

Reconsidering the Phonetic Expression of Focus in Pitch-Accent Languages: Insights from Tokyo Japanese

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THE PROBLEM

The phonetic expression of broad and narrow focus in pitch-accent languages like Japanese differs significantly from that in stress-accent languages like English. For instance, the strategy of “focal pitch expansion – post-focal pitch compression” is effective only when the focused word is accented (Pierrehumbert & Beckman, 1988), and broad focus sentences in Japanese may lack prominence entirely (Mizuguchi & Tateishi, 2023). Our research indicates that in Tokyo Japanese, whether the edges of an Accentual Phrase (AP) are strengthened by jaw opening and elongating its duration is crucial for differentiating broad from narrow focus, with pitch serving as an additional, narrow focus location-specific cue.

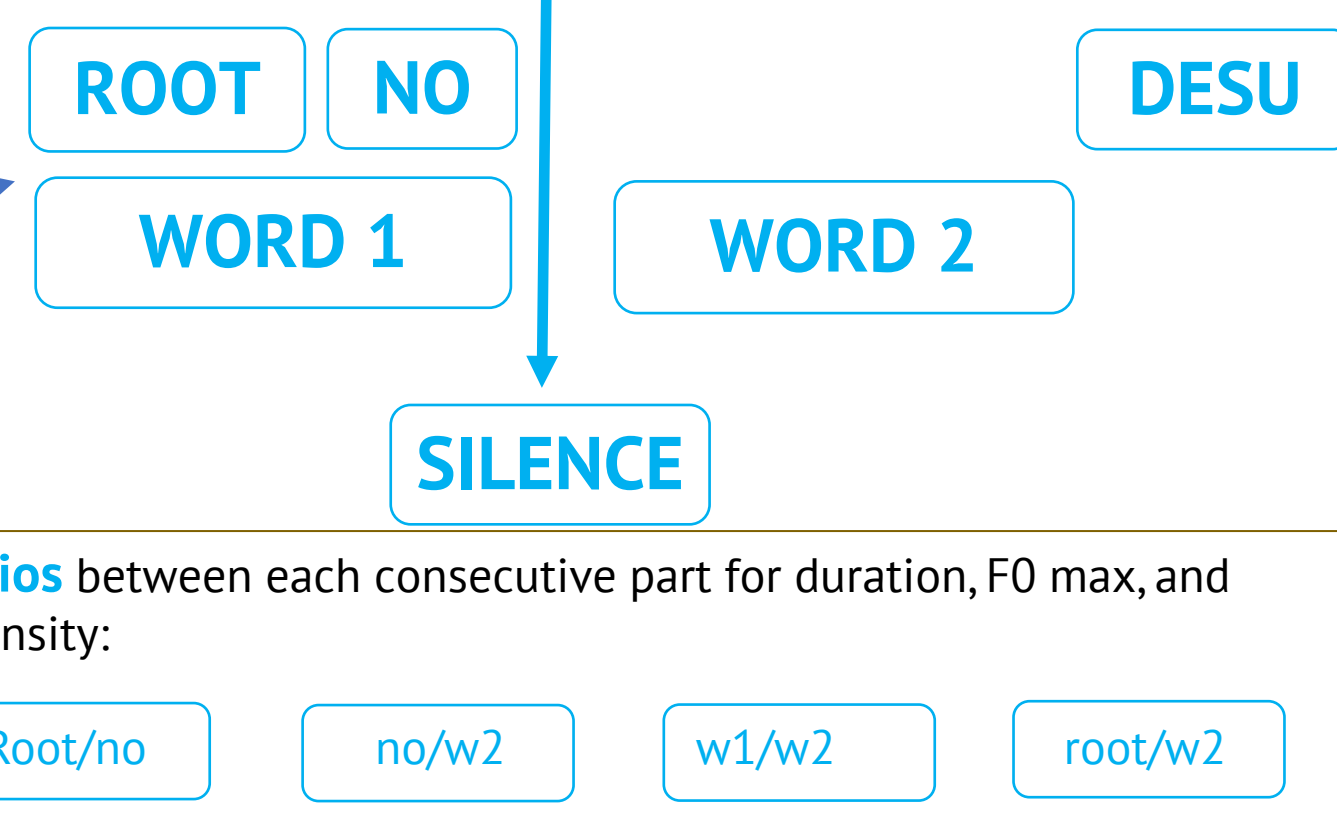
METHODOLOGY

Accent Pattern	Reading 1: Broad Focus	Reading 2: Narrow Focus in W1 & W2	Number of sentences
Au	Tsunóno kubiwa	Tsunóno kubiwadesu	6 +6
Ua	Torano kawá	Torano kawádesu	6 +6
Aa	Umáno mímí	Umáno mímídesu	6 +6
Uu	Sameno kubiwa	Sameno kubiwadesu	6 +6
aU	Umáno hizume	Umáno hizumedesu	6 +6
uA	Ushino tsunó	Ushino tsunódesu	6 +6
aA	Ahíno honé	Ahíno honédesu	6 +6
uU	Ushino kazari	Ushino kazaridesu	6 +6
Total Number of Sentences			96

MEASURES:

- Duration, F0 max, and intensity of each labelled part
- F1 in –no as proxy for jaw opening
- Silence automatically detected by WebMAUS

UMA-NO HIZUME-DESU



PARTICIPANTS' INTUITIONS

Broad Focus sentences are uttered in one single chunk, and Narrow Focus in 2 chunks."

