determine which of these three is the 'true form.' Thus, I have placed all three of these in a free variation relationship.

3. Consonants

Twenty-six unique consonants were observed in Mandarin. Figure 2 displays the consonants of Mandarin.

	Bilabial	Labiodental	Alveolar	Alveolo-palatal	Retroflex	Palatal	Labial-palatal	Velar	Labial-velar	Glottal
Stops	p pʰ		t tʰ					k kʰ		
Fricatives		f	s	ɕ	ʂ ʐ			x*		h*
Affricates			ts tsʰ	tɕ tɕʰ	tʂ tʂʰ					
Nasals	m		n					ŋ		
Approximants					ɻ	j	ɥ		w	
Lateral Approximants			l							

Figure 2. The Consonants of Mandarin

3.1 Stops

3.1.1 Bilabial Stops

There were two bilabial stops observed in Mandarin, a voiceless aspirated bilabial stop and a voiceless unaspirated bilabial stop. A minimal pair was found to prove this variation: [pʰáɪ] 'arrange' and [páɪ (sə)] 'white' (I confirmed with the consultant that [páɪ] by itself can still mean 'white.' Figure 3 provides a visual display of this contrast between aspiration and no aspiration.

[pʰáɪ] 'arrange'

[páɪ] segment of [páɪ sə] 'white'*
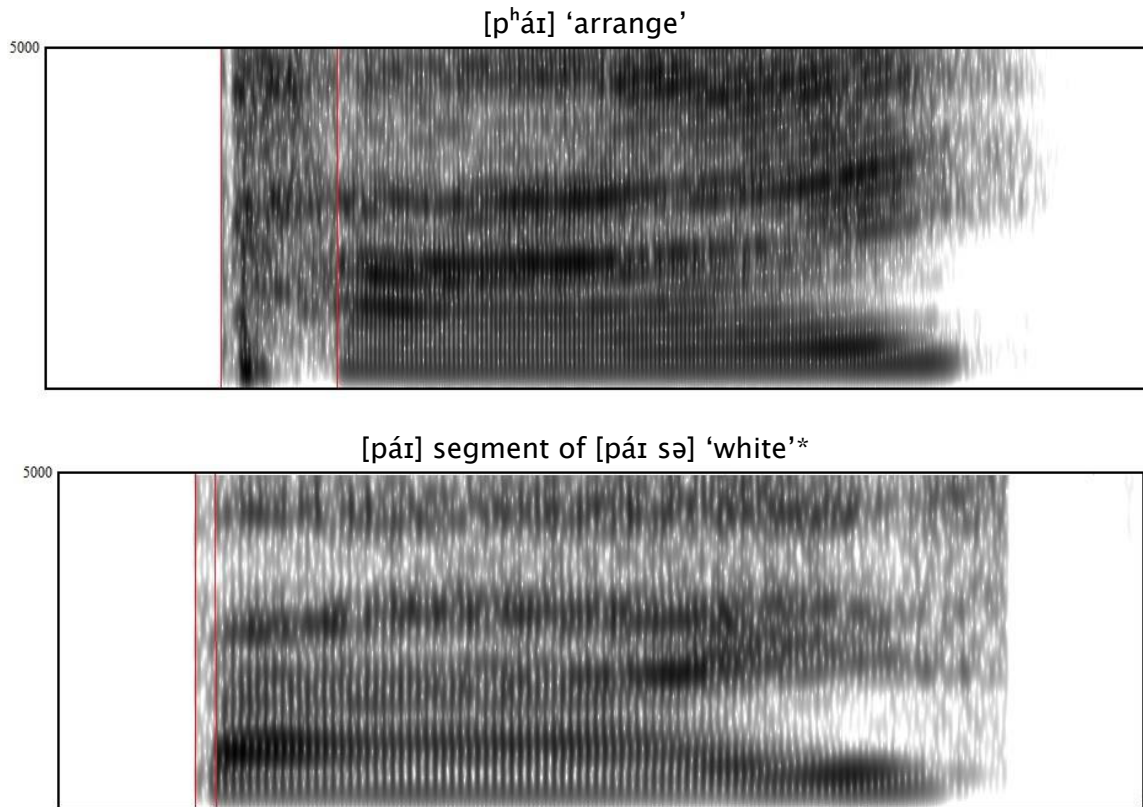
*This segment has been truncated for the sole purpose of giving a more accurate depiction of the difference in VOT.

