Phonetically complete neutralization in Mankiyali

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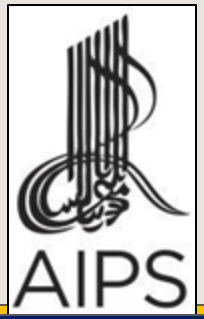
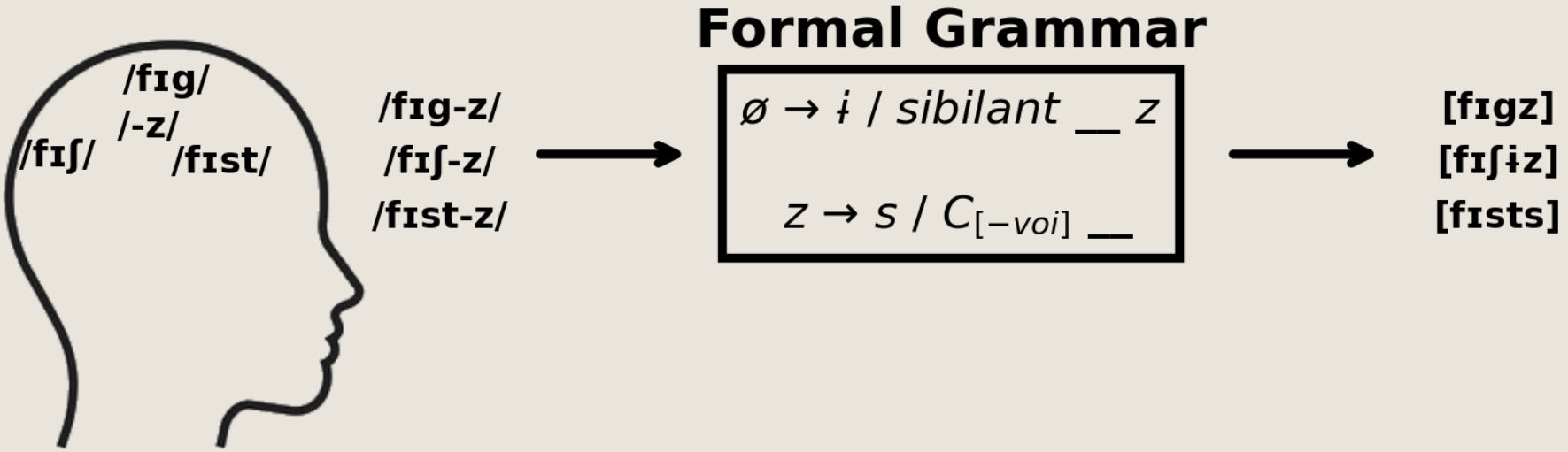
FASAL 15 – UT Austin

