

# Types of statistical learning in the acquisition of alternations:

insights from artificial grammar learning

Jennifer Kuo, Cornell University (kuojennifer.com)

## Discussion

Preference for **non-alternation**

- Paradigm uniformity (Benua, 1995; Kenstowicz, 1997; Steriade, 2000)
- Underlearning of alternation pattern

Effect of phonotactics **depends on alternation rates**, surfacing when...

- Uncertainty in choice of alternant.
- Extending high rates of alternation.

**Leakage** (Martin, 2011): use phonotactics...

- even when alternation is *not* phonotactically motivated in training.
- potentially shaping lexicon over time.

Implications for **modeling**

- Phonotactics & alternations are separate...
- but interact with e/o

## Takeaway

Speakers utilize phonotactics when extending alternations, in a way that is **sensitive to paradigm-internal frequencies**.

## Future directions

- Test the **reverse pattern** (alternation increases phonotactic violations).
- Degrees** of phonotactic violations.
- Effect of **individual** phonotactic judgments
- Effect of **input size**
- Replication with **in-person study**.

Link to poster

[www.kuojennifer.com/files/2024\\_wccf1.pdf](http://www.kuojennifer.com/files/2024_wccf1.pdf)



## Experiment

### Participants

- N=150 English speakers (Prolific)

### Stimuli

- Final **[p]** may alternate with **[k]**
- Suffixes: /-a/ 'dual', /-la/, /-wa/
  - /-la/ and /-wa/ mean 'bigger' or 'many'
- CV!CVCC, obeys English phonotactics

### Procedure

- Training:** 30 p-final + 30 fillers, 2 repetitions
  - p-final items always given with /-a/.
  - /-wa/ and /-la/ shown with filler items.
- Testing:** 16 p-final
  - shown with /-la/ and /-wa/
  - 2AFC: non-alternating vs. p~k alternation

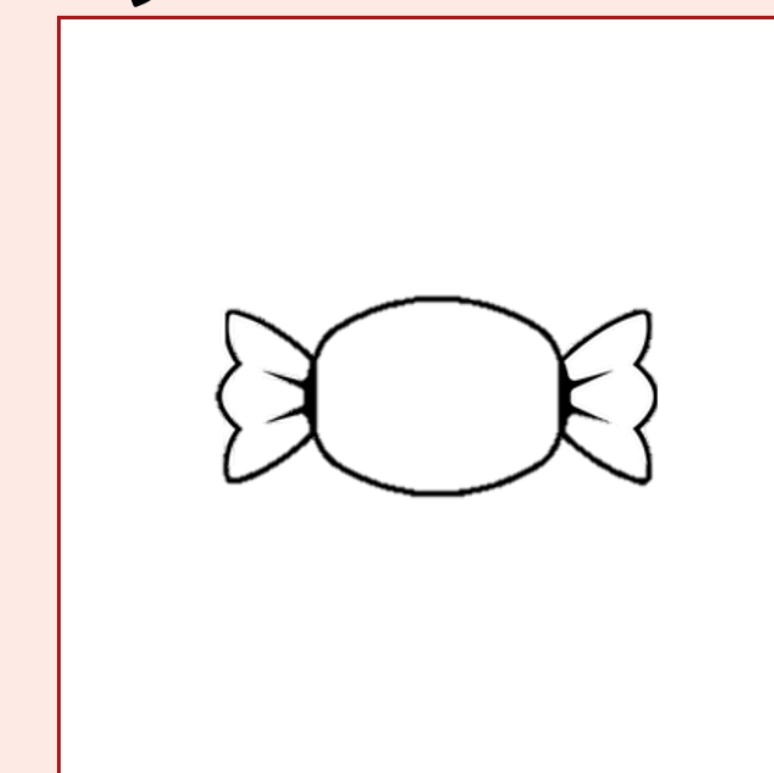
### Factors

- Rate of alternation** in training data: 20%, 40%, 60%, 80%
- Phonotactic markedness** of alternating form, based on English judgments (Hammond, 1999)

