

Are there **6** or **9** tones in Cantonese?

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Tonal System in Cantonese

Tone	Description	Examples	Tone	Description	Examples
1	High level	詩 'poem' <i>si1</i>	1	High stopped	一 'one' <i>jat7</i>
2	High rising	史 'history' <i>si2</i>			
3	Mid level	試 'try' <i>si3</i>	3	Mid stopped	八 'eight' <i>baat8</i>
4	Mid-low falling	時 'time' <i>si4</i>			
5	Mid-low rising	市 'city' <i>si5</i>			
6	Mid-low level	是 'yes' <i>si6</i>	6	Mid-low stopped	日 'day' <i>jat9</i>

- Traditional Chinese linguists – 9 tones (e.g., Cheung, 2007)
- Contemporary linguists – 6 tones (e.g., Bauer & Benedict, 1997; Matthews & Yip, 2011)

Major tone correspondences between Cantonese and Mandarin (Zhang & Gao, 2000)

Cantonese tone	Mandarin tone	Percentage	Example	Cantonese / Mandarin pronunciation	Exception	Cantonese / Mandarin pronunciation
1	1	93%	郊 'suburb'	<i>gaau1 / jiao1</i>	魔 'devil'	<i>mo1 / mo2</i>
2	3	89%	找 'find'	<i>zaau2 / zhao3</i>	摸 'touch'	<i>mo2 / mo1</i>
3	4	91%	怪 'strange'	<i>gwai3 / gwai4</i>	傘 'umbrella'	<i>saan3 / san3</i>
4	2	93%	牛 'cow'	<i>ngau4 / niu2</i>	微 'little'	<i>mei4 / wei1</i>
5	3	76%	偉 'great'	<i>wai5 / wei3</i>	市 'city'	<i>si5 / shi4</i>
6	4	94%	又 'again'	<i>jau6 / you4</i>	捕 'catch'	<i>bou6 / bu3</i>

魔 'devil'

Cantonese: mo1 (high level)

Mandarin: mo2 (rising) → mo1 (level)

