

# Examining the effectiveness of high-variability phonetic training in second language acquisition

## INTRODUCTION

### OBSERVATION:

- Learning a second language – challenging for adults
- New sound contrasts – difficult to produce (and perceive) resulting in foreign accents that can interfere with intelligibility
- EXAMPLE: Mandarin Chinese tone for English speakers

### PROBLEM:

- Language classes typically taught by a single instructor (learners exposed to a single voice for months)
- Recent work shows that high variability phonetic training (HVPT) using multiple voices can benefit learners
- However, the literature reports mixed results

## OUR STUDY

- RATIONALE: since the effectiveness of the HVPT method is debated, our goal is to test it using Mandarin tone as the target structure
- Examples of different tones:  
[https://www.purpleculture.net/chinese\\_pinyin\\_chart/](https://www.purpleculture.net/chinese_pinyin_chart/)

### HYPOTHESIS:

HVPT (training with multiple voices) leads to more successful learning than low variability phonetic training (LVPT – training with a single voice).

## METHODOLOGY

### Stimuli:

- Monosyllabic Mandarin Chinese words uttered in 4 different tones produced by 5 native speakers
  - bao 1: flat bag 包
  - bao 2: rising thin 薄
  - bao 3: falling-rising full 饱
  - bao 4: falling Leopard 豹
- 15 different words (10 used in training, 5 used in testing)

### Participants:

- Monolingual high school students from Romania
- 2 groups of listeners
  - LVPT: exposed to only one voice (n = 6, mean age 16.3)
  - HVPT: exposed to three voices (n = 9, mean age 15.8)

### Procedure:

- 3 sessions on 3 alternate days, administered online using Pavlovia/PsychoPy
- Training on Days 1-3
- Testing on Day 3

### LVPT group:

Trained with 1 voice only, tested on the same voice + 2 new voices (all new words).

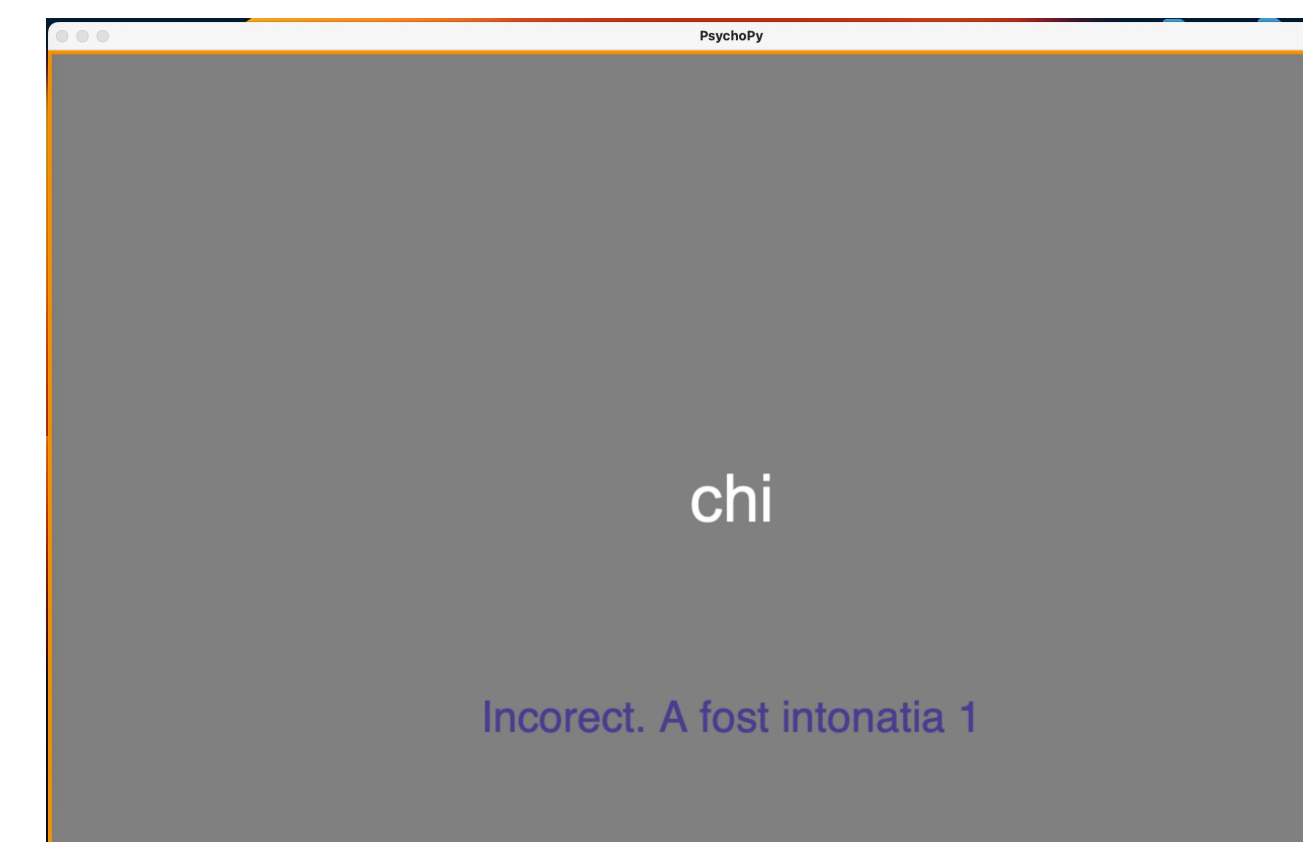
### HVPT group:

