

Pitch variability cues perceptions of Singlish:

A perceptually-guided approach to sociophonetic variation

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Singlish

Tamil Mandarin (我们) Cantonese (拍拖) English
Dey, wǒ men paktor always
makan at kopitiam one.
Malay English Malay Hokkien/
Hakka (店) ???



ENGLISH VS SINGLISH
PHRASES



YOU THEN LAH!!

I think it was you who did it

How do listeners map variation to variety?

- Dialect Recognition

How is variable speech categorized as Singlish?

- Linguistic Cues

What role, if any, does prosody play in listeners' categorizations of Singlish?

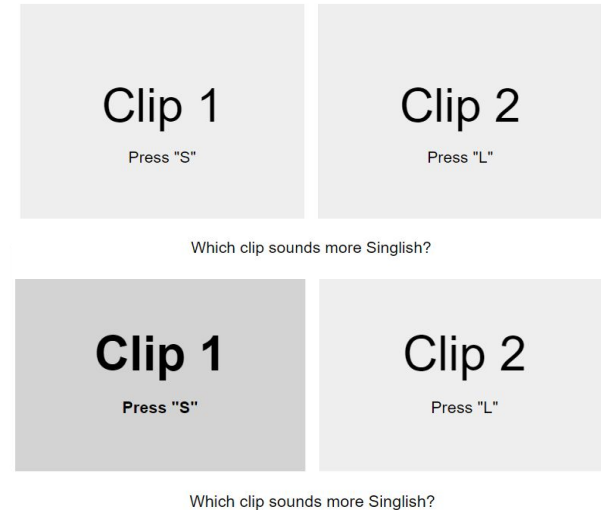
Methods

Speeded Forced-Choice Task

- Stimuli:
 - 40 natural-speech audio clips from podcasts
 - 5 male, 5 female talkers, 4 clips/talker
 - 1.4 to 2.6 seconds long, one IP
 - Semantically neutral
 - Syntactically and lexically similar to Standard English
- Listeners:
 - 132 participants
 - 121 Chinese, 2 Malay, 6 Indian, 1 Other
 - 67 Female, 62 Male, 2 Non-binary, 1 Prefer not to answer
 - Born between 1956 to 2004

Speeded Forced-Choice Task

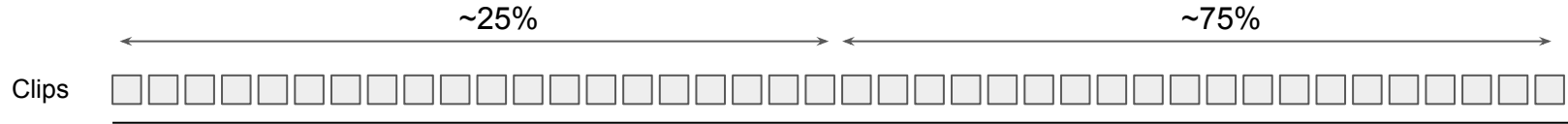
- In each trial:
 - Hear two clips
 - “Which clip sounds more Singlish?”
 - 500 milliseconds between clips
 - 2 seconds to respond
- 6 blocks of 20 trials each
- Two clips per trial
- Randomization within each block



Follow-up questionnaire: Demographic background, Language attitudes, “List three attributes to describe the speakers who sounded more Singlish.”

Possible Outcomes

- Some clips almost always chosen; other clips almost never chosen
 - Two relatively discrete groups of clips



- All clips chosen about half of the time
 - Task design, ambiguous stimuli, ...

