

# Towards a Model of Second Language Word Production and Recognition in Mandarin

Patrick Chun Kau Chu  
University of New South Wales, Sydney, Australia



## Aim of the study

To understand how Cantonese speakers' production and recognition of second language (L2) Mandarin words is influenced by the first language (L1) lexical system and their L2 phonological proficiency.

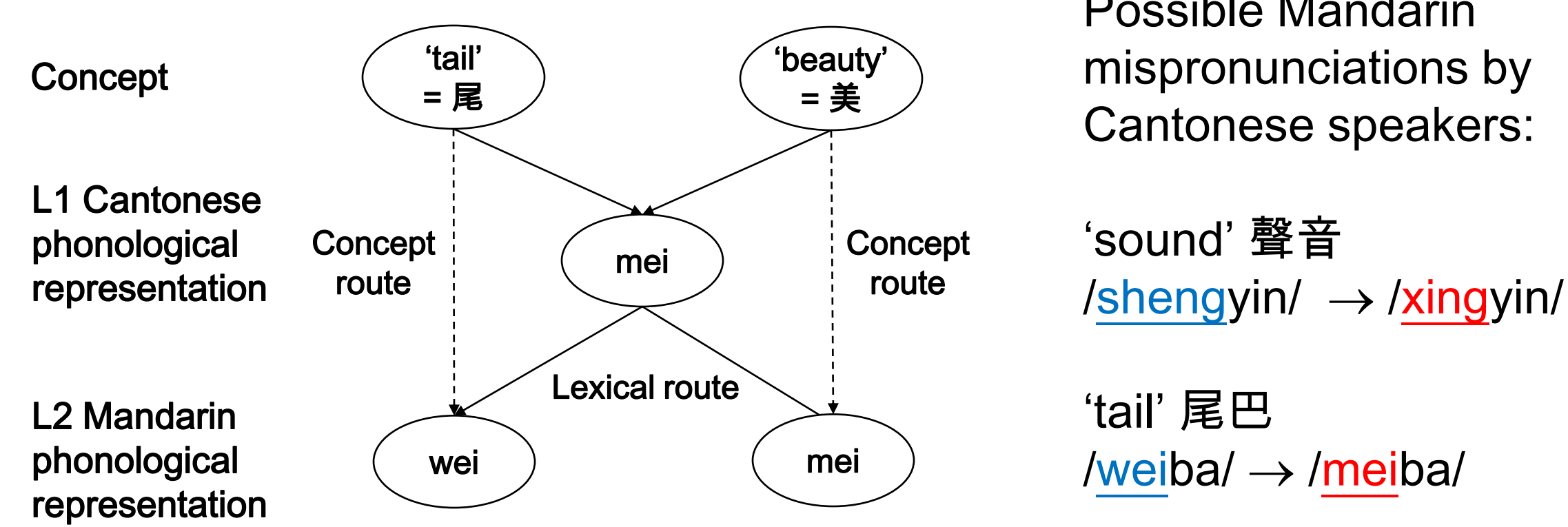
## Pronunciation relationships between Cantonese and Mandarin words

There are many homophones in Cantonese and Mandarin.

Character / meaning	聲 'sound'	星 'star'	尾 'tail'	美 'beauty'
Cantonese pronunciation	/sing/		/mei/	
Mandarin pronunciation	/sheng/	/xing/	/wei/	/mei/

Cantonese speakers may mistakenly think that words that are homophones in Cantonese are also homophones in Mandarin.