10 PARTIC. * 96 SENTEN. = 960 SENTENCES

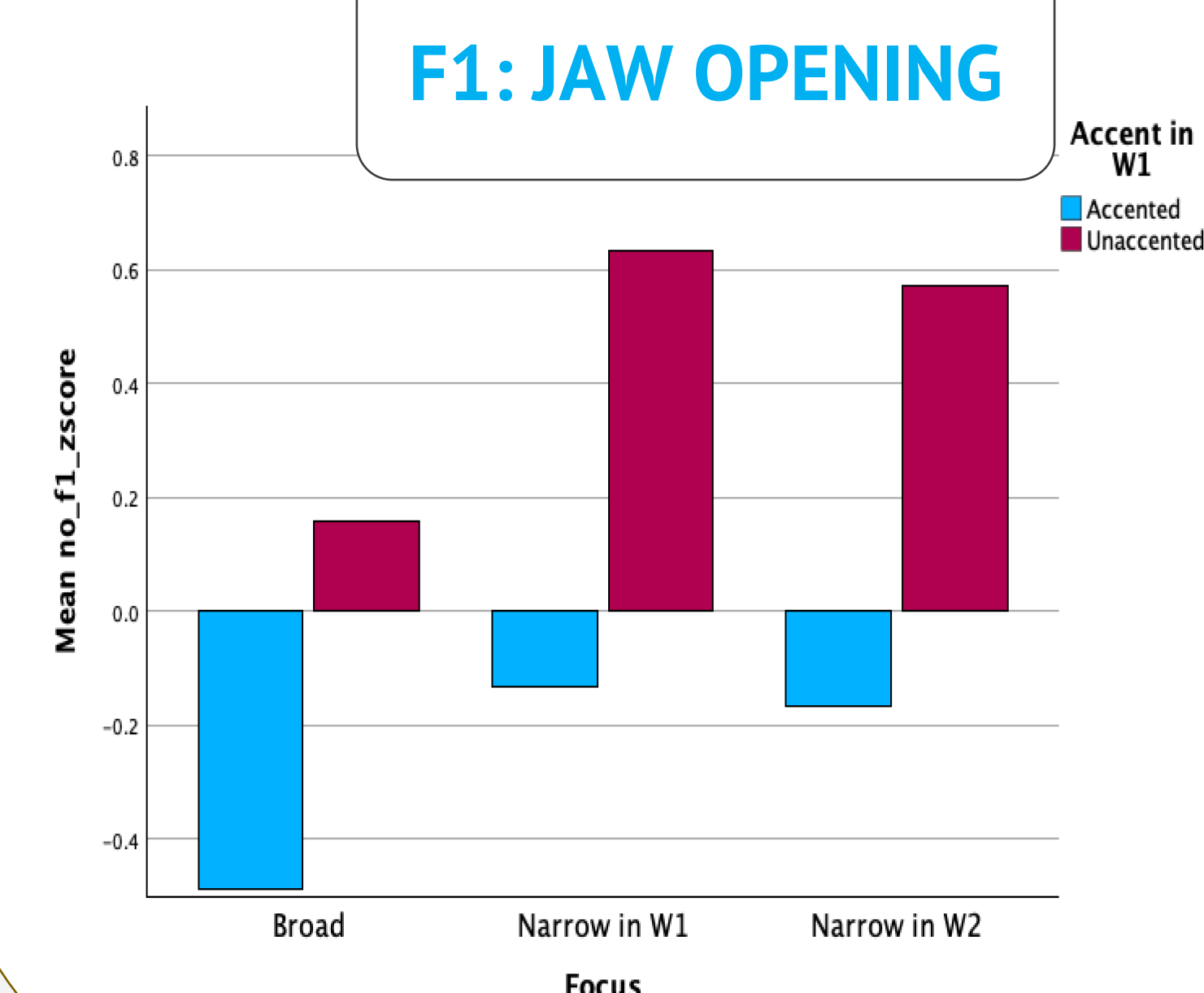
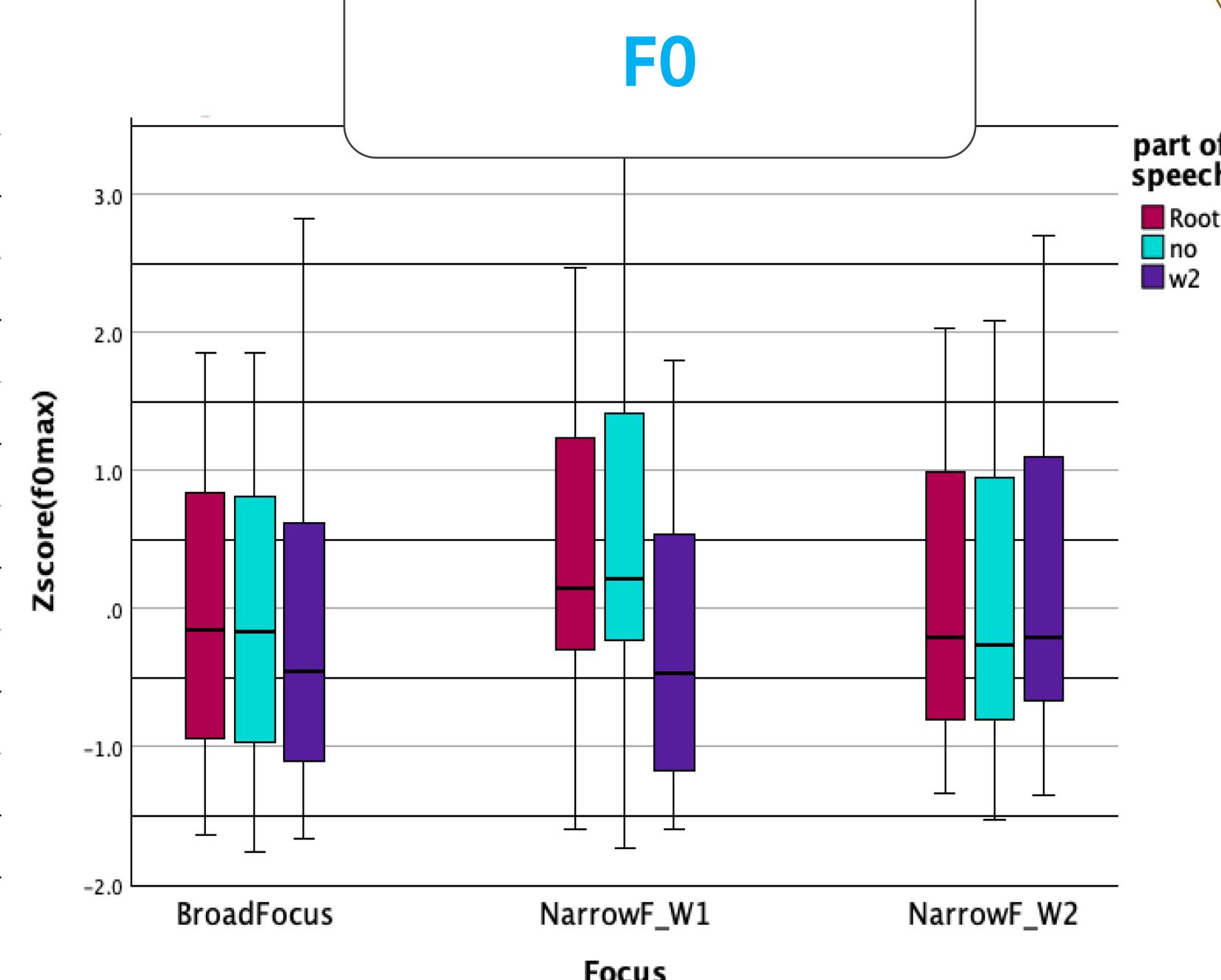
