



VARIATION IN MANDARIN PRENUCLEAR GLIDE SEGMENTATION?

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DEBATE IN THE LITERATURE

Question: What is the Mandarin prenuclear glide?

- Is it part of the onset or the rhyme?
- Is it an independent segment or not?
- Palatal glide /j/, bilabial glide /w/, labiopalatal glide /ɥ/.
- A Mandarin syllable: C**G**VX (X = nasal or offglide)

(I) Glide examples

- | | | | | | |
|---------|----------|---------|--------|---------|-------------|
| a. njaw | 'bird' | c. kwo | 'wok' | e. lɥe | 'to omit' |
| b. ɕja | 'shrimp' | d. swan | 'sour' | f. ɕɥɛn | 'to select' |

DEBATE IN THE LITERATURE

- Glide is part of the initial/onset:
 - Wang 1973, Bao 1990, Duanmu 2002
- Glide is part of the final/rhyme:
 - Cheng 1973, Pulleyblank 1982, Hseuh 1985
- Depends on the glide:
 - Lin 1989, Wan 1999
- Depends on the consonant:
 - Ladefoged & Maddieson 1996, Wan 1999, Wang & Chang 2001

METHOD IN THE LITERATURE SUMMARIZED BY YIP (2003)

- Observe glide behavior in fanqie secret languages and speech error data.
- Whether G moves/deletes/copies with C or V

Fanqie secret languages

- Split one syllable into 2, based on a template.
- *May-ka* secret language (Chao 1931)

(2) tʂaw → tʂaj kaw

- Bao (1990): /w/ is part of onset.

(3) t^hwo → t^hwaj kwo

*t^haj kwo

Speech error data

- Wan (1999): /kw/ is a constituency
- Consonant replacement error

(4) fej xwa → fej fa

‘nonsense’ *speech error*

PROBLEM WITH THE METHOD POINTED OUT BY YIP (2003)

- We don't know what is influencing the decision on what to do with the glide.
 - Structural status of the glide OR phonotactics concerning the glide?
 - Placing the glide in a new environment might incur markedness violations,
 - which can be repaired by violating faithfulness constraints.
- We don't know who is making the decision on what to do with the glide.
 - Different speakers might arrive at different conclusions for the glide.
 - Individual speaker data pooled in secret language and speech error data
 - which leads to inconsistent conclusions in the literature.

THE CODEWORD LANGUAGE GAME

My approach: a language game experiment:

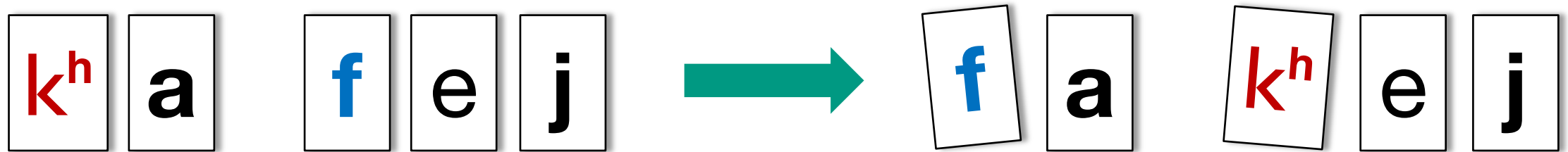
- Based on fanqie secret language
- Phonological environment controlled
- Larger data set
- Speaker variation on display

Speaker variation: I compare two analyses:

- Segmentation variation
- Phonotactics constraint ranking variation

THE CODEWORD LANGUAGE GAME

- **The task:** swap the initial consonants of a disyllabic word to form a codeword.



Original word: 'coffee' 咖啡

Codeword

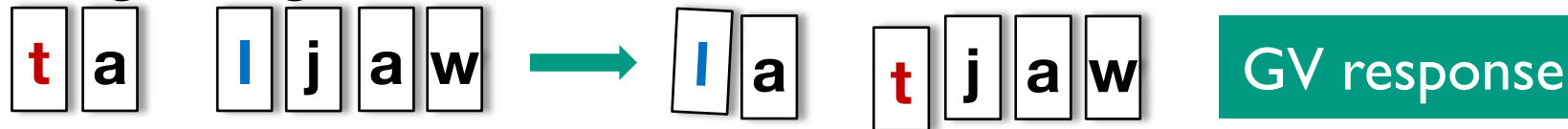
- Barnes (2002) employed the same method to investigate palatalization in Bulgarian.

INTERPRETATION (I): SEGMENTATION VARIATION

- Depending on the glide segmentation, speaker might choose different responses.

(5) Example test item: [ta ljaw] 'star anise' 大料

a. *Independent glide segmentation: CGVX*



b. *Secondary articulation segmentation: C^GVX (Duanmu 2000)*



c. *Double representation segmentation: C^GGVX*



INTERPRETATION (2): PHONOTACTICS RANKING VARIATION

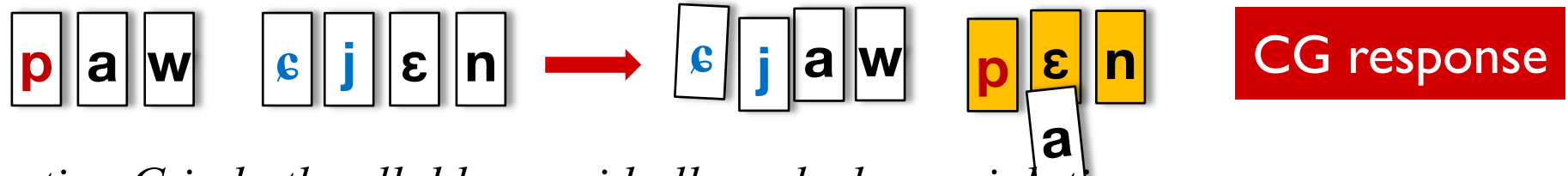
- Depending on the phonotactics constraint ranking, speaker might choose different responses.

