STRESS AS A PROSODIC GESTURE

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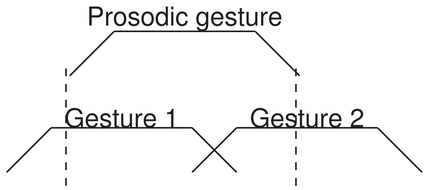
INTRODUCTION

Background



- Prosodic gestures slow the clock → gestural lengthening, lessened overlap (Byrd and Saltzman, 2003)
- Greek lexical stress → gestures longer and larger (Katsika, 2016, 2018)

Research Gap: Stress → lessened overlap
Current Study: Stress → gestural coordination
Finding: Stress → elongate the gestural lag between a consonant and a vowel (CV lag)

STIMULI

- 481 English utterances; 45 participants
- Wisconsin X-ray Microbeam Database (Westbury et al., 1990): simultaneous acoustic and articulatory recordings

Stimuli

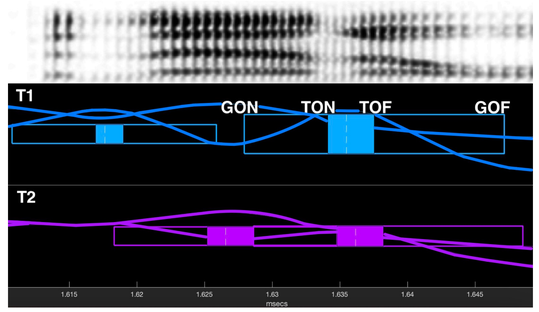
Stressed	Unstressed	C	V
ba**NA**na [næ]	bana**NA** [nə]	T1	T2
MOment [mo]	al**MO**st [mo]	LL	T2
THIngs [θɪ]	no**THI**ng [θɪ]	T1	T2

- T1 → tongue tip (Hall, 2010); T2 → tongue blade
- LL → lower lip (Gao, 2008; Zhang et al., 2019)

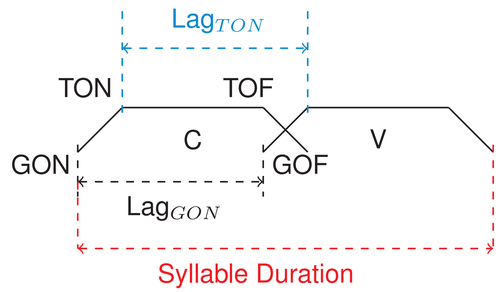
PROCEDURE

- Matlab → *Mview* package → *lp_findgest* algorithm (Tiede, 2005)

Sample Gestural Annotation: "Banana"

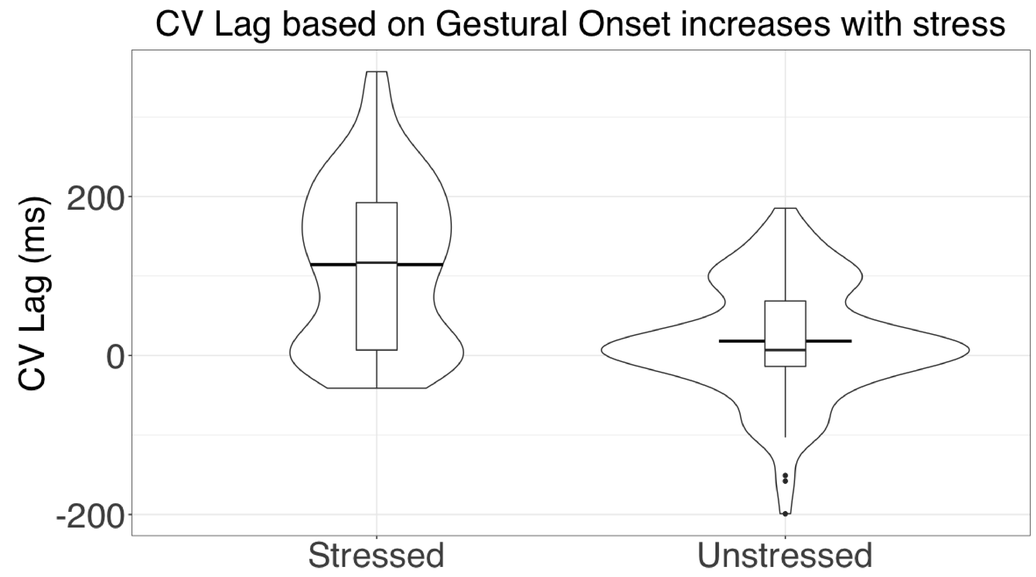


MEASUREMENTS



- **8 Timestamps**: GON_C, GOF_C, TON_C, TOF_C, GON_V, GOF_V, TON_V, TOF_V (Gafos, 2002)
- **Syllable Duration=Last$_{timestamp}$ – First$_{timestamp}$**
- **CV lag = V$_{timestamp}$ – C$_{timestamp}$**
- **Normalized CV lag = $\frac{\text{CV lag}}{\text{Syllable Duration}}$**

RESULTS



Mixed effects model (random intercept of participant)

Measurement		Estimate	P value
Gestural Onset	**Intercept**	114.68	<0.0001
	Unstressed	-96.33	<0.0001

- CV lag increases with stress for all 8 measurements
- Random intercept of participant → all measurements significant
- Random intercepts of participant, syllable position → target offset, gestural offset, normalized gestural offset significant

CONCLUSION&DISCUSSION

- CV lag in stressed syllables > CV lag in unstressed syllables
- Stress introduces variation in CV coordination → control stress
  - Zhang et al. (2019): CV lag for the full-tone condition > CV lag in the toneless condition → suggested tone gesture has a sequential relationship with CV gestures
  - Mandarin toneless syllables weakened and unstressed (Chao, 1965; Lin, 2000; Yip, 2002; Lee, 2003) → stress rather than tone induced CV alignment variation → no need for distinguishing different alignments based on tone
- Stress could be analyzed as a prosodic gesture that slows down the clock
- Statistical results using random intercept of syllable position → need further research
- Stress may attract prosodic gesture (Byrd and Saltzman, 2003)
- Prosodic gesture shifts towards stressed syllables (Katsika, 2012; Byrd and Krivokapić, 2021)

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