

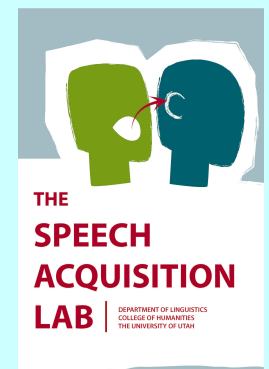
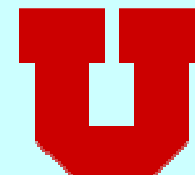
Naturalness of Three Phonological Harmony Types

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Overview

- This study investigates the relationship between relative frequency and learnability of three phonological harmony types

Background

- Certain phonological patterns are cross-linguistically more frequent than others
- e.g., cross-linguistic frequency of harmony patterns:

Vowel (V) > Coronal (C) > Dorsal (D)

(Rose & Walker 2001, and others)

Harmony

- Harmony ~ Long-distance assimilation between vowels or consonants in a word

Harmony Examples

- Turkish Vowel Harmony

[ayak-ten] ('foot', ablative) → [ayaktan]

→ Vowel in suffix agrees in frontedness with vowels in root

(Shaw 1991)

Harmony Examples

- Chumash Coronal Consonant Harmony

[ušla] (‘with the hand’) → [usla-siq]



(‘to press firmly by hand’)

→ Consonant agrees in anteriority with
rightmost sibilant

(Shaw 1991)

Harmony Examples

- Tlachichilco Tepehuan Dorsal Consonant Harmony

[uks-laqts'-in] → [oqslaqts'in] 'look at X across surface'

→ /k/ in prefix [uks] becomes uvular [q] if uvular follows in root

(Rose & Walker 2001)

Background

- Frequent patterns are more learnable than unattested ones
 - e.g., assimilation/dissimilation vs. random patterns (Wilson 2003)
- Similarly, in this study we asked whether the relative frequency of harmony types ($V > C > D$) is related to their relative learnability

Study

- This question was addressed by means of an experiment:
 - Monolingual English speakers were taught words from an unfamiliar language
 - Later tested on their knowledge of the harmony patterns (i.e., their learning success)

Hypotheses

1. Learners will learn words with V harmony better than learners learning words with C consonant harmony ($V > C$)
2. $V > D$
3. $C > D$

Study Overview

- Artificial Grammar Paradigm (Wilson 2003; Gomez & Gerken 1999)
- **Training Phase** Participants listened to words in an unfamiliar language
- **Testing Phase** Participants were asked to determine whether words followed the pattern of the words from the training phase

Participants

- Monolingual speakers of English
- Recruited from undergraduate courses at the University of Utah
- Randomly assigned to one of three experimental groups:
 - V harmony group (N=13)
 - C harmony group (N=13)
 - D harmony group (N=13)

Stimuli: Training Phase

Training Condition	Harmony Pattern	Examples
V harmony	Rounding harmony between last root vowel and all suffix vowels	<i>tiku-fotu</i> <i>kitu-fotu</i> (N=20)
C harmony	Harmony between last root consonant and all suffix consonants	<i>tinu-sani</i> <i>nitu-sani</i> (N=20)
D harmony	Harmony between last root consonant and all suffix consonants	<i>togi-kegu</i> <i>tegi-kegu</i> (N=20)

Stimuli: Testing Phase

- The test consisted of forty word stimuli, ten in each of four test word conditions (N=40)

Stimuli: Testing Phase

Test Word Condition	Definition
Old-Grammatical	Root is familiar from training; harmony follows trained harmony pattern → <i>Identical to words learned during training (N=10)</i>
Old-Ungrammatical	Root is familiar from training; harmony does not follow trained harmony pattern (N=10)

Stimuli: Testing Phase

Test Word Condition	Definition
New-Grammatical	Root is <i>unfamiliar</i> from training; harmony follows trained harmony pattern (N=10)
New-Ungrammatical	Root is <i>unfamiliar</i> from training; harmony does not follow trained harmony pattern (N=10)

Procedures: Training Phase

- Participants were auditorily exposed to block of 20 words repeated 8 times (N=160)
- Participants were instructed to learn what they could about the sounds of the language
- i.e., participants were to learn the pattern underlying the words

