Connecting experimental methods and language teaching

Learner perceptions of oral and nasal vowels in Lakota

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Agenda

1. Background for the study
    - Grounding our approach
    - L2 acquisition
    - Oral + nasal vowels in Lakota
    - Orthography & L2 phonology
2. Hypotheses
3. Method
4. Results & Discussion
5. Conclusions & Implications

Grounding our study

We are not members of the Lakota community: We thank the **Lakota Language Consortium** for permission to undertake this project

Today we're isolating one **particular** aspect of language

We acknowledge that the world of language, and what language means to communities, encompasses **much more** than what we will discuss today

Our hope is that the ideas we're presenting can be a part of efforts to:

- **Identify**, **center**, and **integrate** Indigenous needs and values about language in linguistic science (see Natives4Linguistics)
- Put **additional linguistic methodologies** toward that purpose

Terminology + focus

We use the common distinction between “first” and “second” language

We use the term **“second language” (L2)** in the typical, Western academic sense:

Language typically not acquired from/near birth from exposure to family and caretakers through the first several years of life (e.g., Ortega 2009)

We have a **U.S. focus** and discuss **Lakota** for this pilot study, but the general ideas here can apply elsewhere

In the U.S. and many other places … many Indigenous languages are now primarily acquired as **L2s**

(Part of) the big picture

Many such languages **differ considerably** from English:
in sounds, word structure, sentence structure, etc. (e.g., Mithun 1999)

Experimental methods can help inform efforts in **how to teach** these languages to learners who have English as their first language (L1)

We'll consider two questions about developing an L2 **sound system**:

1. How do English L1s **perceive sounds** in Indigenous languages that are not present in English?

2. How is this perception **affected by the writing systems** (orthography) used to teach languages?

Lakota

Why Lakota?

Currently spoken in **North, South Dakota**

5,000+ **speakers** and strong
language teaching efforts + resources
(Lakota Language Consortium 2019)

Image: Lakota Language Consortium

Lakota has some **sounds** + sound **distinctions** not found in English

These are indicated in **particular** orthographic ways (i.e., ***spelling***)

For example …

Oral + nasal vowels in Lakota

/i, e, u, o, a/ vs. **/ĩ, ũ, ã/** (Rood & Taylor 1996)

This oral vs. nasal contrast **not** in English

L2s must **learn this distinction**
to develop their Lakota phonology:

Perception (our focus) + **production**

In standard education practice:
Nasal vowels are indicated **orthographically**
with the symbol **<ŋ>**
(Ullrich & Black Bear, 2016)

Examples

há ‘skin’	**háŋ** ‘yes’
hĩ ‘tooth’	**hĩŋ** ‘hair’
sú ‘seed’	**súŋ** ‘braid’

New Lakota Dictionary (2014)

Oral + nasal vowels in Lakota

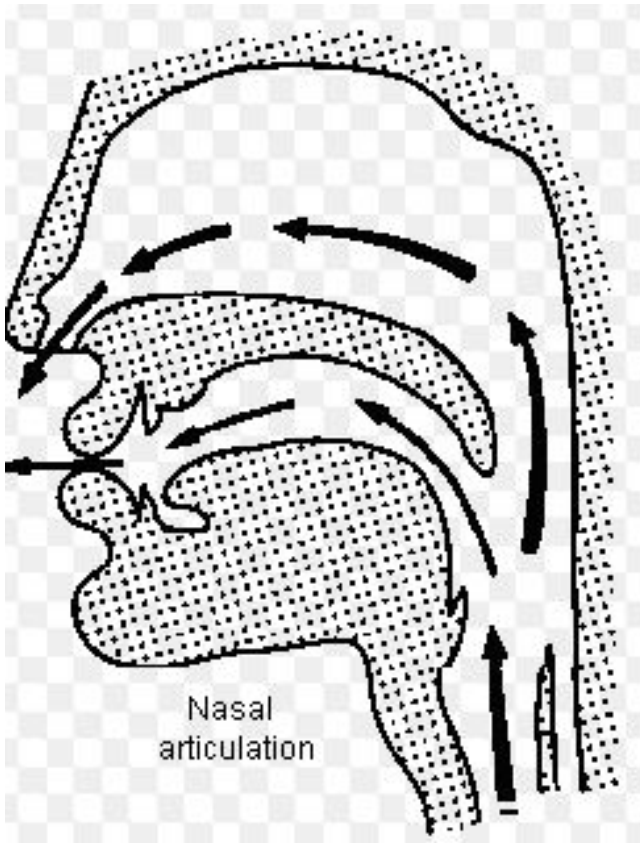
Different nasal vowels have **different qualities**