## L2 Mandarin word production model



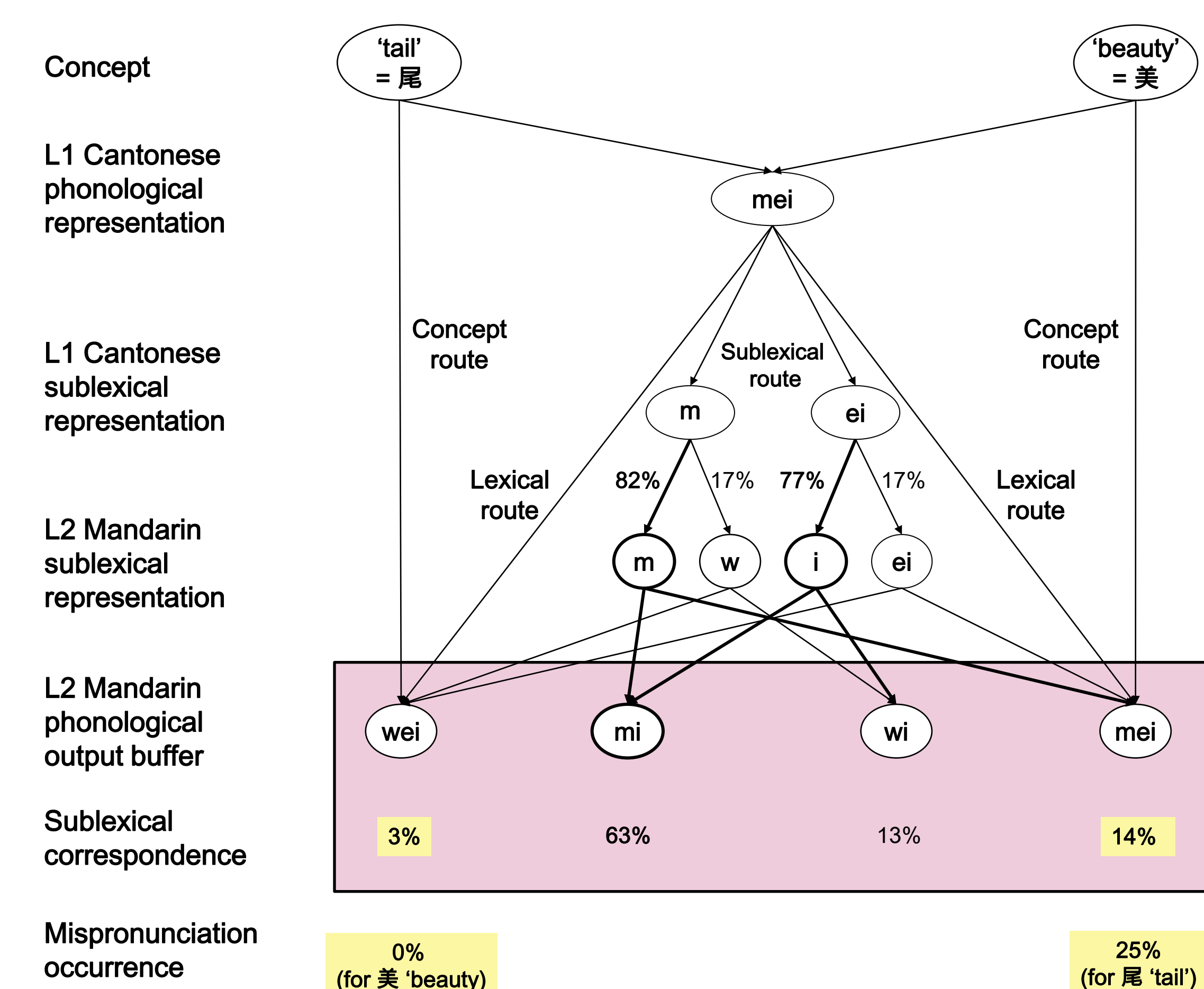
- In a Mandarin word production task for Cantonese speakers, negative homophonic transfer from Cantonese was not symmetrical.
- For example, 尾 'tail' was mispronounced by 25% of the Cantonese speakers as *mei* in Mandarin while none of them mispronounced the word 美 'beauty' as *wei* in Mandarin. In addition, some Cantonese speakers mispronounced the word 尾 'tail' as *mi*, which cannot be accounted for using the above model.
- Cantonese speakers' Mandarin production may also be influenced by the sublexical correspondence between Cantonese and Mandarin.