Trained with 3 voices, tested on 1 of these voices + 2 new voices (all new words).

### TRAINING:

- Part 1:** Listen to 10 words produced in 4 tones; receive visual input (spelling in Latin characters and tone number)
- Part 2:** Listen to the same 10 words produced in 4 tones, see Latin spelling → attempt to guess the correct tone → receive correct/incorrect response and tone number

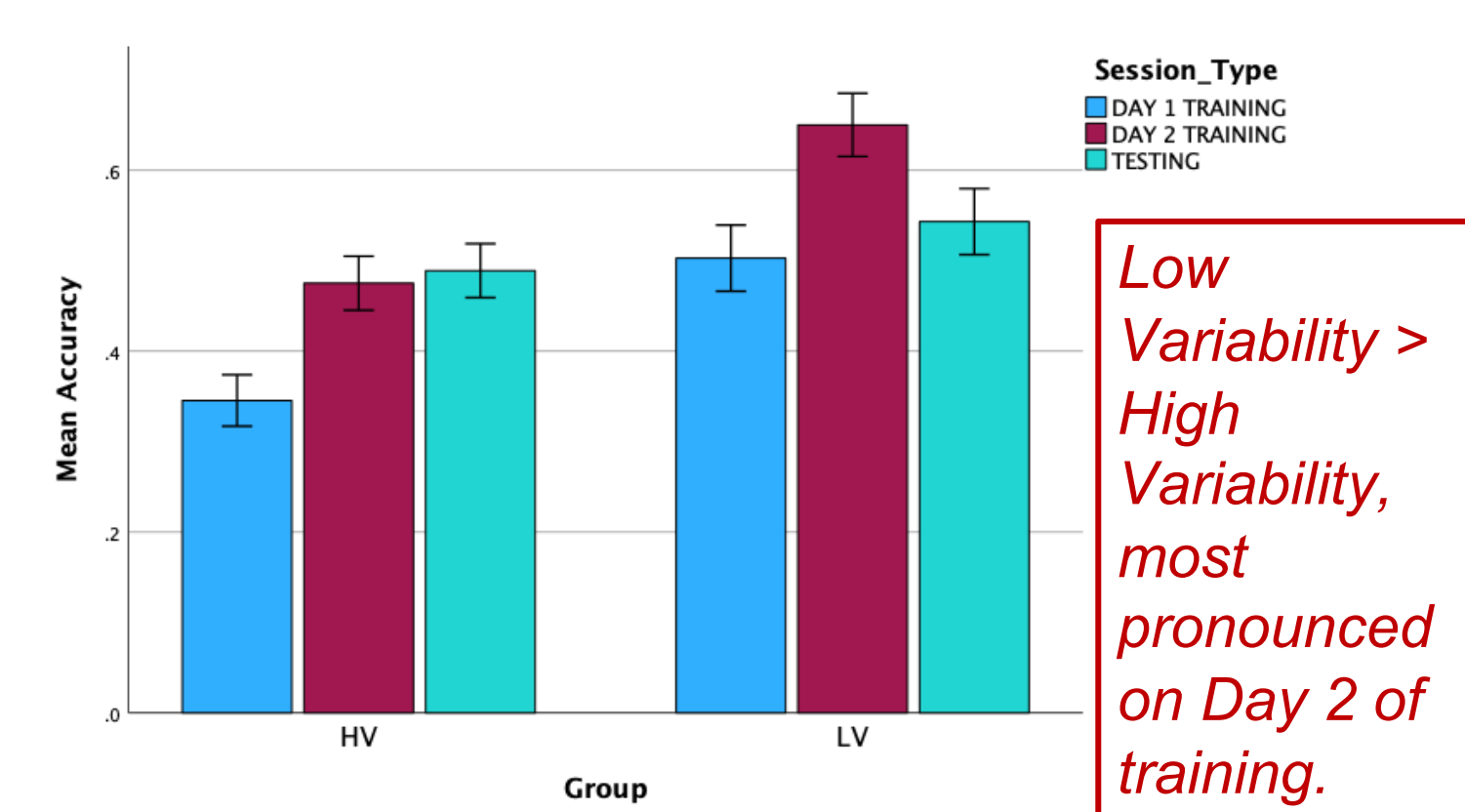
**TESTING:** Listen to 5 new words produced by 3 voices (1 familiar, 2 new) ; guess correct tone, no feedback provided



