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Comparing two vowel mergers in Toronto vs. Hong Kong Cantonese in terms of functional load

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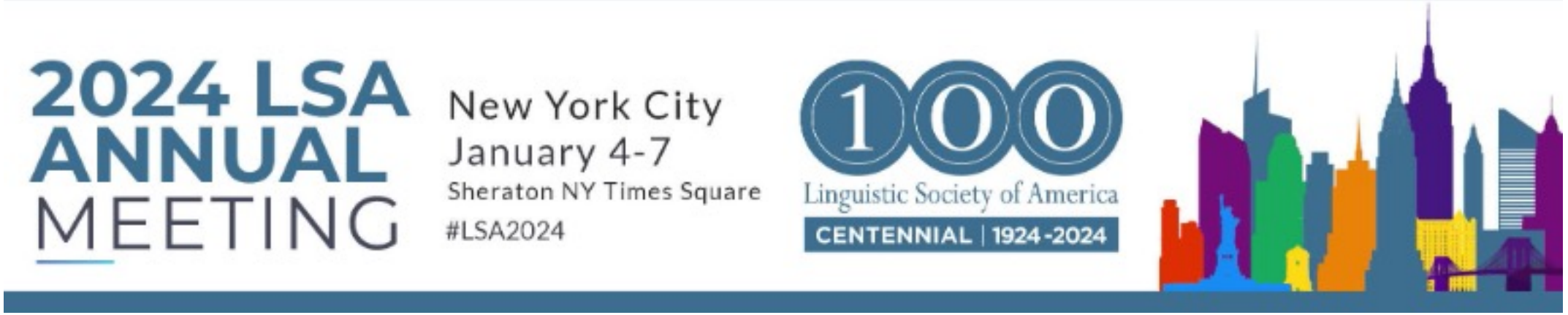
Comparing two vowel mergers in Toronto vs. Hong Kong Cantonese in terms of functional load



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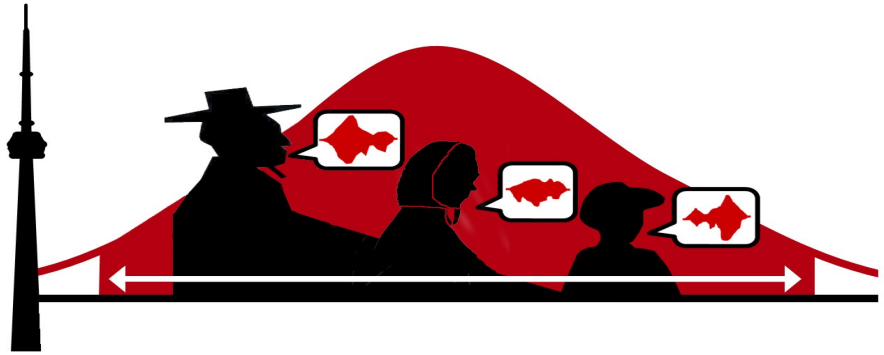
https://holmantse.github.io/



HERITAGE LANGUAGE VARIATION AND CHANGE IN TORONTO
HTTPS://NGN.ARTSCI.UTORONTO.CA/HLVC/0_0_HOME.PHP

Social Sciences and Humanities Research Council of Canada
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ST. CATHERINE UNIVERSITY

Overall Presentation Goal

- Does a heritage language (HL) context increase the susceptibility of merger for lower functional load (FL) phonemes?
  - Addressed through a comparative study of Cantonese AM~OM vs. /y/~/u/ merger in Hong Kong (Homeland) vs. Toronto (Heritage).