## Onset and rime pronunciation relationships between Cantonese and Mandarin (Zhang & Gao, 2000)

Cantonese onset /m/					
Mandarin onset	Number of words	Percentage	Example	Cantonese pronunciation	Mandarin pronunciation
m	160	82%	美 'beauty'	mei5	mei3
w	33	17%	尾 'tail'	mei5	wei3
b	2	1%	剝 'to shell'	mok1	bo1, bao1

Cantonese rime /ei/					
Mandarin rime	Number of words	Percentage	Example	Cantonese pronunciation	Mandarin pronunciation
i	99	77%	皮 'skin'	pei4	pi2
ei	26	20%	尾 'tail'	mei5	wei3
in	1	1%	您 'you'	nei5	nin2
ü	1	1%	履 'shoes'	lei5	lü3
er	1	1%	餌 'bait'	lei6	er3

## L2 Mandarin word production model: Incorporating the sublexical route (Chu & Taft, LSHK ARF 2010)

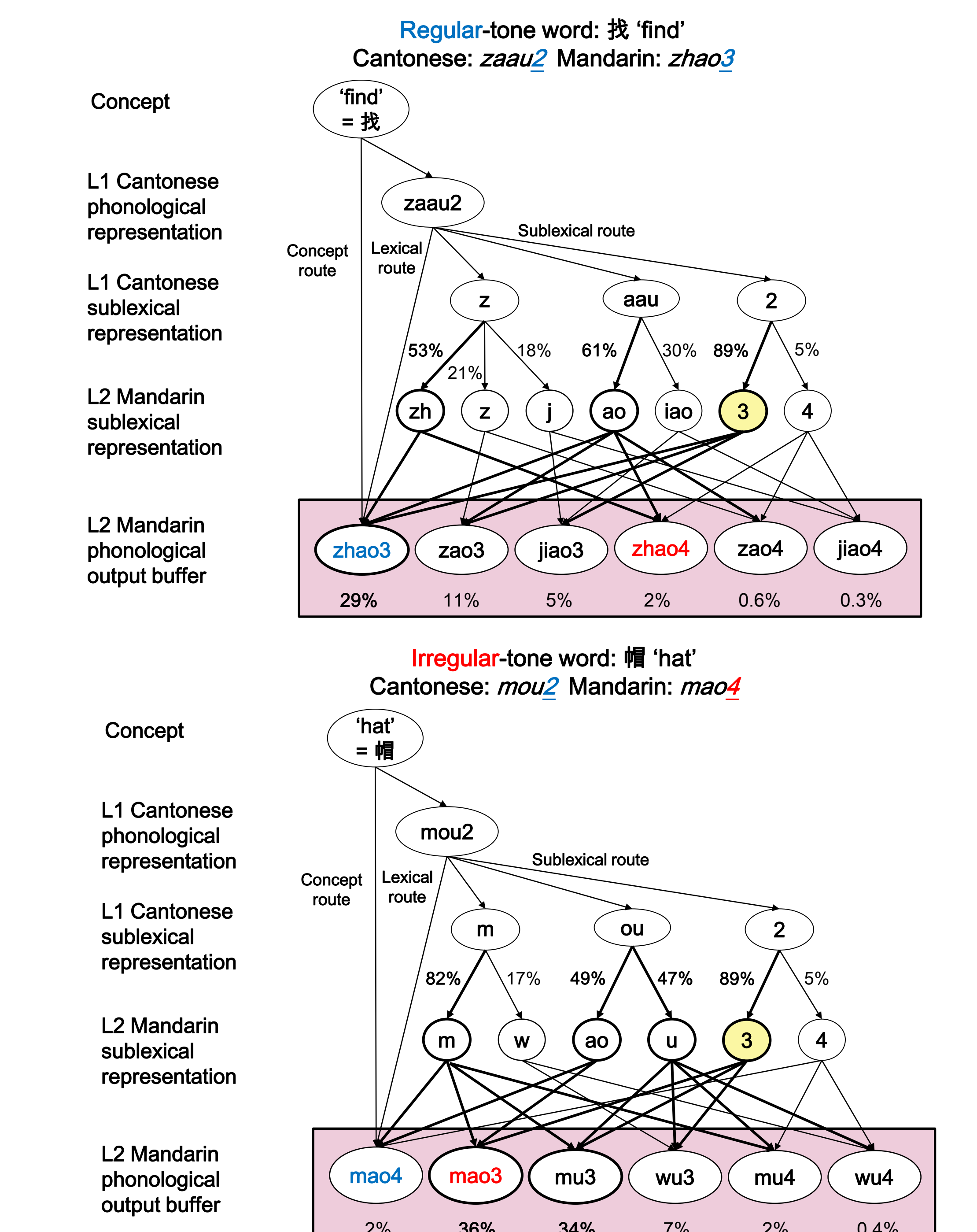


- Sublexical correspondence in the L2 Mandarin phonological output buffer is the multiplication of the corresponding Cantonese-Mandarin onset and rime pronunciation correspondence and it is assumed to be proportional to its activation level.
- Beginning learners use both the lexical/concept route and sublexical route in L2 word production while advanced learners gradually develop an inhibitory mechanism to inhibit the activation of the L1 phonological representation and hence activations through the sublexical route.
- Evidence for the use of the sublexical route:
  - Mispronunciation of the word 尾 'tail' as *mi* due to its high activation