Figure 3. Spectrograms of [pʰáɪ] 'arrange' and the [páɪ] segment of [páɪ sə] 'white'

There are two points to be made here. First, we can see based on the spectrograms that there is a significant difference voiced onset times of the two syllables (the boundaries are marked by the vertical red lines). Specifically, we can see that [pʰáɪ] 'arrange' has a longer VOT than [páɪ (sə)] 'white.' Second, although I had first transcribed the unaspirated bilabial stop as a voiced bilabial stop, based on the spectrogram of [páɪ (sə)] 'white' we can see that there is no voice bar. The lack of a voiced/voiceless contrast and presence of an unaspirated/aspirated contrast is important in that it applies to all of the stops and affricates in Mandarin which we will see in the next sections.

3.1.2 Alveolar Stops

There is a voiceless aspirated alveolar stop and a voiceless unaspirated alveolar stop in Mandarin. An example of a minimal pair of these two consonants is [tʰà] 'step on' and [tà] 'big.' Some additional examples are [tʰīŋ] 'hear,' [tʰjēn kʰɔ́ŋ] 'sky,' [tɔ̀ʊŋ u] 'animal,' and [twŏ ɕā] 'fall.'

3.1.3 Velar Stops

Like the bilabial and alveolar stops, there is a voiceless aspirated velar stop and a voiceless unaspirated velar stop in Mandarin. An example of a minimal pair is [kʰæ̀n] 'see' and [kæ̀n] 'dark purple.' Other examples include [kĕɪ] 'give' and [kān ʦà̀ŋ] 'liver.'

3.2 Fricatives

3.2.1 Labiodental Fricatives

A voiceless labiodental fricative was observed in Mandarin. Some examples of words that include this consonant are [fù ʨiŋ] 'father,' [fə̄ŋ] 'wind,' and [fŭ làn tə] 'rotten'

3.2.2 Alveolar Fricatives

A voiceless alveolar fricative was observed in Mandarin. Some examples were found in words such as [sā xwăŋ] 'lie,' [sə̄n lĭŋ] 'forest,' [sɨ̂] 'die,' and [swɔ́ jŏʊ] 'all.'

3.2.3 Alveolo-Palatal Fricatives

As we have seen already in 2.1.3, an alveolo-palatal fricative was observed in Mandarin. Some examples are [ɕăʊ háɪ] 'child,' [ɕāŋ] 'fragrance,' and [ɕɛ̌] 'blood.'

Issues

As we have discussed, it is difficult to tell if extra palatalization is needed when transcribing words that involve this consonant. One test that I tried myself was to attempt repeat these words in a manner where there does not sound like there is a [j] in between [ɕ] and the vowel. This test failed, as I was not able to utter a syllable without palatalization. Therefore, I believe that this is an inherent characteristic of the consonant due to its place of articulation.

3.2.4 Retroflex Fricatives

Voiceless and voiced retroflex fricatives were observed in Mandarin. The voiceless retroflex fricative, along with the voiceless alveolo-palatal fricative, is a sound that one might confuse with the English voiceless palato-alveolar fricative [ʃ]. In the case of my consultant, the tongue often seemed to be somewhere in between a retroflex and a palato-alveolar fricative, making it difficult to decide how to transcribe it. After listening to many words with this sound, I decided that it not

only seemed like it was closer to a retroflex, it also fit better with the rest of the consonant set of Mandarin. For example if we categorize the sound as a retroflex fricative, it aligns with the homorganic voiceless retroflex affricate, which was more clearly retroflex. Therefore, I categorized this consonant as a voiceless retroflex fricative. Here are some examples of the voiceless retroflex fricative: ʂwɔ̄ 'say,' [ʂā] 'kill,' [ʂwěɪ] 'water.'

