

The time course of sociolinguistic influences on wordlikeness judgments

James Myers and Tsung-Ying Chen

National Chung Cheng University, Taiwan

ExLing 2016: Tutorial and Research Workshop on Experimental Linguistics
27 June - 2 July 2016, Saint Petersburg, Russia

Dedication

- Lab assistants
Yuchu Chang, Kueiyeh Chen, Peishan Chen, Meichun Liu, Yihsin Wu, Yushan Yan
- Grant support
MOST 103-2410-H-194-119-MY3

2

The big picture

- Our study
 - Wordlikeness judgments by bilingual speakers of Southern Min (Taiwanese) and Mandarin
- What affects wordlikeness judgments?
 - Lexical variables
 - Sociolinguistic variables
- When do these variables affect judgments?
 - Depends on the language

3

Wordlikeness

- The intuition that a nonword could be a word
blick vs. **bnick** (Chomsky & Halle, 1965)
- Why use this task?
 - Measures productive linguistic knowledge
 - Complements more popular processing tasks
 - Lends itself to regression-based designs
 - Permits fully crossed item x participant designs across languages
 - There's a free Web app for it: **Worldlikeness**

Worldlikeness

<http://lngproc-4083.nitrousp.com:3000/>

4

Lexical influences on wordlikeness

- Neighborhood density improves judgments
 - blick** brick, click, slick, black, block, bliss, lick, ...
 - bnick** brick, nick, ...
 - Distinct from phototactic probability (Bailey & Hahn, 2001)
- Cross-lexicon neighbors in bilingual speakers?
 - Not for Spanish/English bilinguals (Frisch & Brea-Spahn, 2010)
 - What about Mandarin / Southern Min bilinguals?

5

Mandarin and Southern Min

- Similarities
 - Sinitic family (cognates, but mutually unintelligible)
 - Simple monosyllabic morphemes: (C)(G)V(X)T
 - Many people in Taiwan are native speakers of both
- Differences
 - S. Min: Nasalized vowels, lacks some onset contrasts
 - Mandarin: Fewer syllables (1,400 vs. 2,400)
 - Mandarin is the prestige language in Taiwan
 - College-aged speakers are less fluent in S. Min

6

Social influences on speech processing

- Women favor prestige norms
 - E.g., Loudermilk (2013). U. Cal.-Davis Ph.D. thesis
Register formality has immediate ERP effects on word expectations, especially for women
- Listeners disfavor non-native accents
 - E.g., Pantos (2012). Review of Cog. Ling., 10 (2)
Korean accent affects how fast American listeners classify word valence (e.g., lovely vs. horrible)
- Do such factors also affect wordlikeness?

7

Time course

- Neighborhood effects may take time to arise
 - E.g., Stockall et al. (2004). Brain & Lang., 90
350 ms post-onset MEG insensitive to neighbors
- Or maybe they arise immediately
 - E.g., Hunter, C. R. (2013). Brain & Lang., 127
200 ms post-onset ERP sensitive to neighbors
- But these studies used the lexical decision task
 - Neighbors are not facilitative in this task
- Our novel (if crude) time course probe
 - Neighbor x reaction time in judgment choice

8

Stimuli

- Stimulus selection
 - 129 nonlexical syllables composed of Mandarin and S. Min onsets and rimes
 - Log neighbors not collinear, but correlated ($r^2 = .1$)
- Talkers
 - Two females (Mandarin family, S. Min family)
 - S. Min talker has greater vowel nasalization, but also hypercorrects onset contrast
 - Naive listeners cannot consistently judge accent
 - So here we take talker (not accent) as a nuisance

9

Participants, task, and design

- 80 college students
 - Bilingual speakers of S. Min and Mandarin
- Judged stimuli as like/unlike target language
- Reaction time (RT) also recorded (as predictor)
- Four groups:

		Target language	
		Mandarin	S. Min
Talker family	Mandarin	20	20
	S. Min	20	20

10

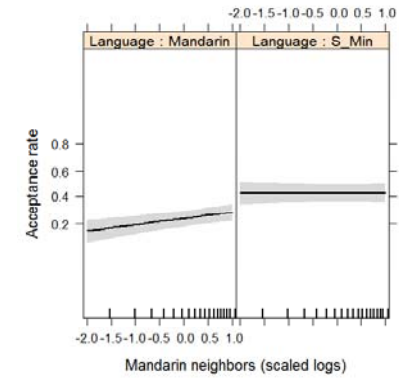
Results overview

	B	SE	z	p
Intercept	-0.74	0.11	-6.80***	
S. Min neighbors	0.18	0.06	3.02**	
Language	-0.45	0.09	-4.79***	
RT	0.06	0.03	2.16*	
S. Min neighbors x Talker	-0.07	0.03	-2.62**	
Mandarin neighbors x Language	0.11	0.03	4.10***	
S. Min neighbors x Language	-0.33	0.03	-12.67***	
Mandarin neighbors x Gender	0.07	0.03	2.84**	
S. Min neighbors x Language x Gender	-0.09	0.03	-3.40***	
Language x RT	0.30	0.03	10.03***	
Mandarin neighbors x Language x RT	-0.06	0.03	-2.29*	