(6) Example test item: [paw ɕjɛn] 'keep fresh' 保鲜

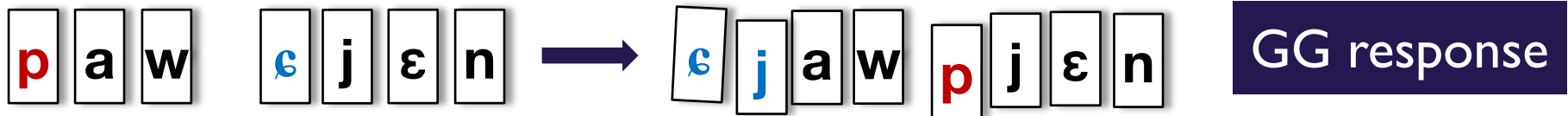
a. Moving just C violates CG markedness, but avoids GV markedness violations.



b. Moving G with C to avoid CG markedness, but violates GV markedness



c. Repeating G in both syllables avoid all markedness violations



PARALLEL RESULT INTERPRETATIONS

Speaker
response

GV response

CG response

GG response

Interpretation (1):

Segmentation variation

Independent segment

Secondary articulation

*Both independent segment
and secondary articulation*

Interpretation (2):

Phonotactics variation

*Keeping G next to V to avoid
GV markedness violations*

*Moving G with C to avoid
CG markedness violations*

*Copying G twice to avoid both
CG and GV markedness violations*

PHONOLOGICAL ENVIRONMENT CONTROL

Disyllabic test item:
CGVX CVX
CVX alternation also controlled for.

Consonant Place	Glide	Vowel Alternation
Palatal: /tɕ/, /tɕʰ/, /ɕ/ ㄐ ㄑ ㄒ	/j/ —	Vowel alternates: /an~ɛn/, /ə~e/ ㄢ ㄛ~ㄝ
Non-palatal: /p/, /pʰ/, /m/, /t/, /tʰ/, /n/, /l/ ㄅ ㄆ ㄇ ㄊ ㄋ ㄌ		Vowel does not alternate: /a/, /ɑŋ/, /aw/, /ow/ ㄚ ㄛ ㄜ ㄛ
Velar: /k/, /kʰ/, /x/ ㄍ ㄎ ㄏ	/w/ ×	Vowel alternates: /ə~o/ ㄛ~ㄛ
Non-velar: /tʂ/, /tʂʰ/, /ʂ/, /ts/, /tsʰ/, /s/ ㄗ ㄘ ㄙ ㄐ ㄑ ㄒ		Vowel does not alternate: /a/, /an/, /ɑŋ/, /aj/, /en/, /ej/ ㄚ ㄢ ㄛ ㄛ ㄛ ㄛ
Palatal: /tɕ/, /tɕʰ/, /ɕ/ ㄐ ㄑ ㄒ	/ɥ/ ㄩ	Vowel alternates: /an~ɛn/, /ə~e/, /en~ɪn/, /ʊŋ~ʌŋ/ ㄢ ㄛ~ㄝ ㄛ ㄛ
Non-palatal: /n/, /l/ ㄋ ㄌ		None

THE EXPERIMENT

Demonstration phase

- No explicit instruction
- Speaker figure out method on their own.
- No glide.

- 42 participants, 33 data analyzed.

- 26 native speakers + 6 heritage speakers + 1 “somewhere in between”.

- Audio stimuli produced by a native Mandarin speaker who has no knowledge of the experiment purpose.

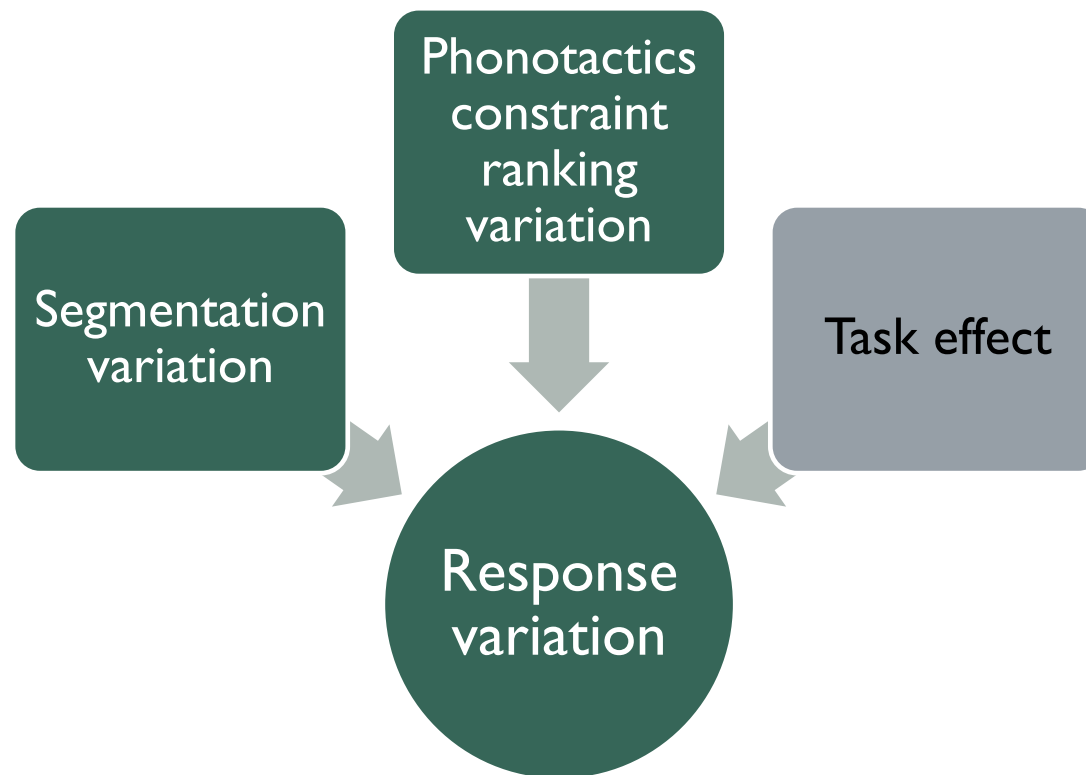
Training phase

- No glide.
- With feedback.

