

Vowel Raising in the Chengdu Dialect of Mandarin

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Introduction

Previously documented /an/ in the Chengdu dialect:

Year of Analysis	1941	1956	1956	1982	1983	2006	2016
Published in	Yang (1984)	Zhen (1958)	Zhen et al. (1960)	Liang (1982)	Zhen (1983)	He and Rao (2013)	Hu and Zhang (2017)
/iai/	a	ɛ	ɛ	ɛ	NA	ɛ	NA
/ian/	e	æ	ɛ	ɛ	ɛ̄	æ / ɛ	ɛ
/yan/	e	æ	ɛ	ɛ	ɛ̄	æ / ɛ	ɛ
/Can/	a	A	æ	NA	ā	æ / ɛ	æ / ɛ
/uan/	a	A	æ	NA	ā	NA	æ / ɛ

- Recent studies: elicited data (Hu and Zhang, 2017), no acoustic analysis (He and Rao, 2013).
- This study: the influence of **age, gender, language attitude** and **vowel context** on the realization of /an/.
- This study: natural speech of 18 native Chengdu speakers from Li (2018).

Methods

Vowel context (target tokens): /(C)ian/, /(C)yan/, /(C)uan/, /(C)an/.

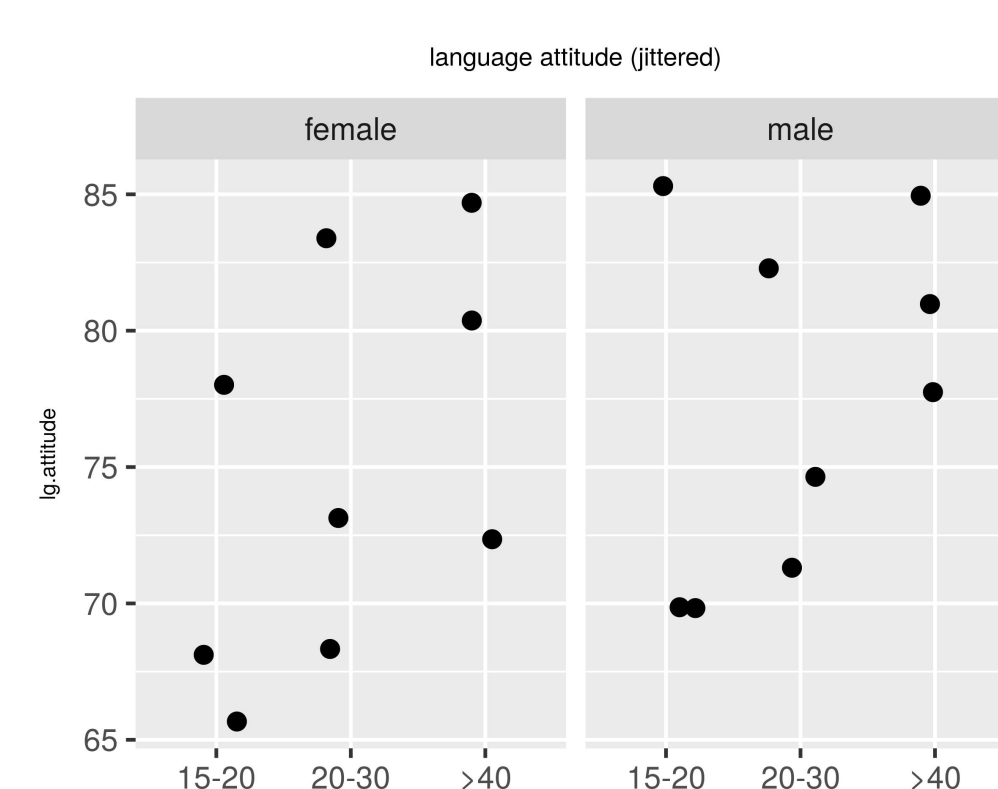
Reference vowels: /a/, /i/, /u/, /o/ as anchors in vowel chart.

Speakers: 3 age groups: 15-20 yrs, 20-30 yrs, >40 yrs; 3 male and 3 female speakers per age group.

Annotation: Annotation starts at 10 minutes, ends with 50 target tokens. F1 and F2 values extracted using Praat (Boersma et al., 2002), Nearey normalized (Nearey, 1977). **Praat settings:** male: 5000 Hz, 5 formants; female: 5500 Hz, 5 formants; Our reference vowels are closer under Nearey normalization. Compared with other normalization procedures, it preserves effectively phonemic and sociolinguistic variation while at the same time minimize physiological variation.

Language attitude questionnaire:

- 30 multiple choice questions to examine participants' language attitude towards the Chengdu dialect and their local identity after the interview.
 - 5-level Likert scale.
 - Total score as language attitude index for each informant.
- (For example: Question: Which language do you prefer to use on daily occasions?