Anecdotal learner reports: **/a/ vs. /ã/ easier to distinguish** than other pairs (Scarborough et al. 2015, p. 302)

Perhaps because **/ã/ is more nasalized** than /ũ/ or /ĩ/ (2015, p. 296)

Experimental methods can **help identify** which vowel contrasts are **easier/harder** for learners to perceive

Nasal vowel production



Oral + nasal vowels in Lakota

Orthographic input has **varying effects** on L2 phonology
(Bassetti 2008; Bassetti et al. 2015)

Orthography may **help** learners develop L2 phonology if:

1. L2 phonemic contrasts are **easy to perceive**
2. Grapheme-phoneme correspondences are **one-to-one**:
   One symbol for one sound
3. Correspondences are **close to L1**: ex) <a> = /a/ in L1 + L2

Experimental methods can also help determine if/how
the **spelling** of nasal vowels plays a role in learner **perception**

Our study

What roles do different vowels + orthography play in **L2 perception?**

Low vowels: /a, ã/

High vowels: /i,ĩ, u, ũ/

Hypothesis 1:

English L1s will more accurately distinguish between Lakota word pairs **differentiated by low vowels** than those differentiated by high vowels

- **Why?** /ã/ is more nasalized than /ĩ, ũ/

Our study

Hypothesis 2:

English L1s **not exposed** to written representations of words will **more accurately** distinguish between word pairs differentiated by oral/nasal vowels

Ex) Easier to distinguish ***há*** vs. ***háŋ*** if one doesn't see them spelled

- **Why?** Literature indicates possible interference from L1 knowledge of English orthography on two counts
  - Grapheme **<ŋ> not in** English orthography
  - Single nasal phonemes represented by a **digraph <Vŋ>** instead of a single symbol