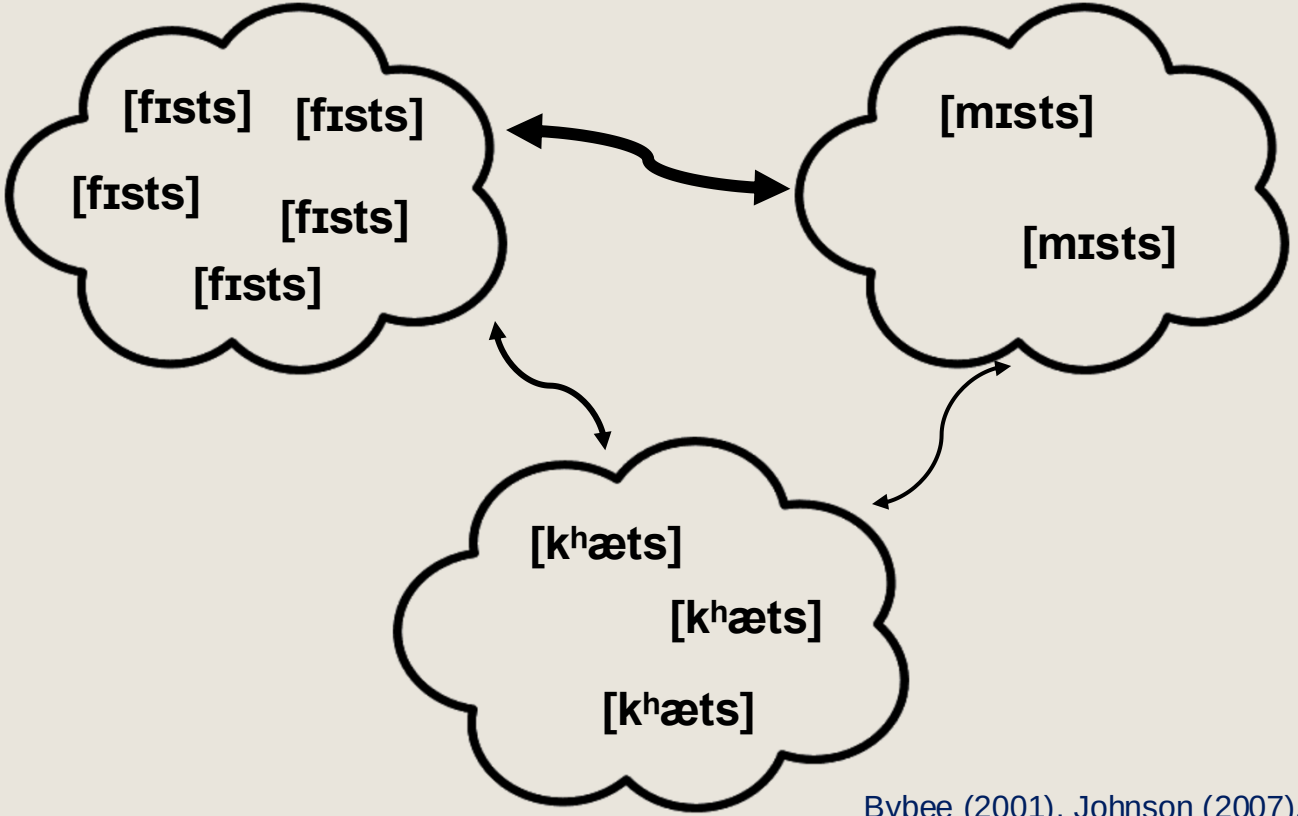


Generative Phonology



Chomsky & Halle (1968), Kenstowicz & Kisseberth (1979)

Usage-based Phonology (Exemplar Theory)



Bybee (2001), Johnson (2007), Goldrick & Cole (2023)