  - Among all homophone pairs, correlation between sublexical correspondence and mispronunciation occurrence = 0.35,  $p = .005$ .

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

Cantonese tone	Mandarin tone	Percentage	Regular-tone words	Cantonese/Mandarin pronunciation	Irregular-tone words	Cantonese/Mandarin pronunciation
1	1	93%	郑 'suburb'	gaau1 / jiao1	魔 'devil'	mo1 / mo2
2	3	89%	找 'find'	zaau2 / zhao3	帽 'hat'	mou2 / mao4
3	4	91%	怪 'strange'	gwai3 / gwai4	伞 'umbrella'	saan3 / san3
4	2	93%	牛 'cow'	ngau4 / niu2	微 'little'	mei4 / wei1
5	3	76%	偉 'great'	wai5 / wei3	市 'city'	si5 / shi4
6	4	94%	又 'again'	jau6 / you4	捕 'catch'	bou6 / bu3

## L2 Mandarin word production model: Incorporating the tone component

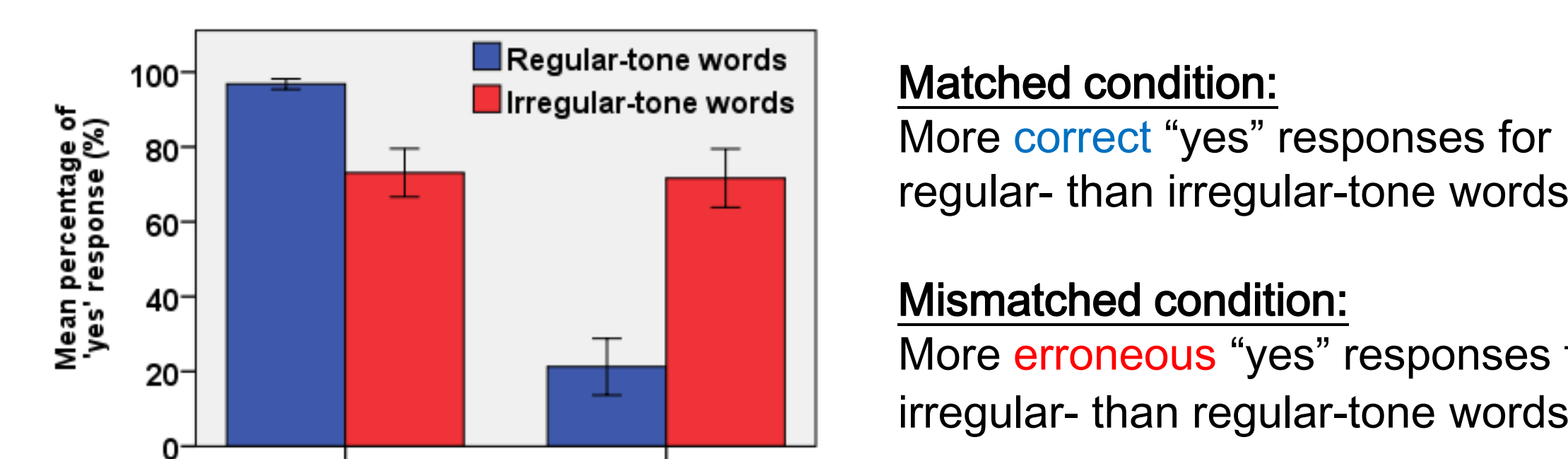


- For regular-tone words (e.g., 找 'find'), the correct pronunciation (i.e., *zhao3*) has the highest activation through the sublexical route.
- For irregular-tone words (e.g., 帽 'hat'), the correct pronunciation (i.e., *mao4*) has a low activation while some incorrect pronunciations (i.e., *mao3*) have a high activation through the sublexical route.
- Therefore, beginning Cantonese learners of Mandarin may mistakenly think that the one with a higher activation is the correct Mandarin pronunciation for those irregular-tone words.