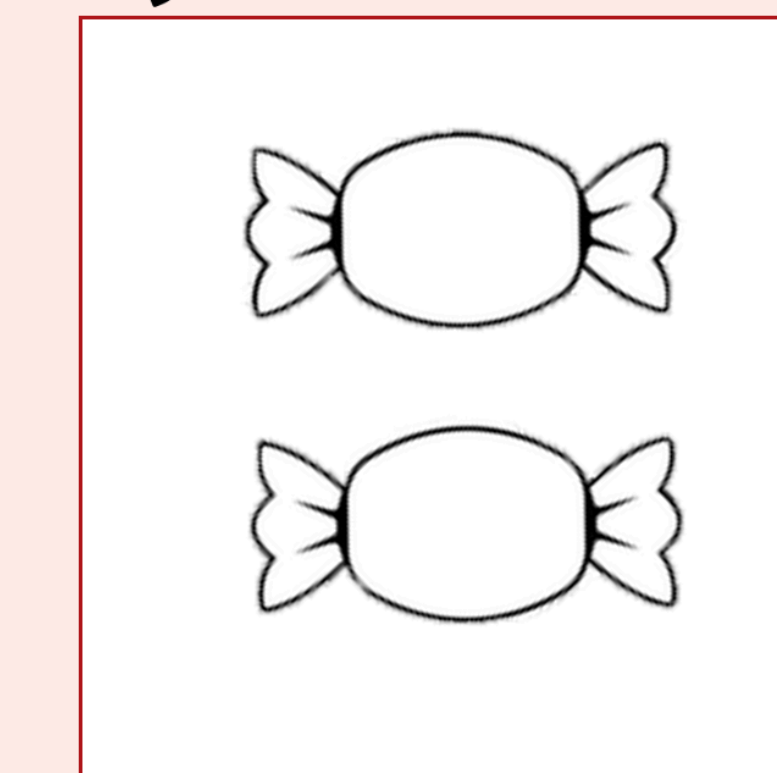
SG	/-wa/	Pattern	Phonotactics	
chiasp	chias.pwa	non-alt	<b>marked onset *pw</b>	Suffix is /-wa/: non-alternation results in bad onset *pw
ganasp	ganas.kwa	p~k	unmarked onset kw	
SG	/-la/	Pattern	Phonotactics	
ganarp	ganar.pla	non-alt	unmarked onset pl	Suffix is /-la/: neutral wrt. phonotactics
penerp	pener.kla	p~k	unmarked onset kl	

Training phase

panasp



panaska

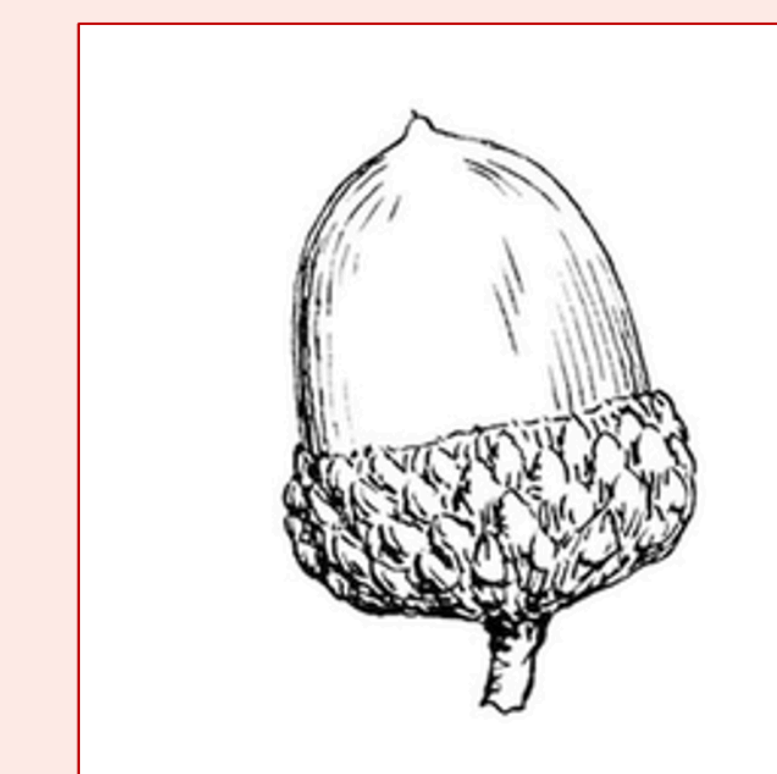


Testing phase

chirisp



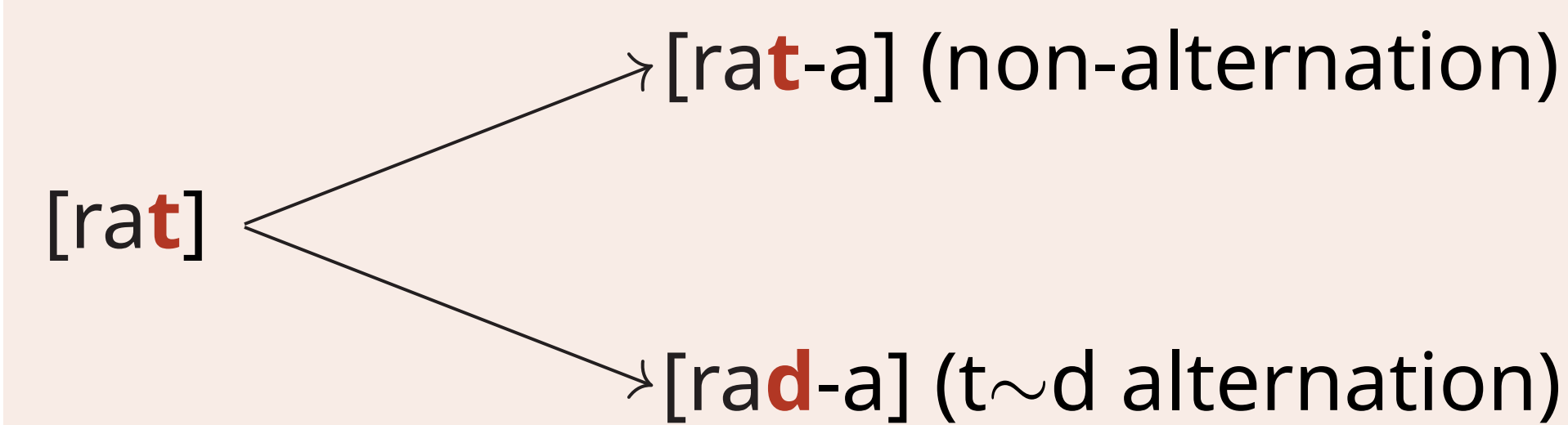
What is this?



