



# Prosodic Characteristics of Genuine and Mock (Im)polite Mandarin Utterances

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## Abstract

As specialized social affects in speech communication, mock politeness and mock impoliteness are usually characterized by unique prosodic patterns that conflict with the literal meanings. To give a quantitative analysis of prosodic characteristics, a context-elicited discourse completion task was conducted to collect genuine and mock (im)polite Mandarin utterances in both imperative and interrogative modes. Results revealed that prosodic features played roles in a complex way. Mock polite speech showed a higher maximum  $F_0$  and intensity, a wider range as well as a higher variability of  $F_0$  and intensity, a lower HNR, and a higher jitter than genuine polite speech, whereas mock impolite speech showed a lower mean/maximum  $F_0$  and intensity, a narrower range as well as a lower variability of  $F_0$  and intensity, a slower speech rate, a higher HNR, and lower jitter, shimmer and H1-H2 than genuine impolite speech. In the perceptual experiment, the lower identification rates on mock (im)politeness indicated that perceptual judgement was influenced by literal meanings. Politeness ratings further showed that mock (im)polite speech was less (im)polite than genuine (im)polite speech, suggesting a good correspondence between prosodic manifestations and perceived politeness. Moreover, interrogatives sounded more polite than imperatives, also verifying the Tact Maxim principle for politeness.

**Index Terms:** (im)politeness, genuine/mock, prosody, Mandarin speech

## 1. Introduction

(Im)politeness is an important topic in pragmatics study. Most research to date, however, has focused on genuine politeness and impoliteness, yet many issues related to (im)politeness do not straightforwardly fit these two opposing extremes. Culpeper et al. [1] proposed that interpersonal interactions involved mixed messages, that is, the messages that contain features mixed with polite and impolite interpretations. Among them, mock politeness and mock impoliteness are two social attitudes that have been widely discussed.

Two important principles of (im)politeness mismatch (i.e., Irony Principle and Banter Principle) proposed by Leech [2] have been used as the basis for the conceptualization of mock (im)politeness. The Irony Principle underlines impoliteness to listeners, while the Banter Principle emphasizes politeness in which untrue and impolite utterances are superficial in nature. Leech's two principles were later integrated into Culpeper's model of impoliteness [3, 4], where he defined mock politeness as "an impoliteness understanding that does not match the surface form or semantics of the utterance or the symbolic meaning of the behavior" and mock impoliteness as "the recontextualisation of impoliteness in socially opposite

contexts creates socially opposite effects, namely affectionate, intimate bonds amongst individuals and the identity of that group." A more recent work on the metapragmatics of mock politeness conducted by Taylor [5] gave another definition, i.e., "mock politeness occurs when there is an (im)politeness mismatch leading to an implicature of impoliteness." What is more, the only phraseology that can potentially predict mock polite behaviors is over-politeness [6], which is considered as a mismatch between the speaker's intention and self-presentation, including instances where the speaker hides insincerity for manipulating the listener [7].

Thus, the present study employed over-politeness as a manifestation of mock politeness. Since the Chinese word 您 Nin2 (an honorific form of 'you') is a good indicator of politeness, mock politeness will be indicated when Nin2 is used in a close relationship. Also, the mismatch between a close relationship and an impolite expression is a good indicator of mock impoliteness.

While most previous studies on the relationship between speech prosody and (im)politeness were based on qualitative and impressionistic observations on fundamental frequency ( $F_0$ ) contours [4, 8-10], recent works have focused more on quantitative analysis of prosodic parameters including  $F_0$ , duration, and intensity, in a combination with more qualitative variables such as pragmatic expressions of (im)politeness categories [11, 12]. A study of Catalan [11] revealed a higher  $F_0$ , a narrower  $F_0$  range, and a lower maximum intensity in mock impolite speech than in genuine impolite speech, whereas a study of German and Polish [12] showed that mock impolite speech had a lower intensity and a larger  $F_0$  variability than genuine impolite speech. Voice quality features are also closely related to politeness marking. For example, speakers of Korean used a breathier voice in informal/impolite speech than in formal/polite speech, for significant differences in H1-H2, HNR, jitter, and shimmer were found between the two types of speech [13].