## Chinese character - Mandarin sound matching task (Chu & Taft, ICPhs 2011)

Cantonese speakers saw a Chinese character and heard a Mandarin pronunciation and decide whether the character matched with the Mandarin pronunciations.

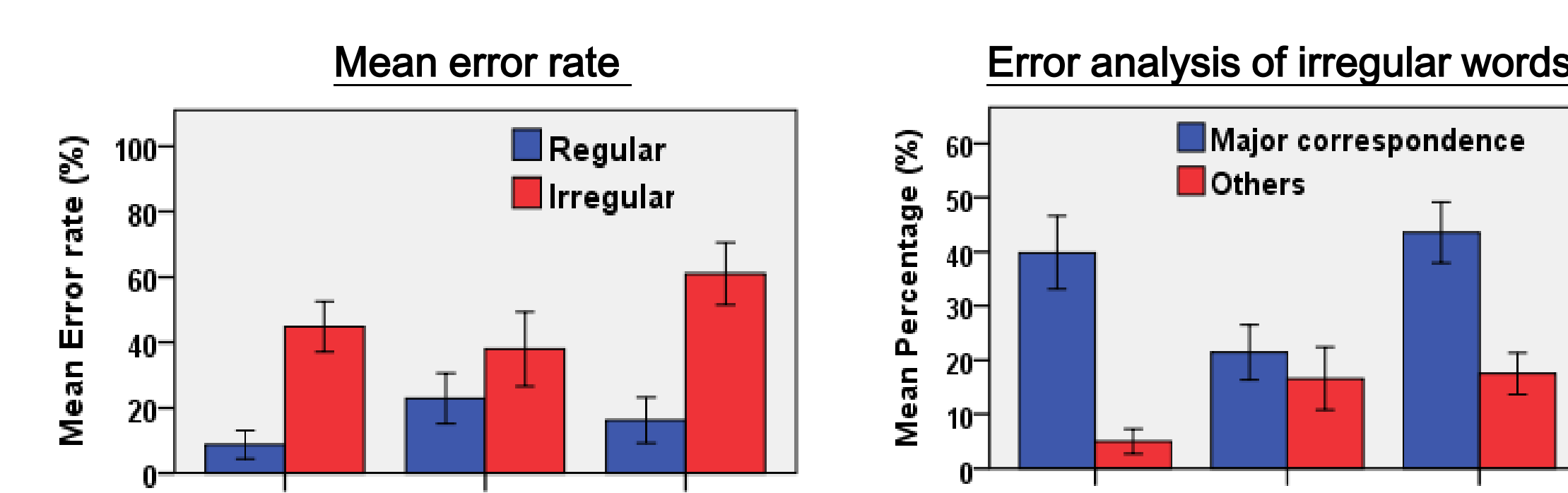
Word Type	Matched	Mismatched
Regular-tone words (e.g. 找 'find' Cantonese: zaau2)	zhao3	zhao4
Irregular-tone words (e.g. 帽 'hat' Cantonese: mou2)	mao4	mao3