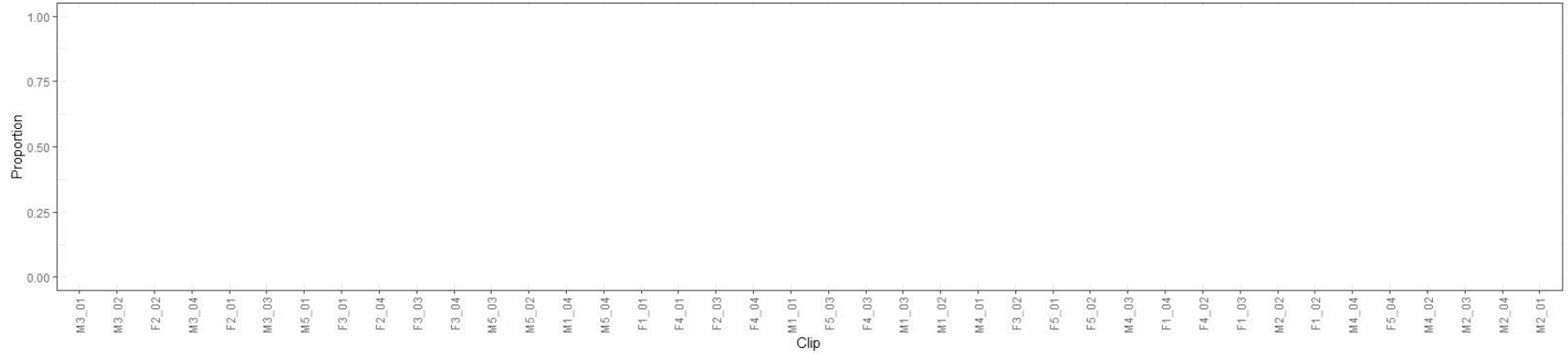


Results

Results

- Clear trend from least to most Singlish
- Categorizations were gradient

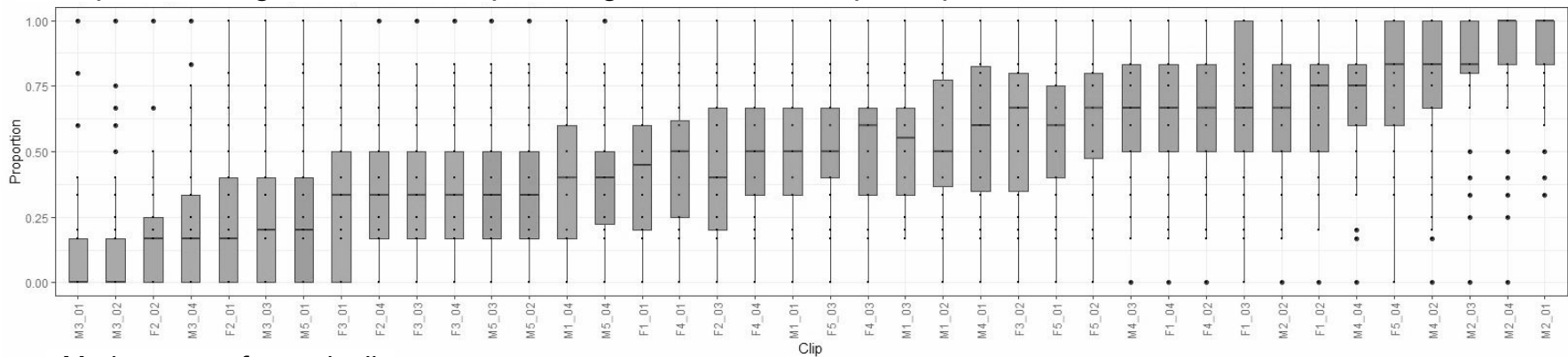
Proportion Singlish for each clip averaged across each participant



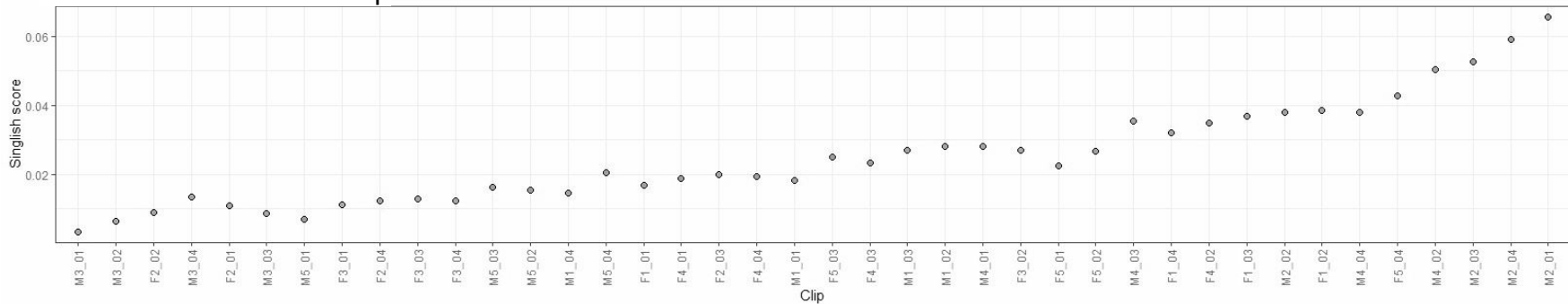
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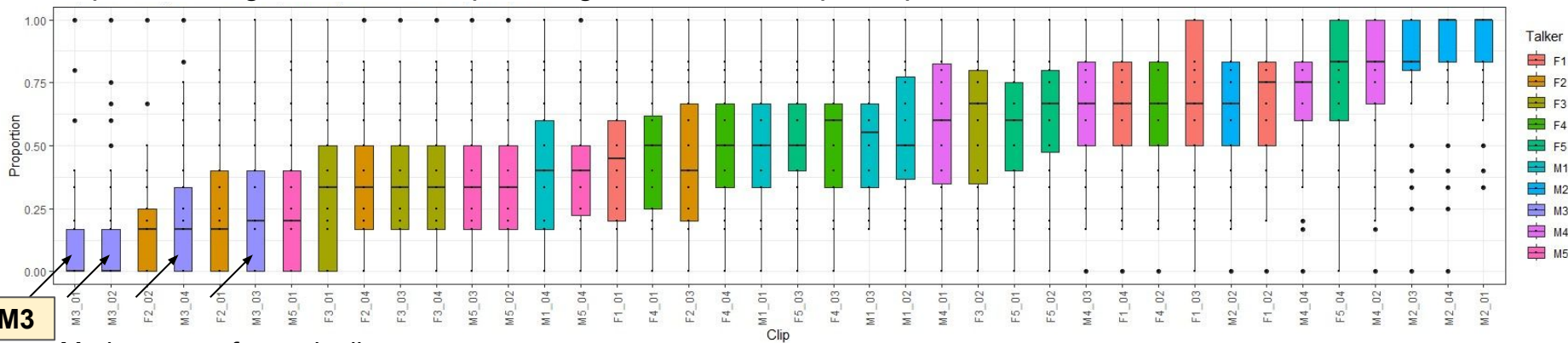
Markov score for each clip