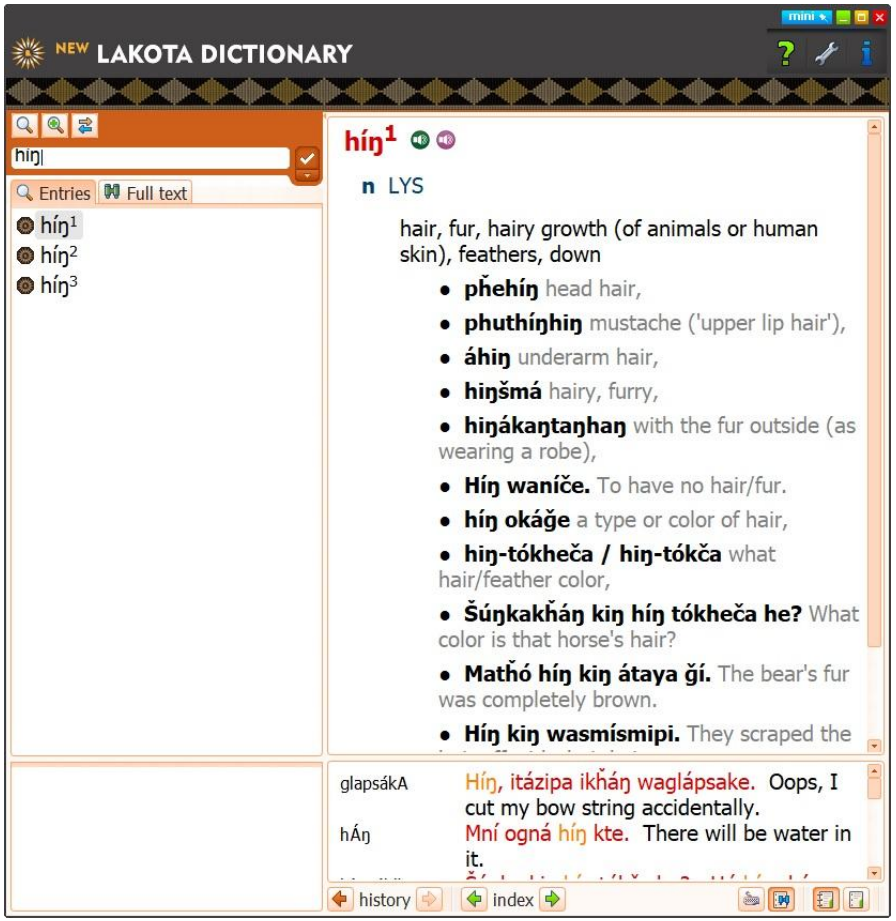
Our study

Lakota words + pronunciations from the ***New Lakota Dictionary*** (2014)

We reached out
and asked **permission**
from the dictionary creators:
The **Lakota Language Consortium**

We used **real Lakota words**
from the dictionary

Participants heard **audio recordings**