Regular-tone

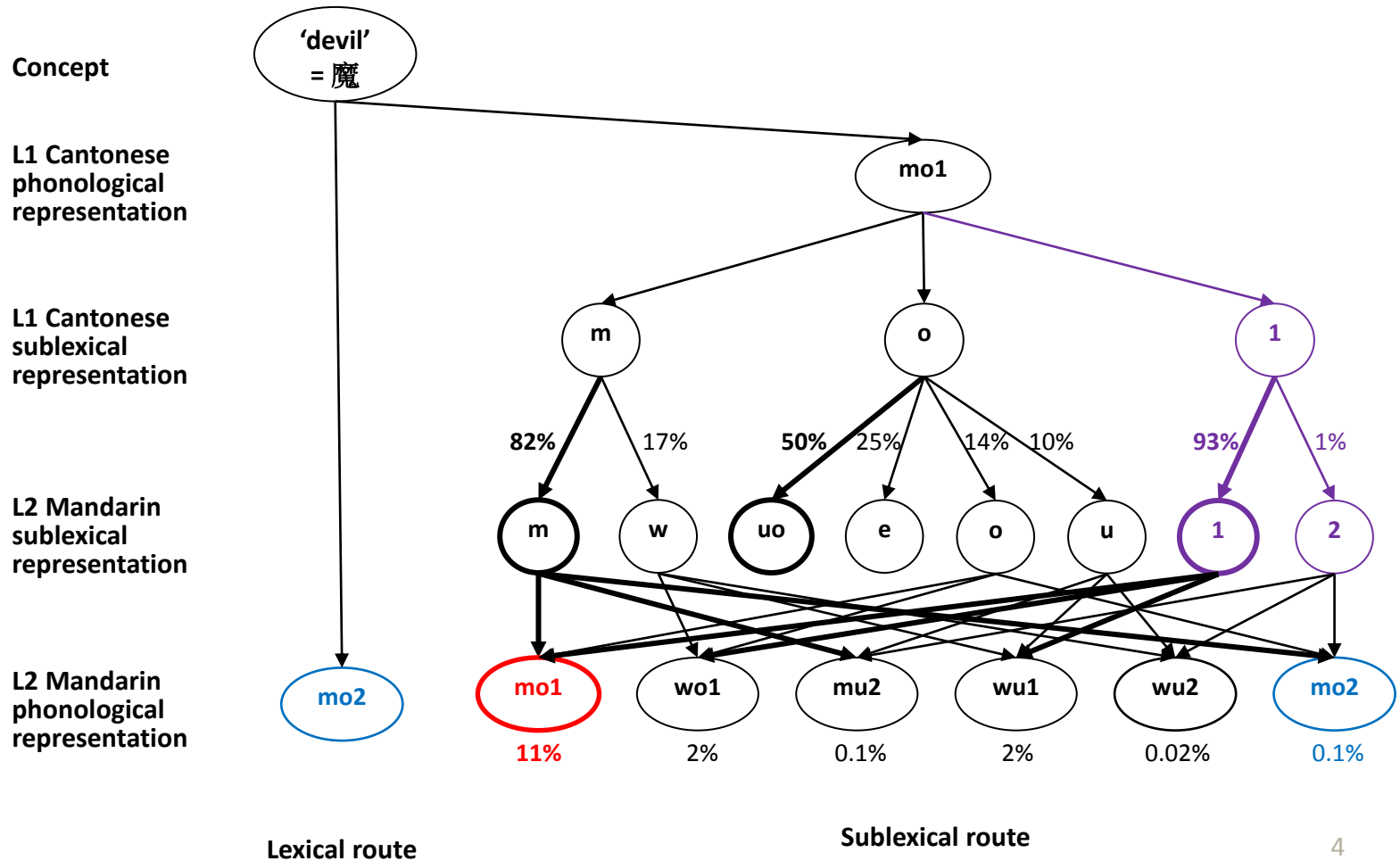
Irregular-tone

Mandarin *pinyin* transcription task (Chu & Taft, 2011)

Accuracy rate: Regular > Irregular-tone words

Dual Route L2 Mandarin word production model (Chu & Taft, 2010, 2011)

Irregular Mandarin tone word 魔 'devil'
Cantonese: *mo1* Mandarin: *mo2* → *mo1*



Pronunciation relationships between Cantonese and Mandarin Tone (Zhang & Gao, 2000)

Cantonese tone	Mandarin tone	Percentage (9-tone system)	Percentage (6-tone system)	Example	Cantonese pronunciation	Mandarin pronunciation
1	1	35% (58)	83% (845)	吸 'suck'	<i>kap7</i>	<i>xi1</i>
	2	16% (26)	5% (49)	級 'level'	<i>kap7</i>	<i>ji2</i>
	3	8% (14)	2% (25)	筆 'pen'	<i>bat7</i>	<i>bi3</i>
	4	40% (67)	9% (88)	測 'test'	<i>caak7</i>	<i>ce4</i>
	neutral	1% (1)	0% (5)	的 'adverbial particle'	<i>dik7</i>	<i>de0</i>
3	1	32% (69)	12% (88)	吃 'eat'	<i>hek8</i>	<i>chi1</i>
	2	23% (50)	7% (51)	國 'country'	<i>gwok8</i>	<i>guo2</i>
	3	12% (25)	7% (48)	百 'hundred'	<i>baak8</i>	<i>bai3</i>
	4	33% (70)	74% (540)	闊 'wide'	<i>fut8</i>	<i>kuo4</i>
6	1	6% (16)	4% (21)	滴 'drop'	<i>dik9</i>	<i>di1</i>
	2	42% (115)	15% (123)	核 'nuclear'	<i>hat9</i>	<i>he2</i>
	3	2% (5)	4% (22)	乙 'second'	<i>jyt9</i>	<i>yi3</i>
	4	50% (139)	77% (638)	入 'enter'	<i>jap9</i>	<i>ru4</i>
	neutral	0% (1)	1% (2)	着 'adverbial particle'	<i>zoek9</i>	<i>zhe0</i>

Remarks:

The number of words using a particular pronunciation correspondence is shown in brackets.

Experiment

- Task: Mandarin *pinyin* transcription task
- Participants: 40 Cantonese speakers
- Design

Cantonese tones	Mandarin tones			
	Tone 1	Tone 2	Tone 3	Tone 4
7	積 (<i>ji1</i>)	即 (<i>ji2</i>)	給 (<i>gei3</i>)	必 (<i>bi4</i>)
8	約 (<i>yue1</i>)	格 (<i>ge2</i>)	法 (<i>fa3</i>)	設 (<i>she4</i>)

Data analysis

- ANCOVA (Analysis of Covariance)
 - Dependent variable: Accuracy rate
 - Independent variable: Mandarin tone
 - Covariate: confidence rating (1-5: least to most confidence)

- Fixed order hierarchical regression analysis on items
 - Dependent variable: Accuracy rate
 - Independent variables
 - First step: confidence rating (1-5: least to most confidence)
 - Second step: percentage of correspondence (9-tone vs. 6-tone)