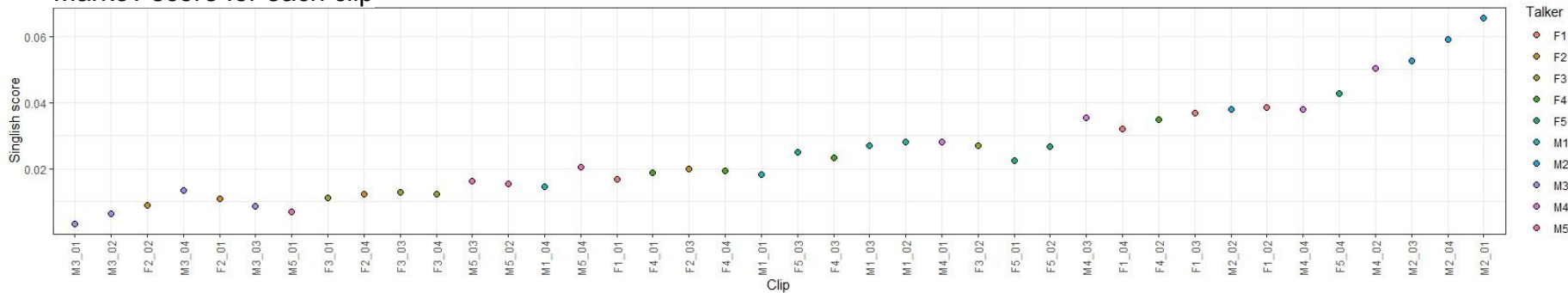
Results

- Talker-specific patterns were observed

Proportion Singlish for each clip averaged across each participant



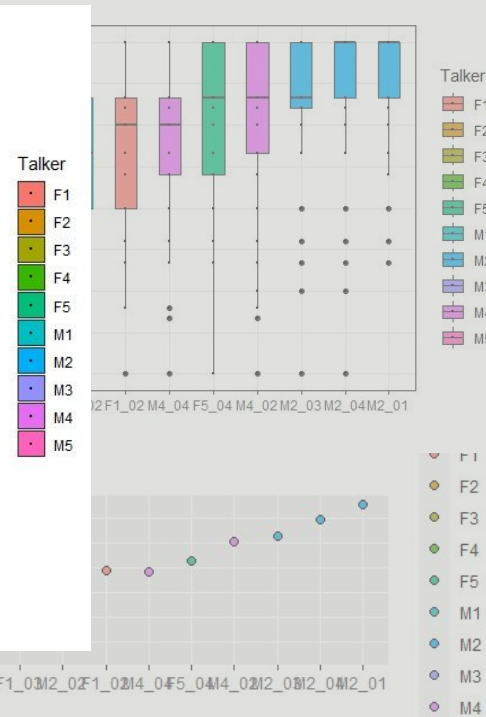
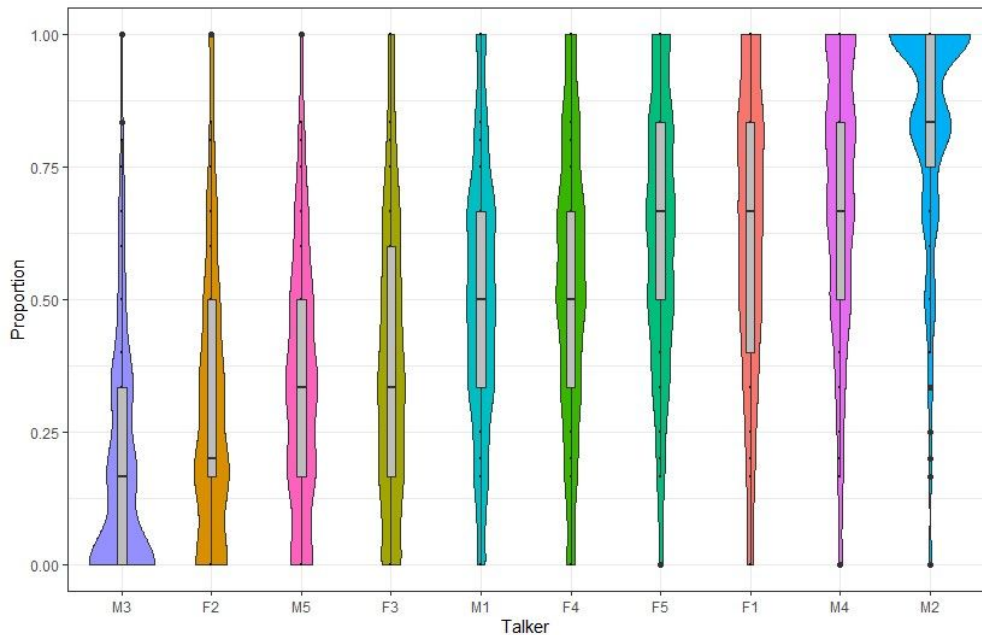
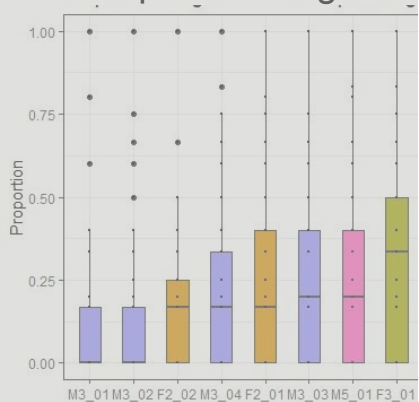
Markov score for each clip



Results

- Between-talker variability was gradient

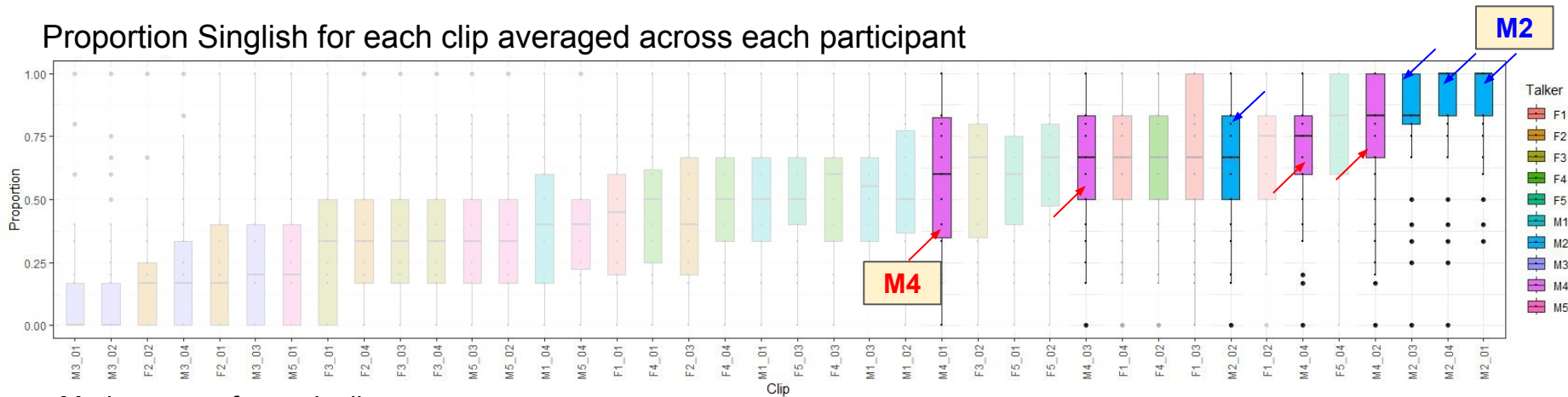
Proportion Singlish for each clip averaged across each participant