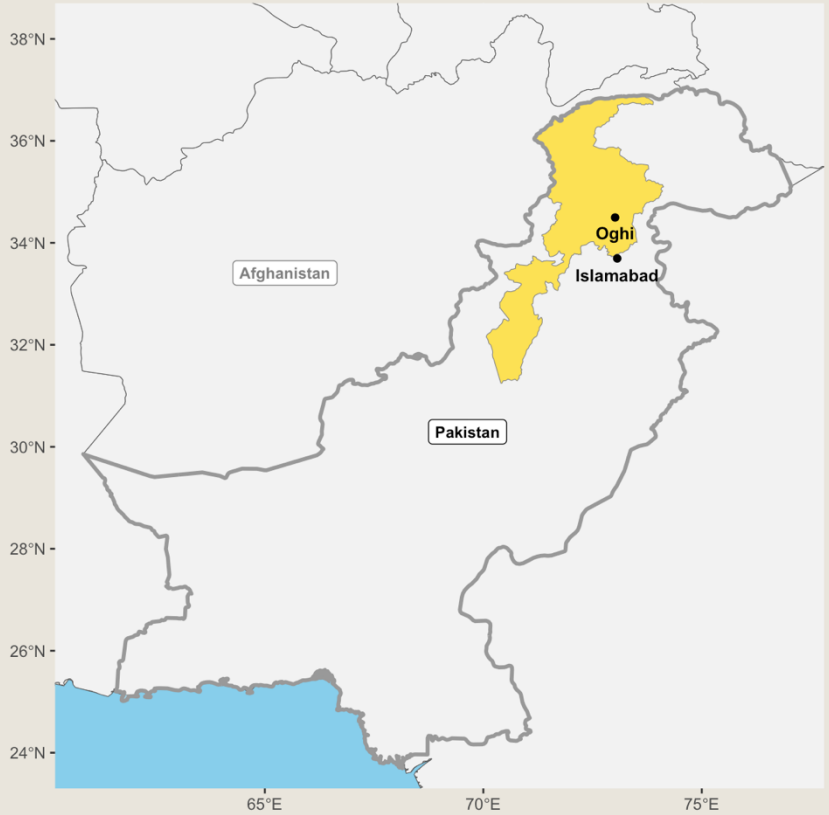
Overview of the Talk

- Research Question:
  - Is there any evidence that a formal phonological grammar exists that is separate from the lexicon?

- Two experiments demonstrating phonetically complete neutralization of a vowel nasality contrast before nasal suffixes in Mankiyali
  - Experiment 1: Nasality is neutralized on the vowels.
  - Experiment 2: No coarticulatory differences on preceding segments.

- Can Exemplar Theory model this phonetically complete neutralization?

Background on Mankiyali



- Spoken by ~500 people
- Danna & Dameka – two remote villages in Khyber Pakhtunkhwa
- Experiment Participants
  - 36 male native speakers
  - Fluent in Hindko, Pashto, and Urdu

Mankiyali Phonology

		Front			Central			Back		
		short	long	nasal	short	long	nasal	short	long	nasal
High	tense	i	ii	ĩi̯					uu	ũũ
	lax	ɪ	ɪɪ	ĩi̯				ʊ		
Mid	tense	e	ee					o	oo	õõ
	lax									
Low	tense							ʌ		
	lax								ɑɑ	ɑ̃ɑ̃

Mankiyali Phonology

- Vowel Nasality is impressionistically described as neutralized before nasal suffixes

[ɖɪɪ]	giant.NOM	[ɖɪ̃ɪ-ɳ]	giant-GEN
[ɖɪ̃ɪ]	pine firewood.NOM	[ɖɪ̃ɪ-ɳ]	pine firewood.GEN

- But, is this neutralization phonetically complete?

Experiment 1

- Research Question: Is nasality completely neutralized on the vowel itself ?

- Participants and stimuli
  - 20 Mankiyali speakers
  - 51 tokens sourced from 4 conditions

CVV (21)	CṼṼ (19)	CVV-N (4)	CṼṼ-N (7)
kii ‘some, few’	kĩĩ ‘insect’		kĩĩ-ɳ ‘of the insect’
guur ‘brown’	gũũ ‘feces’		gũũ-ɳ ‘of the feces’
bɑɑ ‘a leg/arm disease’	bãã ‘arm’ (F.SG)	bɑɑ-ɳ ‘of the disease’	
poo ‘soil’	põõts ‘approach’	poo-ɳ ‘of the soil’	