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

Mixed-effects logistic regression (random items and subjects intercepts) predicting judgments from above variables and all interactions (except between two neighborhood densities) 11

Mandarin neighbors x Language

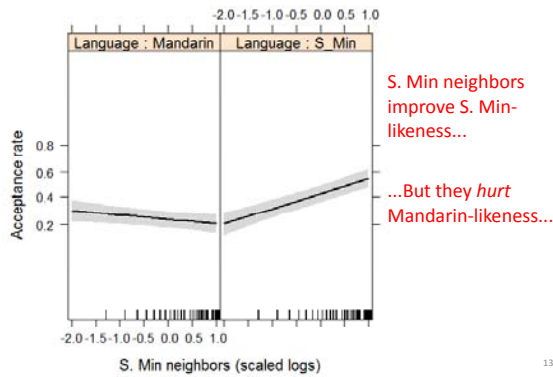


Mandarin neighbors improve Mandarin-likeness

But they have *no* effect on S. Min-likeness

12

S. Min neighbors x Language

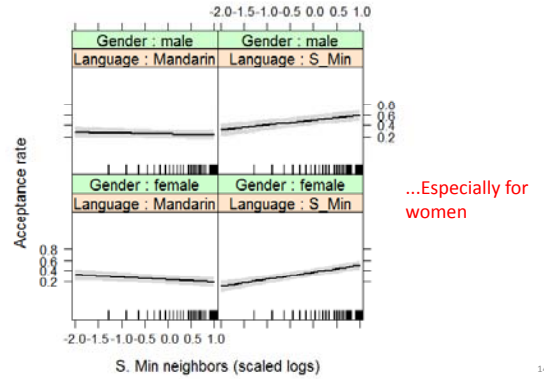


S. Min neighbors improve S. Min-likeness...

...But they *hurt* Mandarin-likeness...

13

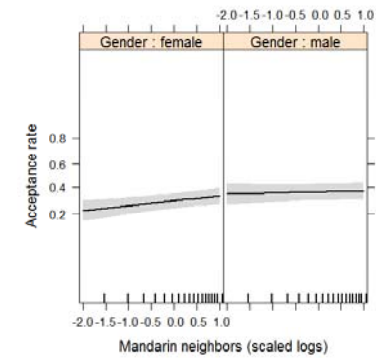
S. Min neighbors x Language x Gender



...Especially for women

14

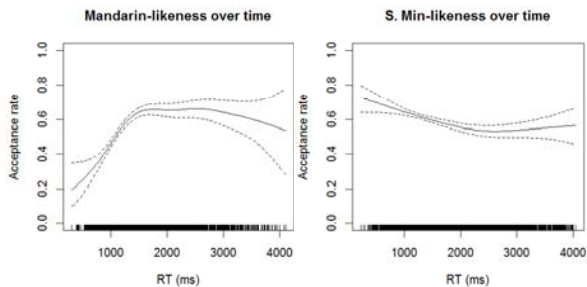
Mandarin neighbors x Gender



Women are also more sensitive to Mandarin neighbors, overall

15

Time course of judgments

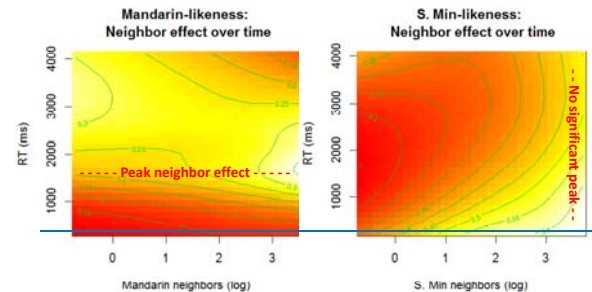


Mandarin acceptance rises quickly

S. Min acceptance falls slowly

Separate mixed-effects generalized additive logistic regression models predicting judgments from smoothed RT for Mandarin & S. Min ($p < .0001$) 16

Time course of neighborhood effect



Mandarin neighbors peak at 2 seconds

S. Min neighbors don't peak

Separate mixed-effects generalized additive logistic regression models predicting judgments (lighter = more accepting) from smoothed RT x neighbors for Mandarin ($p < .0001$) & S. Min (ns) 17

Conclusions

- Bilinguals show cross-lexicon neighbor effects
 - Non-prestige neighbors *hurt* prestige wordlikeness
 - This negative effect is stronger for women
- Judgments show temporal dynamics
 - Prestige language judgments overcome initial inhibition, which is when neighbor effect peaks
 - Perhaps because of its smaller syllable inventory?
- The need for typological psycholinguistics
 - Mandarin/S. Min \neq Spanish/English
 - Tools like **Worldlikeness** may help

18