## Further evidence for the use of the sublexical route in L2 Mandarin word production

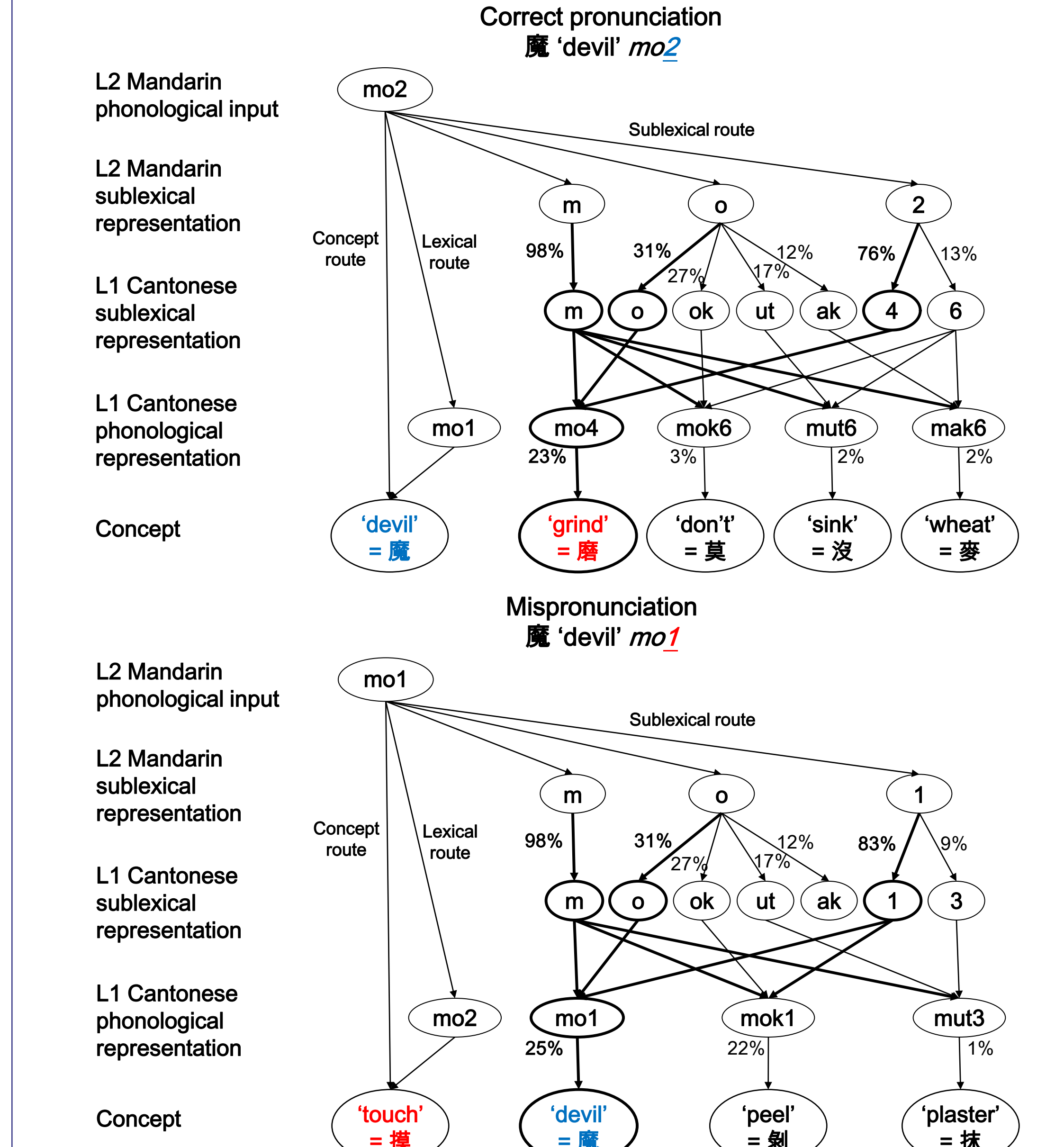
Mandarin pinyin transcription task (Chu & Taft, EPC 2011)

Sublexical unit	Cantonese pronunciation	Regular word	Example	Irregular word	Example
Onset	d	d (96%)	對 'correct'	t (2%)	突 'sudden'
Rime	aai	ai (59%)	帶 'bring'	a (2%)	拉 'pull'
Tone	Tone 4	Tone 2 (93%)	農 'farm'	Tone 4 (4%)	期 'period'



- More errors were found for irregular than regular words, and the errors were due to the use of major pronunciation correspondence.

