

A matched-guise study of Mandarin creaky voice

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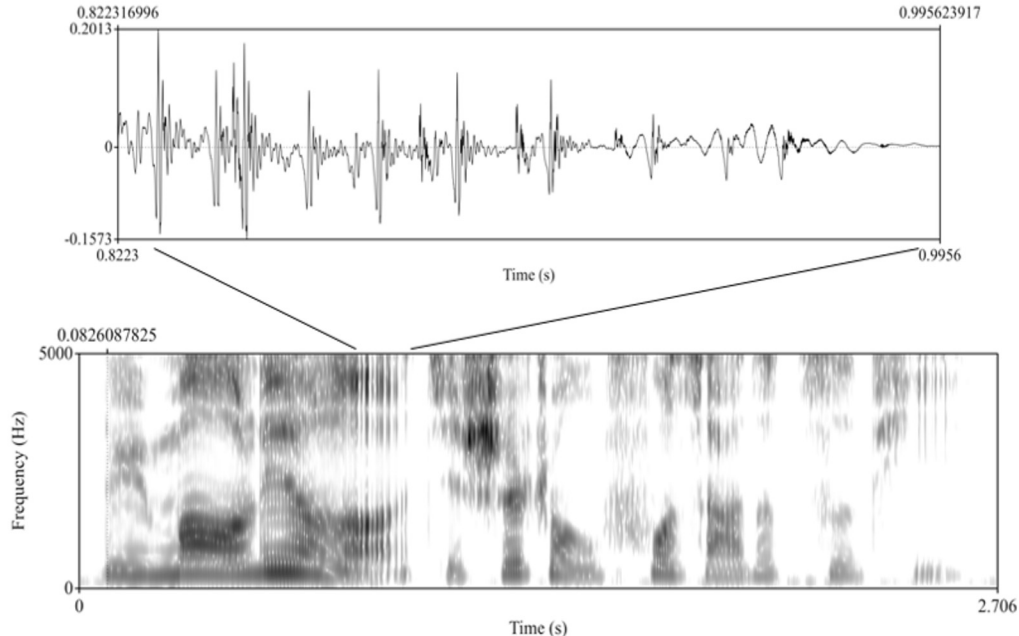
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Creak

- **Creak:** a phonation type in which the arytenoid cartilage in the larynx are drawn together such that the vocal folds are more constricted.



Allophonic creak and gender

- In the U.S. context, creak is negatively evaluated for male voices but even more so for female voices (e.g., Greens & Winters, 2015)
- This stereotypical binary-gender evaluative bias can influence how listeners identify creak in perception:
 - under certain conditions, American English listeners tend to identify more creak in female voices than male voices (Davidson, 2019)
 - in all conditions, Mandarin listeners tend to identify more creak in male voices than female voices (Li et al., 2022)

Creak evaluation and identification

- Differences in creak identification (English vs. Mandarin) may be partially driven by how creak is evaluated in these two languages
- **Research question:** does creak have gender-differentiated social evaluation in Mandarin?
- **Solution:** A matched-guise study of Mandarin creaky voice

Mandarin creaky voice evaluation

Mandarin creak evaluation: Design

- within-subjects
- a matched-guise design



Female creak

Female modal

Male creak

Male modal



**From the same
speaker**

Mandarin creak evaluation: Design

- One utterance → four guises
 - high-pitched and creaky
 - high-pitched and modal
 - low-pitched and creaky
 - low-pitched and modal
- No guises from the same utterance appeared more than once within the same block

Mandarin creak evaluation: Design

- 64 declarative sentences (32 creaky and 32 modal), with the presence of creak being controlled for prosodic position (final vs. nonfinal), locality (global vs. local) and bearing tone

(1) 李艾在公园散步碰到了李哀¹。

Li Ai4 zai gongyuan sanbu pengdao le Li Ai1.

Li Ai4 at park walk met ASP Li Ai1

‘Li Ai4 met Li Ai1 while taking a walk in the park’.

1: highlighted is the creak-containing target syllable

- 12-syllable long with the same syntactic structure (NP1 - TP - NP2), varying in content and lexical items

Mandarin creak evaluation: Design

To avoid fatigue effect, sentences were classified into **groups of two** according to creak locality (global vs. local) and prosodic position (final vs. non-final) while overriding the distinction between different tones

Listeners evaluated sentences of the same type as a group

Mandarin creak evaluation: Design

- 4 blocks in total
- A sample block with creak trials

Group 1: Sentence final + **global creak** + high-pitched
Group 2: Sentence final + **global creak** + low-pitched
Group 3: Sentence nonfinal + **global creak** + high-pitched
Group 4: Sentence nonfinal + **global creak** + low-pitched
Group 5: Sentence final + **local creak** + high-pitched
Group 6: Sentence final + **local creak** + low-pitched
Group 7: Sentence nonfinal + **local creak** + high-pitched
Group 8: Sentence nonfinal + **local creak** + low-pitched
...