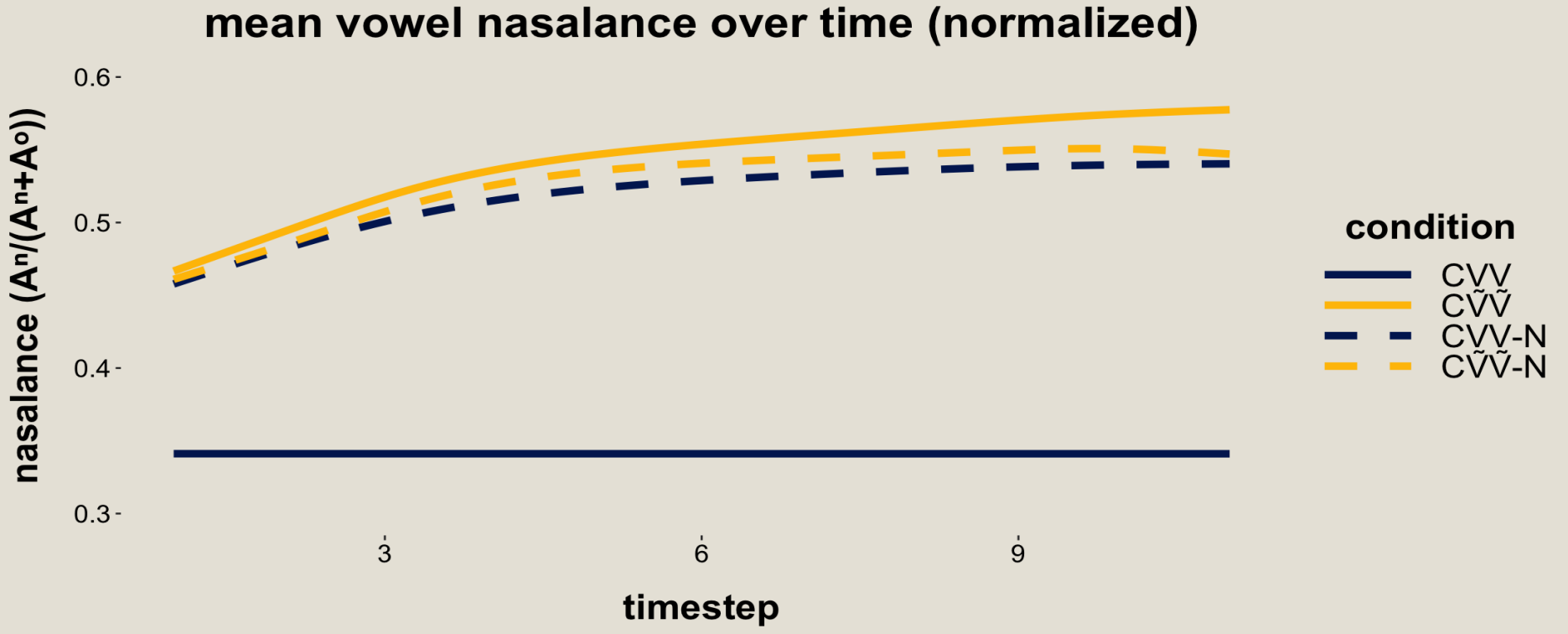
Experiment 1: Measurements & Procedure

- Procedure
  - Recorded in a quiet room in Danna
  - Words presented using Urdu script
  - Each word produced 4 times
- Nasalance: $\frac{A^n}{A^n + A^o}$
- Other correlates to nasality
  - F1 modulation (Shosted et. al., 2012; Carignan, 2017)
  - Breathiness (Garellek et. al., 2016)