In particular, China is conventionally known as "a nation of etiquette," where being polite to others is a traditional virtue. Therefore, how Chinese people differentiate genuine and mock (im)polite speech acoustically and perceptually deserves particular investigation. This study looked into prosodic manifestations and perceptual attributes of Mandarin speech conveying four types of attitudes relevant to (im)politeness, i.e., genuine politeness (GP), mock politeness (MP), genuine impoliteness (GI), and mock impoliteness (MI).

Also, according to the Tact Maxim, the first of the six principles for politeness [2], interrogative (as an indirect speech act) is generally more polite than imperative (as a direct speech act) when requesting others. Therefore, we also included sentence mode (interrogative vs. imperative) as another control factor in the present study.

## 2. Speech data

### 2.1. Corpus design

To keep a balance between naturalness and controllability, elicited speech was used in this study. An oral version of the Discourse Completion Task, originated from pragmatics study and later widely used in prosodic research, was adopted as the method of elicitation. For a comparison of genuine and mock politeness, we designed a set of target sentences expressing *request* associated with literally polite wording. For a comparison of genuine and mock impoliteness, we designed a set of target sentences expressing *criticism* associated with literally impolite wording. For each target sentence, two scenarios were designed to elicit genuine and mock attitudes, respectively. The target sentence was placed at the end of each scenario. Here are a set of example scenarios, each of which were used twice, with either an interrogative or an imperative sentence (shown as 1 and 2, respectively) embedded at the end:

- *Genuine politeness:*

You took a bus to school. Your seat was by the window, and you were going to get off. You said to the passenger next to you politely:

- (1) “麻烦您能挪一下吗?” (Could you move over, please?)
- (2) “麻烦您挪一下!” (Please move over!)

- *Mock politeness:*

Your boy/girlfriend and you took a bus to work together. Your seat was by the window. Your boy/girlfriend was playing his/her phones all the time without any interaction with you and even ignored your words. You were ready to get off, but he/she was still unaware of it. So, you said to him/her:

- (1) “麻烦您能挪一下吗?” (Could you move over, please?)
- (2) “麻烦您挪一下!” (Please move over!)

- *Genuine impoliteness:*

You helped your son with his homework in the evening. When it came to a math problem which you had told him at least three times, he still could not make it. You said to him:

- (1) “你能长点心吗?” (Can you pay more attention?)
- (2) “你长点心!” (Pay more attention!)

- *Mock impoliteness:*

You went to class with your roommate in the morning. Your roommate was a very careless person. When he/she entered the classroom, he/she suddenly realized that he/she forgot to bring his/her schoolbag. You said to him/her:

- (1) “你能长点心吗?” (Can you pay more attention?)
- (2) “你长点心!” (Pay more attention!)

### 2.2. Data recording

Twenty-four native speakers of Mandarin (12M, 12F) were recruited for speech recording. They were graduate students at the age of 22-29 (mean = 23.9, SD = 1.7), with a language proficiency of Mandarin at 2A level, which is generally good enough. None of them had any experience of performing and vocal expression. They were reasonably remunerated for their participation.

After each speaker was familiarized with the materials and could express the intended attitudes appropriately, speech recording was conducted in a sound-proof booth, with a cardioids microphone Neumann U87Ai placed about 15cm in

front of the mouth. The speaker was asked to read the context first and then speak aloud the target sentence. Speech signals were recorded with a sampling rate of 44,100Hz at a 16-bit precision. Eighty utterances (20 target sentences × 2 sentence modes × 2 attitudes) were collected for each speaker. Thus, there were 1920 target utterances altogether.

## 3. Acoustic analysis

For each target utterance, we measured five fundamental frequency (F<sub>0</sub>) parameters, five intensity parameters, five voice quality parameters, and speech rate. Five F<sub>0</sub>/intensity parameters included the mean, standard deviation, max, min, and range of F<sub>0</sub>/intensity, whereas five voice quality parameters were jitter, shimmer, Harmonics-to-Noise Ratio (HNR), H1-H2, and H1-A1. Among them, H1-H2 and H1-A1 were extracted using VoiceSauce, while others were extracted using Praat. All F<sub>0</sub> parameters were measured in semitone (st) with a reference of 50 Hz, and all intensity parameters were transformed to z-scores.

