

# High variability phonetic training (HVPT) in the classroom: Student and teacher perceptions and lessons learned

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AAAL  
March 20, 2022



# What is HVPT?

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- High variability phonetic training (HVPT): an effective tool for learning non-native contrasts in lab settings (Thomson, 2018)
- Features of HVPT:
  - Typically, one of two tasks (see Carlet & Cebrian, 2022):
    - Forced choice identification (e.g. [l] or [ɫ]?)
    - Discrimination (e.g. *same or different?*)
  - Listeners hear multiple voices
  - Target contrasts presented in a variety of contexts / words
  - Given feedback on their responses



# Target Languages

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- HVPT studies mainly focus on L2 English (meta-analysis by Uchihara, Karas, and Thomson, 2021)
- Recent growing body of work in other languages, all showing beneficial effects (in lab settings):
  - Spanish /r-r-d/ (Herd, Jongman, & Sereno, 2013)
  - French /u-y/ (Melnik, 2019)
  - Japanese length (Tajima et al., 2008; Sadakata & McQueen, 2013)
  - Portuguese stop voicing (Nunes & da Côrte, 2021)



# HVPT Beyond the Lab

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- Benefits extend beyond discrimination of target words:
  - Generalization to new voices and words (Thomson, 2018)
  - More robust vocabulary learning (Melnik & Peperkamp, 2020)
- Few studies have examined its efficacy outside a lab setting (Barriuso & Hayes-Harb, 2018)
- To our knowledge, none have looked at the effectiveness of HVPT as a part of required coursework
  - Students  $\neq$  study participants who self-select
  - Classroom imposes constraints on time, task type, etc.



# Research Questions

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When HVPT is implemented as required coursework...

1. Do students improve from pretest to posttest?
1. Do students see HVPT as useful for their learning?

# Overall Protocol

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- Intact classes completed HVPT as homework
- Consent obtained after semester grades were submitted
- Only students who responded to that questionnaire are included in this data set

# Participants



French	Spanish	Japanese
<ul style="list-style-type: none"><li>• 11 students</li><li>• 300-level Phonetics</li></ul>	<ul style="list-style-type: none"><li>• 26 students</li><li>• 300-level Phonetics</li></ul>	<ul style="list-style-type: none"><li>• 11 students</li><li>• 200-level language classes</li></ul>

- All students: (corrected-to-)normal vision, no speech or hearing disorders
- Heritage speakers were excluded from this analysis
- All L1 English except 1 French student (L1 Mandarin) and 1 Spanish (L1 French)



# Method

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## Pretest (Baseline)

- Week 1 of semester, along with questionnaire on attitudes towards pronunciation

## Training sessions

- One training / contrast, spaced throughout the semester
- Repeated until they reached 90% accuracy\*

## Posttests

- Posttest 1: Words from training sessions
- Posttest 2: Generalization to new words, voices
- Questionnaire

# Target Contrasts



French	Spanish	Japanese
/u-y/ tout – tu	/r-r/ caro – carro	/ts-s/ tsuki – suki (つき・すき)
/ã-ê-õ/ paon – pain – pont	/r-d/ coro – codo	/ai-ae/ aimasu – aemasu (あいます・あえます)
/Ñ-Vn/ américain – américaine	/e-ei/ reno-reino	Vowel length: yoji - yooji (よじ・ようじ)
/s-z/ <ss-s> poisson – poison	<g-gu> agitar vs. *aguitar	Consonant length: oto – otto (おと・おっと)
Liaison il accepte – ils acceptant	Stress: término - terminó (1 vs. 3) práctica - practica (1 vs. 2) aportara - aportará (2 vs. 3)	Nasals: sennen – seinen – sen'en – seien (せんねん・せいねん・せんえん・せいえん)

# Six Speakers per Target Language



FR Speakers	SP Speakers	JP Speakers	Pre-Test	Training	Post-Test 1	Post-Test 2
F (Quebec)	F (Spain)	F (Saitama)	○	○		
M (Quebec)	M (Cuba)	M (Tokyo)	○	○		
F (France)	F (Argentina)	F (Shizuoka)	○	○	○	○
M (France)	M (Mexico)	M (Niigata)	○	○	○	○
F (France)	F (Cuba)	F (Tokyo)			○	○
M (France)	M (Spain)	M (Kanagawa)			○	○