Experiment phase

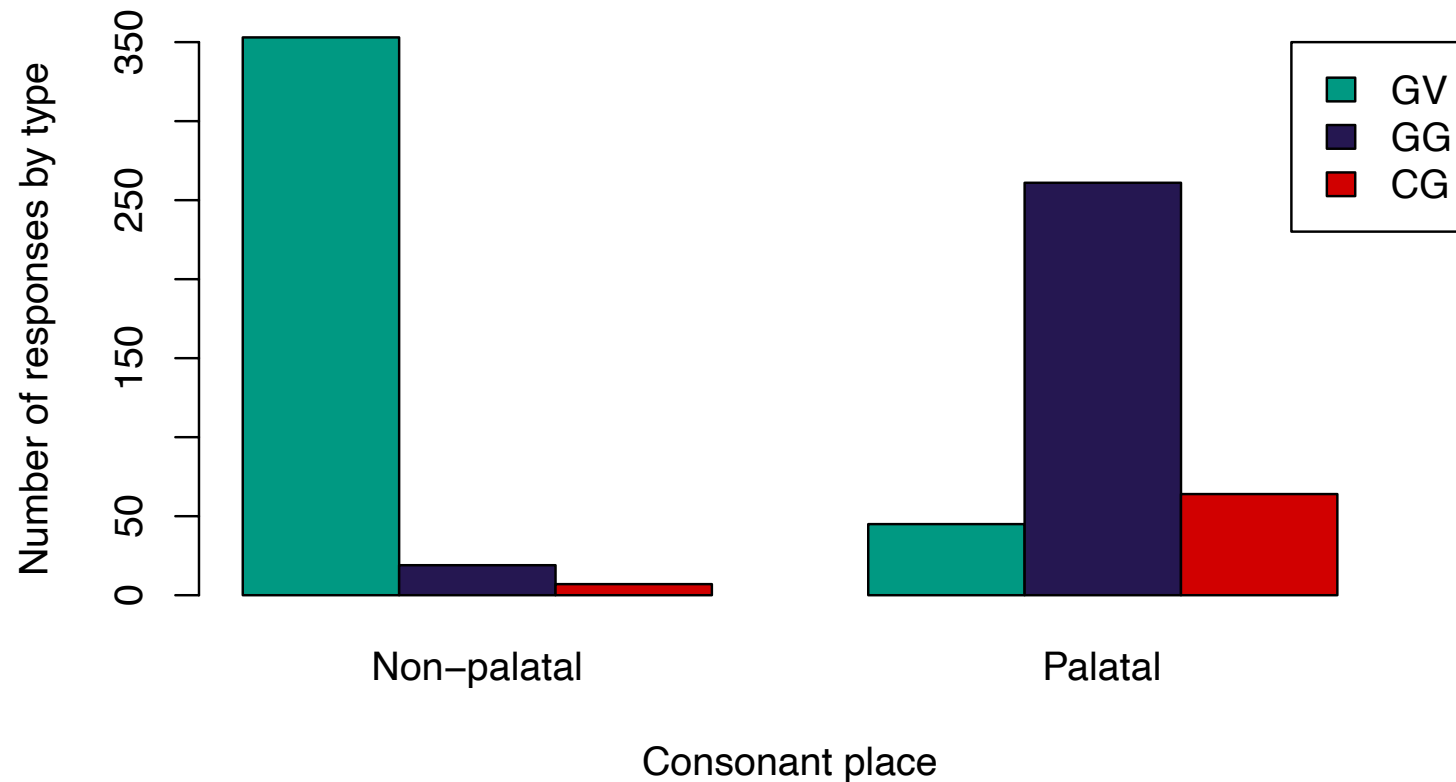
- Encode 100 words
 - 64 glide items
 - 36 glide-less items
- No feedback.