Scoring of the response: Chengdu dialect-5; more Chengdu dialect-4; Both-3; more standard Mandarin-2; standard Mandarin-1). (Li, 2018)

Linear mixed effects model:

Fixed effects:

- Age: 15-20, 20-30, >40
- Gender: male, female
- Language attitude: scores from the above questionnaire
- Vowel context: /ian/, /yan/, /uan/, /(C)an/

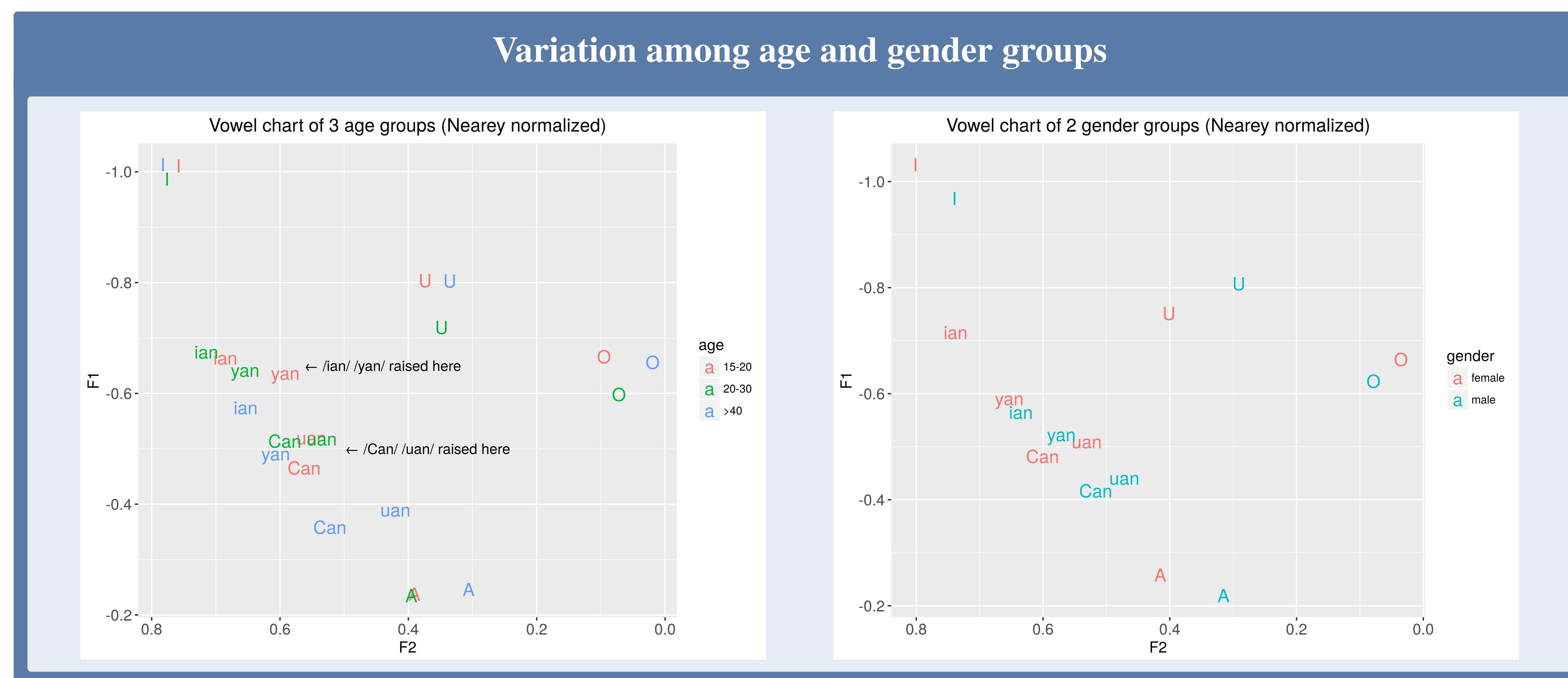
Random effects: subject, word, annotator