chirispla chiriskla

## Background

- How do speakers learn alternations?



- Factors involved in alternation learning:
  - Frequency-matching:** match the rate of alternation found in lexicon (e.g. Ernestus and Baayen, 2003; Hayes et al., 2009).
  - Phonotactics:** probabilistic knowledge of how phonemes can combine in stems (e.g. Pater and Tessier, 2005; Chong, 2021)
- Phonotactics and alternations...
  - Often **line up** e.g. /fj+z/ → [fjz] (cf. \*[fjz])
  - But can also **mismatch** (Paster, 2009; Gouskova, 2018)
- Methodological challenges**
  - Hard to isolate effects of frequency and phonotactics

## Research Questions

- When do speakers use phonotactics to aid in alternation learning?
- How does **phonotactics** interact with **frequency-matching**?

## Acknowledgements

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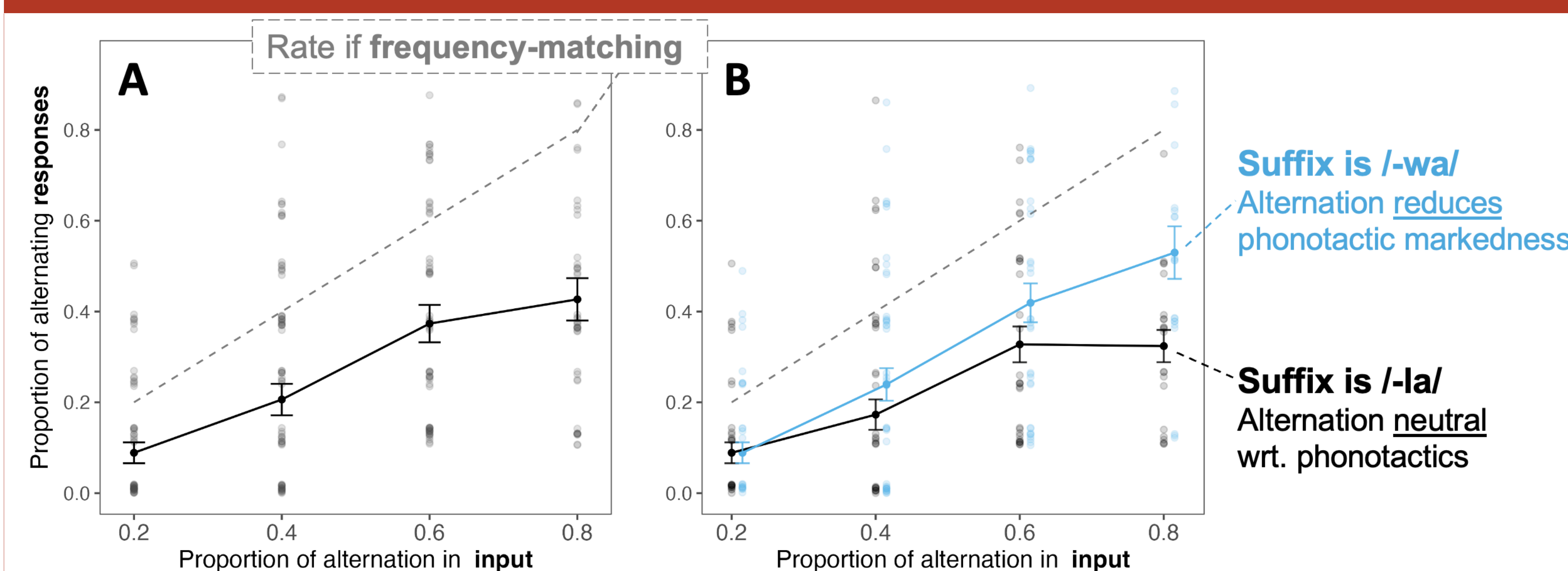
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## Results



- Figure A.** Effects of **frequency-matching** and a **preference for non-alternation**
- Figure B.** **Effect of phonotactics** only at higher alternation rates.

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