Up until this point we have not seen any voiced consonants. However, I observed a voiced retroflex fricative [ʐ] in the speech of my consultant. At first, I perceived this sound as [ɻ] during the interview with my consultant. However, when viewing the spectrogram I noticed that this sound showed more characteristics of a voiced fricative rather than an approximant. The reasoning here was primarily the duration and steadiness of the consonant. It had the length of a fricative and did not show the drastic and distinct formant transitions we would expect from a retroflex approximant. The place of articulation, however, still sounded somewhat 'r-like,' so I determined that this sound was a retroflex. Figure 4 displays the spectrogram of the word [ʐú kwɔ̌] 'if.'
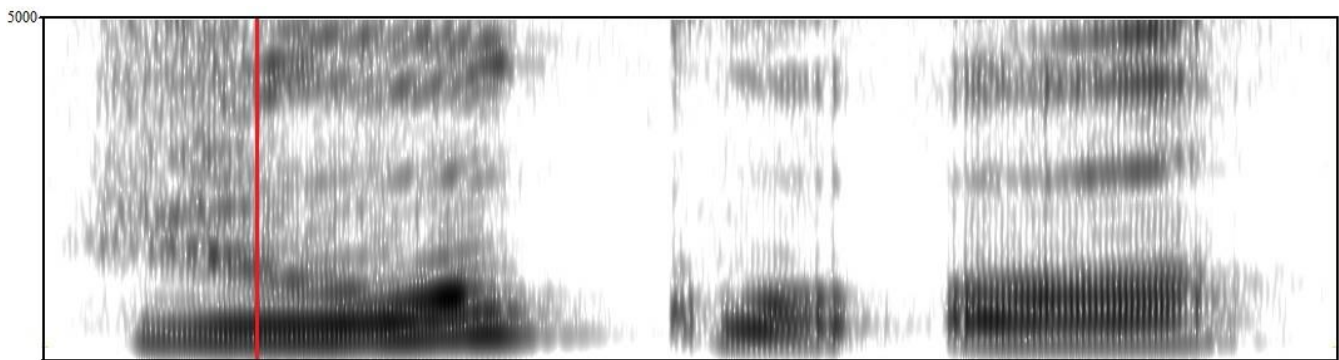

Figure 4. Spectrogram of [ʐú kwɔ̌] 'if'

A few things to note here is that we can see faint formant energy during this segment (before the red line), which many indicate that the distance of the articulators are on the verge of that of a fricative and that of an approximant. However, we can clearly see that there is a significant duration from the start of the segment until the voicing of the vowel (start of voicing marked by the red line).

3.2.5 Velar/Glottal Fricatives

Issues

This is another area of fricatives that got tricky in distinguishing. While I had initially categorized all of the sounds in this section as [h], after listening to the recordings I started to hear frication that is not characteristic of [h]. I could tell that the frication was coming from the back of the mouth, and that it was likely velar. One test that I tried in order to figure where exactly the frication was coming from was to place the cursor in Praat at the end of the fricative just before the vowel to see if it sounded like any familiar stops that were homorganic to the fricative. Sure enough, it sounded a lot like a voiceless velar fricative. Therefore, I changed certain words that previously contained the glottal fricative [h] to have a voiceless velar fricative [x]. This was easy for some sounds, as there was obvious velar frication, but just like we saw with [a] and [æ], there was a spectrum which had [h] on one end and [x] on the other. Sounds that fell in the middle of that spectrum were difficult to pinpoint. I could not find any minimal pairs, and my consultant seemed to perceive both of these sounds as the same phoneme. Furthermore, no patterns were observed to show that [h] and [x] were in complementary distribution. For this reason, I believe these two sounds are in free variation.

To finish off this section, I will give examples of words that contain [h] and words that contain [x]. Words that contain [h] include [hǎʊ] 'good' and [hěn twɔ̄] 'many' and words that contain [x] include [xə̄] 'drink' and [xwàɪ] 'bad.'

3.3 Affricates

Similarly to stops, affricates observed in Mandarin do not have voiced/voiceless contrast, but are rather both voiceless and have aspirated/unaspirated contrast.