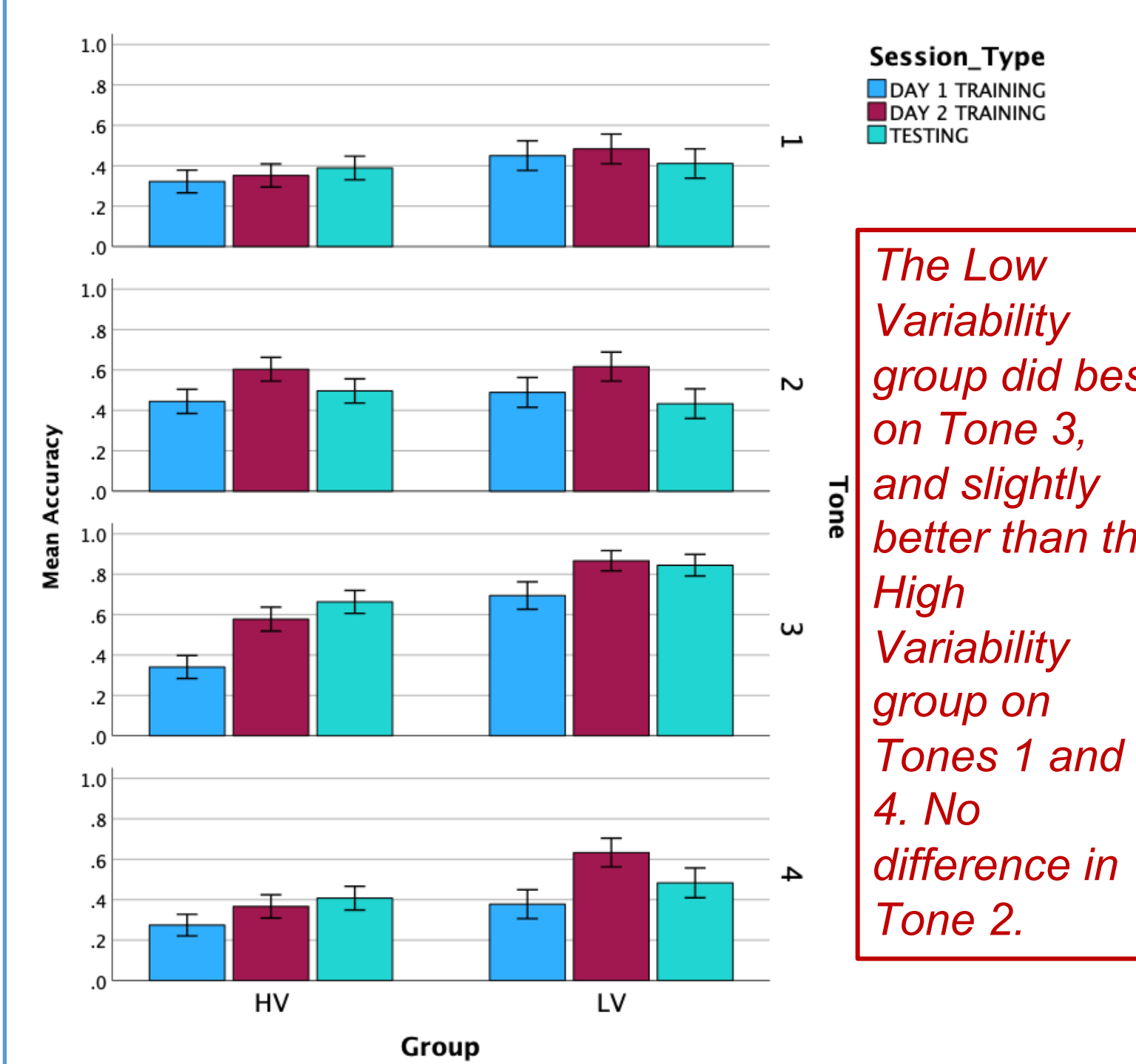
## ANALYSIS

Multivariate ANOVA with Accuracy as dependent variable and Group, Tone, and Session Type as independent variables