Mandarin creak evaluation: Stimuli

Recording & manipulation

- 64 sentences naturally produced by a female native speaker (mean pitch: **225Hz**)
 - All the critical sentences were first read with target syllables being produced with creaky voice and then with target syllables being produced with modal voice.
 - Cross-splicing to create pairs that differed only in the presence of creak
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- Manipulated into low-pitched targets by adjusting vowel formant frequencies and pitch range (mean pitch: **110Hz**; vowel formant ratio: **0.75**)
 - Cross-splicing was then conducted on the male voice

Mandarin creak evaluation: Procedure

Participants: 40 Mandarin listeners
(M=15, F=23, Other =2)

7-point Likert scale: likeability,
competence, intelligence,
attractiveness, wealthiness,
educatedness, friendliness

请听下面两段录音 **Please listen to the following sentences**

▶ 0:00 / 0:03 ———▶ 🔊 ⋮

▶ 0:00 / 0:02 ———▶ 🔊 ⋮



根据您刚刚所听到的声音，您认为说话人是一个富裕的人吗？ **(wealthy)**

非常 不富 裕	2	3	4	5	6	非常 富裕
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根据您刚刚所听到的声音，您认为说话人是惹人喜欢的人吗？ **(likeable)**

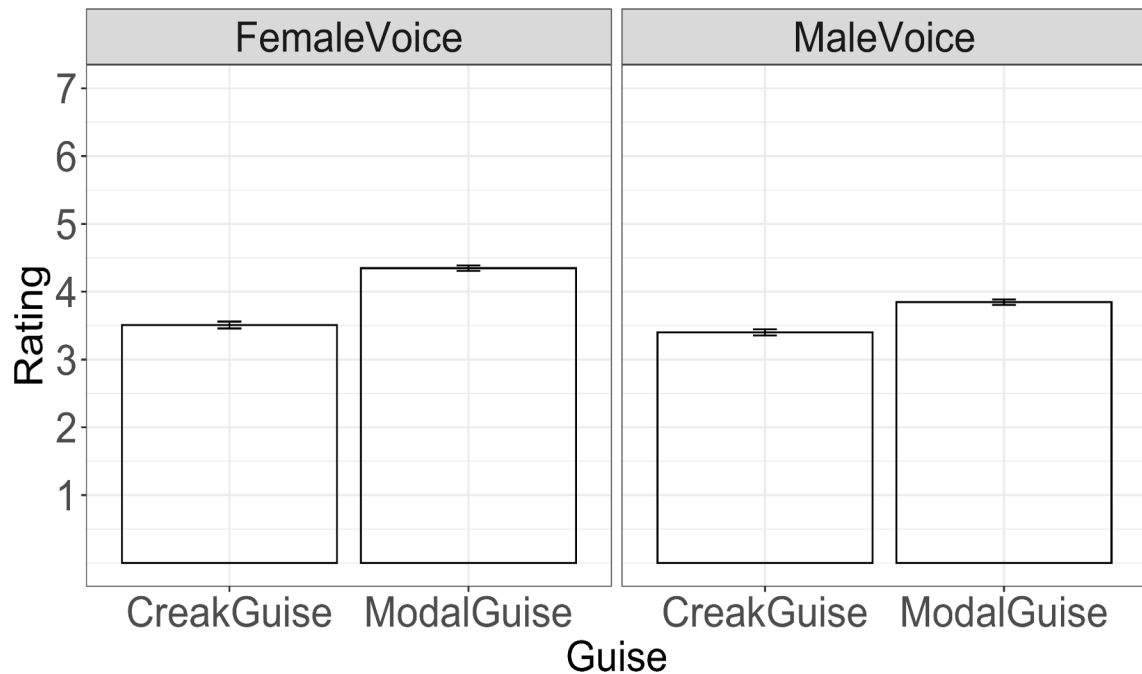
非常 不惹 人喜 欢	2	3	4	5	6	非常 惹人 喜欢
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根据您刚刚所听到的声音，您认为说话人是一个聪明的人吗？ **(intelligent)**