Procedures: Testing Phase

- Immediately followed training
- Participants were auditorily exposed to 40 words

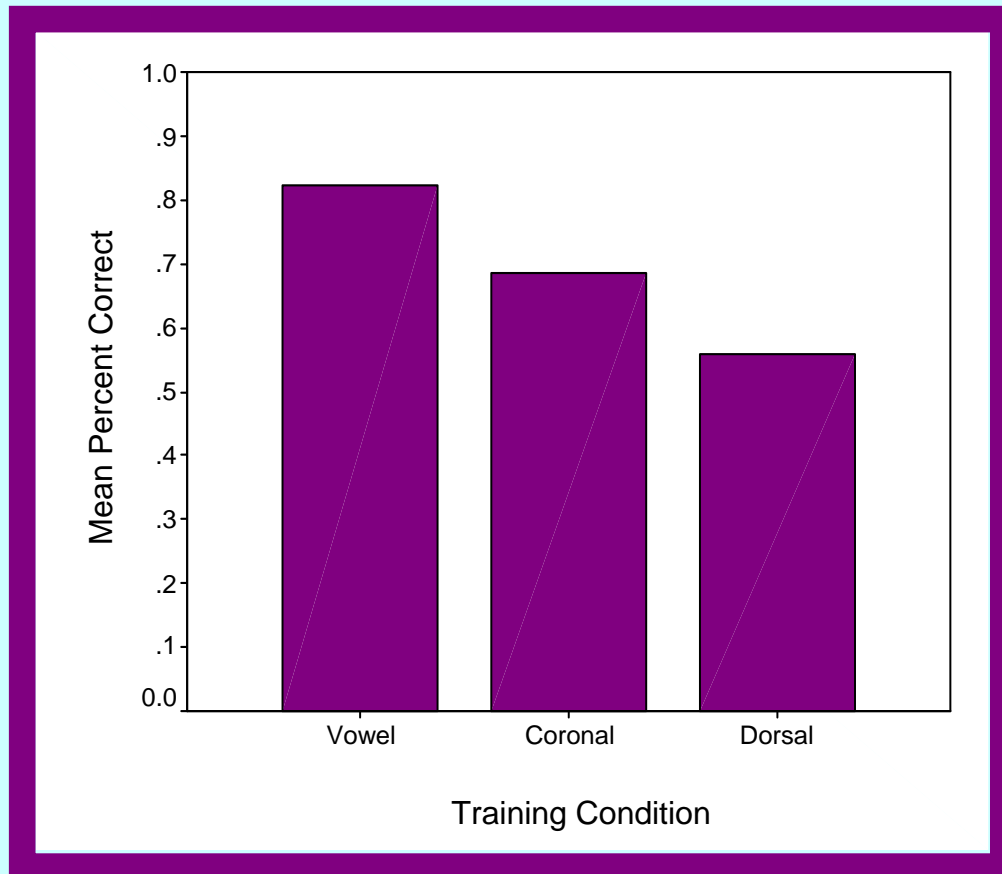
Procedures: Testing Phase

- Participants were asked to press a ‘yes’ button on a keyboard when test words *followed the same pattern* as the words heard during the training phase
- And were asked to press a ‘no’ button when test words *did not follow the same pattern* as the words heard during the training phase

Results: Overall Accuracy

- **Overall Accuracy**: Responding ‘yes’ to grammatical items and ‘no’ to ungrammatical items

Results: Overall Accuracy



Mean proportion correct by participant group:

- V group more accurate than C group ($p < .05$)
- $V > D$ ($p < .05$)
- $C > D$ ($p < .05$)