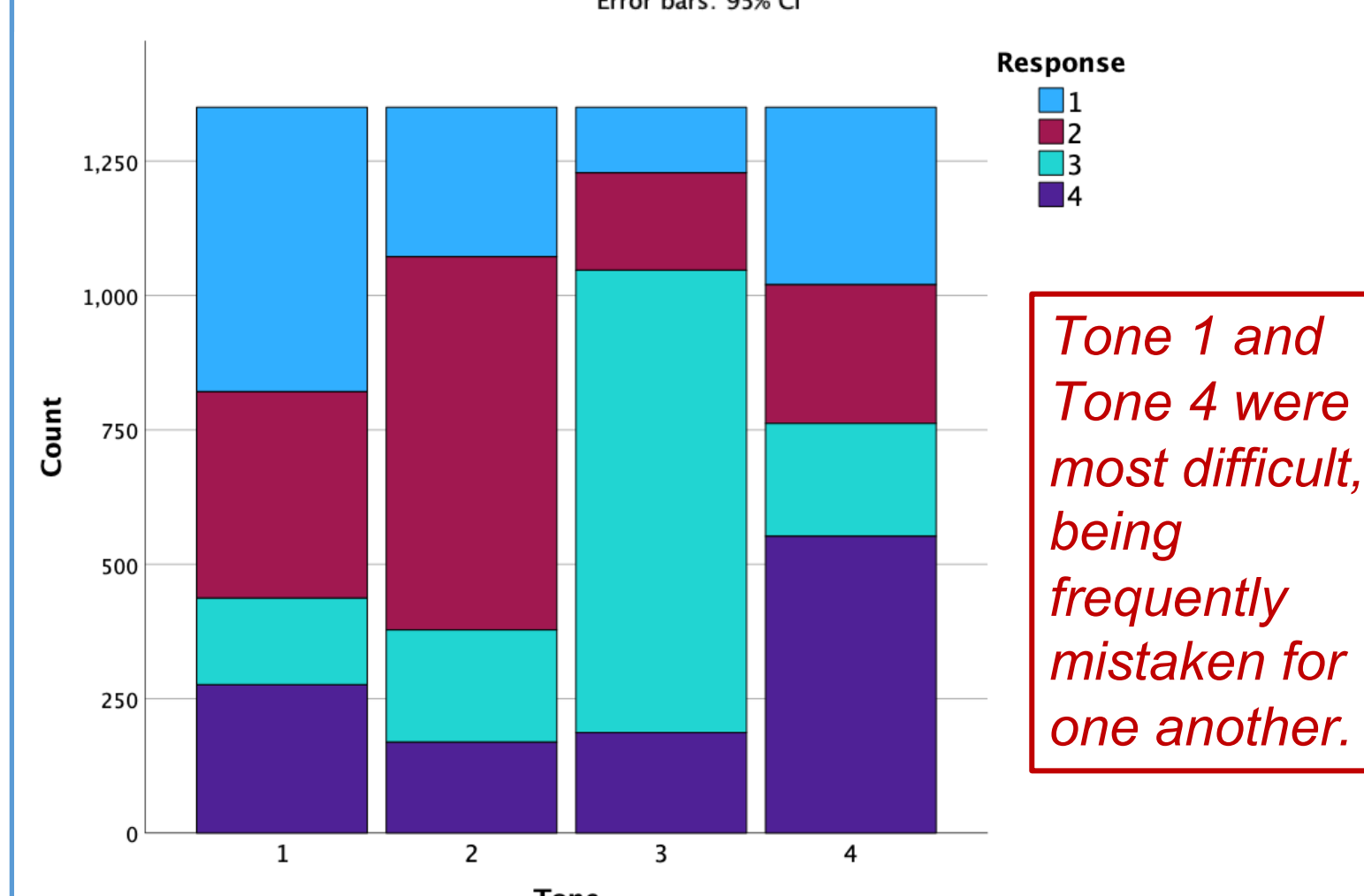
## RESULTS



Low Variability > High Variability, most pronounced on Day 2 of training.



The Low Variability group did best on Tone 3, and slightly better than the High Variability group on Tones 1 and 4. No difference in Tone 2.



Tone 1 and Tone 4 were most difficult, being frequently mistaken for one another.

Significant effects of GROUP, TONE, SESSION TYPE and their interactions (in pairs),  $p < .001$ .

## CONCLUSION

- Hypothesis not supported - more successful learning in the LVPT group.
- Given the complexity of the tone system, it may be easier to process and store the different tones when learning from only one voice, as generalizing over multiple voices (while beneficial in the acquisition of other aspects of language such as novel sounds) could make the task too challenging for learners
- The biggest difference between the LV and HV groups is on Day 2 training
- More work is needed to understand if there are age and gender effects
- Our study adds to the body of work on second language learning and how novel sound contrasts are processed in the mind.

## REFERENCES

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