非常 不聪 明	2	3	4	5	6	非常 聪明
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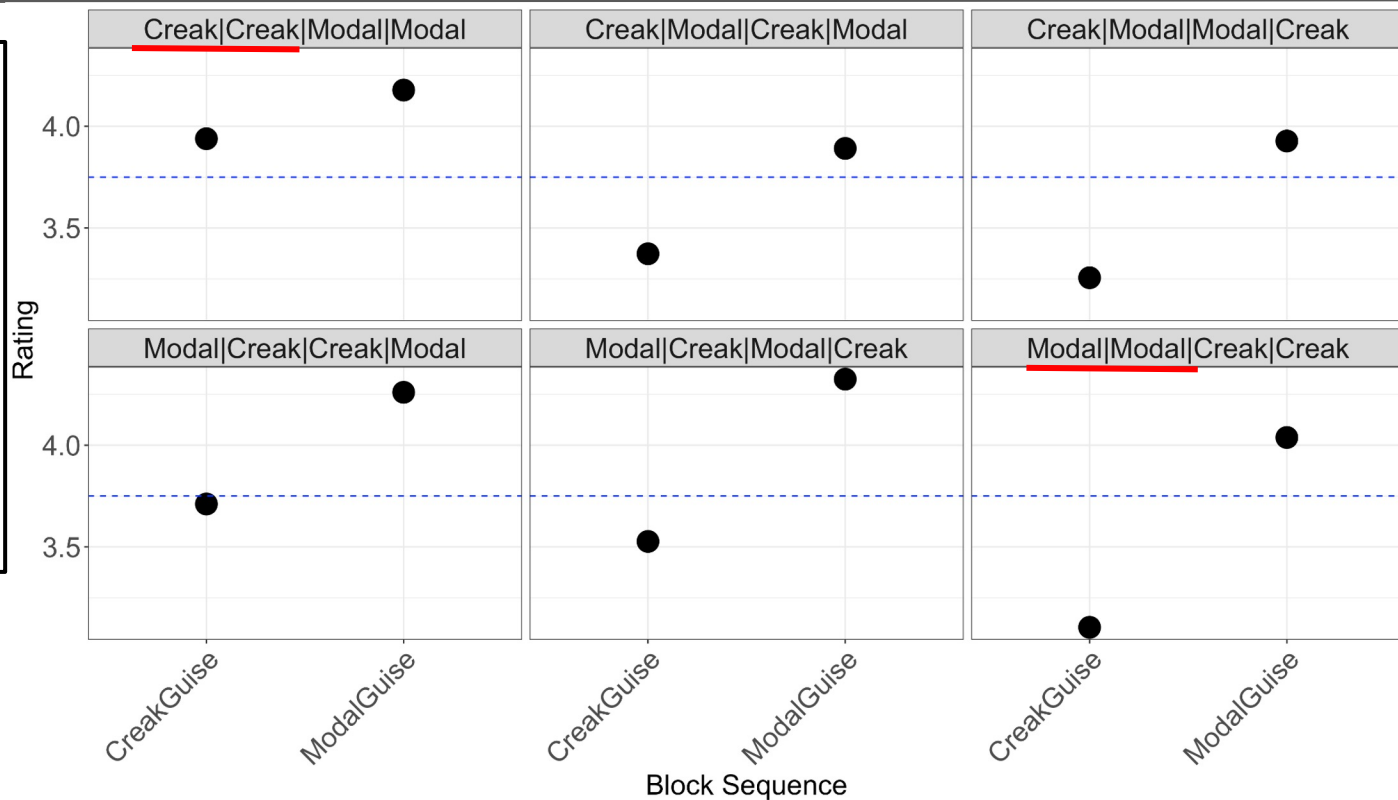
Mandarin creak evaluation: Results

- Creak guises were significantly dispreferred ($\beta=-0.31$, $p<0.001$)
- Male modal voice was dispreferred ($\beta=0.49$, $p<0.01$)
- For the **creaky guise**, the ratings of the female voice were **not significantly different** from those of the male voice ($\beta=0.10$, $p= 0.54$)



Mandarin creak evaluation: Results

Listeners tended to rate creak more harshly if they were first exposed to two blocks with modal utterances



Discussion & Conclusion

- Mandarin listeners in general did not have negative evaluations of female creak, compared to male creak
- In Mandarin, listeners do not display explicit gender biases with respect to creaky voice
- Even though listeners did not evaluate female creak and male creak differently, they tended to downgrade the low-pitched modal voice: a result of manipulation?

Discussion & Conclusion

- Order of exposure matters: listeners tended to rate creak more harshly if they were first exposed to blocks with modal utterances, compared to those who were first exposed to creaky utterances
- Back to English vs. Mandarin: creak evaluation seems to influence creak perception

Thank you for your attention!

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