Statistical comparisons were then conducted in each pair of attitudes, one between genuine vs. mock politeness, and the other between genuine vs. mock impoliteness. In each pair, all 16 parameters were analyzed with linear mixed-effects models (LMMs) using the Jamovi program. Attitude type (genuine vs. mock) and sentence mode (imperative vs. interrogative) were fixed effects, while sentence was a random effect.

Results of statistical comparison on four sets of parameters are shown in Tables 1-4, where asterisk indicates a significant difference between GP and MP, while cross indicates a significant difference between GI and MI. It should be noted that there was no comparison between (GP, MP) and (GI, MI).

Table 1. Statistical comparison of F<sub>0</sub> parameters.

F <sub>0</sub> (st)	GP	MP	GI	MI
F <sub>0</sub> _Mean	22.61	23.11	23.54 <sup>†</sup>	22.23 <sup>†</sup>
F <sub>0</sub> _std	1.62*	1.78*	2.21 <sup>†</sup>	1.97 <sup>†</sup>
F <sub>0</sub> _Min	17.04	17.06	16.06	15.73
F <sub>0</sub> _Max	26.76*	27.71*	29.31 <sup>†</sup>	27.58 <sup>†</sup>
F <sub>0</sub> _Range	11.04*	13.22*	17.49 <sup>†</sup>	13.92 <sup>†</sup>

Table 2. Statistical comparison of intensity parameters.

Intensity (dB)	GP	MP	GI	MI
Intensity_Mean	58.16*	62.05*	64.15 <sup>†</sup>	60.06 <sup>†</sup>
Intensity_std	14.12*	16.27*	17.08 <sup>†</sup>	15.53 <sup>†</sup>
Intensity_Min	23.80	23.36	23.71 <sup>†</sup>	23.52 <sup>†</sup>
Intensity_Max	67.30*	72.09*	74.78 <sup>†</sup>	69.68 <sup>†</sup>
Intensity_Range	43.50*	48.72*	51.08 <sup>†</sup>	46.16 <sup>†</sup>

Table 3. Statistical comparison of speech rate.

	GP	MP	GI	MI
Speech rate (syl/s)	5.41	5.55	5.81 <sup>†</sup>	5.18 <sup>†</sup>

Table 4. Statistical comparison of voice quality parameters.

Voice quality	GP	MP	GI	MI
Jitter	0.02*	0.02*	0.02 <sup>†</sup>	0.02 <sup>†</sup>
Shimmer	0.09	0.09	0.11 <sup>†</sup>	0.10 <sup>†</sup>
HNR	13.08*	12.53*	11.20 <sup>†</sup>	12.60 <sup>†</sup>
H1-H2	6.16	5.62	5.96 <sup>†</sup>	5.60 <sup>†</sup>
H1-A1	3.96	3.82	6.64	6.56

### 3.1. Fundamental frequency

In a comparison of GP and MP, there was no significant main effect on  $F_0$ \_Mean ( $p = 0.081$ ) and  $F_0$ \_Min ( $p = 0.834$ ). However,  $F_0$ \_std was by 0.16st significantly higher ( $p = 0.010$ ),  $F_0$ \_Max was by 0.95st higher ( $p = 0.020$ ), and  $F_0$ \_Range was by 2.18st higher ( $p = 0.013$ ) in MP than in GP.

There were significant interaction effects of Attitude×Mode on  $F_0$ \_Mean ( $\beta = -0.29$ ,  $SE = 0.14$ ,  $t = -2.08$ ,  $p = 0.038$ ),  $F_0$ \_std ( $\beta = -0.15$ ,  $SE = 0.08$ ,  $t = -1.96$ ,  $p = 0.050$ ),  $F_0$ \_Max ( $\beta = -0.85$ ,  $SE = 0.24$ ,  $t = -3.50$ ,  $p < 0.001$ ) and  $F_0$ \_Range ( $\beta = -1.85$ ,  $SE = 0.67$ ,  $t = -2.76$ ,  $p = 0.006$ ). Simple effect analysis showed that only for interrogatives,  $F_0$ \_Mean was by 0.73st significantly higher ( $p = 0.032$ ),  $F_0$ \_std was by 0.23st higher ( $p = 0.001$ ),  $F_0$ \_Max was by 1.47st higher ( $p = 0.002$ ), and  $F_0$ \_Range was by 3.25st higher ( $p = 0.001$ ) in MP than in GP.