from the dictionary:
Same speaker for each word



Research method

Research participants:

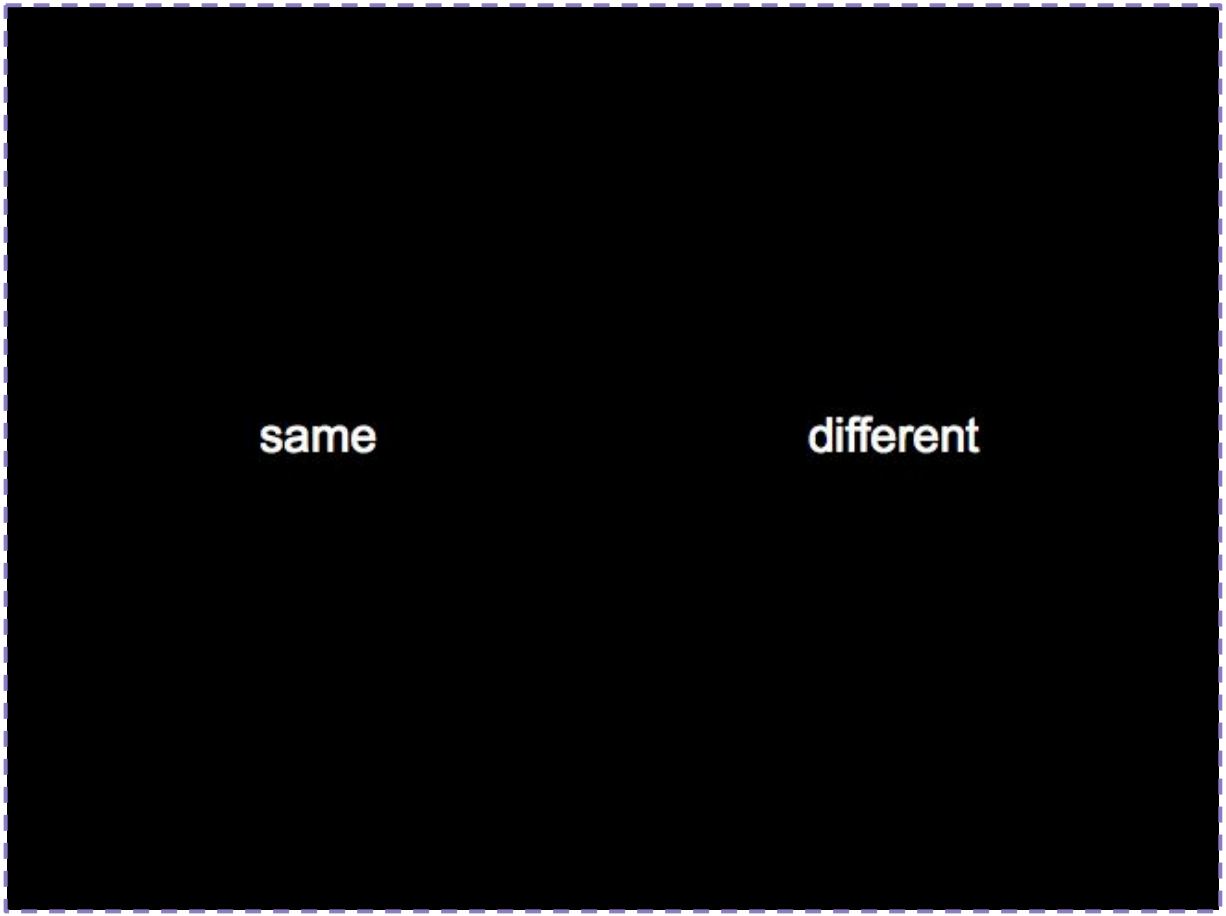
- 18 students at University of Hawai‘i at Mānoa
- Not true Lakota learners
- But they represent the absolute baseline of English L1s with **no exposure to the oral-nasal vowel phonemic contrast**