3.3.1 Alveolar Affricates

Mandarin was observed to have an aspirated and unaspirated alveolar affricate. An example of a minimal pair is [ʦʰǎʊ] 'grass' and [ʦǎʊ] 'early.' Some other examples include [ʂə́n ʦɨ] 'rope' and [ʦwɔ̀] 'sit.'

3.3.2 Alveolo-Palatal Affricates

Aspirated and unaspirated alveolo-palatal affricates were also observed in Mandarin. An example of a minimal pair is [tɕʰìŋ] 'celebrate and [tɕìŋ] 'near.' Other examples include [tɕʰí ý] 'other' and 'tɕǎʊ.'

3.3.3 Retroflex Affricates

Finally, for affricates, there was also observed to be an aspirated and unaspirated retroflex affricate in Mandarin. An example of a minimal pair is [tʂʰàŋ] 'sing' and [tʂàŋ] (a unit of length). (As probably apparent, I had to ask my consultant for the latter word) Other examples include [tʂʰɨ] 'eat,' [tʂòŋ tsɨ] 'seed,' and [tʂɘ̀n tɕɥɛ̀ tə] 'correct.'

3.4 Nasals

3.4.1 Bilabial Nasal

The bilabial nasal was not very common in the list of words elicited to my consultant. In fact, there were only two words total that contained [m]: [mǔ tɕīŋ] 'mother' and [mjɛn] 'sleep.' From this data, it would appear as though [m] only occurs in the syllable-initial position.

3.4.2 Alveolar Nasal

[n], on the other hand, occurred in both the syllable-initial and syllable-final positions and was the most common nasal of the three. Examples of [n] in a syllable-initial position include words such as [ná tʂɘ̀] 'hold' and [njǎʊ] 'bird.' Examples of [n] in a syllable-final position (which occurred more often) include words such as [hán lɘ̌n] 'cold,' [wɘ̄n nwǎn] 'warm,' and [tʂwɘ̌n] 'turn.'

3.4.3 Velar Nasal

Finally the velar nasal was observed in Mandarin. Like in English, the velar nasal appeared to only occur in the syllable final position. In many cases it was difficult to tell the different between syllable-final [n] and syllable-final [ŋ]. A minimal pair that was found was [ʂāŋ] 'commerce' and [ʂān] 'mountain.' Some other examples of words in Mandarin with a velar nasal are: [pīŋ] 'ice,' [ɕīŋ ɕiŋ] 'star,' and [ɥɛ̀ ljāŋ] 'moon.'

3.5 Approximants

3.5.1 Retroflex Approximant

We previously saw that it is not [ɻ], but rather [ʐ] that occurs syllable-initially. However, [ɻ] was observed to occur syllable-finally in the words [àɻ] 'two' and [ăɻ twɔ̄] 'ear.'

3.5.2 Palatal Approximant

We have mentioned the palatal approximant in our discussion revolving around aleovo-palatal consonants. They are found in the syllable-initial position and following a wide variety of syllable-initial consonants. Some examples of [j] in the syllable-initial position are [jăʊ] 'bite,' [jɛ́n] 'salt,' and [swɔ́ jɜ̌ʊ] 'all.' Examples of [j] following syllable-initial consonants are: [njăʊ] 'bird,' [tʰjɛ̄n kʰɔ̄ŋ] 'sky, 'ljóʊ tɔ̀ʊŋ 'flow,' and [njɛ́n] 'year.'

Issues

It must be mentioned once again that there is a possibility for these examples and other words to be transcribed with the superscript [ʲ]. Additionally, it seems that especially for [lj] combinations such as in words like [ljóʊ tɔ̀ʊŋ] 'flow,' the initial steady state of [j] seems to have a longer duration. Therefore, some may say that it this word should be transcribed as [lióʊ tɔ̀ʊŋ]. My hypothesis regarding this (which I came to by attempting to pronounce this word myself) is that the transition from a lateral position to a high front vowel position to a mid-back position is not the 'smoothest' or most 'natural' transition, and therefore takes longer.