# Stimuli

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## Pretest:

- 10-12 items/contrast x 4 speakers x 5 contrasts = 208 items
- About 15 min

## Training:

- 20-24 items x 4 voices per training = 80-96 trials
- About 5 minutes each, if no repeats

## Posttests:

- Known words: 208 items (old words, half new speakers)
- Generalization: 208 items (new words, half new speakers)



continúo

continuó

はらいます

はらえます

¿Qué dijo la persona?  
What did the person say?

何と言いましたか。  
What did the speaker say?

tu

tout

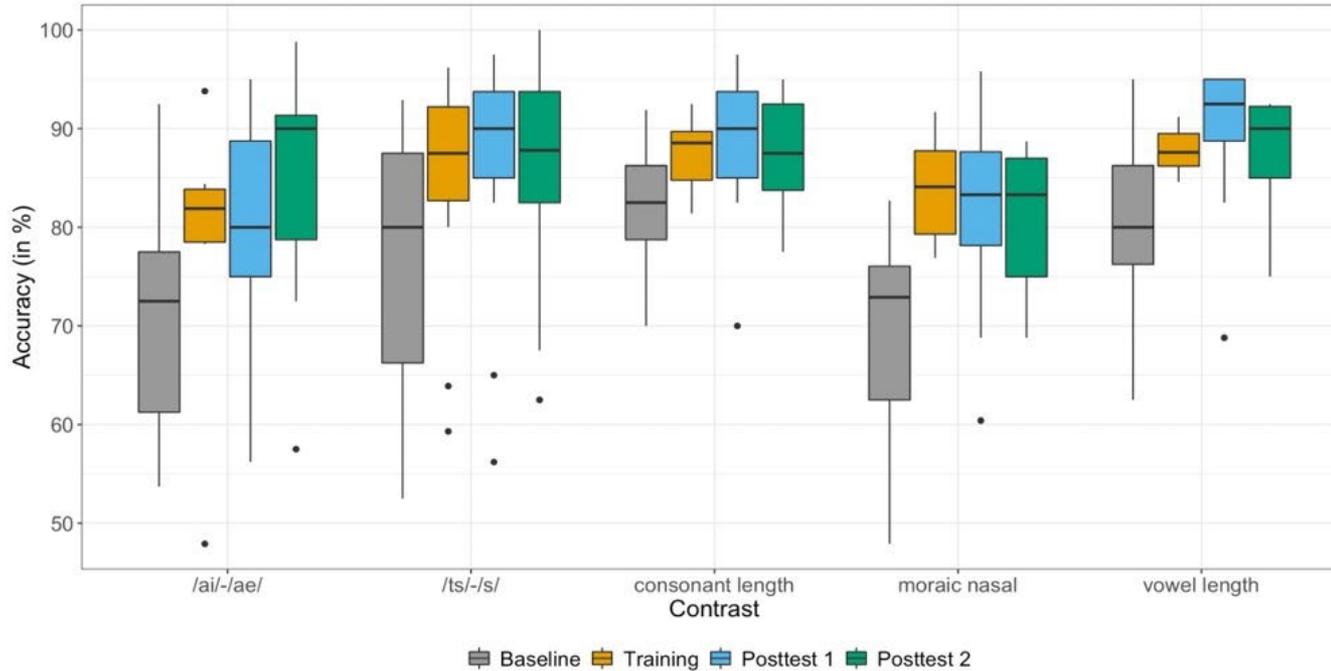


Qu'est-ce que la personne a dit ?  
What did the person say?