SPEAKER VARIATION INTERPRETATION



RESULTS BY CONSONANT PLACE: /j/ ITEMS

Verbal response to /j/ items



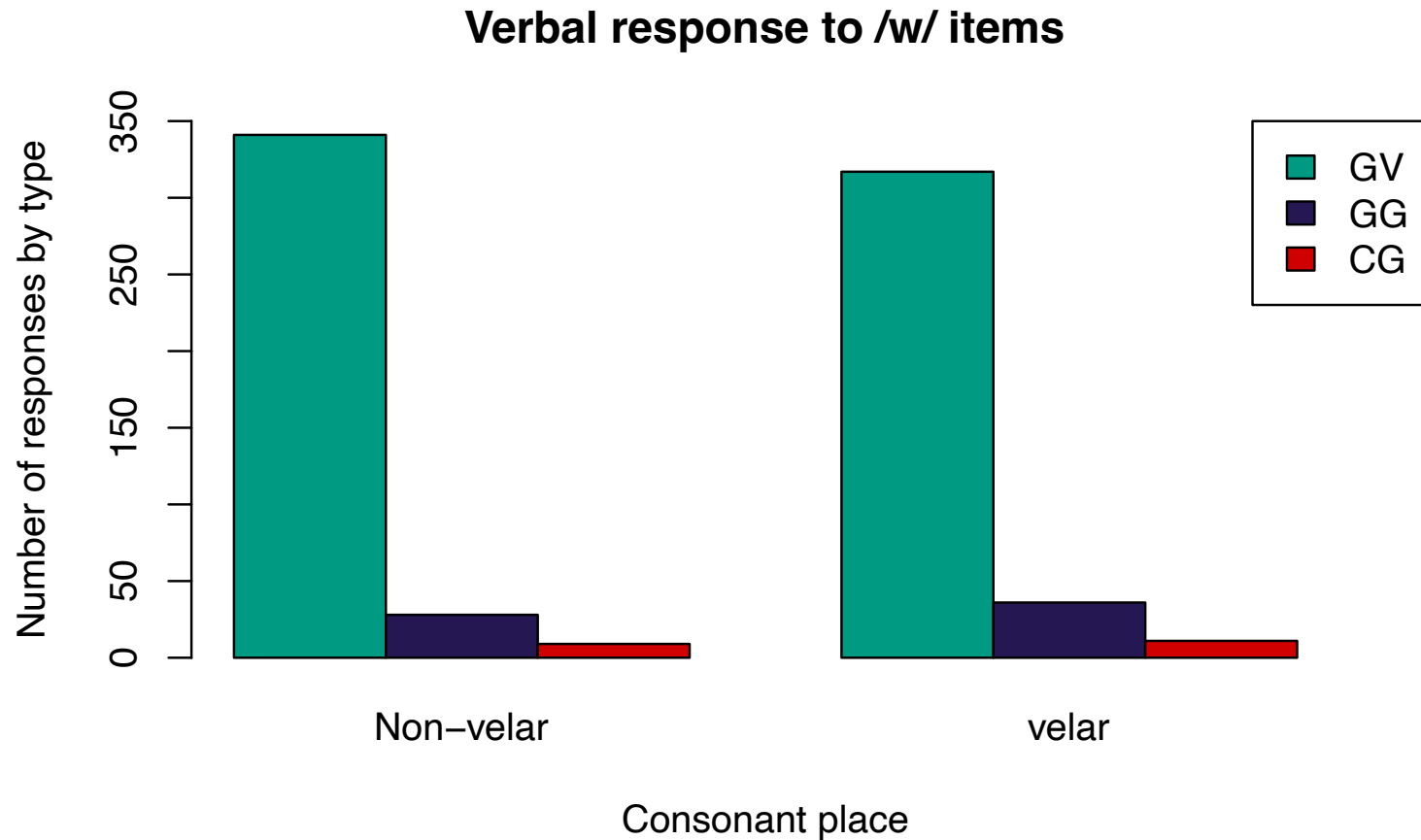
Segmentation variation:

After palatal C:
/j/ more likely to be treated as part of the consonant.

Phonotactics variation:

After palatal C:
/j/ more likely to move with C if it helps avoid * \emptyset V[-high]

RESULTS BY CONSONANT PLACE: /w/ ITEMS



Segmentation variation:

/w/ is an independent segment,
not sensitive to consonant place

Phonotactics variation:

Shortage of GG & CG. Why?
Moving /w/ with C does not
improve on well-formedness.

RESULTS BY VOWEL ALTERNATION: /j/ ITEMS

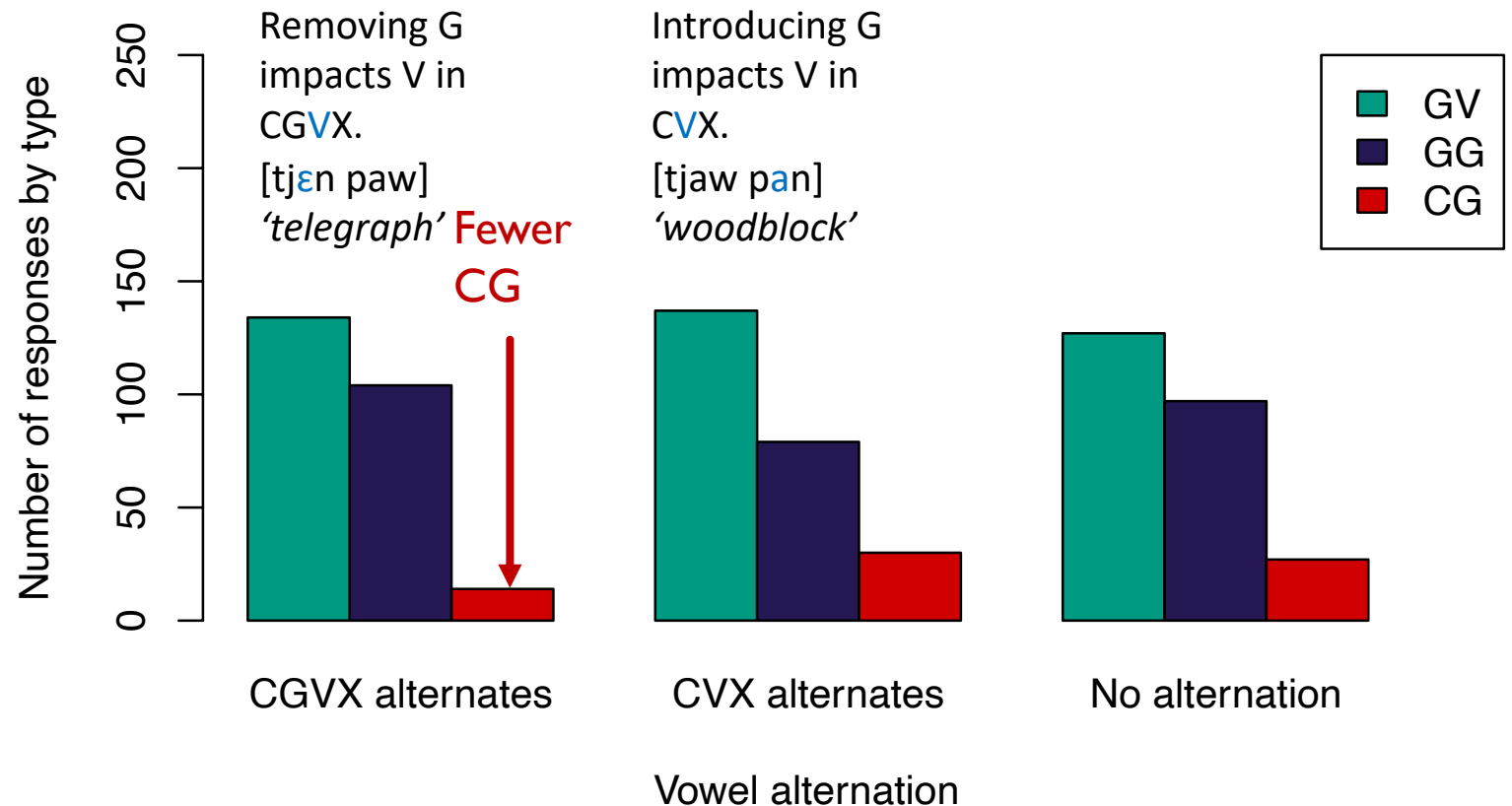
Segmentation variation:

Before alternating V:
/j/ more likely to be treated as part of the rhyme.

Phonotactics variation:

Before alternating V:
/j/ more likely to stay with V if it helps the V stay faithful while avoiding markedness violation.

Verbal response to /j/ items



RESULTS BY VOWEL ALTERNATION: /w/ ITEMS

Segmentation variation:

Before alternating V:

/w/ more likely to be treated as part of the rhyme.

Alternating V in CVX:

/w/ less likely to be treated as part of the onset.

Phonotactics variation:

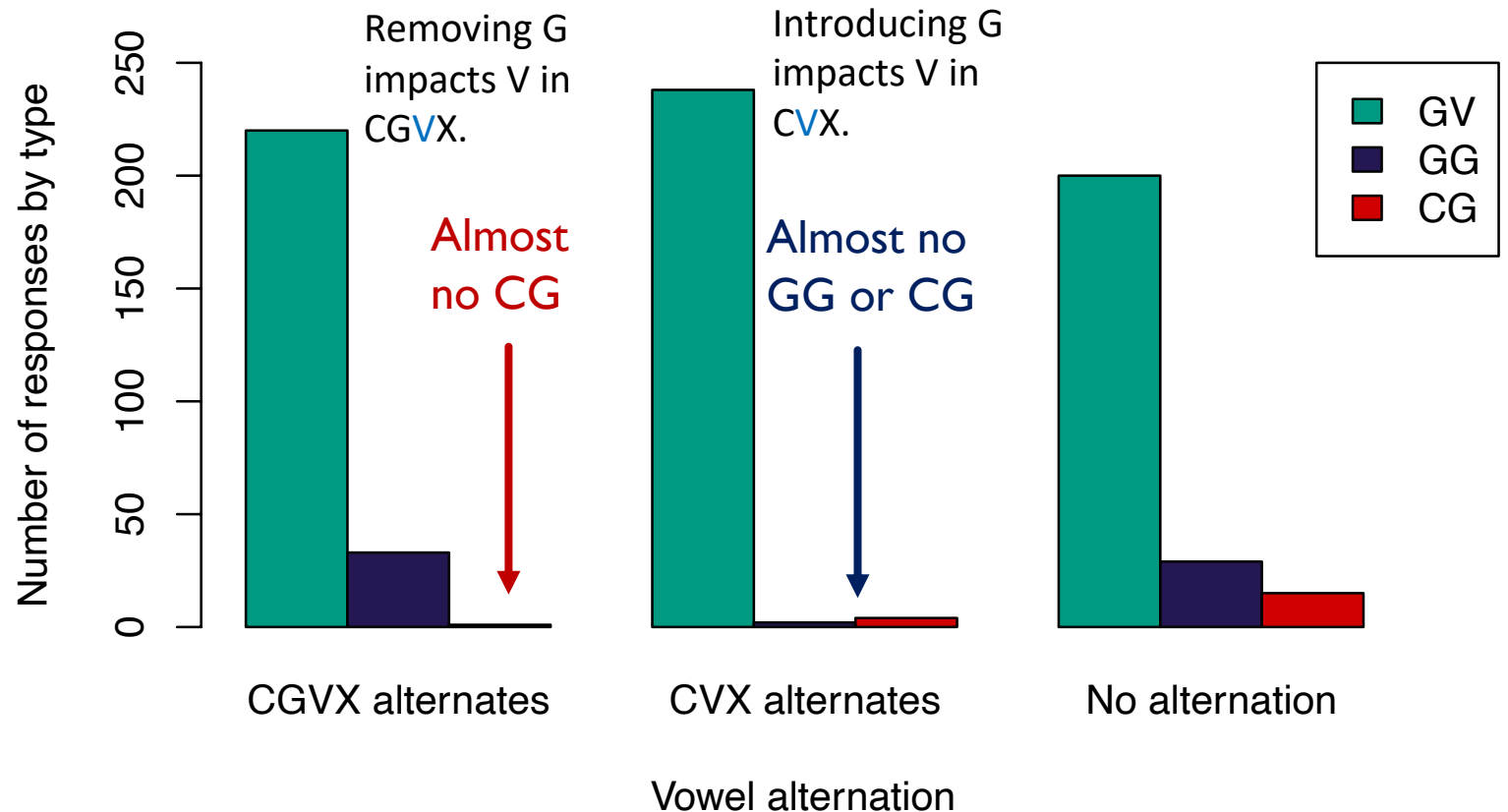
Before alternating V:

/w/ more likely to stay with V if it helps the V stay faithful while avoiding markedness violation.