Background: The FLH

- The Functional Load Hypothesis (FLH)
  - Phonemes involved in distinguishing fewer minimal pairs are more likely to merge over time (cf. Gilliéron 1918, Hockett 1967)
    - Example from English
    - /i/ vs. /ɪ/ (as in beet vs. bit), MORE SUCH MINIMAL PAIRS, not a widespread merger
    - /ɑ/ vs. /ɔ/ (as in *cot* vs. *caught*) FEWER SUCH MINIMAL PAIRS, widespread merger
  - Supported in large corpus study of 634 phoneme pairs and more than a million words across nine different languages (Wedel et al. 2013)
  - Can help account for parallel development in related languages (Round et al 2022)

Background: Heritage Languages

- In the Canadian context, *heritage languages* defined as
  - "Mother tongue languages other than the two *official* languages, English and French" (Nagy 2021)
- A more general definition of *heritage languages:*
  - "Culturally or ethnolinguistically minority languages that develop in a bilingual setting where another sociopolitically majority language is spoken" (Montrul 2015, 2)
- For the current study
  - HLs placed in contrast with varieties spoken in Homeland settings
  - Both definitions recognize the possibility of influence from another language.
  - Both internally and externally motivated change may be possible in such a setting.
  - Low FL-induced merger may be a type of internally motivated change that occurs (and may even be enhanced) in an HL setting

Background: The FLH in an HL context

- Literature on heritage languages:
  - Amount and type of input as sources of *divergent attainment* (Polinsky 2018)
  - Low frequency features more vulnerable to change (Aalberse et al 2019)
- Literature on bilingual contexts mentioning FL (but without direct measurements)
  - Loss of low FL phonemic contrast: /ø/~/œ/ among Heritage French speakers in Pennsylvania (Bullock & Gerfen 2004)
  - Spanish-dominant Catalan-Spanish bilingual speakers more likely to merge mid-vowel contrasts (lower FL) than to produce vowel reduction (higher FL). (Amengual & Simonet 2020)

Background: The FLH in Heritage Cantonese

- Tse (forthcoming, Feb 2024)
  - Compared two vowel pairs in two varieties of Cantonese and evidence of merger

	# of minimal pairs in dictionary	# of minimal pairs in HLVC Corpus (Nagy 2011)	Merger in Homeland Variety	Merger in Heritage Variety
/y/~/u/	5	3	No	Yes
/a/~/ɔ/	108	77	No	No

- Clear correspondence between functional load and evidence of merger (within each group)
- **Less overall input in a HL context means low FL phonemic contrasts are more likely to disappear than in a Homeland context**
- **Low functional load may have an even stronger effect in heritage language varieties in terms of initiating sound changes that have not developed in the Homeland variety**

The OMP~AMP Merger

- Dissimilatory merger in Hong Kong Cantonese (Bauer & Benedict 1997: 419-420)
  - /o/ > /ɐ/ in pre-labial contexts (/m/ and /p/)

Minimal Pair Example (IPA)	Minimal Pair (Jyutping Romanization)	Chinese Character	Gloss	Presentation Shorthand
[kɐm35]	<gam2>	錦	'embroidered'	AM/P
[kom35]	<gom2>	噉	'thus'	OM/P

Note: 35 indicates a mid-rising tone

- Generally not described as a HK Cantonese contrast post-1950s (Bauer & Benedict (1997: 419-420)
- Recent analysis shows it's still a change in progress (Tse 2023, NWAV 51).

Sound samples

- Unmerged speaker (C1F83A, born 1926)

Word	in isolation	in context
gam1	gam1	gam1 nin4 (‘this year’)
gom3	gom3	gom3 do1 (‘so much’)

- Merged speaker (C1M46A, born 1963)

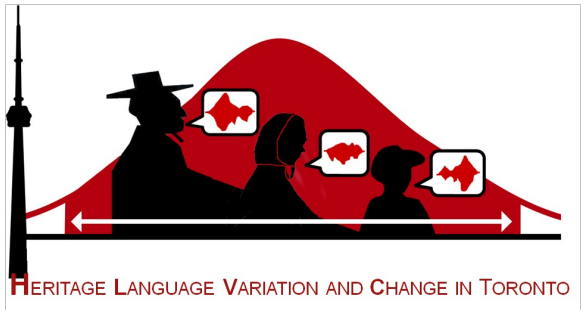
Word	In Isolation	In Context
gan1	gan1 > gam1	gan1 bun2 (‘originally’)
gom3	gom3	gom3 do1 je5 (‘so much stuff’)

Research Questions

The goal of current presentation is to further develop Tse's (Forthcoming) analysis to an additional Cantonese vowel pair: AM/P~OM/P

- Q1) How does acoustic production (F1, F2, F3, and Pillai Scores) of AM/P~OM/P vary based on city (Toronto vs. Hong Kong)?
- Q2) How does the functional load of AM/P~OM/P compare with the functional load of /y/~/u/?
- Q3) To what extent could functional load differences account for different levels of merger in the Homeland vs. Heritage groups?