In a comparison of GI and MI,  $F_0$ \_Mean was by 1.31st significantly lower ( $p < 0.001$ ),  $F_0$ \_std was by 0.24st lower ( $p = 0.003$ ),  $F_0$ \_Max was by 1.73st lower ( $p < 0.001$ ), and  $F_0$ \_Range was by 3.57st narrower ( $p < 0.001$ ) in MI. There was no significant main effect on  $F_0$ \_Min ( $p = 0.326$ ).

There was a significant interaction effect of Attitude×Mode on  $F_0$ \_Mean ( $\beta = -0.59$ ,  $SE = 0.19$ ,  $t = -3.15$ ,  $p = 0.002$ ). For interrogatives MI was by 1.09st lower than GI ( $p = 0.001$ ), while for imperatives MI was by 1.69st lower than GI ( $p < 0.001$ ). There was a significant interaction effect on  $F_0$ \_std ( $\beta = 0.44$ ,  $SE = 0.09$ ,  $t = 4.73$ ,  $p < 0.001$ ), and only for interrogatives MI was by 0.46st lower than GI ( $p < 0.001$ ). There was a significant interaction effect on  $F_0$ \_Min ( $\beta = -2.41$ ,  $SE = 0.47$ ,  $t = -5.09$ ,  $p < 0.001$ ), and only for imperatives MI was by 1.61st lower than GI ( $p < 0.001$ ). Also, there was a significant interaction effect on  $F_0$ \_Range ( $\beta = 2.86$ ,  $SE = 0.74$ ,  $t = 3.87$ ,  $p < 0.001$ ). For interrogatives MI was by 5.19st lower than GI ( $p < 0.001$ ), while for imperatives MI was by 2.33st lower than GI ( $p = 0.020$ ). No significant interaction effect was found on  $F_0$ \_Max.

### 3.2. Intensity

In a comparison of GP and MP, Intensity\_Mean was by 3.89dB significantly higher ( $p < 0.001$ ), Intensity\_std was by 2.15dB higher ( $p < 0.001$ ), Intensity\_Max was by 4.79dB higher ( $p < 0.001$ ), and Intensity\_Range was by 5.22dB higher ( $p < 0.001$ ) in MP. There was no significant main effect on Intensity\_Min ( $p = 0.893$ ).

There was also a significant interaction effect of Attitude×Mode on Intensity\_Mean ( $\beta = -0.81$ ,  $SE = 0.29$ ,  $t = -2.78$ ,  $p = 0.005$ ). For interrogatives MP was by 4.28dB higher than GP ( $p < 0.001$ ), while for imperatives MP was by 3.47dB higher than GP ( $p < 0.001$ ). There was a significant interaction effect on Intensity\_std ( $\beta = -1.46$ ,  $SE = 0.19$ ,  $t = -7.79$ ,  $p < 0.001$ ). For interrogatives MP was by 2.71dB higher than GP ( $p < 0.001$ ), while for imperatives MP was by 1.23dB higher than GP ( $p = 0.001$ ). There was a significant interaction effect on Intensity\_Max ( $\beta = -1.55$ ,  $SE = 0.35$ ,  $t = -4.40$ ,  $p < 0.001$ ). For interrogatives MP was by 5.55dB higher than GP ( $p < 0.001$ ), while for imperatives MP was by 3.99dB higher than GP ( $p < 0.001$ ). Also, a significant interaction effect was found on Intensity\_Range ( $\beta = -2.48$ ,  $SE = 0.38$ ,  $t = -6.55$ ,  $p < 0.001$ ). For interrogatives MP was by 6.08dB higher than GP ( $p < 0.001$ ), while for imperatives MP was by 3.57dB higher than GP ( $p < 0.001$ ).

In a comparison of GI and MI, Intensity\_Mean was by 4.08dB significantly lower ( $p < 0.001$ ), Intensity\_std was

1.55dB lower ( $p < 0.001$ ), Intensity\_Min was by 0.19dB lower ( $p < 0.001$ ), Intensity\_Max was by 5.10dB lower ( $p < 0.001$ ), and Intensity\_Range was by 4.92dB lower ( $p < 0.001$ ) in MI.