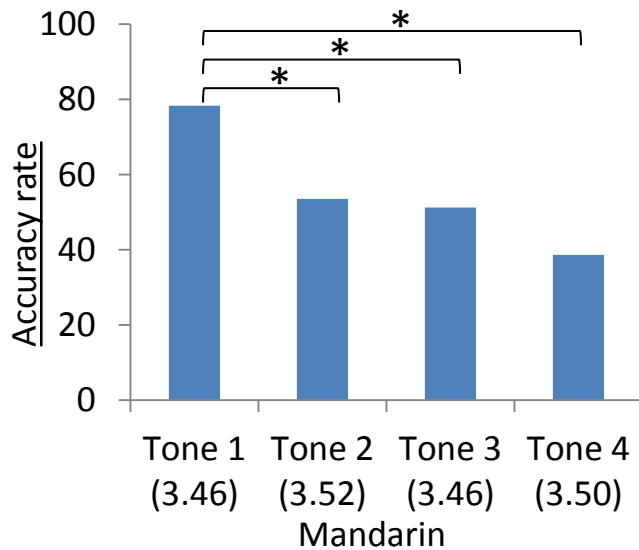
Cantonese tone	Mandarin tone	Items	Accuracy	Confidence (1-5)	9-tone correspondence	6-tone correspondence
7	1	積 (<i>ji1</i>)	70	3.40	35	83
	2	即 (<i>ji2</i>)	50	3.33	16	5
	3	給 (<i>gei3</i>)	78	4.03	8	2
	4	必 (<i>bi4</i>)	45	4.08	40	9
8	1	約 (<i>yue1</i>)	53	3.75	32	12
	2	格 (<i>ge2</i>)	75	4.00	23	7
	3	法 (<i>fa3</i>)	75	4.10	12	7
	4	設 (<i>she4</i>)	75	3.43	33	74

Results – Tone 7 words

Pronunciation relationships between Cantonese tone 7 and Mandarin tones

Cantonese tone	Mandarin tone	Percentage correspondence	
		9-tone	6-tone
7	1	35%	83%
	2	16%	5%
	3	8%	2%
	4	40%	9%

ANCOVA analysis - Cantonese Tone 7 words



Regression analysis - Amount of unique variances accounted for by each variables

Cantonese tone 7 words		
Step 1:	25.5% **	
Confidence rating		
Step 2:		
Pronunciation	34.8% ***	0.3%
correspondence	(6-tone)	(9-tone)

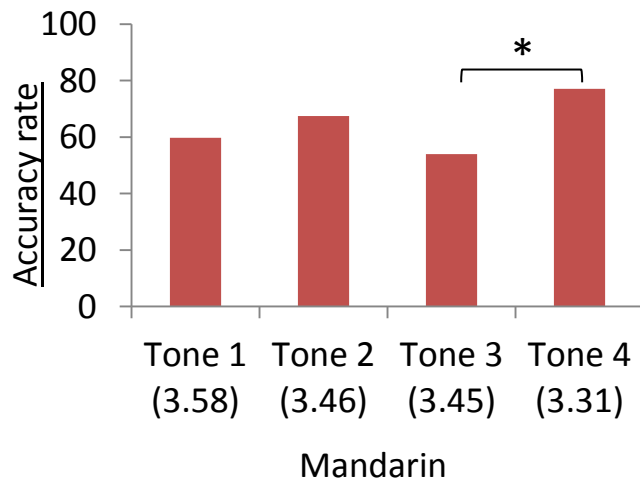
*** $p < .001$
 ** $p < .01$
 * $p < .05$ 8

Results – Tone 8 words

Pronunciation relationships between Cantonese tone 8 and Mandarin tones

Cantonese tone	Mandarin tone	Percentage correspondence	
		9-tone	6-tone
8	1	32%	12%
	2	23%	7%
	3	12%	7%
	4	33%	74%

ANCOVA analysis - Cantonese Tone 8 words



Regression analysis - Amount of unique variances accounted for by each variables

	Cantonese tone 8 words	
<u>Step 1:</u> Confidence rating	20.7% **	
<u>Step 2:</u> Pronunciation correspondence	16.0% * (6-tone)	13.7% * (9-tone)

*** $p < .001$

** $p < .01$

* $p < .05$ 9

Can Cantonese speakers' perceptual confusion between Mandarin tone 1 and 4 affect the result?