Results: age and gender

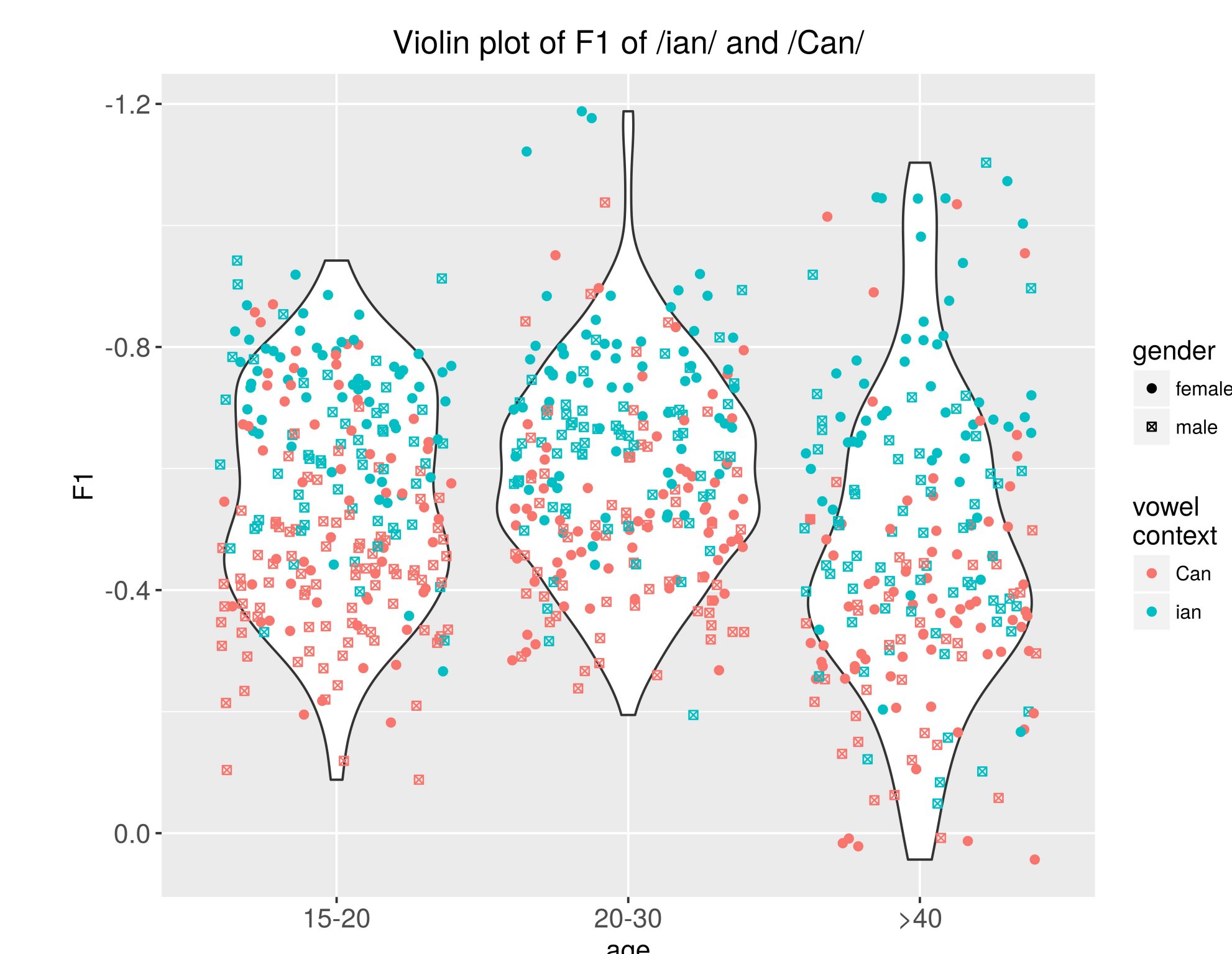
- Raising:** /ian/, /yan/, /uan/, /Can/ in younger groups all higher than the oldest age group
- Similar realizations for 2 younger age groups

Results: age and gender

- Females raise more than males → females lead the change
- Possible sequence for raising: /ian/ (assimilation) → /yan/ → /uan/ and /Can/