Data and Methods



- Source
  - Heritage Language Variation and Change in Toronto (HLVC) Corpus Nagy (2011)
  - Sociolinguistic interviews (audio recorded spontaneous speech)
- Midpoint F1/F2/F3 measured using Praat script
- Measurements normalized using Nearey 1 Method (Thomas & Kendall 2007) based on vowel space of 12 vowel categories
  - Much of data originally processed as part of larger study of Cantonese vowels (Tse 2019)
  - AM/P~OM/P vowel class information from Eitel (1877)
- Mixed Effects modeling using R-brul (Johnson 2009) with F1, F2, or F3 as dependent variable, word and speaker as random effect, vowel class (AM/ P vs. OM/P) and city (Toronto vs. HK) as fixed effects

Historic vowel class information from Eitel's (1877) dictionary

214 *Kam* /e/ CANTONESE

Cl. | 衾 ʿ*kam* ˬ*k'am* an embroidered coverlet (*Shi.*); 貝 | *pui*ˀ ʿ*kam* shell-embroidery (*Shi.*), a kind of shell-fish (*K.*); 衣ˀ | ˀ ʿ*kam* embroidered robes (*D. M.*), the gentry.—**Mi.** | 文 ʿ*kam* ˏ*man* flowery style; | 繡 ʿ*kam sau*ˀ adorned, elegant; 什 | 碗碟 *shap*$_2$ ʿ*kam* ʿ*ún tip*$_2$ coloured porcelain; | 鷄 ʿ*kam* ˬ*kai* the golden pheasant (Thaumalea Picta).

9,13.

30,9.

ˬ吟 V. t dur last goo wel end

/o/

Kòm.

75,5.

ˬ柑 [i.w. 甘 ˬ*kòm*] *K.* a kind of (loose-skinned) orange (Citrus Margarita); s.a. 鉗 ˏ*k'im* the bit of a bridle.—**Mi.** | 皮 ˬ*kòm* ˏ*p'i* orange peel; 分 | 同味 ˬ*fan* ˬ*kòm* ˏ*t'ung mi*^{2} the slices of one orange taste alike (*met.*) share and share alike; 開 | 票 ˬ*hoi* ˬ*kòm* ˬ*piú* to bet on the number of seeds found in an orange; 茶枝 | ˏ*ch'á* ˬ*chi* ˬ*kòm* a loose-skinned orange.

Data Analyzed

Speakers Analyzed

	Year of Birth	Total
Hong Kong	1938-1998	8
Toronto Gen1	1922-1963	15
Toronto Gen2	1965-1993	15
	1922-1998	n = 38

Vowel Tokens Analyzed

AM/P	OM/P	Total
889	816	n = 1705

Pillai Scores

- A measurement of vowel merger widely used in sociolinguistic studies of sound change (Nycz & Hall-Lew 2015)
  - Based on Pillai-Bartlett statistic calculated from MANOVA test
  - Scores range from 0 (least distinct) to 1 (most distinct)
  - Lack of consensus about cutoff point between merged vs. unmerged
- Sneller & Stanley's (2023) formula used for determining threshold values
  - $p_{95} = \frac{e}{m}$
  - p_{95} = 95th percentile per sample size, m = average sample size per group
  - Recognizes the importance of individual speaker sample size

Assessing Individual Speaker Merger

	A	B	C	D	E	F
1	Speaker	Group	Pillai Scores	# of Tokens	PS Threshold	Merged?
2	CXM52A	0	0.307	36	0.15101566	no
3	CXM27A	0	0.124	64	0.08494631	no
4	CXM20A	0	0.121	26	0.2090986	yes
5	CXF77A	0	0.494	53	0.10257667	no
6	CXF49A	0	0.11	41	0.13259911	yes
7	CXF43A	0	0.573	47	0.11567157	no
8	CXF19A	0	0.465	44	0.12355826	no
9	CXF16A	0	0.089	41	0.13259911	yes
10	C2M44A	2	0.55	49	0.11095028	no
11	C2M27A	2	0.481	12	0.45304697	no
12	C2M22A	2	0.349	31	0.17537302	no

1) Use Sneller & Stanley's (2023) formula

2) Is the Pillai Score greater than the threshold value?