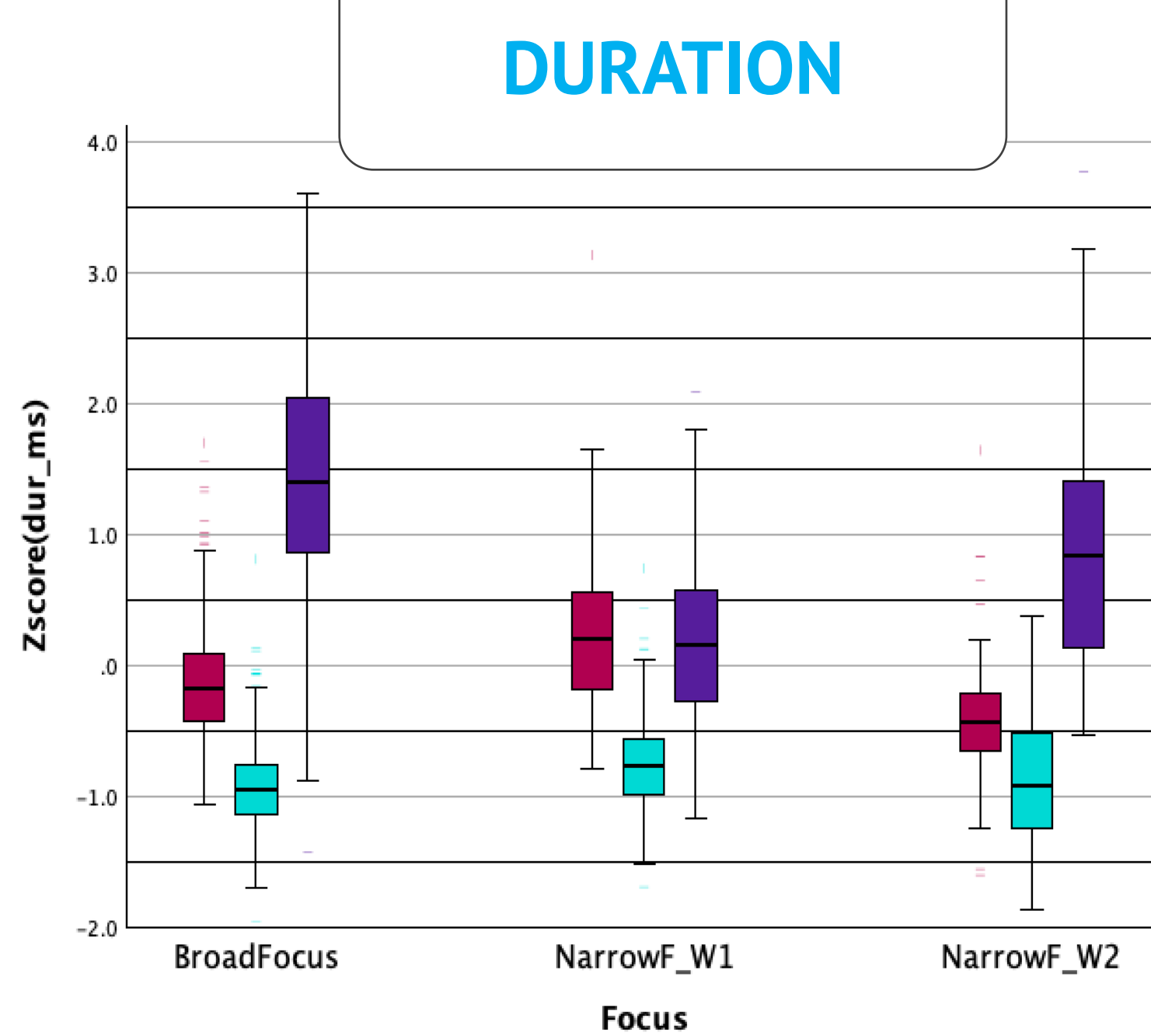
RESEARCH QUESTIONS