# Results

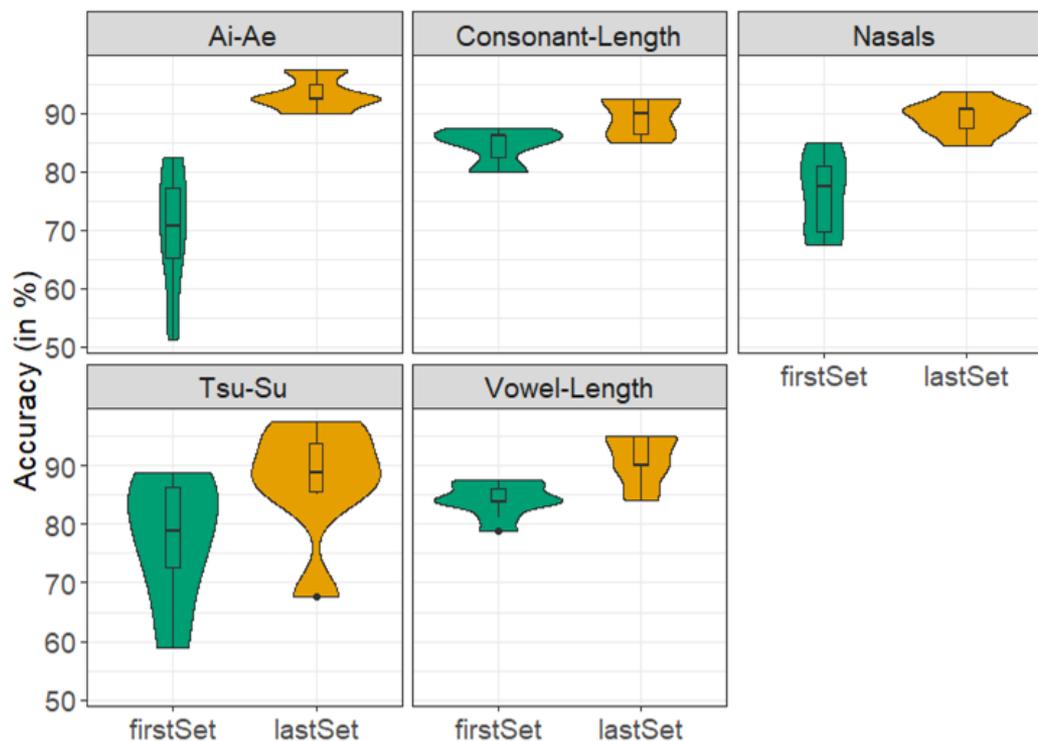
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# Example: Japanese





# Improvement Through Training





# HVPT Effectiveness

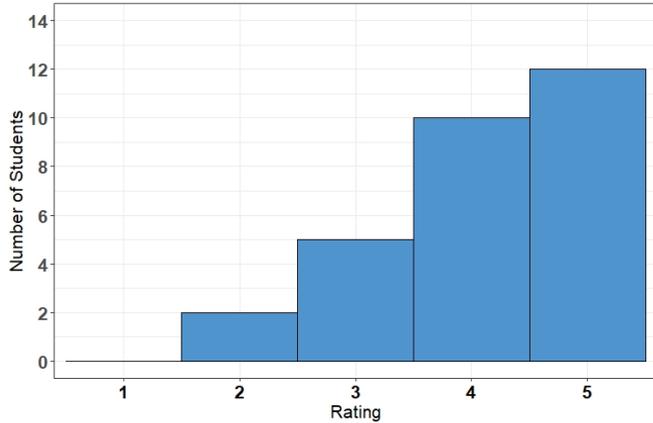
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- Overall improvements from pre- to posttest
  - French:
    - Ceiling on liaison even on pretest
    - Nasals were most difficult
  - Spanish:
    - No improvement for /r-d/
    - <g-gu> was low on pretest, but fast improvement