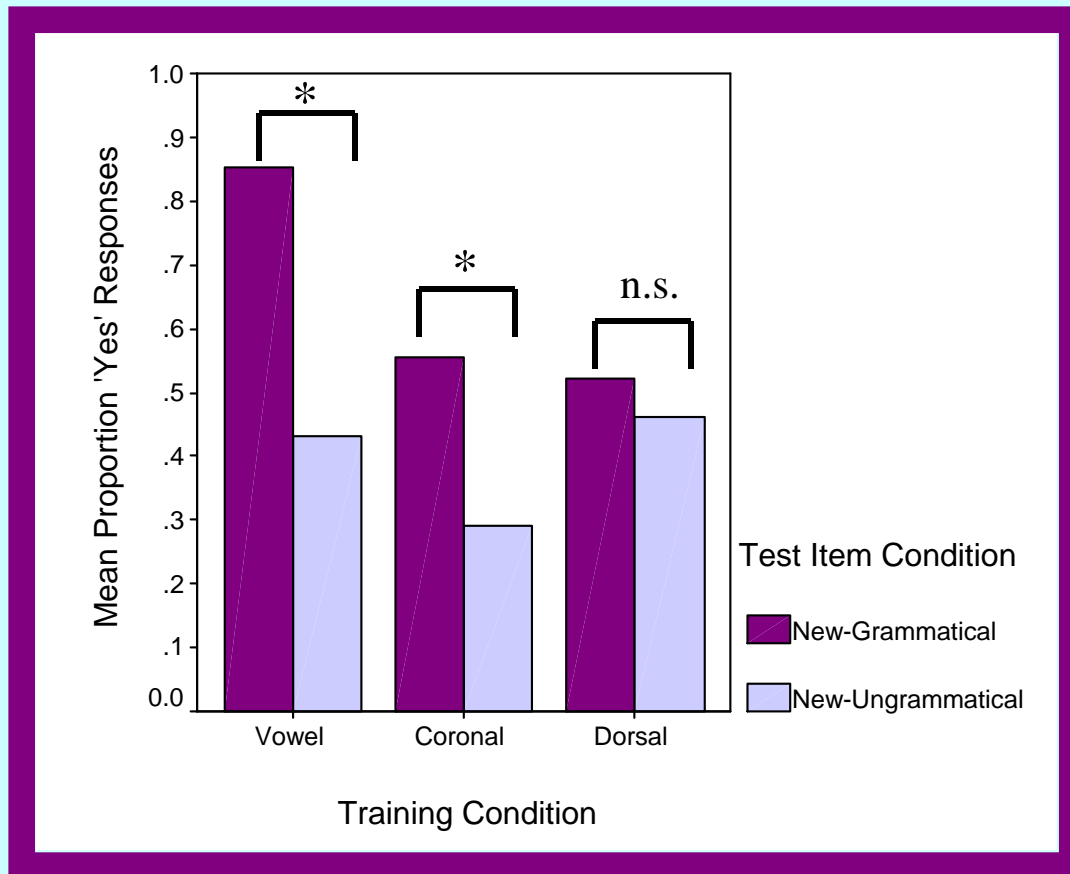
Results: Overall Accuracy

- Overall Accuracy data indicate gradience in performance $V > C > D$

Results: Pattern Learnability

- **Pattern Learnability**: Responding ‘yes’ to New-Grammatical more often than to New-Ungrammatical test items

Results: Pattern Learnability



Mean proportion 'yes' responses in New-Grammatical vs. New-Ungrammatical items by participant group:
V group ($p < .05$),
C group ($p < .05$),
D group ($p = .33$)

Results: Pattern Learnability

- Pattern Learnability data indicate V, C vs. D in pattern learning

Results: Pattern Learnability

- Participants in V and C groups generalized the pattern to new roots
 - They learned their respective harmony patterns

Summary of Results

- Overall Accuracy indicates $V > C > D$ in correctness
- Pattern Learnability shows $V > D$ and $C > D$ in pattern learning, not $V > C$

→ Hypotheses 2-3 confirmed

Conclusions

- The relative frequency of V, C vs. D harmony is related to learnability
- Relative learnability is a reflection of phonological naturalness (Wilson 2003)

Conclusions

- The present study has provided partial evidence that **the relative frequency** of three harmony patterns is related to **the relative learnability/naturalness** of the patterns

Future Directions

- ANOVA addressing hypothesis 1 ($V > C$)
- Restructuring of stimuli, replication

Thank You!

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- Please contact me with any questions/
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