## L2 Mandarin word recognition model

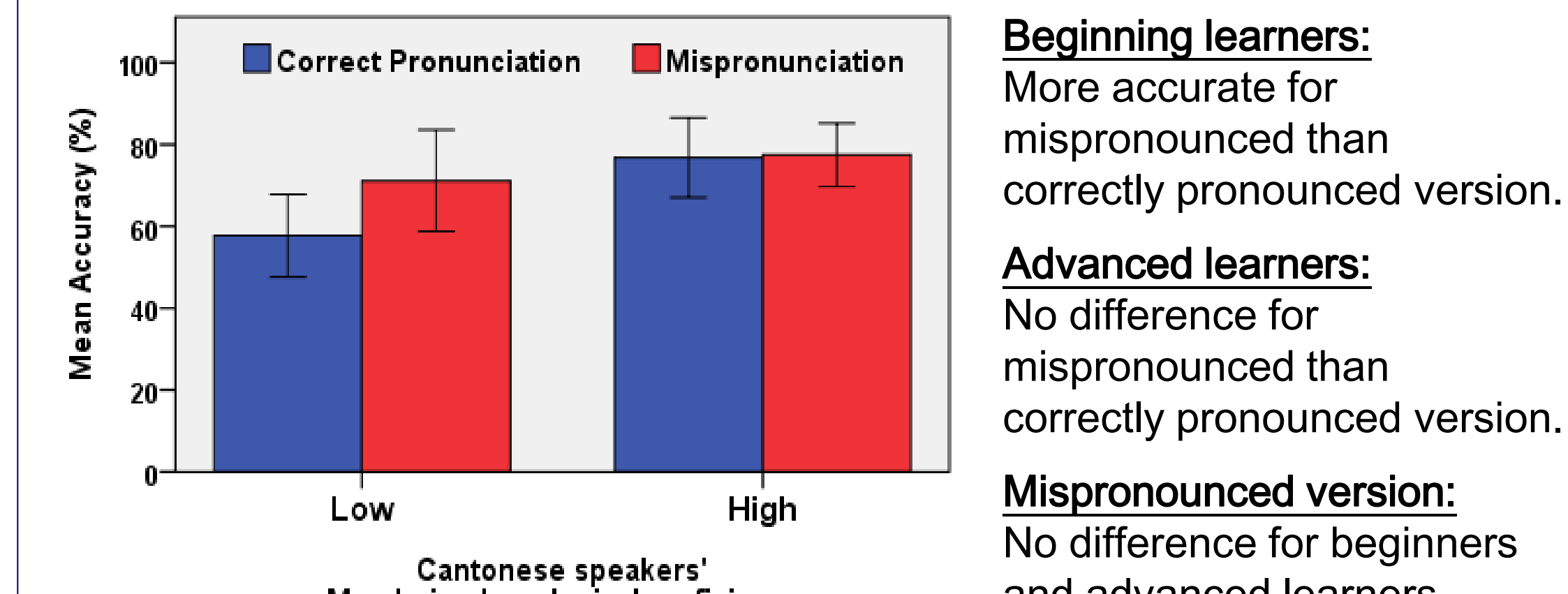


- If beginning learners rely mainly on the sublexical route in L2 word recognition, they should activate the correct concept 魔 'devil' from the mispronounced version *mo1* better than the correctly pronounced version *mo2*.
- If advanced learners inhibit the use of the sublexical route and rely more on the lexical/sublexical route in L2 word recognition, they should have more trouble understanding the intended concept 魔 'devil' from the mispronounced version *mo1* when compared with beginning learners.

## Testing the L2 Mandarin word recognition model

Disyllabic word transcription task (Chu & Taft, ISB 2011)  
魔鬼 'ghost' Correct pronunciation: mo2gui3  
Mispronunciation: mo1gui3 (nonword 摸鬼)

Accuracy = ability to understand the intended word from the utterance



- With increasing L2 phonological proficiency, Cantonese speakers rely more on the use of concept/lexical routes in L2 word recognition while the sublexical route is still in active use to generate possible word candidates.

## Conclusions

- Three-route L2 word production and recognition model: Concept, lexical and sublexical
- Beginning learners rely more on the sublexical route than lexical/concept route in both L2 word production and recognition.
- Advanced learners gradually develop an inhibitory mechanism to suppress the use of sublexical route in L2 word production, while both sublexical and lexical/concept route are still in active use to generate possible word candidates in L2 word recognition.
- Future research
  - Lexical decision with cross-modal priming
  - Eye-tracking paradigm with visual-world paradigm
  - Event-related potential (ERP) using N400

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