3) If yes → merged
If no → not merged

Functional Load Measurement

- Quantitatively operationalized as number of minimal pairs identified in:
  - Eitel's (1877) dictionary
  - The HLVC Corpus (Nagy 2011)
    - From the corpus as a whole
    - Not necessarily from the same individual speaker

Q1: F1, F2, and F3 results

OM/P raised (lower F1, $p < 0.001$)

F1 Model of AM/P vs. OM/P

Random Effects ($R^2 = 0.259$): Speaker, Word				
Fixed effects ($R^2 = 0.078$)				
	Coef.	N	Mean (Hz)	*p*-value
Rime Groups				***
AM/P	9.828	889	459	
OM/P	-9.28	816	425	

Note. R^2 [total] = 0.337

OM/P retracted (lower F2, $p < 0.001$)

F2 Model of AM/P vs. OM/P

Random Effects ($R^2 = 0.278$): Speaker, Word				
Fixed effects ($R^2 = 0.133$)				
	Coef.	N	Mean (Hz)	*p*-value
Rime Groups				***
AM/P	21.105	889	1350	
OM/P	-21.105	816	1281	

Note. R^2 [total] = 0.411

OM/P more rounded (lower F3, $p < 0.01$)

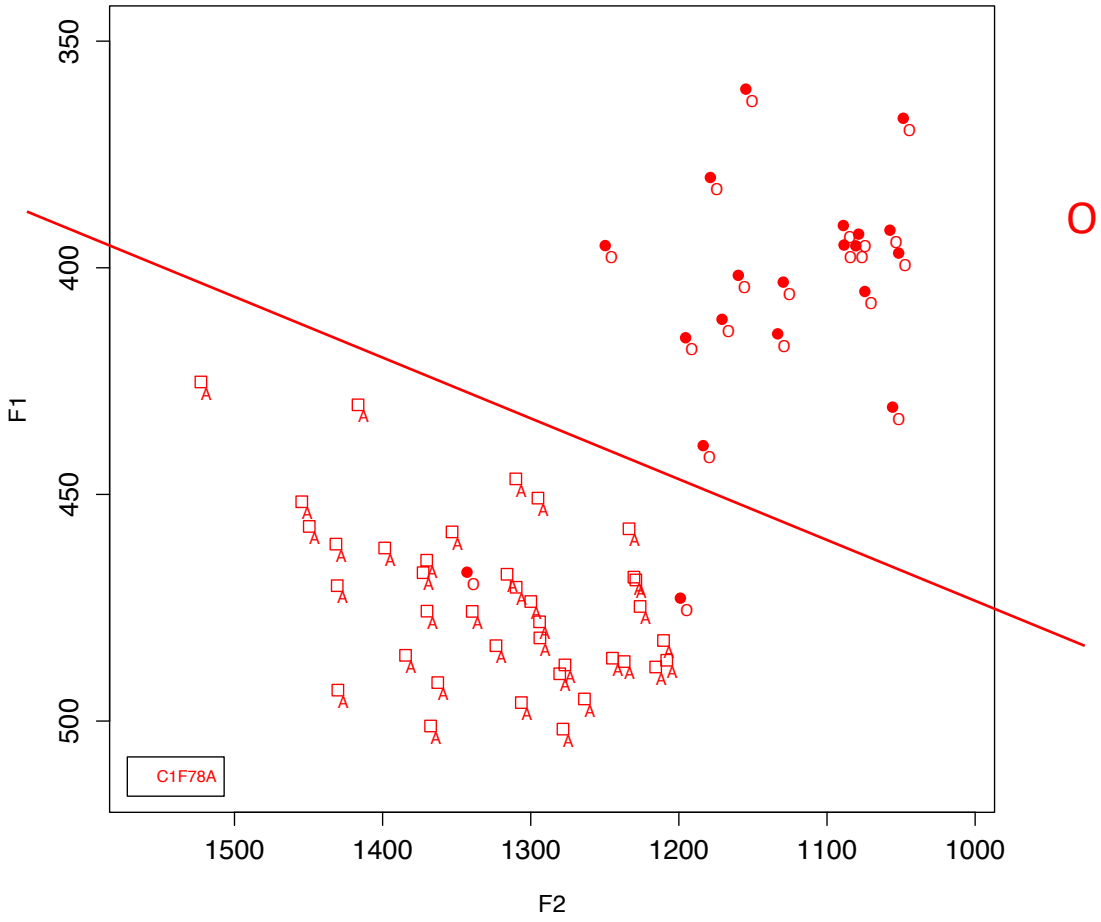
F3 Model of AM/P vs. OM/P

Random Effects ($R^2 = 0.124$): Speaker, Word				
Fixed effects ($R^2 = 0.03$)				
	Coef.	N	Mean (Hz)	*p*-value
Rime Groups				**
AM/P	16.124	889	2911	
OM/P	-16.124	816	2862	

Note. R^2 [total] = 0.154

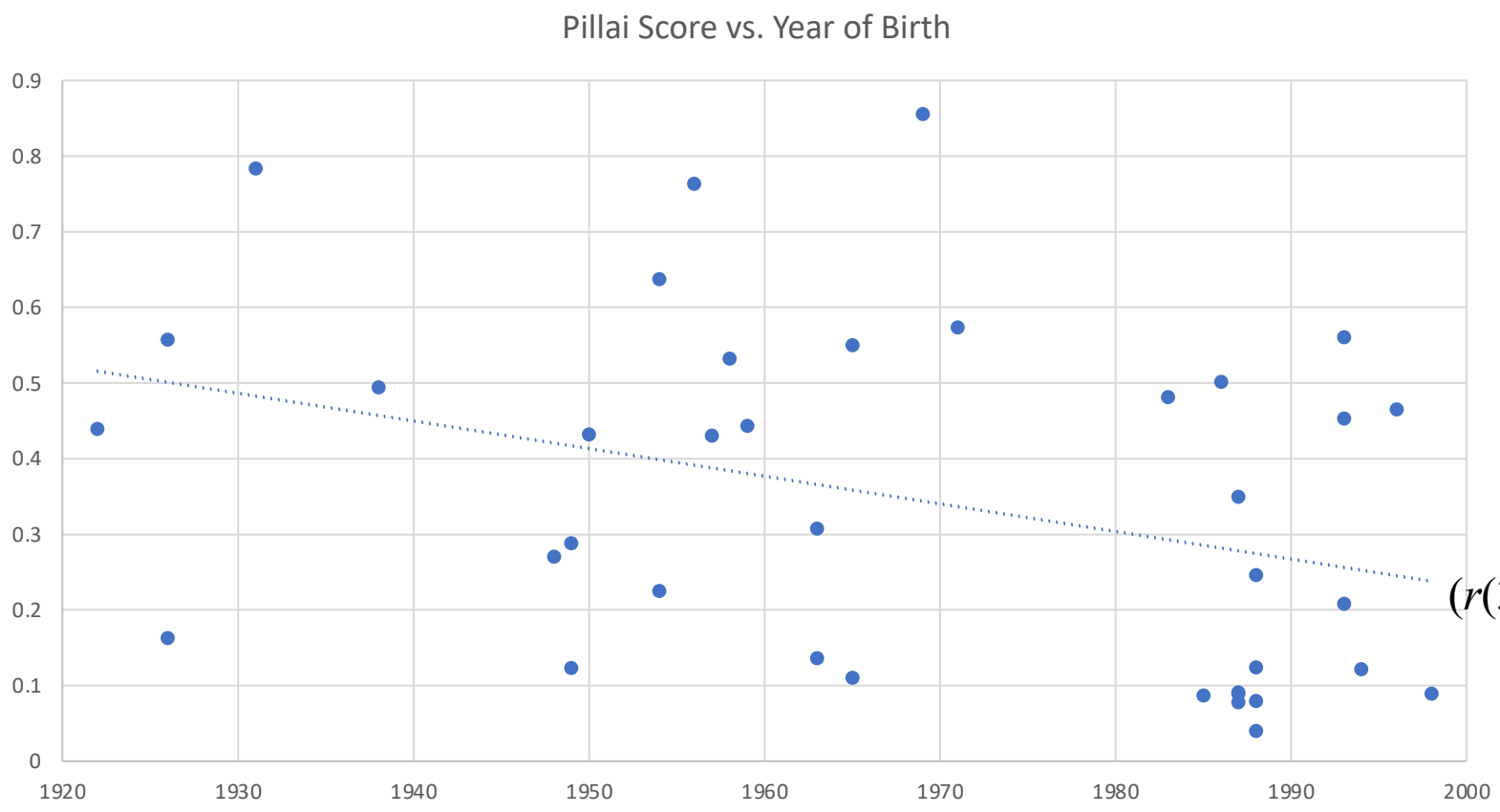
Neither ’City’ nor ‘Generation’ significant in any model

