Learning words with lexical tone: Is manipulation of attentional focus beneficial?

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Background

- Lexical tones differentiate lexical meaning in tonal languages. (Yip, 2002)
- Lexical tones are difficult to learn for speakers of non-tonal languages. (e.g. Pelzl et al., 2019)
- Factors influencing the learning of tones: pitch ability, musicality, L2 aptitude and general cognitive ability (e.g. Bowles et al., 2016; Wong & Perrachione, 2007)
- Popular tone teaching methods: visualization of tone contours (Liu et al., 2006) and using music, (Lin, 1985) hand gestures or other body movements (Tsai, 2011)

→ Focus on drawing learners' attention to the contrastiveness of pitch

Theoretical support for focusing on cue-contrastiveness

- Noticing hypothesis: "noticing is necessary for intake." (Schmidt, 1990, p. 141)
- Automatic Selective Perception: Perceptual salience is influenced by linguistic experience, but experimental manipulation can reallocate attentional focus. (Strange, 2011)
- Competition Model: Presenting the contrastive form can increase the relative strength of a cue in acquisition. (MacWhinney, 2005)

Motivation

- No study has investigated the **effectiveness of cue-contrastive training** in word learning in a controlled experimental setting.
- Contribute towards better connecting vocabulary teaching practices with word learning theories

Participants

- 90 self-identified native English speakers
  - Age: *M* = 22 years (18-47)
  - no knowledge of tonal languages
  - no professional music experience

Method

- Laboratory-based auditory novel word learning experiment (method inspired by Quam & Creel, 2017)
- Learning materials (novel words):

Pa1	Pa2	Pa3	Sa1	Sa2	Sa3
Pi1	Pi2	Pi3	Si1	Si2	Si3
Pu1	Pu2	Pu3	Su1	Su2	Su3

Procedure

1. Background questionnaire
2. Pitch perception contour test (Wong & Perrachione, 2007)
   - to control pitch perception ability between groups
3. Training session (3 training groups)
4. Word recognition test session
5. Word production test session (analysis in progress)

Training session

- Participants randomly assigned to one of 3 training groups
- Same instruction for all three groups: *You will see objects and hear them named. Repeat the words and try to learn them. You will be tested later.*
- Words presented in triads with different cue-contrastiveness in different training groups

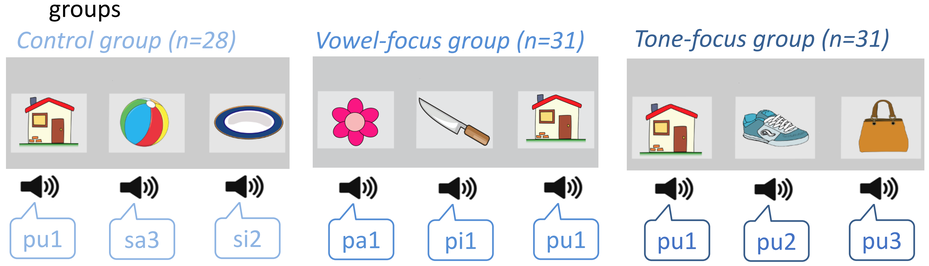

Fig1. Examples of triads in 3 training groups

- Each triad presented 6 times
- Self-paced, participants clicked spacebar to move on

Test session

- All three groups took the **same** 2-alternative forced-choice task
- 90 trials presented pseudo-randomly

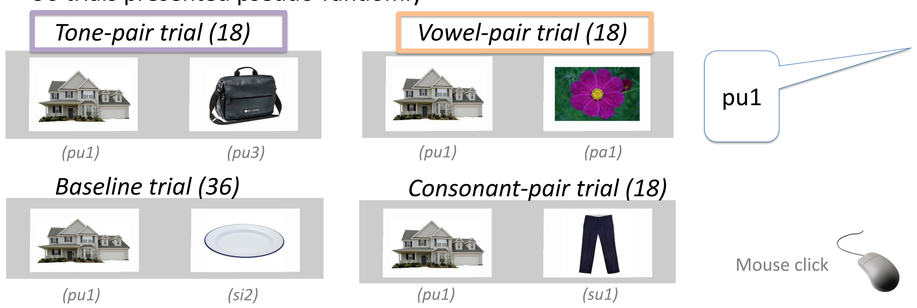

Fig2. Examples of different trial types

Results

- **Pitch perception contour test:** groups did not differ significantly
- **Forced choice task:**