3.5.3 Labial-Palatal Approximant

If the equivalent vowel to [j] is [i] and the equivalent vowel to [w] is [u] then the equivalent vowel of the labial-palatal approximant [ɥ] would seem to be [y]. It took some trial and error going through the IPA chart to find that this sound existed in Mandarin. Like [j], [ɥ] can be found syllable-initially and following syllable-initial consonants. Examples of words where [ɥ] is in a syllable-initial position are [ɥè ljāŋ] 'moon' and [ɥɛ́n tə] 'round.' Examples of words where [ɥ] follows a syllable-initial consonant are [ɕɥɛ̆] 'snow and [ʈʂɜ̀n tɕɥɛ̀ tə] 'correct.' Unlike [j], the consonants that [ɥ] seems to follow are more limited than [j]. Namely, [ɥ] seemed to only follow alveolo-palatal consonants. However, our data set is of course too limited to make this claim.

3.5.4 Labial-Velar Approximant

Just like [j], [w] occurred syllable- initially and following a wide range of syllable initial consonants. [w] occurred syllable-initially in words such as [wán] 'play' and [īŋ wèɪ] 'because.' It occurred following syllable-initial consonants in words such as [kwèn ʦɨ] 'stick,' [ʈʂwǎn] 'turn,' [hú pʰwɔ̄] 'lake,' [wə̄n nwǎn] 'warm,' and many others.

3.6 Lateral Approximant

Finally, the last consonant found in Mandarin was the lateral approximant [l]. [l] was found in words such as [xə́ ljə̀ʊ] 'river,' [láɪ] 'come,' and [lỳ sə] 'green.'

4. Suprasegmental Features

As stated in the beginning of this paper, Mandarin has four main tones and neutral tone. The following four words display the four tones of Mandarin high, rising, falling-rising, and falling, in that order: [jɛ̄n] 'smoke,' [jɛ́n] 'salt,' [jɛ̌n] 'eye,' and [jɛ̀n] 'swallow.' Figure 5 displays the spectrograms of these four words with a pitch line so that the tones can be more easily identified.
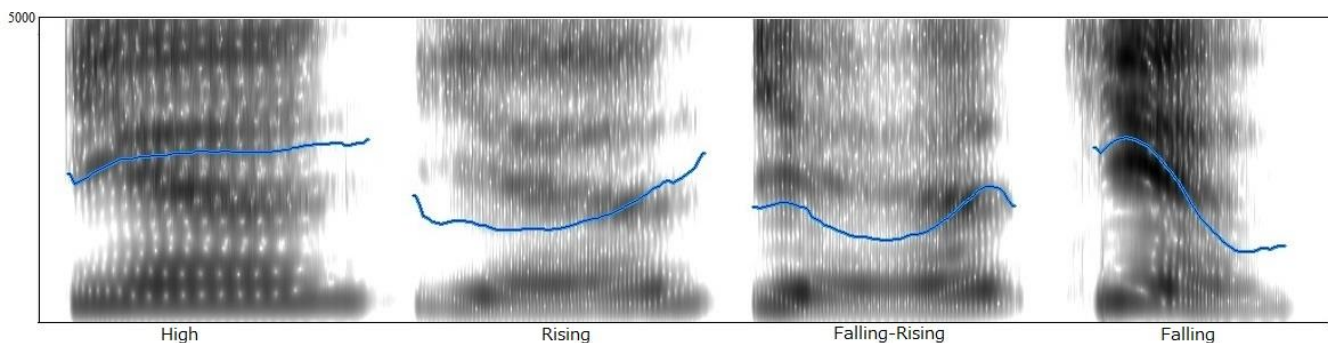
Figure 5. A spectrogram of the main four tones of Mandarin using [jɛn] (Not including Neutral)

Issues

The neutral tone was the hardest of the 5 tones to identify since it often seemed like a falling tone. Context and patterns found in certain words such as words ending with [ʦɨ], [tə] and [sə] were helpful in determining neutral tones. Due to the fact that the neutral tone changes based on the preceding syllable, it is not included in the spectrograms.

Another issue with tones was that there seem to be specific tone patterns when more than one syllable is involved, which may have affected my perception of the tones.