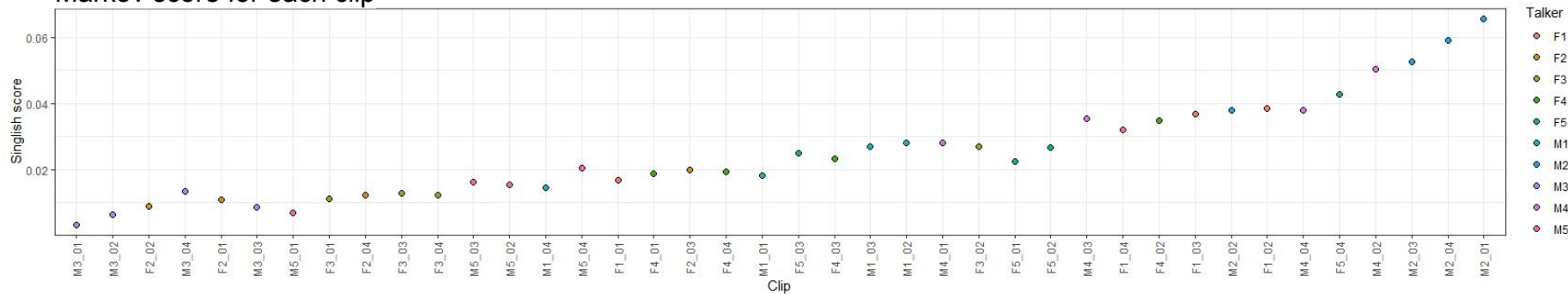
Results

- The 'Most Singlish' talkers also demonstrated within-talker variability

Proportion Singlish for each clip averaged across each participant

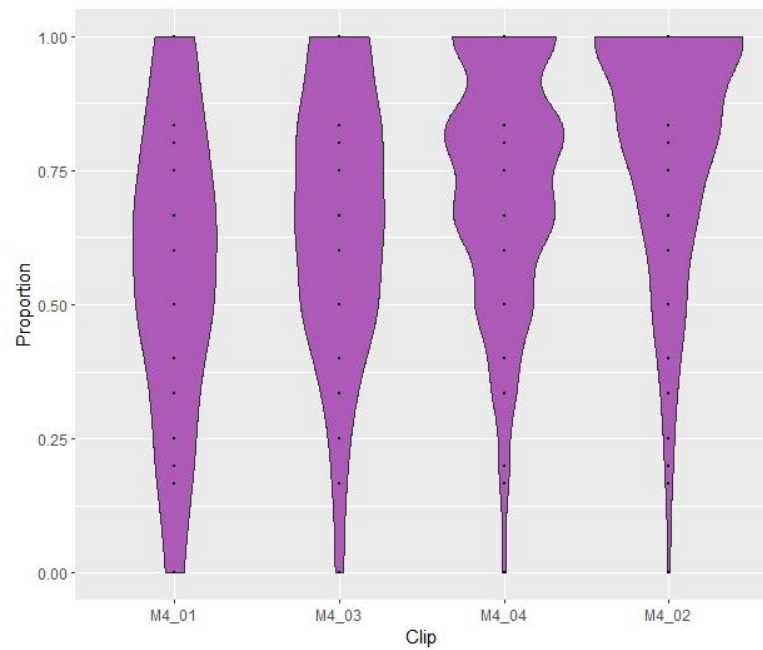


Markov score for each clip

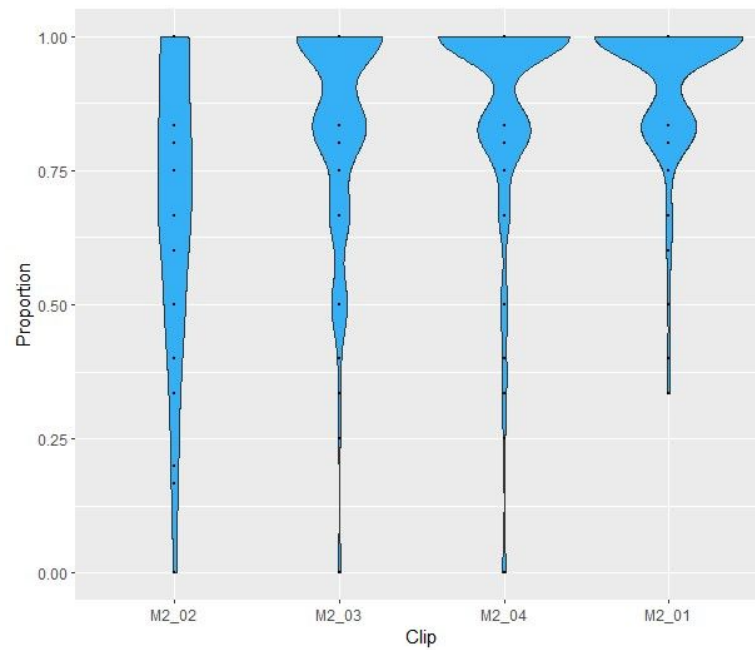


Results

M4



M2



Interim Summary

- Listener categorizations of Singlish were gradient
- Between- and within-talker variability was observed

How were these categorizations made?

Results

“List three attributes to describe the speakers that sounded more Singlish.”