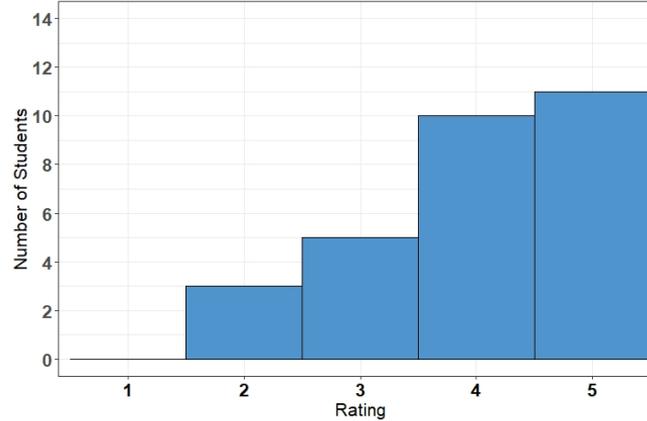
# Survey: Made me Think, Useful



**HVPT Made Me Think About Pronunciation**



**HVPT Was Useful**

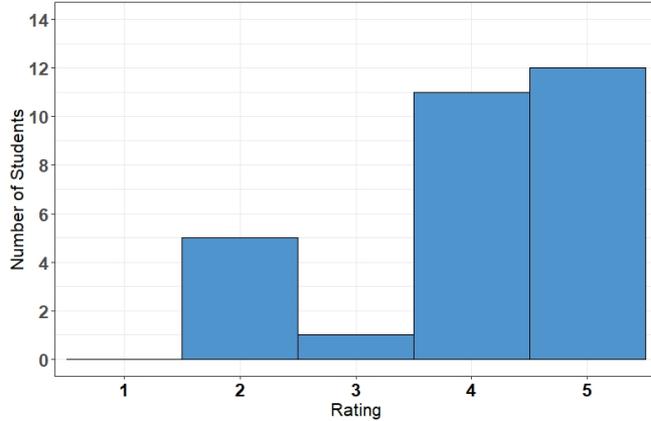


- 5 strongly agree
- 4 agree
- 3 neither agree nor disagree
- 2 disagree
- 1 strongly disagree

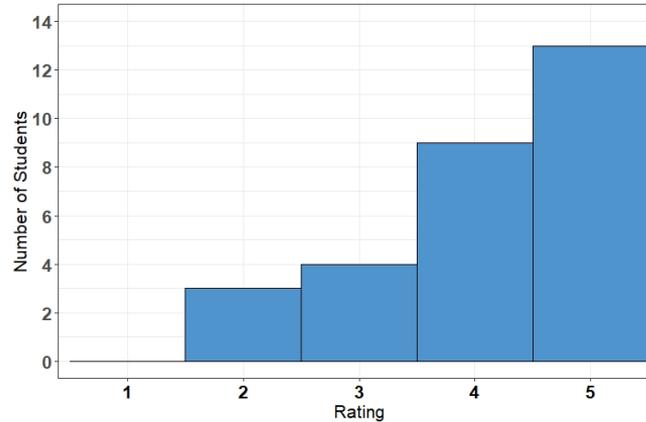
# Survey: Helpful, Can Recommend



**HVPT Helped My Listening**



**I Would Recommend HVPT to Others**



- 5 strongly agree
- 4 agree
- 3 neither agree nor disagree
- 2 disagree
- 1 strongly disagree

# Mostly Positive Impressions

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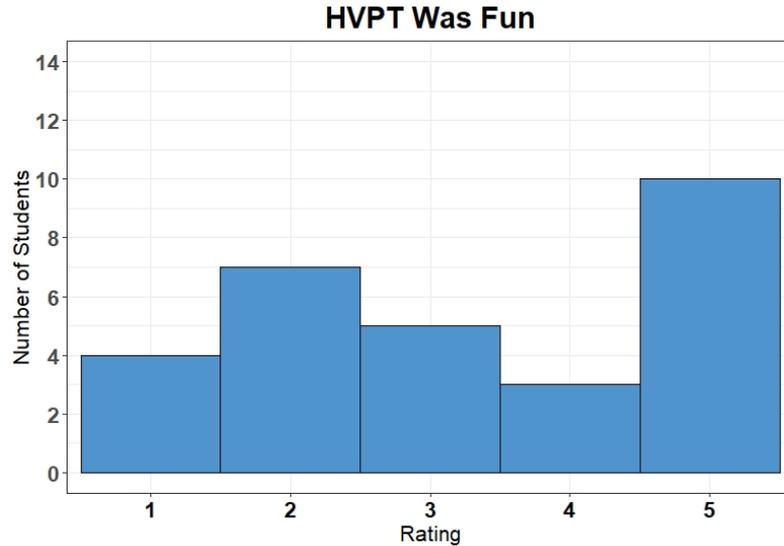