Experiment 1: Analysis

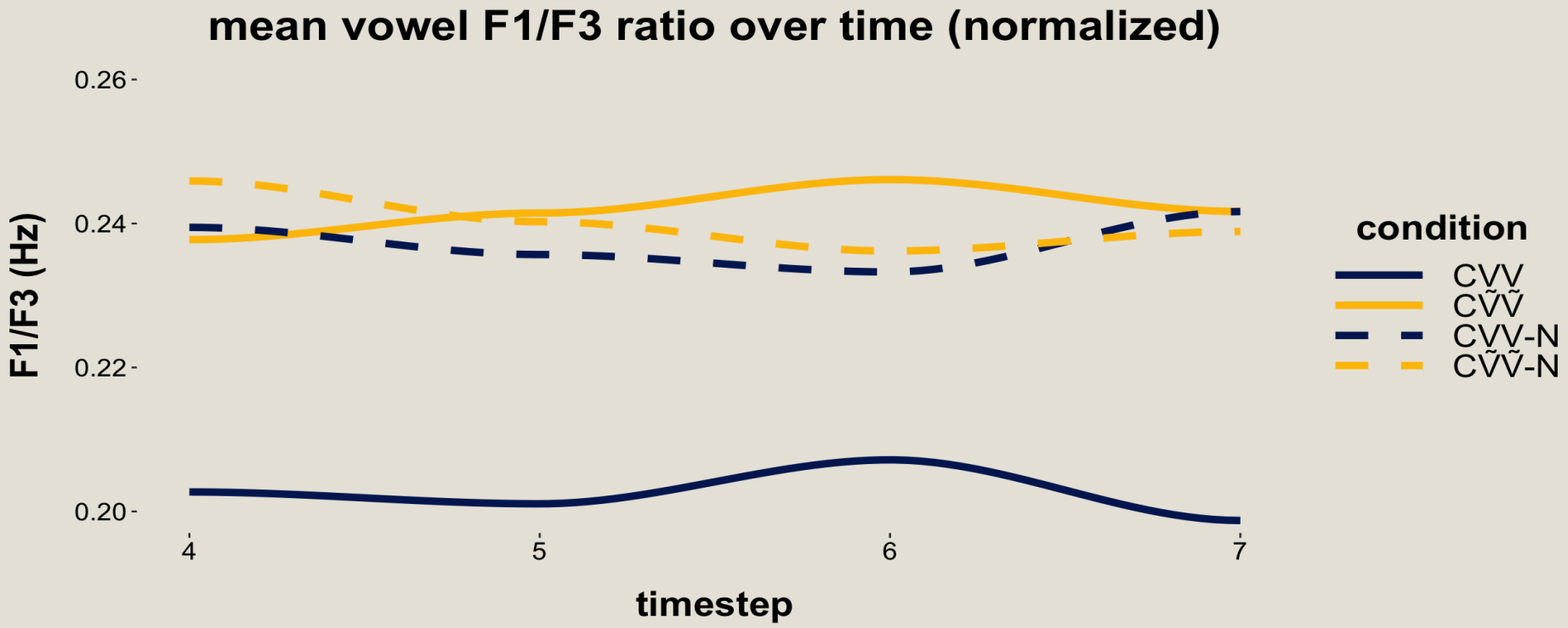
- Nasalance: measured at 11 equidistant time points across each vowel.
- F1 modulation: F1/F3 ratio at four equidistant time points across the middle 40% of each vowel (Monahan & Idsardi, 2010).
- Breathiness: z-scored H1*-H2* at four equidistant time points across the middle 40% of each vowel.

Experiment 1: Results



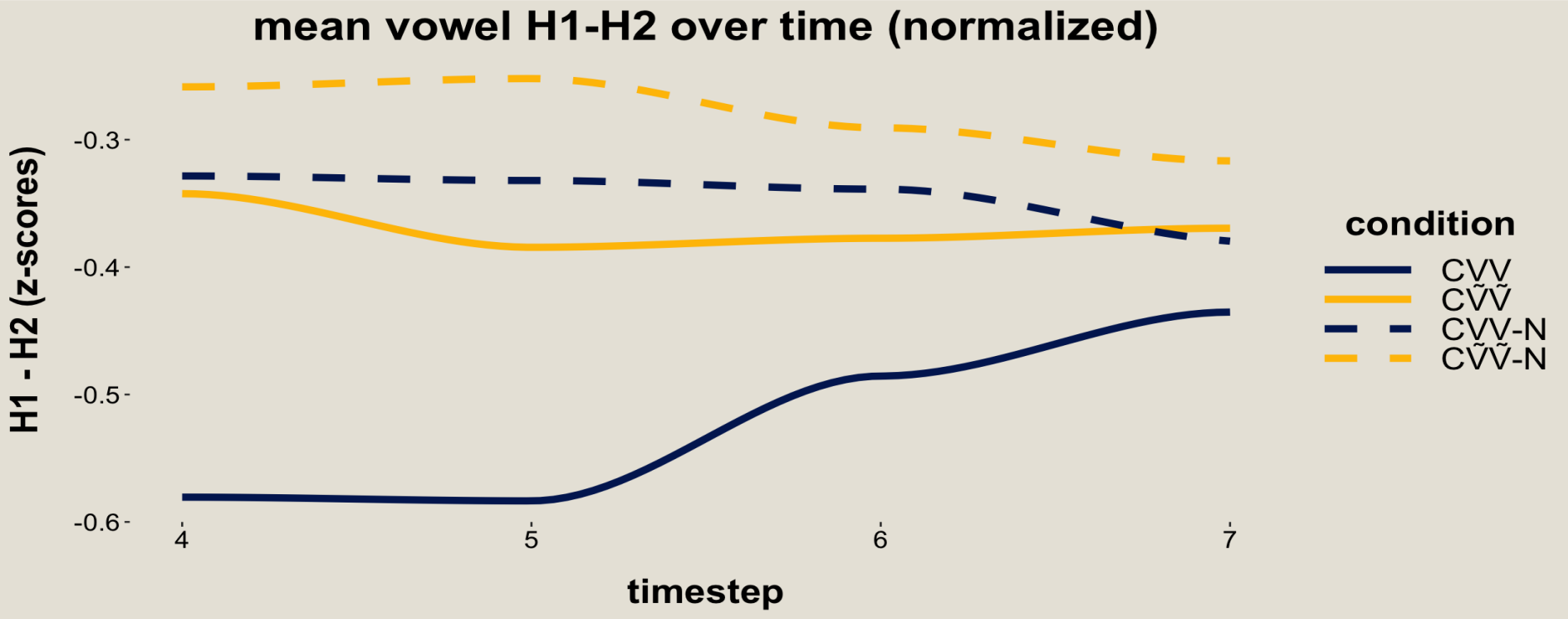
- **Takeaway**: No evidence for a difference in nasalance between CVV-N and CṼṼ-N