Alternating V in CVX:

/w/ less likely to move with C into CVX syllable, if it will introduce markedness violation.

Verbal response to /w/ items

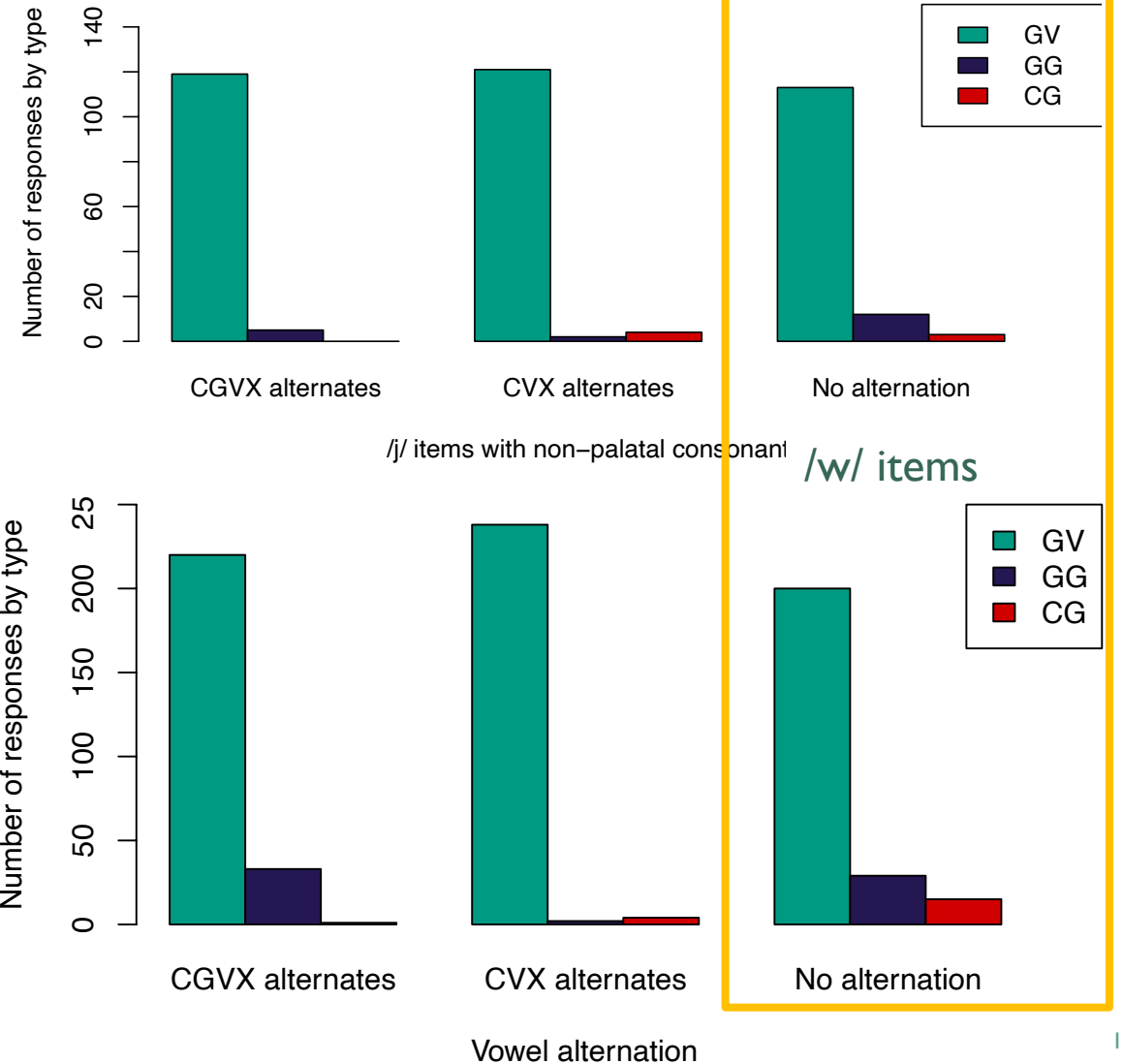


SPOTLIGHT ON NO-ALTERNATION GROUP Non-palatal C /j/ items

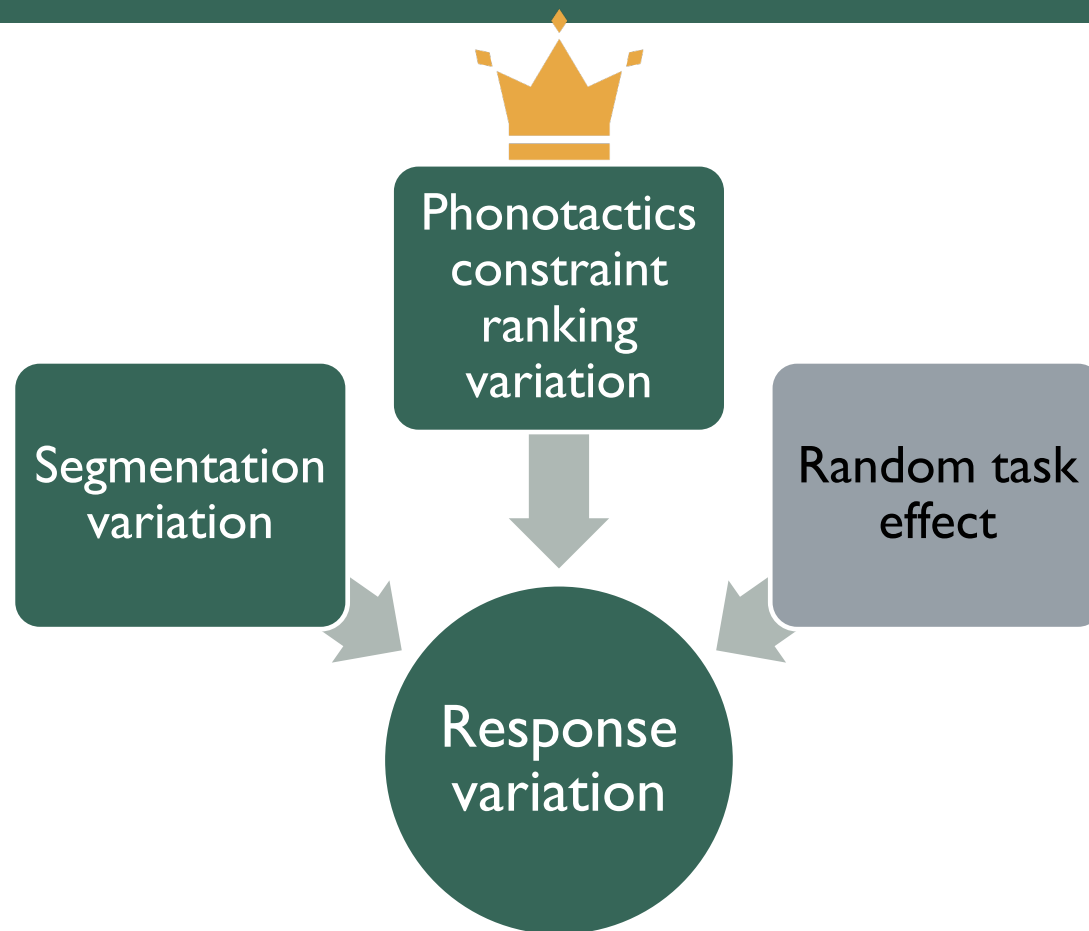
- Whether G moves or not does not affect
 - V quality
 - C quality
 - phonotactics markedness constraint violations

Yet there is speaker variation in response!

- Source: Task effect.
- A previous test item that requires GG or CG response.
- Participant more prone to opting for GG and CG even if they are not the optimal codeword choice.



SPEAKER VARIATION INTERPRETATION



SUMMARY

- Debate on the segmentation status of the Mandarin prenuclear glide
- Due to inconsistency of conclusion from secret language and speech error data
 - Lack of phonological environment control
 - Shortage of speaker variation data
- My codeword language game experiment addresses both problems in the methodology
- Speaker variation in codeword response concerning glide movement
- Best accounted for using phonotactics constraint ranking variation
- As opposed to genuine segmentation variation

Next step:

- Model the probabilistic phonological grammar that can predict the speaker variation in response tokens.