F1 vs. F2 Illustration for unmerged speaker (C1F78A)



OM/P raised and retracted

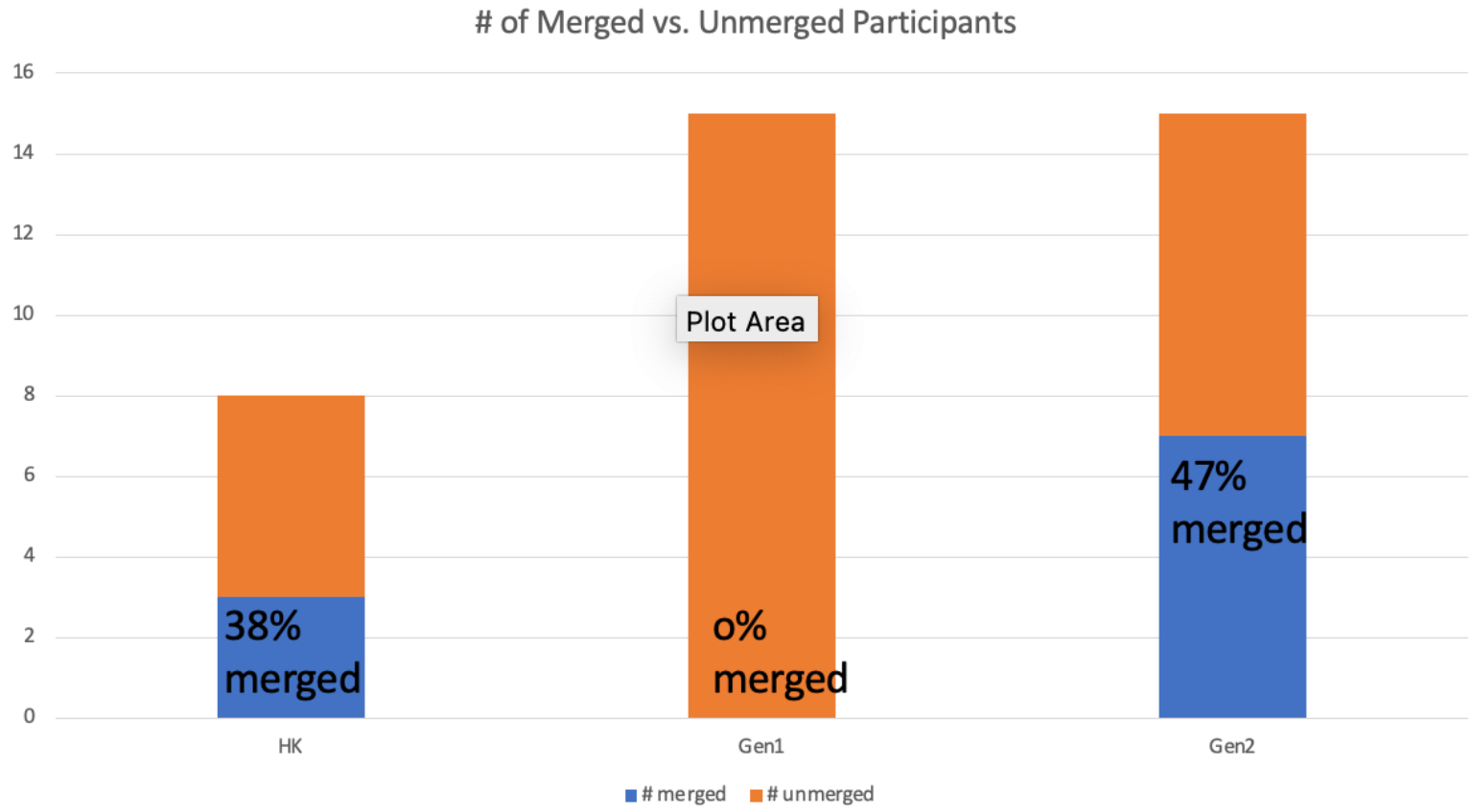
Q1 Results: Pillai Scores vs. Year of Birth