“*HVPT training is beneficial!!* It allowed me to hear native speakers' pronunciation of the words and also hear the differences between words that looked similar. *It really helped me learn this semester & I definitely think you should incorporate it in your classes in the future!*”

“HVPT *brought to my attention the importance of pronunciation* as some of the exercises were quite difficult and emphasized the need for greater practice.”

“This is the first Spanish course I've taken that uses this kind of perception training. All of my courses in the past have focused primarily on grammar and vocabulary, so the *HVPT training definitely did a lot more for my listening skills and pronunciation* than any other course I've taken.”

# Survey: Not Fun for Everyone



- 5 strongly agree
- 4 agree
- 3 neither agree nor disagree
- 2 disagree
- 1 strongly disagree



# Difficult, Hard to Improve

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- “The fact that you *had to get 90% EVERY SINGLE TIME* to get a good grade in class *sucked*”
- “My biggest complaint is [...] *not knowing why I made a mistake made it exceedingly difficult to improve my score.* Often times it took multiple attempts to see even a slight improvement”
- “mientras los entrenamientos de percepcion son muy util, *completandolos fue frustrante para mi.* ademas *no me gusta que puede oir cada palabra un tiempo*” [sic]



# Classroom Challenges

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- HVPT can be humbling; students are not accustomed to accuracy requirements (vs participation)
- Could not ensure ideal listening conditions
  - Headphones, quiet room, focus on (one) screen...



# Classroom Benefits

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- Reinforce learning outcomes in listening
  - Ex: match HVPT contrast to unit on Japanese verb forms:  
“I sing”                    *utaimasu*  
“I can sing”                *utaemasu*
- Pedagogically useful to include non-traditional HVPT contrasts
  - Even upper-level students initially struggled with sound-spelling correspondence

# Changes Based on First Experience

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- Include explanatory reference pages
- Make sure to include brief explanations in class as well
  - Students might not read explanations/instructions on the LMS
- Create practice tasks where students can listen to the tokens again multiple times before moving on
- Establish pedagogical protocols for tough cases:
  - For students who can't meet criterion: partial credit? Only after a certain number of attempts / amount of improvement?
  - Ensuring students know it is low-stakes



# Other Task Improvements

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- Adding Progress Bar
- Showing scores when they did not meet criterion
- Including more and larger variety of voices, contrasts
- Modifying feedback options
  - Hear missed sounds again
  - Compare sounds in the practice exercises



# Other Planned Adaptations

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- Splitting tasks up into smaller, more regular chunks
- Matching tasks to curricular outcomes
- Lexical encoding tasks:
  - Picture matching
  - Pronunciation judgment (“the speaker did / did not say this word”)



# Back to RQs

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- RQ1: Do students improve from pretest (baseline) to posttest?
  - For the most part, yes!
    - SP tap-d was exceptional, but otherwise consistent improvement
  - With few exceptions (SP tap-trill), able to generalize to new words and speakers



# Back to the RQs

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- RQ2: Do students see HVPT as useful for their learning?
  - For the most part, yes, but...
  - Also frustrating and long if they have to repeat
  - Requires careful planning and implementation



# In the Works

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## Multilingual Online Listening Exercises (MOLE)

- French, Japanese and Spanish

Working on developing open educational resource

The screenshot shows the MOLE website interface. At the top left, there is a logo of a mole wearing headphones and the text 'MOLE'. To the right of the logo are a notification bell icon and a user profile icon labeled 'AT'. Below the logo, there is a navigation bar with 'HOME', 'Dashboard', and 'Courses'. The main content area features a white box with the heading 'JOIN A COURSE'. Below the heading, it says 'Please enter the course code that your instructor gave you below.' There is a text input field labeled 'Course Code' and a 'Submit' button.



# Thank you! Questions?

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