There was also an interaction effect of Attitude×Mode on Intensity\_Min ( $\beta = -0.99$ ,  $SE = 0.30$ ,  $t = -4.23$ ,  $p < 0.001$ ). Only for imperatives MI was by 1.01dB lower than GI ( $p < 0.001$ ). However, no significant interaction effect was found on Intensity\_Mean ( $p = 0.642$ ), Intensity\_std ( $p = 0.493$ ), Intensity\_Max ( $p = 0.522$ ), and Intensity\_Range ( $p = 0.178$ ).

### 3.3. Speech rate

In a comparison of GP and MP, no significant main effect was found on speech rate ( $p = 0.178$ ). However, there was a significant interaction effect of Attitude×Mode ( $\beta = -0.26$ ,  $SE = 0.07$ ,  $t = -3.74$ ,  $p < 0.001$ ). Only for interrogatives MP was by 0.27syl/s faster than GP ( $p = 0.018$ ).

In a comparison of GI and MI, speech rate was by 0.64syl/s significantly slower in MI ( $p < 0.001$ ). There was also a significant interaction effect of Attitude×Mode ( $\beta = -0.31$ ,  $SE = 0.10$ ,  $t = -3.09$ ,  $p = 0.002$ ). For interrogatives MI was by 0.27syl/s slower than GI ( $p < 0.001$ ), while for imperatives MI was by 0.79syl/s slower than GI ( $p < 0.001$ ).

### 3.4. Voice quality

In a comparison of GP and MP, jitter was by 0.00083 significantly higher ( $p < 0.001$ ), and HNR was by 0.55 lower ( $p = 0.003$ ) in MP. There was also a significant interaction effect of Attitude×Mode on HNR ( $\beta = 0.49$ ,  $SE = 0.21$ ,  $t = 2.29$ ,  $p = 0.020$ ). Only for interrogatives MP was by 0.82 lower than MP ( $p < 0.001$ ). No significant main or interaction effect was found on shimmer, H1-H2, and H1-A1.

In a comparison of GI and MI, jitter was by 0.00083 significantly lower ( $p < 0.001$ ), shimmer was by 0.011 lower ( $p < 0.001$ ), HNR was by 1.40 higher ( $p < 0.001$ ), and H1-H2 was by 0.36 lower ( $p = 0.035$ ) in MI. There was no significant main effect of Attitude on H1-A1 ( $p = 0.816$ ). Also, there was no significant interaction effect of Attitude×Mode on any of these parameters.

## 4. Perceptual experiment

### 4.1. Method

The perceptual experiment consisted of two tasks, i.e., an identification task and a politeness rating task. Twelve native listeners of Mandarin at similar ages (mean = 24.7; SD = 1.0) participated in the identification task, and other 21 native listeners at similar ages (mean = 24.4; SD = 2.7) participated in the politeness rating task. None of them had a reported history of auditory or cognitive disorders.

After a perceptual validation test conducted via the online platform [www.wjx.cn](http://www.wjx.cn) by four native listeners who were all graduate students in linguistics, altogether 320 utterances from speech recordings were selected as stimuli, which were partitioned into four lists of 80 utterances using a full Latin-square counterbalancing procedure, with four attitude types rotating across the lists. Each participant was assigned randomly one of the four lists for perceptual test.

In the identification task, for each utterance a participant was asked to choose one out of the four given attitudes. In the politeness rating task, for each utterance a participant was asked to give a score of politeness on a 7-point Likert scale, where 7 represents highly polite and 1 indicates highly impolite.

## 4.2. Results

As shown in Table 5, the ordering of the identification rates among four attitudes is GP > GI > MP > MI. Genuine (im)politeness is much better identified than the mock ones. In addition, the rate of identification in GP is higher for interrogatives (97.50%) than for imperatives (90.83%); in MP and GI, however, the rates of identification are higher for imperatives than for interrogatives.

As shown in Table 6, the ordering of the average scores of politeness among the four attitudes is GP > MP > MI > GI. In addition, interrogatives consistently have higher average scores of politeness than imperatives in all four attitudes.