[1] What are the **pitch**, **duration**, **intensity**, **silence**, and **jaw opening** patterns that cue broad and narrow focus in Tokyo Japanese?

[2] How do these **cues interact**?

[3] Does any **strategy** emerge to phonetically mark narrow and broad focus?

RESULTS



INDIVIDUAL CUES

fixed factors	duration				f0				intensity				F1_no	measure ratios
	RootW2	RootIno	noW2	W1W2	RootW2	RootIno	noW2	W1W2	RootW2	RootIno	noW2	W1W2		
NF in W1 vs. NF in W2	***	*	*	**	***		**	**	***	.	.	**		
Broad F vs. Narrow F	***		***	***	**		.	*						
Accent									***	***		***	***	
NFW1_NFW2*Accent				.					*			.		
BF_NF * Accent					.	.								
Model r2	13.8	5	9.2	12.6	25.3	0.8	31.5	31.8	33.2	32.5	9.5	23.3		

Mixed models with D.Vs of duration, F0, intensity ratios and F1 in -no and fixed factors of Focus (Broad vs Narrow), Focus Position (NFW1, NFW2), and Accent showed that:

- Duration & F0 cue Focus and Focus Position independently from Accent
- F0 models explain more variation than duration models

DISCUSSION

CUES' INTERACTIONS

Focus (Broad versus Narrow):

- Duration ratios between Accentual Phrases, F1 in “no”, and silences account for most of the variation

Focus Position (NF W1 & NF W2):

- F0 together with silences and F1 account for most of the variation

D.V.	DURATION, F1, SILENCE				FIXED FACTORS			
	dur (Root/W2)	F1	silence	F0 (no/w2)	dur (Root/W2)	F1	silence	F0 (no/w2)
BROAD F VS. NARROW F IN W1	***	***	***	***	***	***	***	***
BROAD F VS. NARROW F IN W2	***	***	***	***	***	***	***	***
NARROW F IN W1 VS. NARROW F IN W2	***	***	***	***	***	***	***	***
Model r2	0.37	0.16	0.185	0.185	0.37	0.16	0.185	0.185

EMERGING STRATEGIES

- Edge-Strategy:** reinforcing the edges of an AP by means of silence insertion, wider jaw-opening, and AP duration ratios cues Broad versus Narrow Focus by perceiving Broad
- Pitch-Strategy:** altering the F0 maxima of an AP in relation to neighboring AP cues Narrow Focus Position

CONCLUSIONS AND FUTURE RESEARCH

These results support speakers' intuition about perceiving Broad Focus in one chunk and Narrow Focus in two chunks:

- The Edge-Strategy reinforces the edges of AP in Focus enhancing the perception of 2-chunks only in Narrow Focus
- As a result of no edge insertion, Broad Focus is perceived a single chunk
- The Pitch-Strategy facilitates the perception of Focus placement in Narrow Focus, not the perception of 2 IP, as in “Akusento” theories of pitch-range resetting (Pierrehumbert and Beckman, 1988)

Future research:

- Perform a perception study to test the perceptual consequences of the Edge-Strategy and the Pitch-Strategy
- Examine longer sentences & natural speech.

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