THANK YOU!

Selected References:

- Bao, Zhiming. (1990). Fanqie languages and reduplication. *Linguistic Inquiry* 21.3.
- Barnes, Jonathan (2002). Palatalization in Bulgarian dialects: An experiment in phoneme categorization. In Ronelle Alexander & Vladimir Zhobov (eds.) *Revitalizing Bulgarian Dialectology*. University of California Press.
- Chao, Yuen-Ren (1931). 反切語八種 [Eight varieties of secret languages using Fan-ch'ieh]. *Bulletin of the Institute of History and Philology, Academia Sinica* 2:3. 312-54.
- Duanmu, San (2002). *The Phonology of Standard Chinese*. Oxford University Press.
- Ladefoged, Peter, & Ian Maddieson (1996). *The sounds of the world's languages*. Blackwell.
- Lin, Yen-Hwei (1989). Autosegmental treatment of segmental processes in Chinese phonology. PhD dissertation, University of Texas at Austin.
- Wan, I-Ping (1999). Mandarin phonology: Evidence from speech errors. PhD dissertation, State University of New York at Buffalo.
- Yip, Moira (2003). Casting doubt on the onset-rime distinction. *Lingua* 113. 779-816.

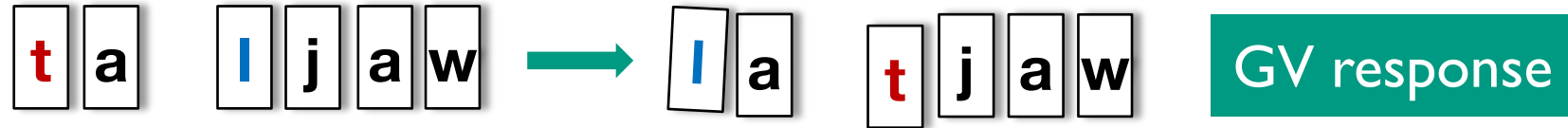
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BONUS: INTERPRETATION (I): SEGMENTATION VARIATION