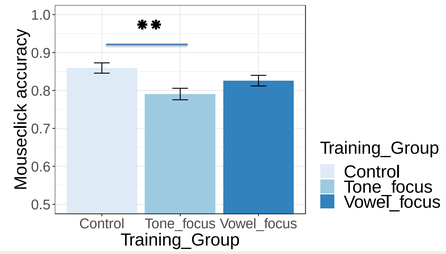

Fig3. Overall accuracy by training group (error bars = 95% CIs)

Analysis: Generalized linear mixed-effect regression (glmer)

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Accuracy~Training_Group*Trial_Type+(1|Participant)+
(1|Stimulus)+family=binomial(link="logit")
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Predictors simple-coded (Training Group, ref=Control group; Trial Type, ref=baseline)

- Significant interaction effects between training group and trial type

→ Unexpectedly, tone-focus training hurt overall accuracy of word learning .

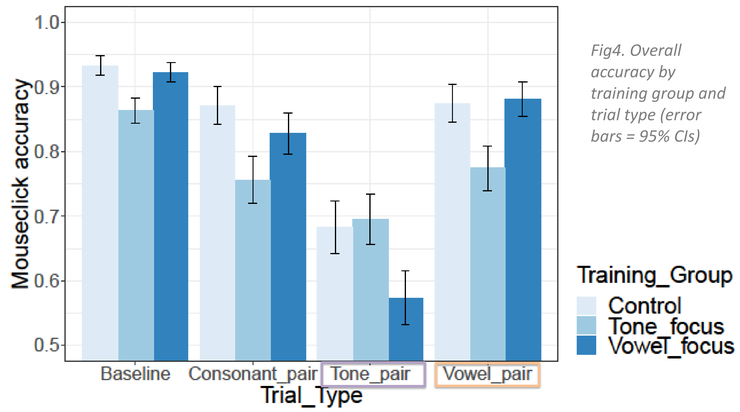

Fig4. Overall accuracy by training group and trial type (error bars = 95% CIs)

Separate models for each trial type

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Accuracy~Training_Group+(1|Participant)+(1|Stimulus)+
family=binomial(link="logit")
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Training Group simple-coded (ref=Control group)

	Baseline trials	Consonant_pair trials	Tone-pair trials	Vowel_pair trials
Tone_focus group	*b* = -1.31 *p* = .003**	*b* = -0.95 *p* = .002**	*b* = 0.08 *p* = .75	*b* = -0.90 *p* = .006 **
Vowel_focus group	*b* = -0.53 *p* = .23	*b* = -0.46 *p* = .14	*b* = -0.55 *p* = .03 *	*b* = 0.06 *p* = .86

→ Focus on tone in training did not lead to more accurate use of tonal cue, but to less accurate use of non-focused cues.

Summary & Conclusions

- Unexpectedly, drawing attentional focus to a specific cue in training did not benefit word learning.
- Instead, focus on a specific cue hurt the use of other (non-focused) cues, and led to lower overall success in word learning.
- Results are consistent with Zhao et al. 's (2011) hypothesis that "the recognition of Chinese monosyllabic words might rely more on global similarity of the whole syllable structure or syllable-based holistic processing rather than phonemic segment-based processing" (p. 1761).

→ Thus, the results from the current experiment might indicate that vocabulary learning in a tonal language is better supported through syllable-based holistic training than through allocating attentional focus on a specific phonemic cue.

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