Perceptual factors license phonological contrasts in Chamorro

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RESEARCH QUESTION: What governs a wider range of vocalic contrast before laryngeal consonants in Chamorro?

1. Chamorro vowel distribution

- **Mid vowels** in Chamorro only occur in **closed stressed syllables** [4,5,14]

High vowels		Mid vowels	
[gú:.pu]	‘fly’	[tém.mu]	‘knee’
[ú:.luʔ]	‘worm’	[mét.gut]	‘strong’
[lí:.ʔiʔ]	‘see’	[pók.puk]	‘bump’

- Stress shift triggers alternations, both raising and lowering:

[mét.gut]	[mit.gót.ŋa]	‘stronger’
[pók.puk]	[puk.pók.ŋa]	‘his/her bump’
[tém.mu]	[tim.móŋ.ŋa]	‘his/her knee’

- Also, raising of mid vowels in nativized loans:

• Notice that stressed mid vowels remain…	[hó:.dzu] < *Spanish* [óʝo]	‘hole’
	[bé:.lu] < *Spanish* [βélo]	‘veil’

- **Chamorro vowel inventory [4,5,14]:**

	Front	Central	Back
High	i		u
Mid	e		o
Low		a	ɑ

2. Exceptionality of mid vowels before laryngeals

- Some **mid vowels exceptionally** occur in **stressed open syllables** in the native vocabulary

Mid before laryngeal consonant		Mid before oral consonant	
[bó:.ʔan]	‘froth’	[gó:.fis]	‘lungs’
[té:.ʔuk]	‘thick’	[pó:.tu]	‘rice-cake’
[dé:.ha]	‘see’	[é:.tsuŋ]	‘crooked’

- **An observation**: before laryngeals, mid vowels are more common than expected [5,12]; is this just chance?
- A chi-squared test for significance can be conducted on bisyllabic native roots from the Revised Chamorro-English dictionary [12]

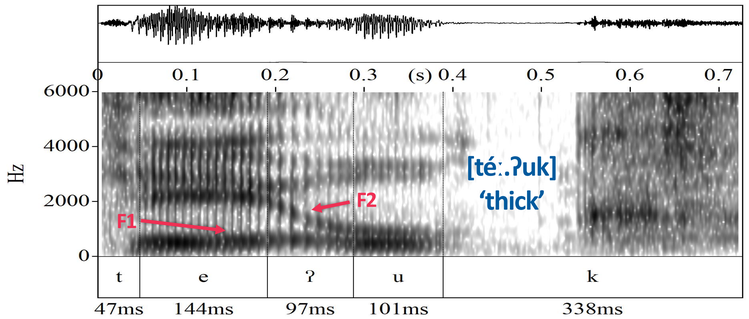
	Mid vowel	High vowel	Total
Intervocalic laryngeal	29 (19)	48 (58)	77
Intervocalic oral	107 (117)	368 (358)	475
Total	136	416	552

- X-squared = 7.38, df = 1, p-value < 0.01 – **significant, not chance!**
- How might the **patterned exceptionality** [15] of mid vowels before laryngeals be explained?

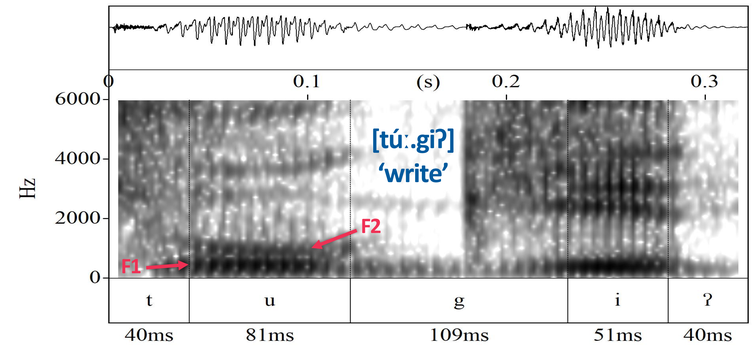
3. Evidence for perceptually motivated licensing

Proposal: Laryngeals permit a wider range of vocalic contrast due to the persistence of vowel formant information

- Vowel formants persist through the laryngeal, providing longer vowel steady state and transition information as perceptual evidence
- Glottal stop realized as creaky voice word-medially



- Vowel formants **do not** persist through oral consonants:



- Distinctiveness of contrasts captured through constraints referencing perceptual distance between formants in positional inventories [7,11]
- Assign F1 levels relative to vowel height: **i = 1 , ɪ = 2 , e = 3** [7]
  - Mindist:F1:2 – Assign a violation if distance between F1 levels is ≤ 2
  - NoMerge – Assign a violation for every pair of merged vowels
  - Periph – Assign a violation for every non-peripheral vowel ([o e])
- Perceived F1 contrasts better signaled with longer formants
- **Formant length scales perceptual distance** between formants: laryngeals multiply by 1.5, oral consonants multiply by 1

	$í:_x$ʔ ~ $é:_y$ʔ	MINDIST:F1:2	NOMERGE	PERIPH
→	$í:_x$ʔ ~ $é:_y$ʔ (3)			*
	$í:_{x,y}$ʔ		*!	
	$é:_{x,y}$ʔ		*!	*

	$í:_x C_{oral}$ ~ $é:_y C_{oral}$	MINDIST:F1:2	NOMERGE	PERIPH
	$í:_x$C ~ $é:_y$C (2)	*!		*
→	$í:_{x,y}$C		*	
	$é:_{x,y}$C		*	*!

4. Against an exceptional coda hypothesis

- Mid vowels in stressed open syllables are **not** just the result of intervocalic consonants being syllabified as codas [10]; here’s why:

Gemination

- The C of certain –CV suffixes geminate when a word has a closed stressed syllable, and a word-final open syllable [4,5,14]

[gék.pu]	[gik.pók.ku]	‘my flyer’
[tém.mu]	[tim.móŋ.ŋa]	‘his/her knee’

- Gemination does **not** trigger for forms with a stressed mid vowel before an intervocalic consonant

[bé.ʔi]	[be.ʔí:.ŋa]	‘his/her bandage’
[bó.ʔu]	[bo.ʔú:.hu]	‘my bubble’

Penultimate lengthening

- Vowels in penultimate stressed open syllables are lengthened [4,5,14]

[tú:.giʔ] (109ms) (5 tokens)	‘write’	[mét.gut] (55ms) (4 tokens)	‘strong’
[dí:.suʔ] (98ms) (7 tokens)	‘squat’	[pók.puk] (45ms) (7 tokens)	‘bump’

- Mid vowels before intervocalic consonants are lengthened, indicating an open syllable, i.e. no coda assignment

[bó:.han] (116ms) (8 tokens)	‘hand-fan’	[dó:.ʔak] (148ms) (7 tokens)	‘cataract’
[té:.ʔuk] (112ms) (3 tokens)	‘thick’	[bó:.ʔan] (116ms) (4 tokens)	‘froth’

- High vowels in stressed open syllables become a major puzzle if this hypothesis is adopted

CONCLUSION:

- **Reference to phonetic cue information allows a cohesive account of patterned exceptionality in Chamorro**
- **Other approaches, such as licensing by cue [13], may be equally effective, but still maintain integration of perceptual factors within the phonological system**
- **A purely phonological account of exceptionality is possible, *a la* [8], but not as effective for this case due to a lack of evidence for a unique diachronic pathway to explain lexical categorization [3]**
- **Neither is there evidence of loan word influence conditioning a separate stratum that exceptional forms occupy, *a la* [9]**

Si Yu‘us ma‘åsi‘!

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