Experimental design:
Experiment tested participants’ ability to distinguish between word pairs, and potentially learn these contrasts (*same-different* task)

- Three stages: Pre-test, training, and post-test
- Two training groups: Orthography and No-orthography

Pre-test

All participants



sú sú

sú súŋ

Training: Familiarization

No-orthography Group

oral nasal

há háŋ

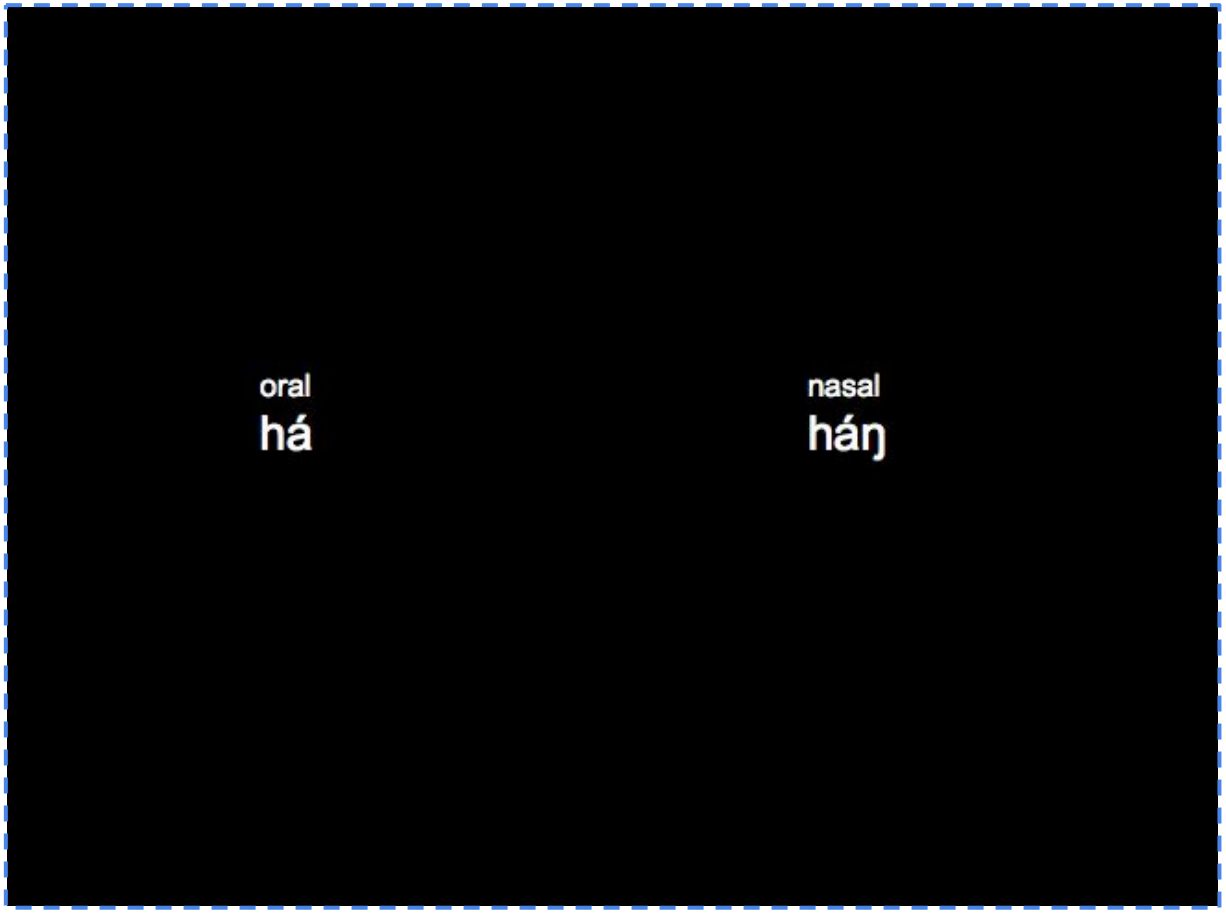
Training: Matching

No-orthography Group

háŋ

Training: Familiarization

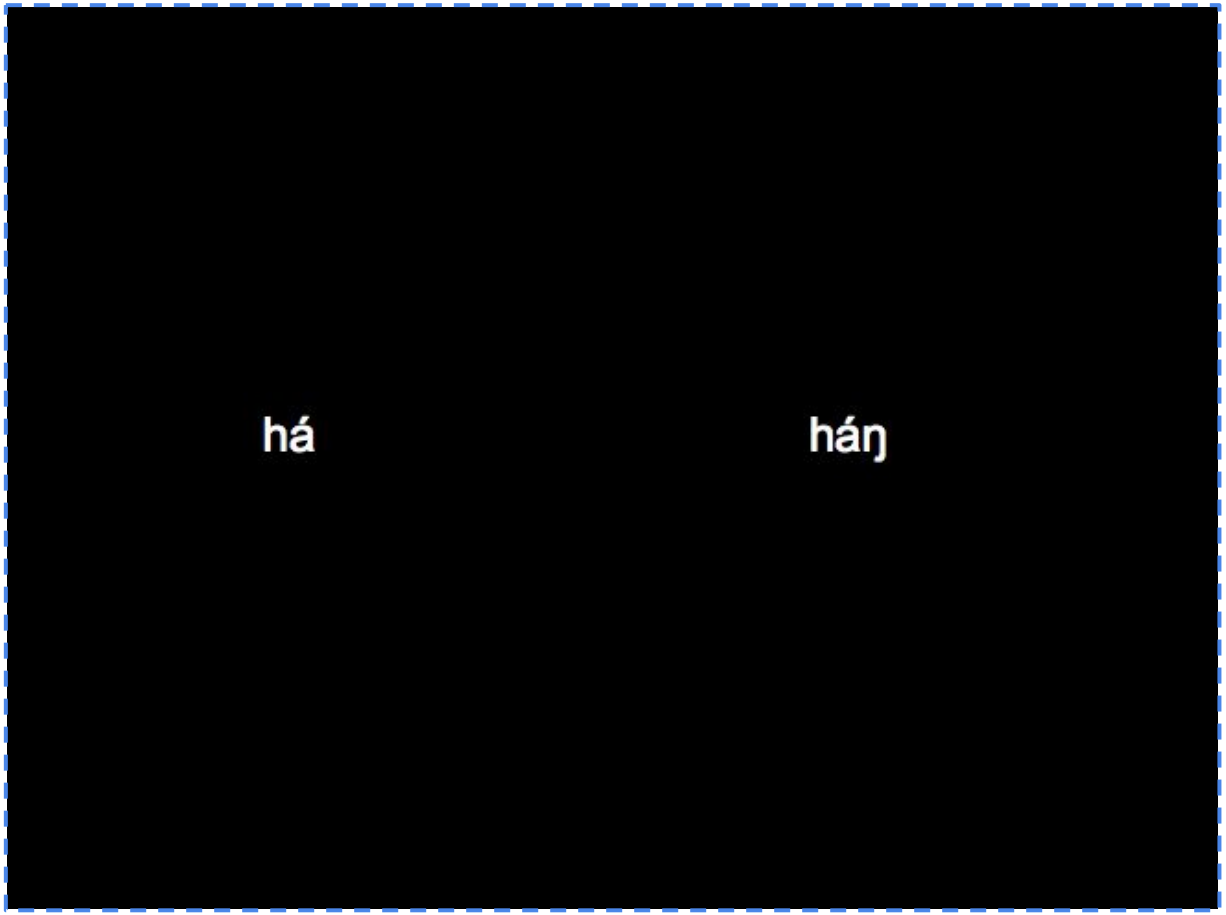
Orthography Group



há háŋ

Training: Matching

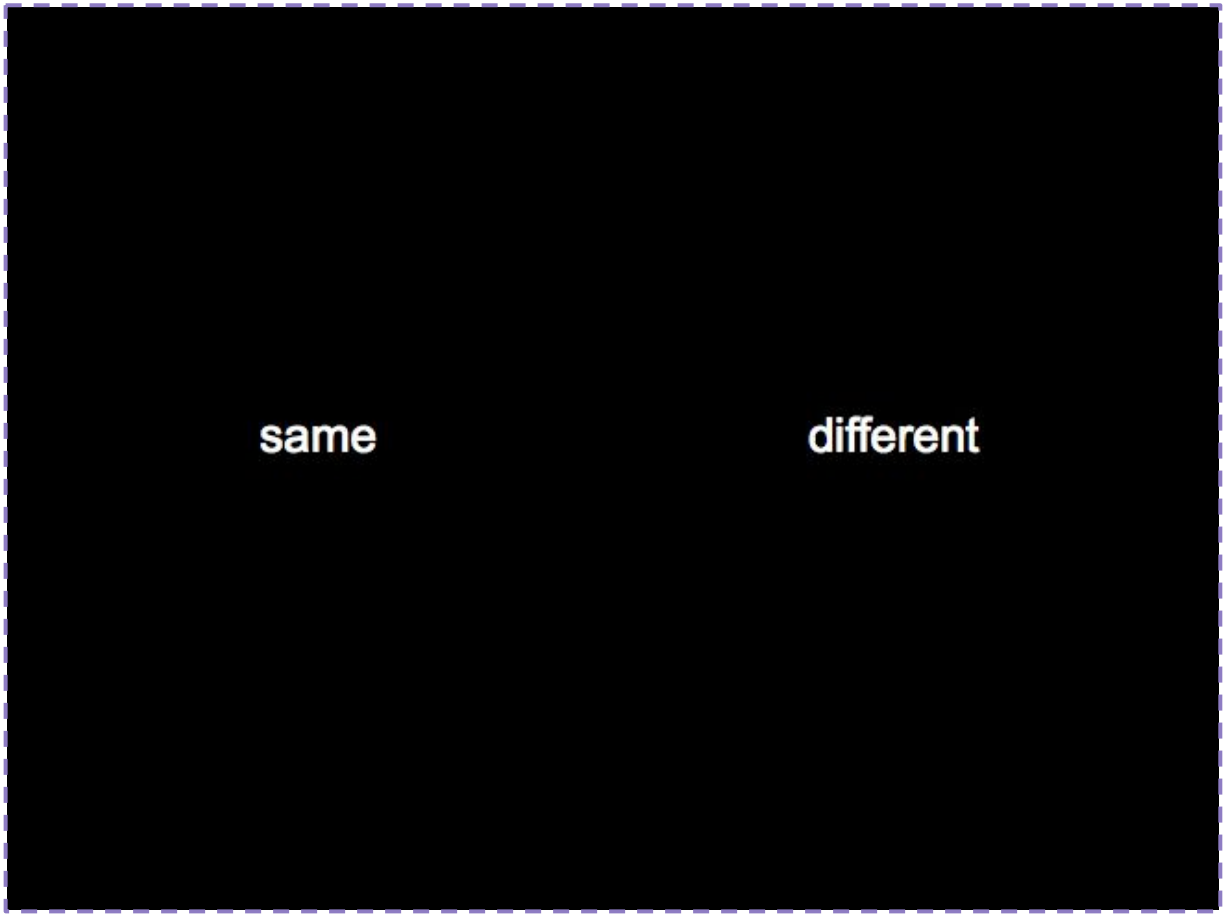
Orthography Group



háŋ

Post-test

All participants



sú sú

sú súŋ

Discussion

H1 English L1s will more accurately distinguish between Lakota word pairs **differentiated by low vowels** than those differentiated by high vowels

Result: *kind of* supported

- /a, ã/ pairs (low vowels) were easily distinguishable
- But **so** were /u, ũ/ pairs
- As expected, /i,ĩ/ words were most difficult to distinguish

Accuracy

	Pre-test
/a/ & /ã/	86.75%
/u/ & /ũ/	90.93%
/i/ & /ĩ/	70.80%

Group results

Orthography group

Pre-test:
Average score: 80.2%

Post-test:
Average score: **85.2%**
(5% improvement)