$(r(36) = -0.361, p < 0.05)$

- Trend towards merger, but still a change in progress

Q1: Individual Speaker Results based on Sneller & Stanley's (2023) formula



Minimal Pair Counts

/ɐ/ (AM/P)			/o/ (OM/P)			
Syllable	Sample Word	# of Other Homophones (based on distinct characters)	Syllable	Sample Word	# of Other Homophones (based on distinct characters)	Minimal Pairs in HLVC?
Am2	唵 (‘a mystic syllable used in Buddhistic incantations’; interjection)	3	*Om2*	揞 (‘to cover with hand’)	0	N
Ham6	喊, (‘all, the whole’)	0	Hom6	撼(‘to shake’)	5	Y
Gam1	金 (‘gold’)	2	*Gom1*	甘 (‘sweet’)	5	N
gam2	錦 (‘embroidered’)	0	*Gom2*	噉 (‘so’, conjunction)	5	N
Tam5	氹 (‘cesspool’)	0	Tom5	(‘pit’)	0	N

- Only one minimal pair in HLVC Corpus
- Three /y/~/u/ minimal pairs in HLVC Corpus (Tse Forthcoming)

Q3

- AMP-OMP has lower FL than /y/~/u/ in terms of minimal pairs occurring in the corpus.
- While /y/~/u/ is completely absent in Hong Kong, AMP~OMP is found in both HK and Toronto
- Using Sneller and Stanley's (2023) formula for Pillai Score thresholds, we find a remarkable rate of change towards merger moving from Gen1 (0%) to Gen2 (47%) Toronto speakers
  - Also more merger in Toronto Gen2 than in HK

Conclusion

- Does a heritage language (HL) context increase the susceptibility of merger for lower functional load (FL) phonemes?
  - AM/P~OM/P has lower FL than /y/~/u/
  - While the former found in both HK and Toronto, the latter found only in Toronto
    - This difference corresponds with FL differences
- This study provides further support for this hypothesis
  - Increased use of the dominant language along with decreased use of the HL may make low FL contrasts more susceptible to change.
  - In fact, low FL induced mergers that have already developed in the Homeland may even be accelerated in a HL context
- This study contributes to a growing body of research on sound change in heritage varieties and bilingual settings more generally.
  - While this study shows reduction in vowel inventory, that is not always the case in HL settings (cf. Tse 2016)
    - Contra deficit views of HL varieties
    - LOT-THOUGHT merger in English generally not described as a ‘deficit’
- The FLH is supported in BOTH monolingual and bilingual settings

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감사합니다 Дякую Grazie molto Спасибо 多謝 gratsiə namuor:ə

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Slides will be available on:

https://holmantse.github.io/

HTTPS://NGN.ARTSCI.UTORONTO.CA/HLVC/0_0_HOME.PHP

Post-Script

- Wo Hop is one of the oldest Chinese restaurants in Manhattan Chinatown
- English spelling reflects conservative pronunciation of “Wo Hop”

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Photo source: Lily Jeng, posted to “Gaslight Café – A Marvelous Mrs. Maisel Community” Facebook group, June 3, 2023.