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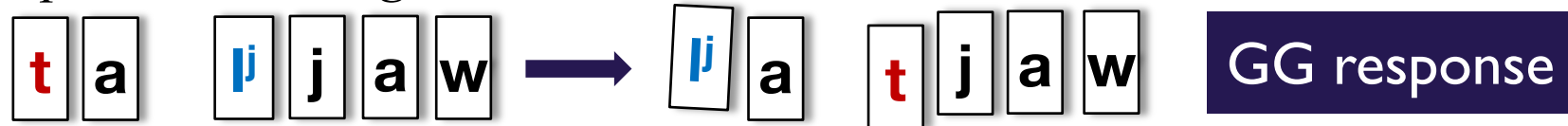
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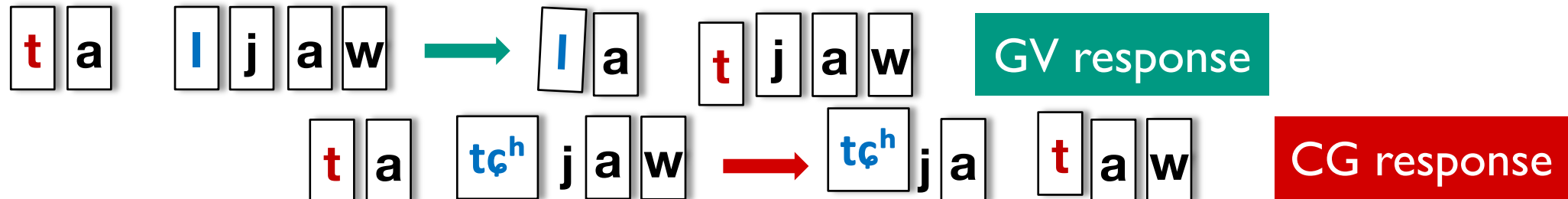
b. *Secondary articulation segmentation: C^GVX (Duanmu 2000)*



c. *Double representation segmentation: C^GGVX*

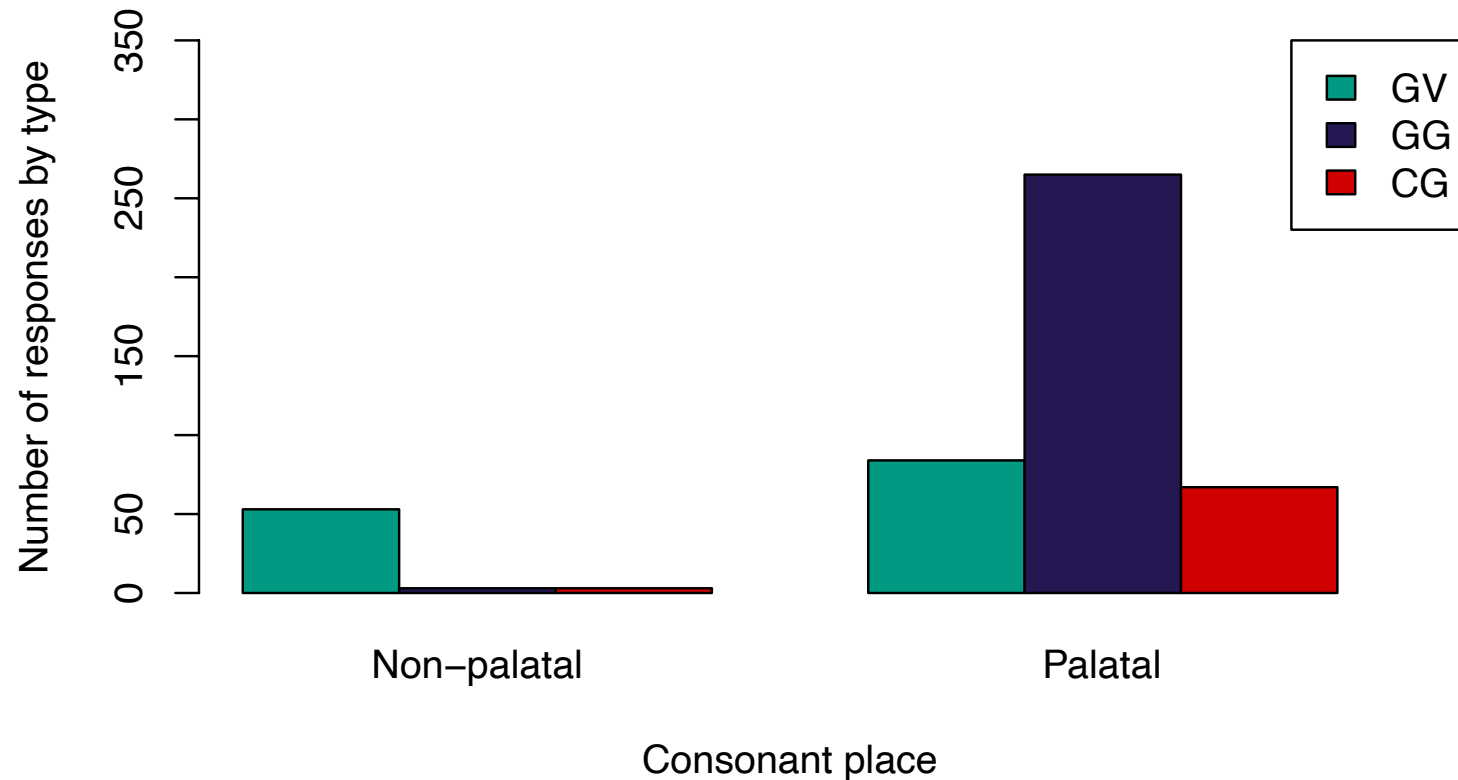


d. *Natural Palatal CV transition: C[-pal]GVX, C[+pal]VX (Ladefoged & Maddieson 1996)*



BONUS: RESULTS BY CONSONANT PLACE: /ɥ/ ITEMS

Verbal response to /ɥ/ items



Segmentation variation:

After palatal C:
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Phonotactics variation:

After palatal C:
/j/ more likely to move with C if it helps avoid *ɕV[-high]