Experiment 1: Results



- **Takeaway**: No evidence for difference in F1/F3 ratio between CVV-N and CṼṼ-N

Experiment 1: Results



- **Takeaway**: No difference in z-scored H1*-H2* between CVV-N and CṼṼ-N

Experiment 2

- Research Question: Is there evidence of incomplete neutralization on adjacent segments?

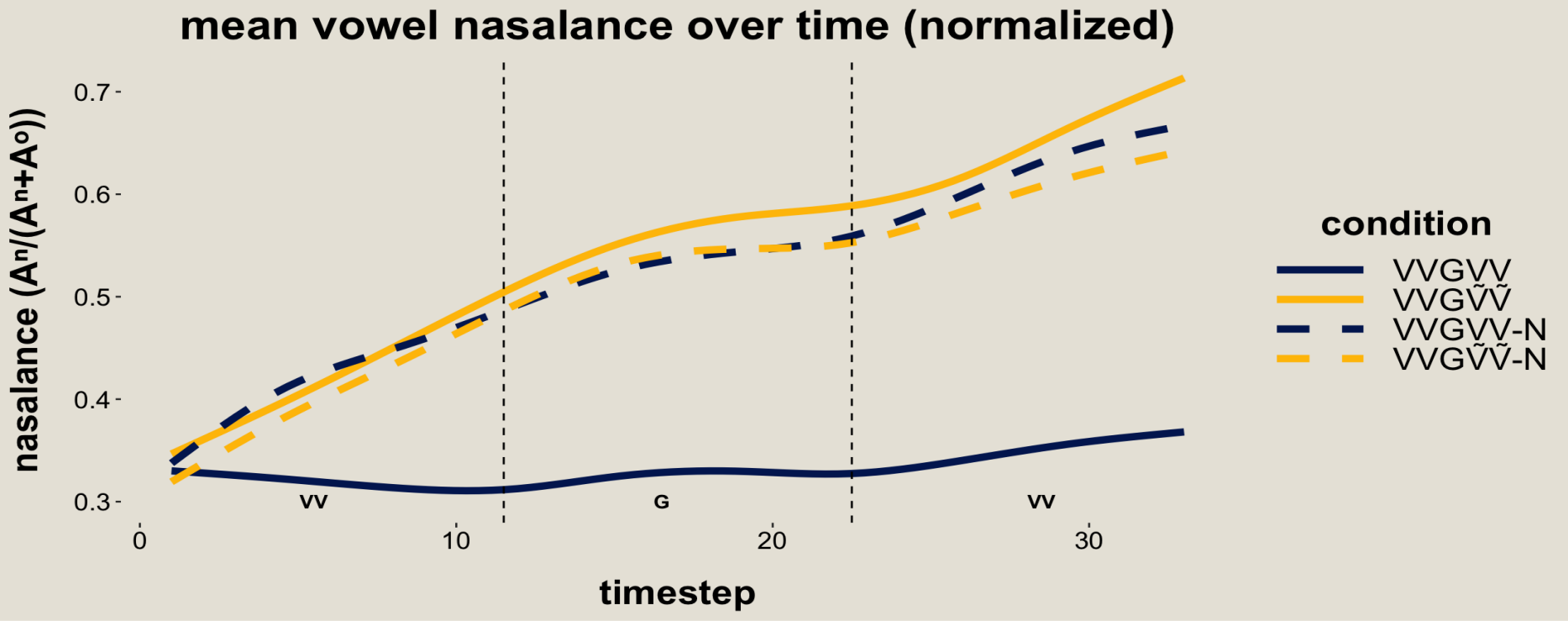
- Participants and stimuli
  - 16 additional Mankiyali speakers
  - 38 tokens sourced from 4 conditions

