Stress and intonation in Uyghur

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Presented to *LING 460: Structure of Uyghur* taught by Mahire Yakup at the University of Buffalo

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Bu adem kim?

- I’m an assistant professor at University of California, Irvine in the Department of Language Science
- My Uyghur name is Yüsüp
- I study phonetics and phonology
- I’ve published papers on Uyghur phonology (particularly backness harmony), phonetics, prosody, and even syntax!

Roadmap

1. A crash course on prosody
2. Studies of stress in Uyghur
3. A phonological model of Uyghur prosody
4. Conclusion and future directions

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Prosody

Basic definition: Properties of speech that are **suprasegmental**

- Relative prominence of a syllable within a word (**stress**)
- Sentence-level pitch movement (**intonation**)

Some languages have stress

All languages have intonation

Intonation and stress typically **interact** (important for later!)

Stress

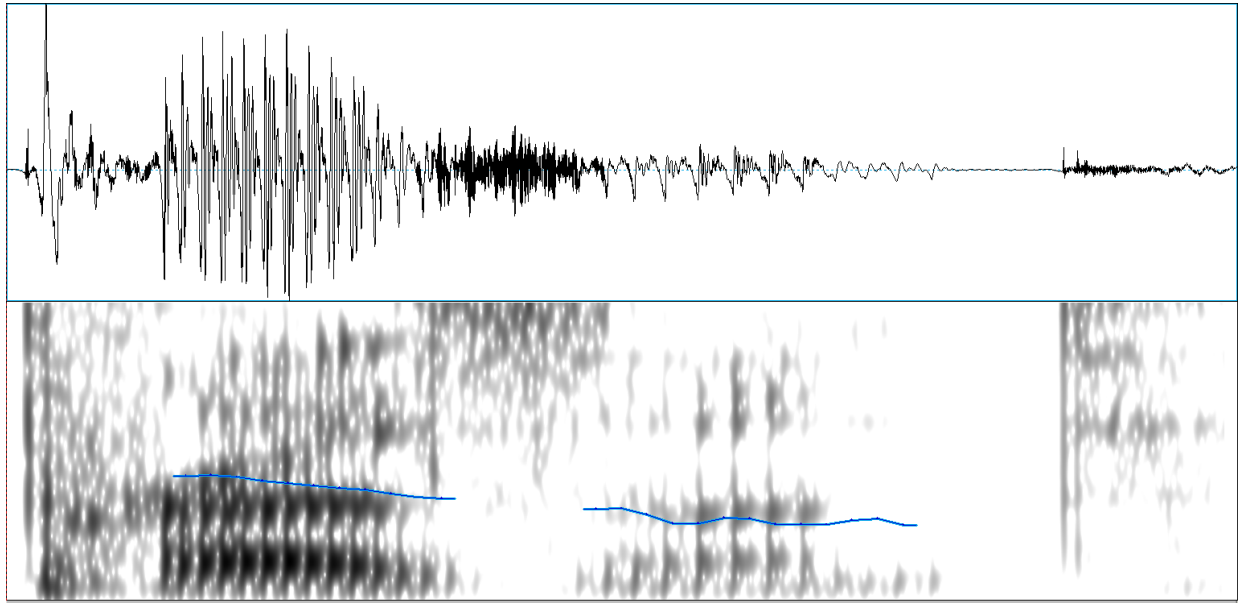
One or more syllables in a word are **relatively more prominent**

- Stressed syllables
- (also relative prominence of a word in a sentence)