Word List

#	Transcription	English Meaning	#	Transcription	English Meaning
1	àɻ	two	37	láɪ	come
2	ǎɻ twɔ̄	ear	38	ljóʊ tɔ̀ʊŋ	flow
3	ɕāŋ	fragrance	39	lỳ sə	green
4	ɕàʊ	laugh	40	mjɛ́n	sleep
5	ɕǎʊ háɪ	child	41	mǔ tɕīŋ	mother
6	ɕɛ̌	blood	42	ná ʈʂà	hold
7	ɕīŋ ɕiŋ	star	43	nán ʐàn	man
8	ɕɥɛ̌	snow	44	njǎʊ	bird
9	fə̄ŋ	wind	45	njɛ́n	year
10	fǔ làn tə	rotten	46	nɥ̌ ʐɛ́n	woman
11	fù tɕiŋ	father	47	páɪ sə	white
12	hǎɪ	sea	48	páɪ tjɛ̄n	day
13	hán lǎn	cold	49	pí ʦɨ	nose
14	hǎʊ	good	50	pīŋ	ice
15	hēɪ sə	black	51	pʰáɪ	arrange
16	hǎn twɔ̄	many	52	pʰí fū	skin
17	ɥɛ̀ ljāŋ	moon	53	pʰjāʊ fú	float
18	ɥɛ̌n	far	54	sā xwǎŋ	lie
19	ɥɛ́n tə	round	55	sēn lǐŋ	forest
20	hū ɕī	breathe	56	sɨ̀	four
21	hú pʰwɔ̄	lake	57	sɨ̌	die
22	ī	one	58	swɔ́ jǒʊ	all
23	īŋ wèɪ	because	59	ʂā	kill
24	jǎʊ	bite	60	ʂān	mountain
25	jɛ̀ ʦɨ	leaf	61	ʂāŋ	commerce
26	jɛ̀ wǎn	night	62	ʂán ʦɨ	rope
27	jɛ́n	salt	63	ʂàʊ	thin
28	jɛ̀n	swallow	64	ʂwɔ̄	say
29	jēn	smoke	65	ʂwěɪ	water
30	jǎn	eye	66	ʂwéɪ kwǒ	fruit
31	kæ̀n	dark purple	67	tà	big
32	kān ʦàŋ	liver	68	tǎ	fight
33	kěɪ	give	69	tǎ ljɛ̀	hunt
34	kǔ tʰə́ʊ	bone	70	tæ̀n	egg
35	kwàn ʦɨ	stick	71	tɔ̀ʊŋ u	animal
36	kʰæ̀n	see	72	tɔ̀ʊŋ tɕɛ̄	freeze

#	Transcription	English Meaning	#	Transcription	English Meaning
73	twǒ ɕā	fall	93	ʈʂʰáŋ	long
74	tʰà	step on	94	ʈʂʰàŋ	sing
75	tʰɔ́ʊ	head	95	ʈʂʰɨ	eat
76	tʰīŋ	hear	96	ʦāŋ tə	dirty
77	tʰjēn kʰɔ̄ŋ	sky	97	ʦǎʊ	early
78	ʨàŋ fɯ	husband	98	ʦwɔ̀	sit
79	ʨǎʊ	horn	99	ʦʰǎʊ	grass
80	ʨɪ̀ŋ	near	100	wán	play
81	ʨēn tə	sharp	101	wǎn	kiss
82	ʨʰī ʦɨ̌	wife	102	wēn nwǎn	warm
83	ʨʰí ý	other	103	xɔ́ʊŋ sə	red
84	ʨʰɪ̀ŋ	celebrate	104	xə́	and
85	ʈʂàŋ	a unit of length	105	xə̄	drink
86	ʈʂə̀n	stand	106	xə́ ljə́ʊ	river
87	ʈʂə̀n ʨɥɛ̀ tə	correct	107	xwàɪ	bad
88	ʈʂɨ fáŋ	fat(n)	108	ý	fish
89	ʈʂɨ tàʊ	know	109	y̌	rain
90	ʈʂɨ́ tə	straight	110	ý twàn tə	dull
91	ʈʂòŋ ʦɨ	seed	111	ʐə̀ʊ	meat
92	ʈʂwǎn	turn	112	ʐú kwǒ	if