CVVGVV (11)	CVVGṼṼ (8)	CVVGVV-N (11)	CVVGṼṼ-N (8)
bɪɪʋɑɑ ‘marriage’	sɪɪʋ-ãã̃ ‘I make wet’ (M.SG)	bɪɪʋɑɑ-ɳ ‘of marriage’	sɪɪʋ-ãã̃-ɳ ‘I will make wet’ (F.SG)
	raaʋãã̃ ‘beans’		raaʋãã̃-ɳ ‘of beans’
paaʋii ‘table legs’		paaʋii-ɳ ‘of table legs’	
suuʋii ‘needle’	tʃuʋĩĩ̃ ‘squashes’ (M.PL)	suuʋii-ɳ ‘of the needle’	tʃuʋĩĩ̃-ɳ ‘of squashes’ (M.PL)

Experiment 2: Measurements, Analysis & Procedure

- Procedure
  - Same as experiment 1
- Nasalance: $$\frac{A^n}{A^n + A^o}$$
- Analysis
  - Nasalance measured at 11 equidistant timepoints
  - 11 points for each of the segments in the VVGVV sequence.

Experiment 2: Results



- **Takeaway**: No difference in nasalance found on preceding segments

Discussion

- Can Exemplar Theoretic Models account for phonetically complete neutralization of vowel nasality in Mankiyali?

- What we do know: **phonetically incomplete neutralization** supports exemplar theory.

/ki-mo/	'tree'-PART	→ [kimo]	μ dur of [i]: 50 ms
/ki/	'tree'	→ [kii]	μ dur of [ii]: 125 ms
/kii/	'key'	→ [kii]	μ dur of [ii]: 157 ms

- Generative Phonology: phonological neutralization should always lead to phonetically complete neutralization.

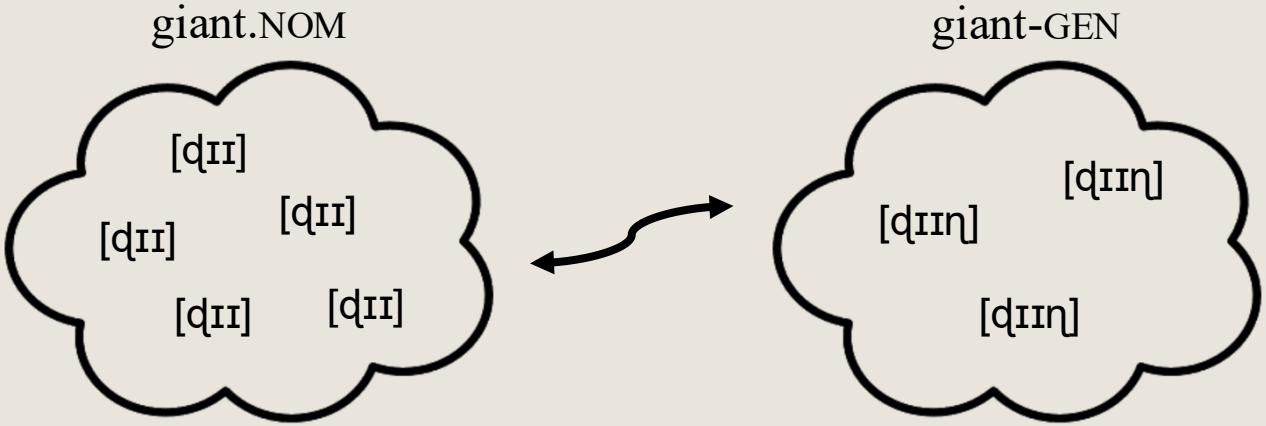
- Exemplar Theory: the connection of [kimo] 'also tree' with [kii] 'tree' influences its pronunciation.