→ Improvement is statistically significant ($p < .01$)

No-orthography group

Pre-test:
Average score: 85.5%

Post-test:
Average score: **87.7%**
(2.2% improvement)

→ Improvement is not statistically significant

Discussion

H2 English L1s **not exposed** to written representations of words will **more accurately** distinguish between word pairs differentiated by oral/nasal vowels

Result: not supported

	Pre-test results		Post-test results	
	orthography	no-orthography	orthography	no-orthography
/a/ & /ã/	85.6%	87.9%	78.7%	79.2%
/u/ & /ũ/	87.96%	93.9%	93.5%	98.6%
/i/ & /ĩ/	67.1%	74.5%	83.3%	85.2%

All post-test results significantly different from pre-test

Discussion

In a nutshell, here are the improvements:

	Orthography	No-orthography
/u/ & /ũ/	5.5%	4.7%
/i/ & /ĩ/	**16.2%**	10.7%

Pre-test results

	orthography	no-orthography
/a/ & /ã/	85.6%	87.9%
/u/ & /ũ/	87.96%	93.9%
/i/ & /ĩ/	67.1%	74.5%

Post-test results

orthography	no-orthography
78.7%	79.2%
93.5%	98.6%
83.3%	85.2%

All post-test results significantly different from pre-test

Discussion

H2 English L1s **not exposed** to written representations of words will **more accurately** distinguish between word pairs differentiated by oral/nasal vowels

Result: not supported

Why did the orthography group improve more?

- Orthography more helpful than category labels
- Participants said orthography gave them something concrete to map to

Conclusions

- Our goal was to explore:
  - If particular L2 sound contrasts are easy/difficult to perceive
  - If orthography helps learners with these contrasts

- We found that:
  - Experimental evidence corroborates learner reports and contributes additional insight
  - Particular sound contrasts vary in difficulty
  - Orthography helped learners more with the most difficult contrast

Implications

In what way is this study helpful for language teachers? SLA in general?

- **Orthography can be helpful** for teaching oral vs. nasal vowels
- Can **adapt this experiment** to phonemic contrasts in other languages
- Experiments could help inform community **decisions** regarding pedagogy, resources, and/or orthography
- Such scientific evidence can **support related efforts,** such as funding applications and reports

Future directions :

- Look at link between perception and **production** in revitalization contexts
- Modify training to improve learning

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