- *tune (rhythmic like in mandarin)*
- *variety in intonation*
- *monotonous*
- *flat tone*
- *speaking too fast*
- *fast speaking*

Results

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Results

Following from participants' responses, we analyzed:

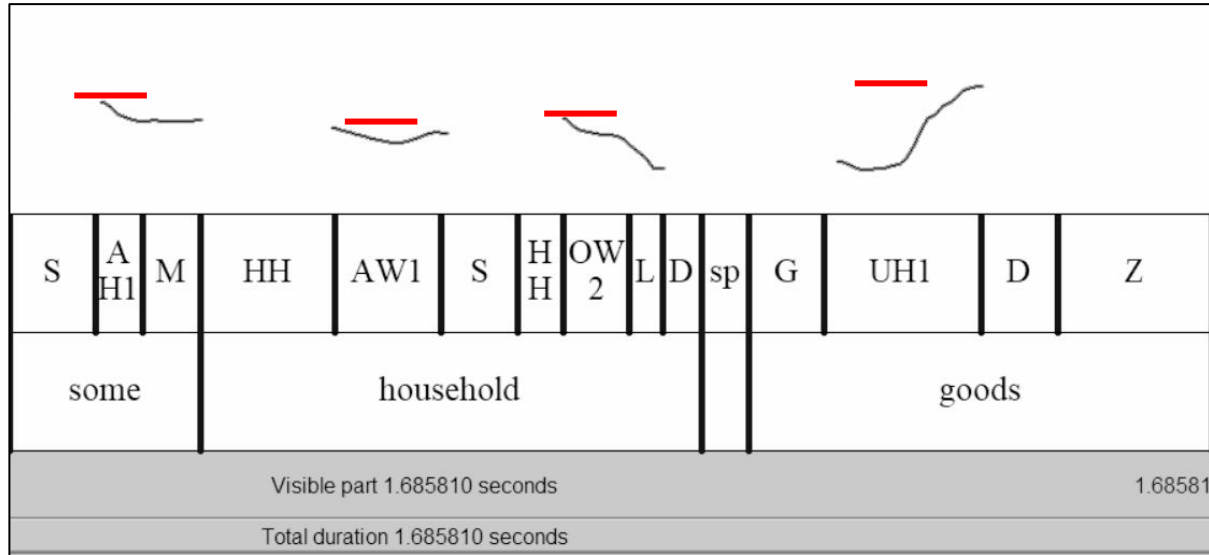
1. Pitch PVI
2. Pitch variance
3. Durational PVI
4. Articulation rate

Results

1. Pitch PVI

- Comparisons of adjacent vowels' maximum semitones

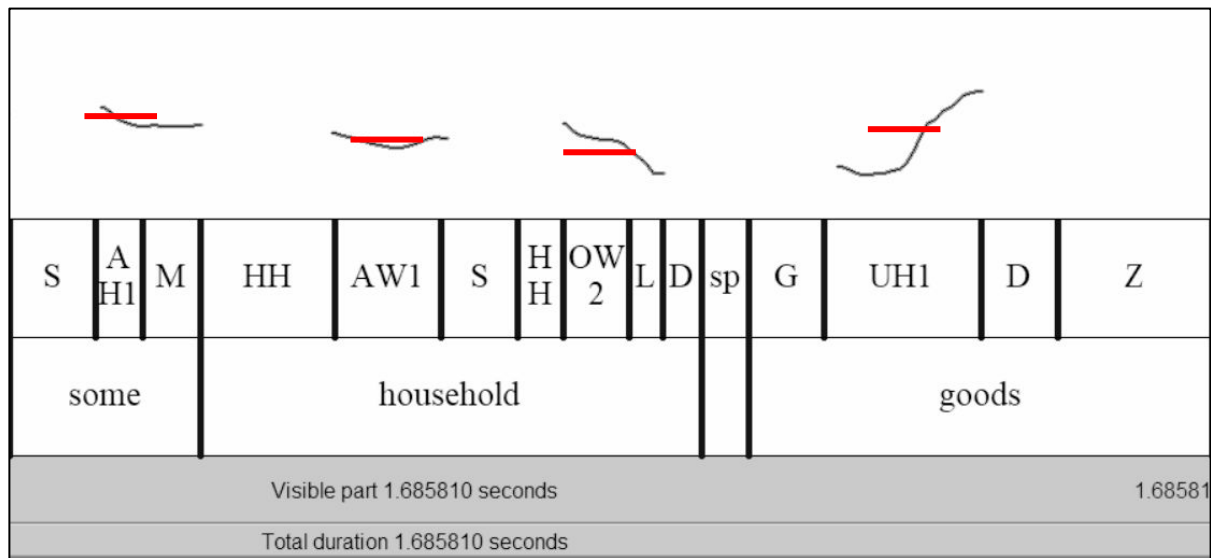
$$\text{nPVI} = 100 \left[\sum_{k=1}^{m-1} \left| \frac{d_k - d_{k+1}}{(d_k + d_{k+1})/2} \right| / (m - 1) \right]$$