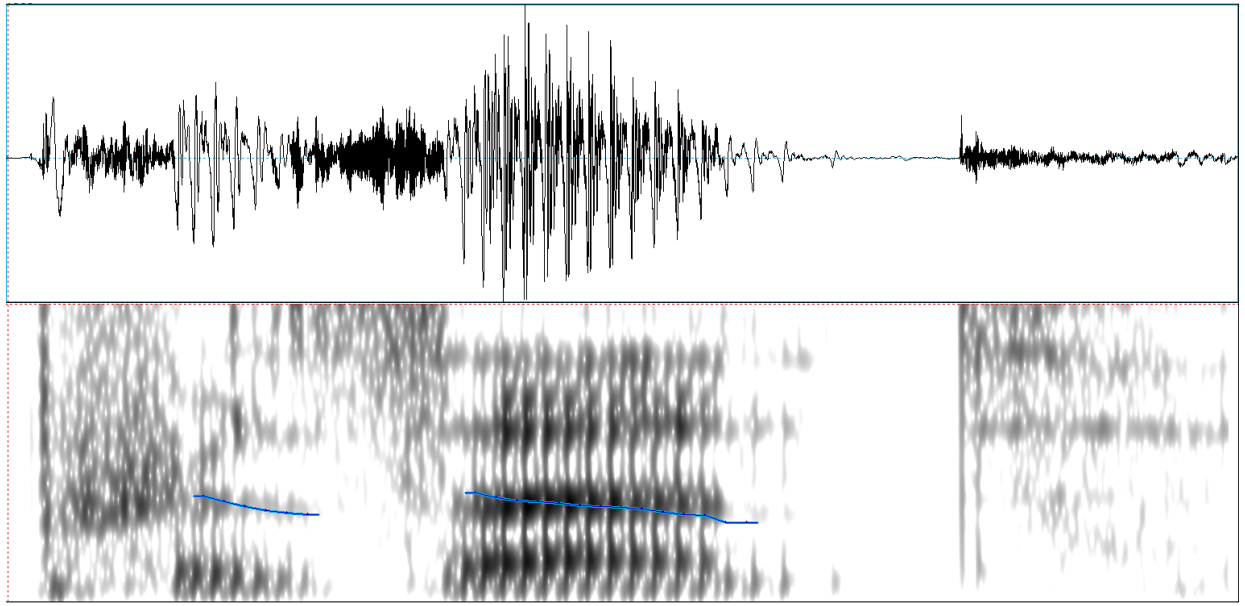
Prominence signaled by different acoustic features across languages

- **Pitch** excursions (high or low peaks)
- Higher **intensity**
- Longer **duration**
- Segmental changes (e.g. **vowel reduction** in unstressed syllables)

Spot the differences (English)



present (n.)



present (v.)

Different types of stress languages

Phonological stress: stress location is (mostly) predictable

- e.g. Czech, Finnish

Lexical stress: stress location is (mostly) not predictable

- e.g. English, Russian

Intonation

Intonation refers to **utterance-level pitch dynamics**

- Distinct from **lexical tone** in, e.g., Mandarin

Pitch is used across the entire utterance to signal linguistic information

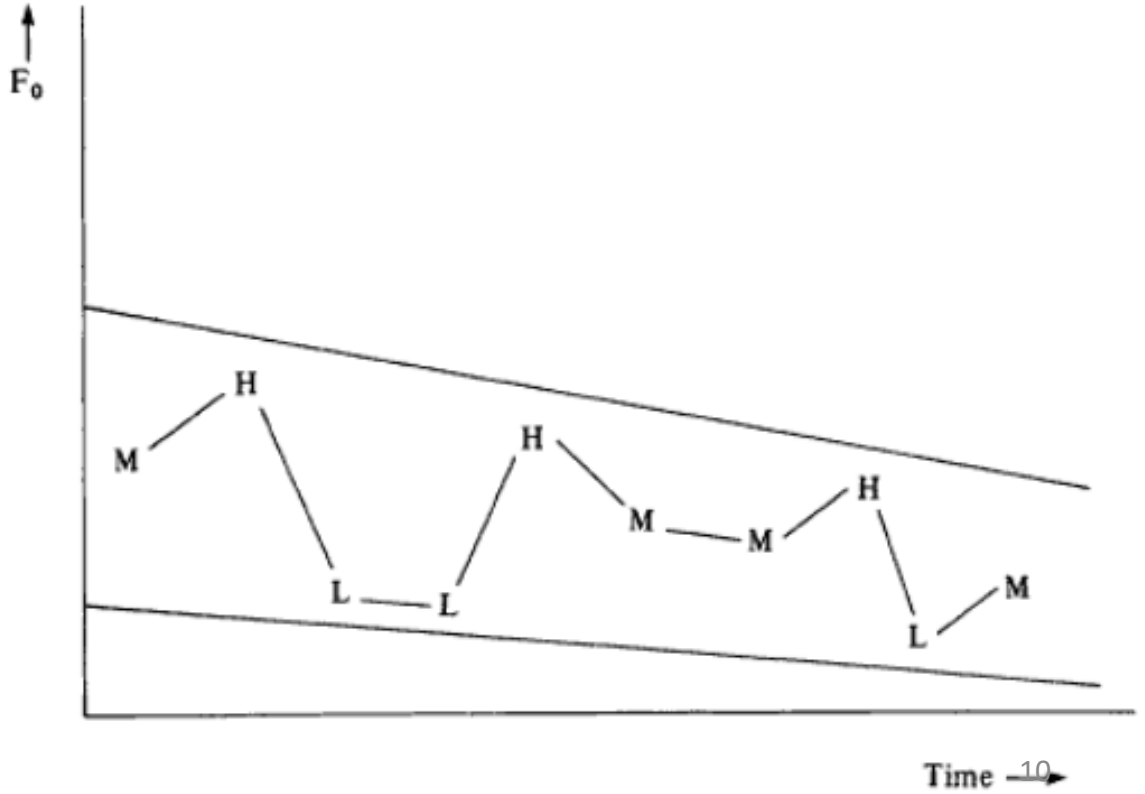
- Different types of utterances: e.g., questions vs. statements
- Indicating new or given information, contrast, etc.