Table 5. Rates of identification (%).

Attitude	Rate (%)	Sentence mode	
		Imperative	Interrogative
GP	94.17	90.83	97.50
MP	64.58	69.17	60.00
GI	82.71	87.50	77.92
MI	56.87	57.50	56.25

Table 6. Scores of politeness rating.

Attitude	Score	Sentence mode	
		Imperative	Interrogative
GP	6.02	5.72	6.32
MP	4.72	4.26	5.19
GI	2.04	1.80	2.28
MI	2.72	2.64	2.80

## 5. Discussion

By acoustic analysis, we examined prosodic manifestations of genuine and mock (im)polite Mandarin speech. Since mock politeness is deemed to be less polite than genuine politeness while mock impoliteness is deemed to be more polite than genuine impoliteness, as was also verified in the perceptual experiment, we can compare our findings with previous studies on (im)polite speech.

In the first place, the max, range, and SD of  $F_0$  were significantly higher in MP than in GP, whereas the mean, max, range, and SD of  $F_0$  was significantly lower in MI than in GI. There were also significant interaction effects between attitude type and sentence mode. For example, in a comparison of GP and MP, only for interrogatives there was a significant difference between MP and GP.

As revealed in previous studies, a *stereotype* of (im)polite speech is that polite speech tends to have a higher pitch than impolite speech [14-16] (though there is not always an acoustic evidence; instead, speech rate may play a more important role [17]). The results on  $F_0$  here seem to contradict with this stereotype. However, we interpret the results in the way that in expressing mock politeness speakers tend to raise  $F_0$  to signal an exaggerated ‘politeness,’ whereas in expressing mock impoliteness they tend to lower  $F_0$  to signal an exaggerated ‘impoliteness’ – in both case an exaggeration may be an indicator of mock expression.

It was also found that MP had a higher intensity than GP, while MI had a lower intensity than GI. In a sense this coincides with the reports in previous studies [11-13, 18-21]. For speech rate, MI was significantly slower than GI, while only for interrogatives MP was significantly faster than GP

(for imperatives there was no significant difference). This basically coincides with the finding in [17].

A higher jitter and a lower HNR were found in MP than in GP. This coincides with the finding on Catalan that the speech with a higher politeness had lower jitter and shimmer [21]. Also, lower jitter, shimmer and H1-H2, as well as a higher HNR were found in MI than in GI, suggesting a more stable and less breathy voice in MI. This coincides with the finding of a breathier voice in the informal/impolite speech of Korean [13].

After acoustic analysis, the perceptual experiment further tested the rates of identification of attitude type and the scores of politeness. The rate of identification was lower in MP and MI than in GP and GI, suggesting that perceptual judgement was influenced by literal meanings. In addition, in GP the rate of identification was higher for interrogatives than for imperatives, which coincides with the Tact Maxim principle that interrogatives tend to be more polite than imperatives. In contrast, the results were reverse in MP and GI, which however still coincides with the Tact Maxim principle, for MP and GI are intrinsically associated with impoliteness.

The ordering of the scores of politeness, GP > MP > MI > GI, coincides with the expectation that mock (im)politeness is less (im)polite than the genuine ones, and the attitudes named with politeness, whether genuine or mock, sound more polite than the attitudes named with impoliteness. In addition, interrogatives sounded consistently more polite than imperatives, again verifying the Tact Maxim principle.

## 6. Conclusions

This study conducted both acoustic analysis and perceptual experiment on genuine and mock (im)polite Mandarin speech. In acoustic analysis, a number of prosodic features, including  $F_0$ , intensity, speech rate and voice quality, were found to play significant roles in distinguishing genuine and mock (im)polite Mandarin speech. In perceptual experiment, the lower identification rates on mock (im)politeness indicated that perceptual judgement was influenced by literal meanings, while politeness ratings showed that mock (im)polite speech was perceptually less (im)polite than the genuine ones, based on which we further found a good correspondence between prosodic manifestations and perceived politeness. In addition, interrogatives were found to be perceptually more polite than imperatives, which verified the Tact Maxim principle for politeness.

Future work needs to take into account facial expression, gesture and other physical signals to find a combinatorial multimodal strategy in expressing genuine and mock (im)politeness.

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