Results

2. Pitch variance

- Standard deviation of the mean semitone of each vowel

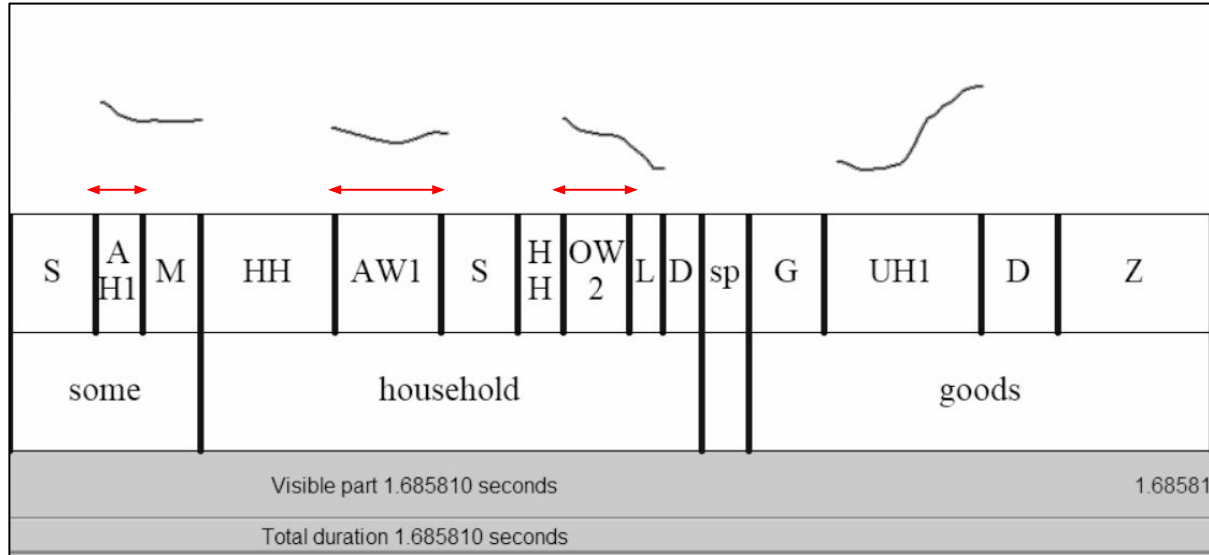


Results

3. Durational PVI

- Comparisons of the duration of adjacent vowels

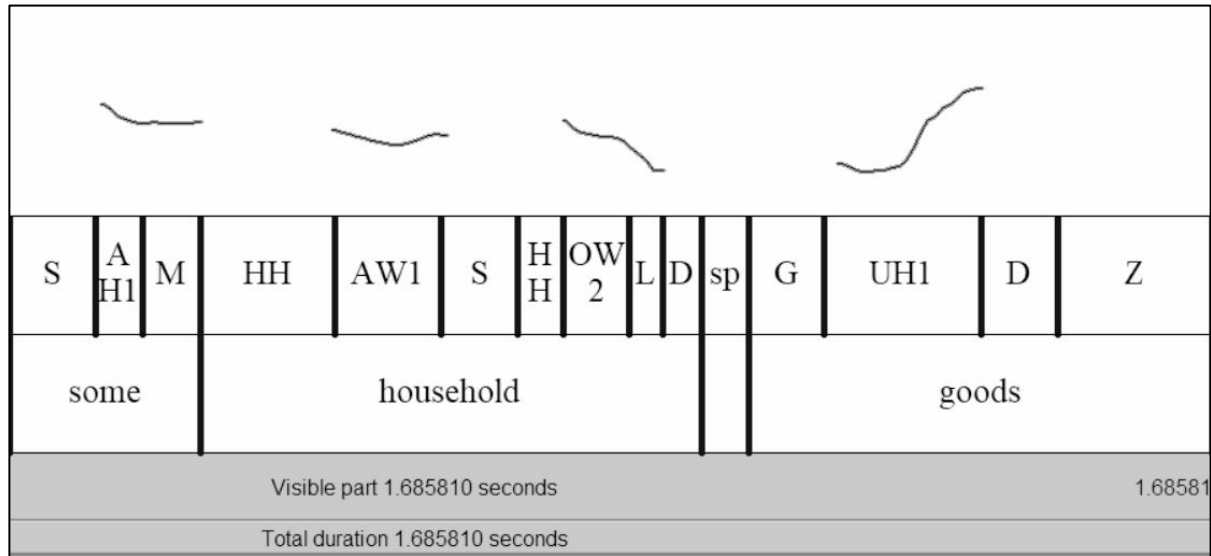
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Results

4. Articulation rate

- Syllables per second



Results

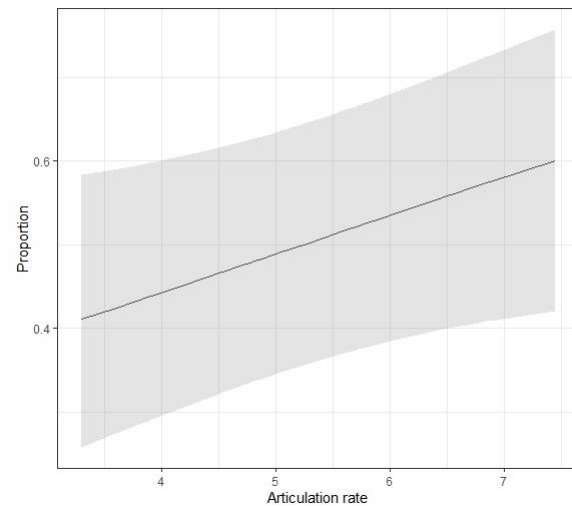
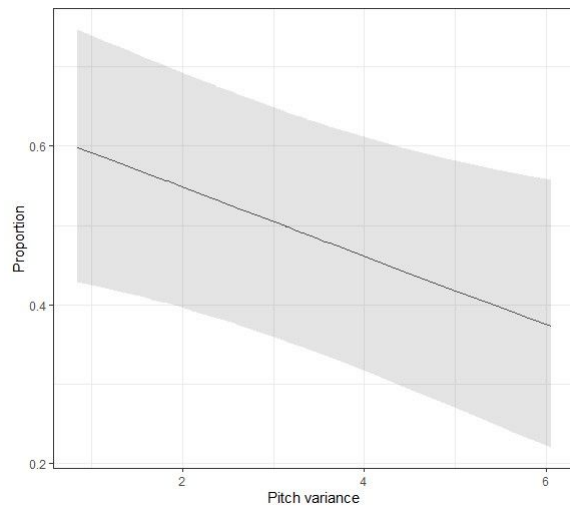
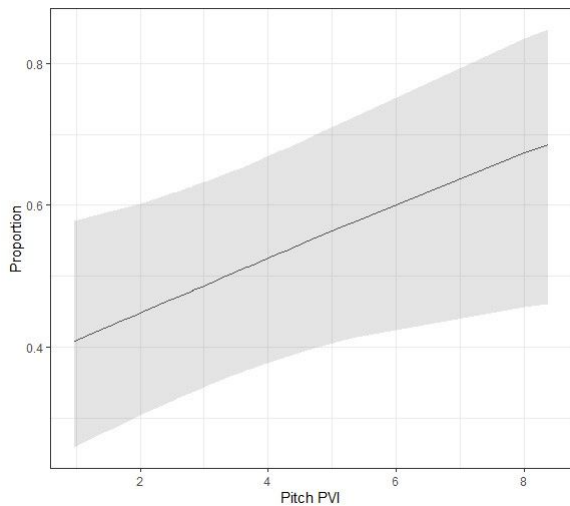
- Logistic mixed effects regression model
 - Dependent variable: Singlish (1/0)
 - Fixed effects: pitch PVI, pitch variance, durational PVI, articulation rate
 - Random effects: clip, participant, speaker