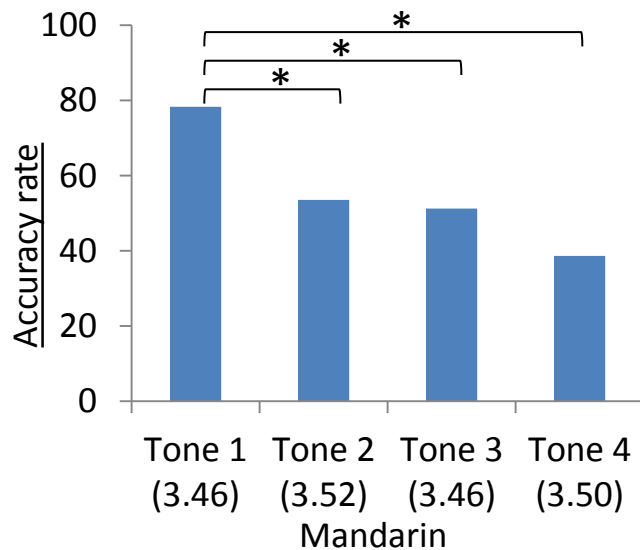
Pronunciation relationships between Cantonese tone 7 and Mandarin tones

Cantonese tone	Mandarin tone	Percentage correspondence	
		9-tone	6-tone
7	1	35%	83%
	2	16%	5%
	3	8%	2%
	4	40%	9%

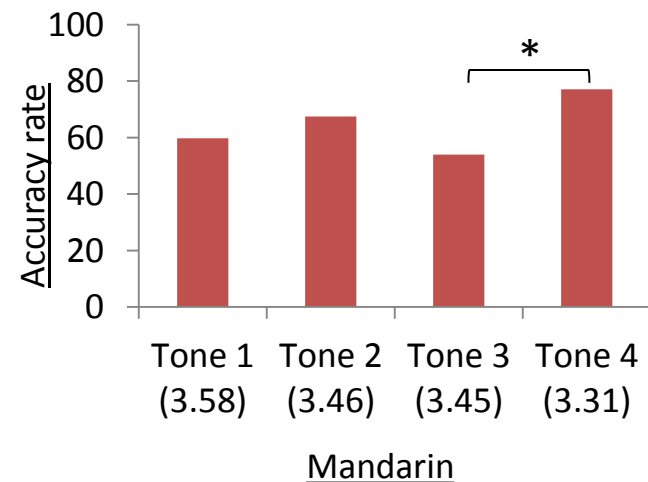
Pronunciation relationships between Cantonese tone 8 and Mandarin tones

Cantonese tone	Mandarin tone	Percentage correspondence	
		9-tone	6-tone
8	1	32%	12%
	2	23%	7%
	3	12%	7%
	4	33%	74%

ANCOVA analysis - Cantonese Tone 7 words



ANCOVA analysis - Cantonese Tone 8 words



Pronunciation relationships between Cantonese and Mandarin Tone: Type vs. Token frequency analysis

Cantonese tone	Mandarin tone	Percentage (9-tone system)		Percentage (6-tone system)	
		Type	Token	Type	Token
7	1	35% (58)	29% (138)	83% (845)	81% (2254)
	2	16% (26)	19% (90)	5% (49)	6% (155)
	3	8% (14)	7% (32)	2% (25)	2% (63)
	4	40% (67)	44% (213)	9% (88)	10% (264)
	neutral	1% (1)	2% (10)	0% (5)	1% (39)
8	1	32% (69)	33% (174)	12% (88)	13% (240)
	2	23% (50)	23% (124)	7% (51)	7% (127)
	3	12% (25)	15% (79)	7% (48)	7% (133)
	4	33% (70)	29% (153)	74% (540)	74% (1401)
9	1	6% (16)	6% (45)	4% (21)	3% (57)
	2	42% (115)	42% (324)	15% (123)	16% (341)
	3	2% (5)	2% (12)	4% (22)	3% (60)
	4	50% (139)	50% (387)	77% (638)	79% (1696)
	neutral	0% (1)	0% (2)	1% (2)	0% (2)

Conclusion

- Cantonese Tone 7 words
 - ANCOVA and regression analysis support the 6-tone but not the 9-tone system
- Cantonese Tone 8 words
 - ANCOVA partially supports both the 6-tone and 9-tone systems
 - Regression analysis support both the 6-tone (16.0%) and 9-tone (13.7%) systems
- In general, there are more supporting evidence for the 6-tone over 9-tone system in Cantonese.
- A linguistic issues concerning Cantonese speakers' L1 tone representation can be examined indirectly through their knowledge of L2 sounds
- Provide further support of the Dual route L2 Mandarin word production model

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