Discussion

- But what about **phonetically complete neutralization**?
  - The generative framework easily accounts for it for the same reason it cannot account for phonetically incomplete neutralization.
- Exemplar Theory: For the same reason it can account for incomplete neutralization, the theory is unable to account for phonetically complete neutralization.

Discussion

- Consider the complete neutralization of vowel nasality in Mankiyali:
  - Phonetic pressure to nasalize ‘pre-N’ vowels.
  - Oral bases should influence the realization of these pre-N vowels.



- Prediction: the neutralization of nasality should be incomplete.

Discussion

- It's possible that token frequency could be manipulated to generate complete neutralization.
  - But this would likely require some undesirable assumptions to achieve it

- To account for phonetically complete neutralization of nasality in Mankiyali
  - There needs to be some formal system - **separate from the lexicon** - in which the weight of different pressures can be calibrated.

  - Eliminativist exemplar models explicitly reject formal mechanisms of this kind.

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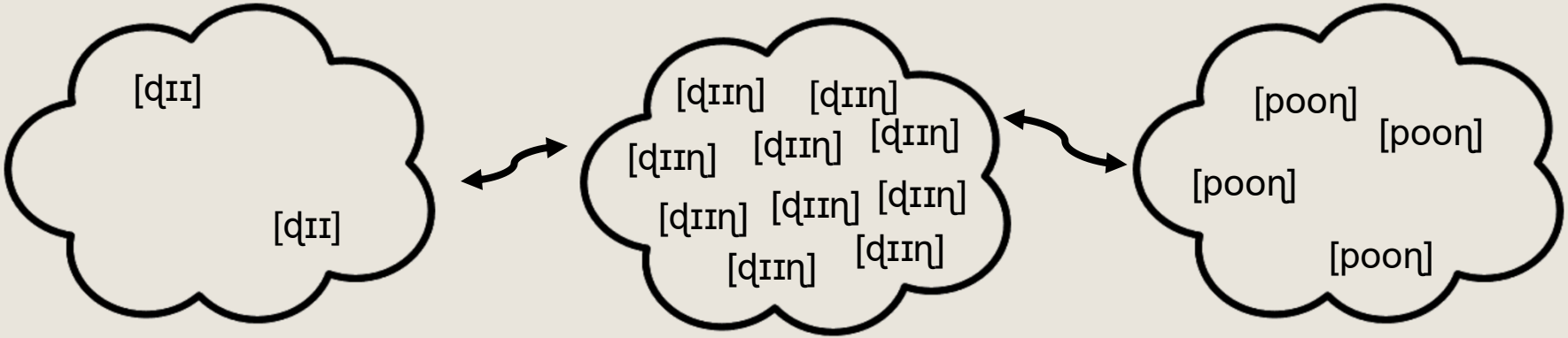
Appendix

- There is a way in which Exemplar theory can account for the Mankiyali data:
  - **Token frequency** is a mechanism that exists within Exemplar Theory to control the relative strength of processes spreading across the lexicon.
  - For frequency effects to generate complete neutralization here…



Appendix

- There are some issues with this analysis:
  - It relies on morphologically related bases (e.g., [ɖɪɪ] ‘giant.NOM’) influencing inflectional variants like [ɖɪɪ-ɳ] ‘giant-GEN’ to the same degree as inflectionally related forms like [poo-ɳ] ‘son-GEN’.
    - Exemplar theory assumes the opposite: semantically related forms have the strongest connections (e.g., Bybee, 2001; Johnson, 2007).
  - The pattern of complete neutralization is uniform across all 15 nominative-genitive pairs tested.
    - For a frequency-based account to hold, each of these 15 pairs would have to exhibit the exact same asymmetry: a rare NOM form and a frequent GEN form.