	Estimate	Std. Error	z-value	p-value
(Intercept)	-0.936	0.708	-1.323	0.1859
Articulation Rate	0.186	0.0973	1.908	0.0563 .
Pitch PVI	0.155	0.0735	2.112	0.0347 *
Pitch Variance	-0.176	0.0772	-2.276	0.0228 *
Durational PVI	-0.000	0.006	-0.094	0.9254

Results

A clip was more likely to be chosen as the more Singlish clip if it had:

- Higher pitch PVI
- Lower pitch variance
- Faster articulation rate

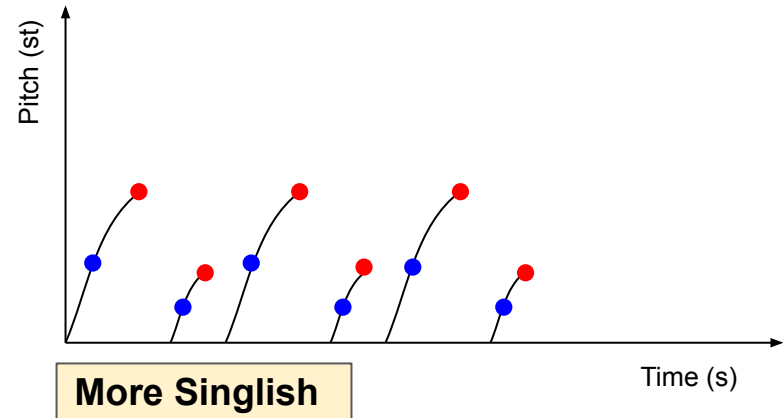
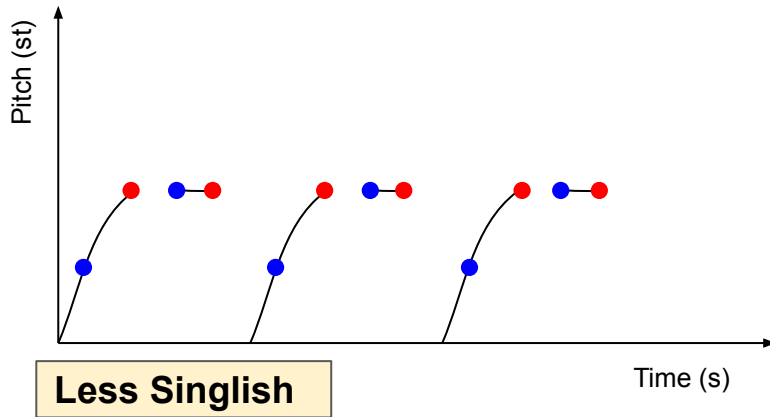


Discussion

- Perception:
 - Listener categorizations of Singlish were **gradient**, with between- and within-talker variability
- Prosodic Variation:
 - Clips more likely to be chosen as ‘more Singlish’ were associated with **more local pitch variability** but **less global pitch variability**
 - Ties into listeners’ open-ended responses

Max: Greater difference between max pitch of adjacent vowels for More Singlish than Less Singlish

Mean: Smaller SD of mean pitch for More Singlish than Less Singlish

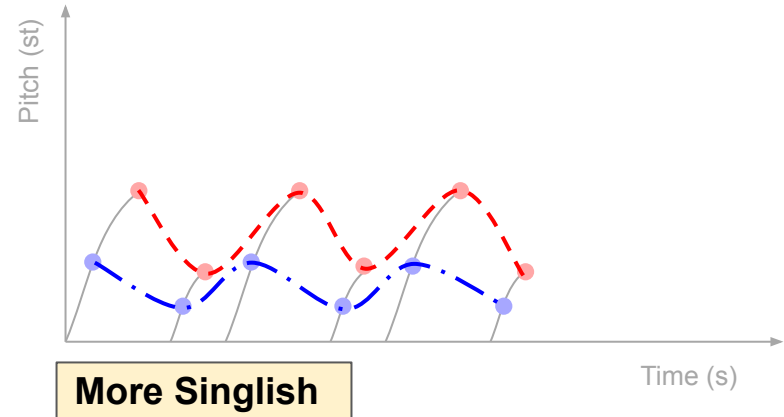
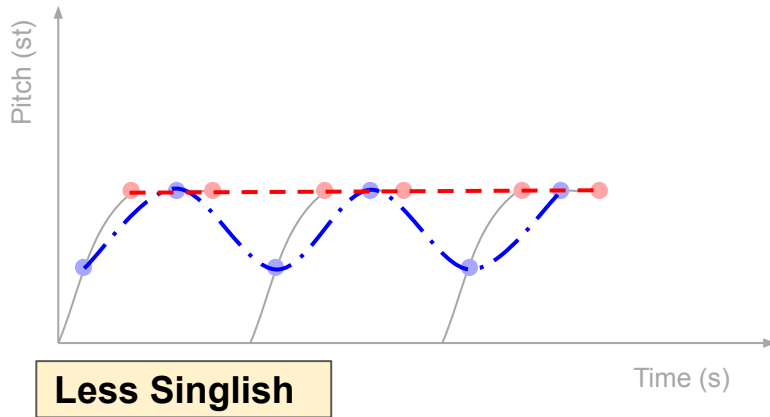