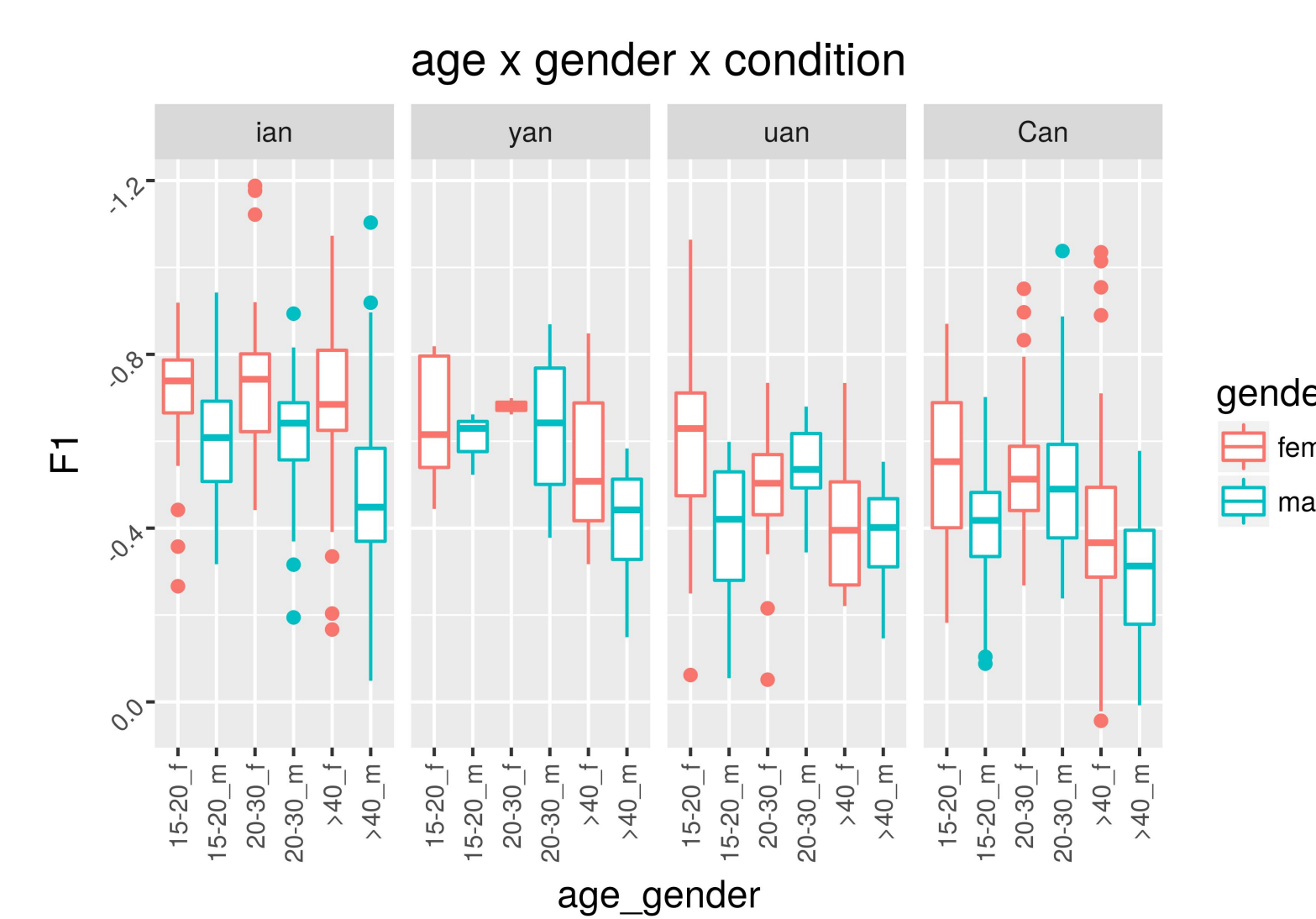


Results: vowel contexts



- /ian/ and /Can/: most extreme environments
- Wider range for /ian/ within the oldest age group b/c females more advanced in raising → similar to the younger age groups → evidence for /ian/ raising first
- 2 younger age groups very similar

Results: linear model



model	AIC	BIC	LogLik	R ²
$F1 \sim age + context + randEff$	-846.5	-798.2	433.2	0.300
$F1 \sim gender + context + randEff$	-847.2	-803.7	432.6	0.295
$F1 \sim lg.att. + context + randEff$	-847.9	-804.4	432.9	0.303
$F1 \sim age * gender + context + randEff$	-854.9	-792.1	440.5	0.367
$F1 \sim age * gender * lg.att. + context + randEff$	-862.6	-770.8	450.3	0.410

Table: Models and their fit, by lme4 (Bates et al., 2015), w/ max likelihood. R² for fixed effects (Nakagawa and Schielzeth, 2013).

- Likelihood ratio test of lg.att.-only model vs. full model: $p = 0.00014$ → prefers **full model** (so does AIC, but not BIC)
- In the full model, all four predictors significant (age^{**} , $gender^{**}$, $lg.att.^{***}$, $context^{***}$)
- Note: $lg.att. \sim age * gender: R^2 = 0.2471$ → $lg.att.$ not completely predictable from age and $gender$ → could be included in the model

Discussion

- Confirms results in previous studies, e.g. He and Rao (2013); Hu and Zhang (2017)
- Found an effect from not only age and gender, but also language attitude and vowel context
- Apparent-time track of change allows us to observe the stages in the phonologization of an innovative pattern with phonetic origins
- Whether it should be understood as a regular sound change, i.e. a gradual transformation of a single phonetic feature, or a change triggered by lexical diffusion remains to be answered
- Next: extend to include even younger speakers (< 15 years old)

Conclusion

- Raising attested in natural speech of two young age groups
- Female speakers leading the sound change (c.f. Labov (2001))
- Possibly started from assimilation and then spread to other conditions: /ian/ → /yan/ → /uan/ and /Can/
- Older, male speakers: more positive language attitude

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