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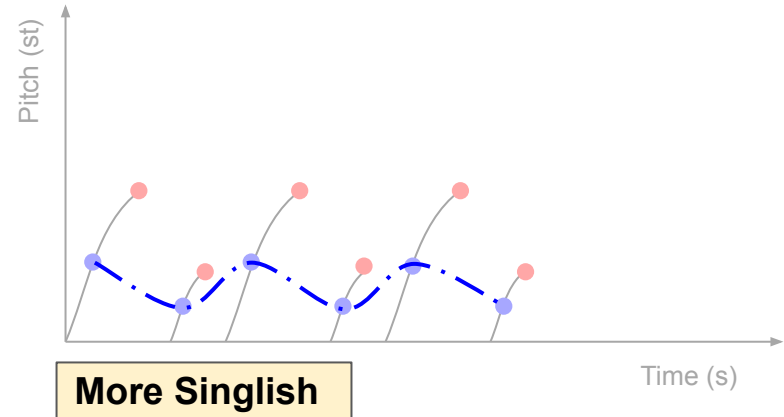
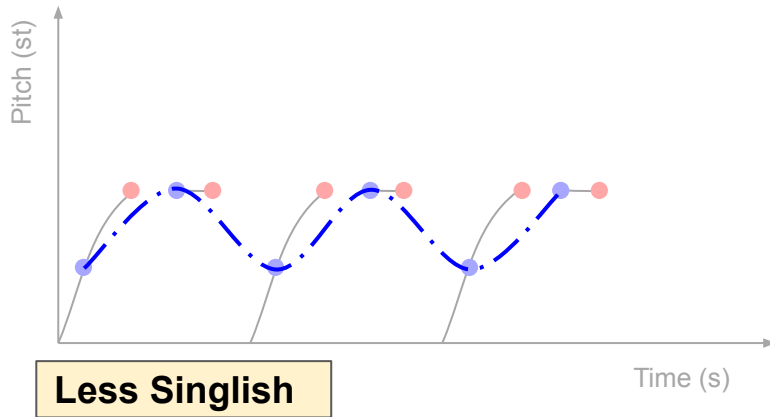


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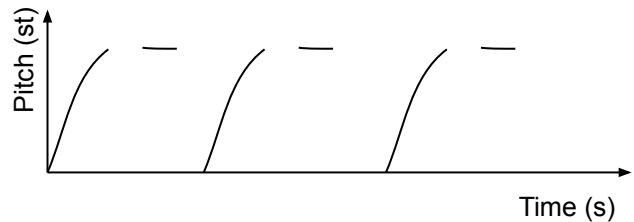
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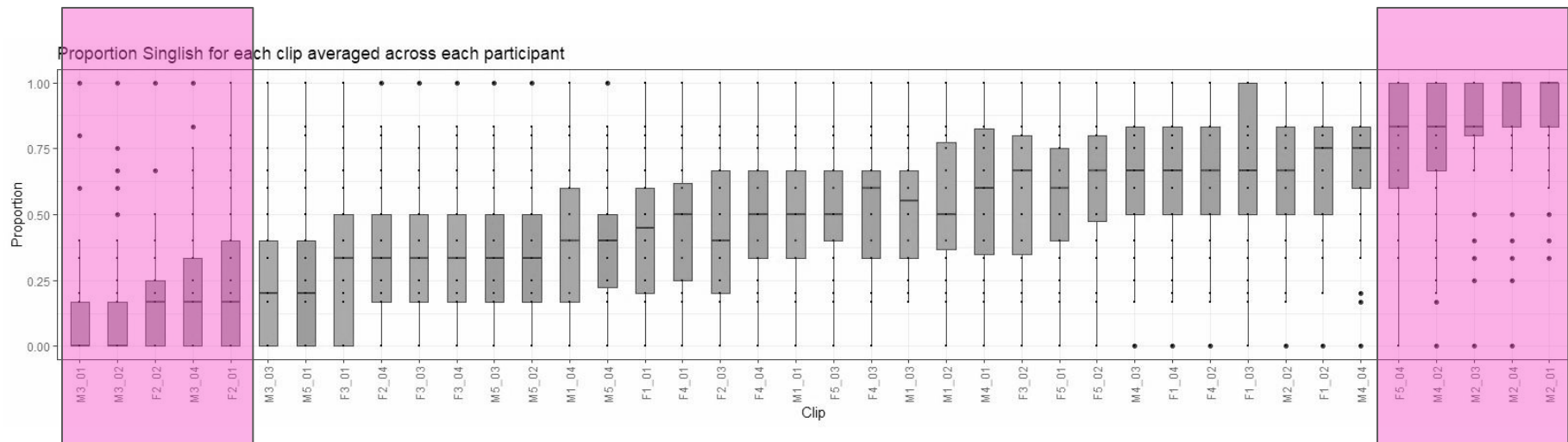
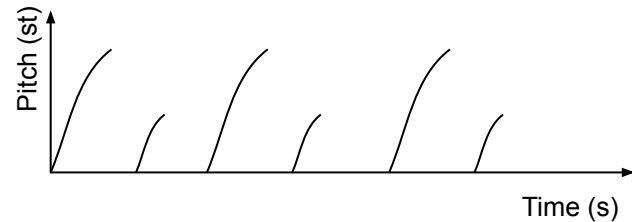
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Predictions



- Acoustic analysis of specific clips
- Perception experiment with low-pass filtered stimuli
- Production experiment



Implications

- Exploratory methodology and listener-driven analyses for sociophonetic investigation
 - Both implicit and explicit decisions were involved in this study
- Gradient categorizations of Singlish support models of Singapore English that are more continuous than binary
- A comparison/counterpart for Singlish

Conclusion

- Pitch variability is a primary prosodic cue for categorizing variable speech as Singlish
 - A feature that can be further explored in future work
- Listeners map variation to a variety in a gradient, systematic manner, even when there is no explicitly provided counterpart for the variety
 - Suggests that listeners' categorizations of variation is gradient

Thank you!

Questions? Email us!

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