All languages have intonation, but differ in the details

Declination

General property of utterance-level f0: it **decreases over the utterance**

- In part because airflow decreases
- Also called ‘downdrift’



(Ladd 1984)

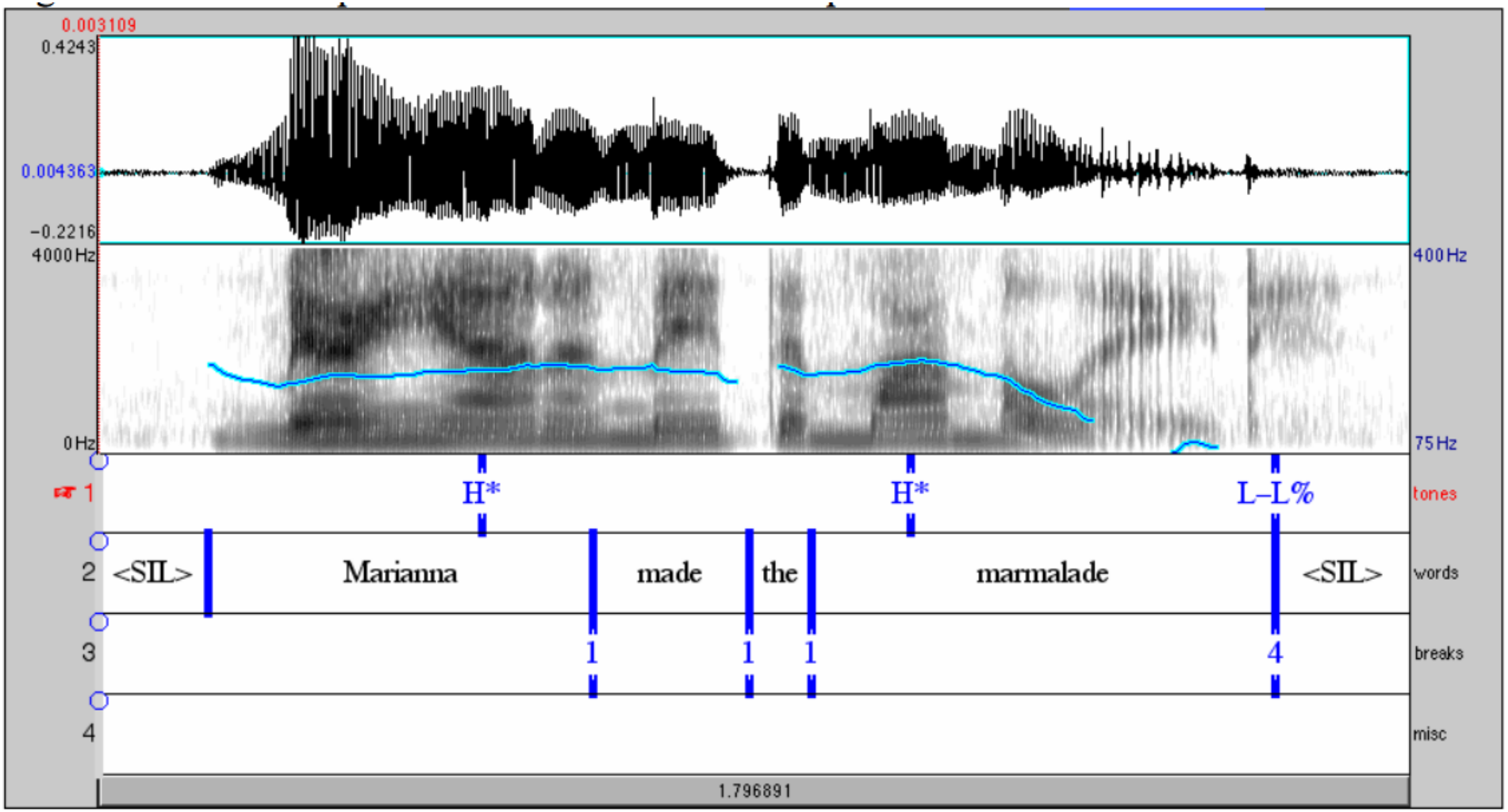
Pitch anchors in intonation

Specific f0 targets (“head marking tones”) can make individual words **prominent** relative to neighboring words

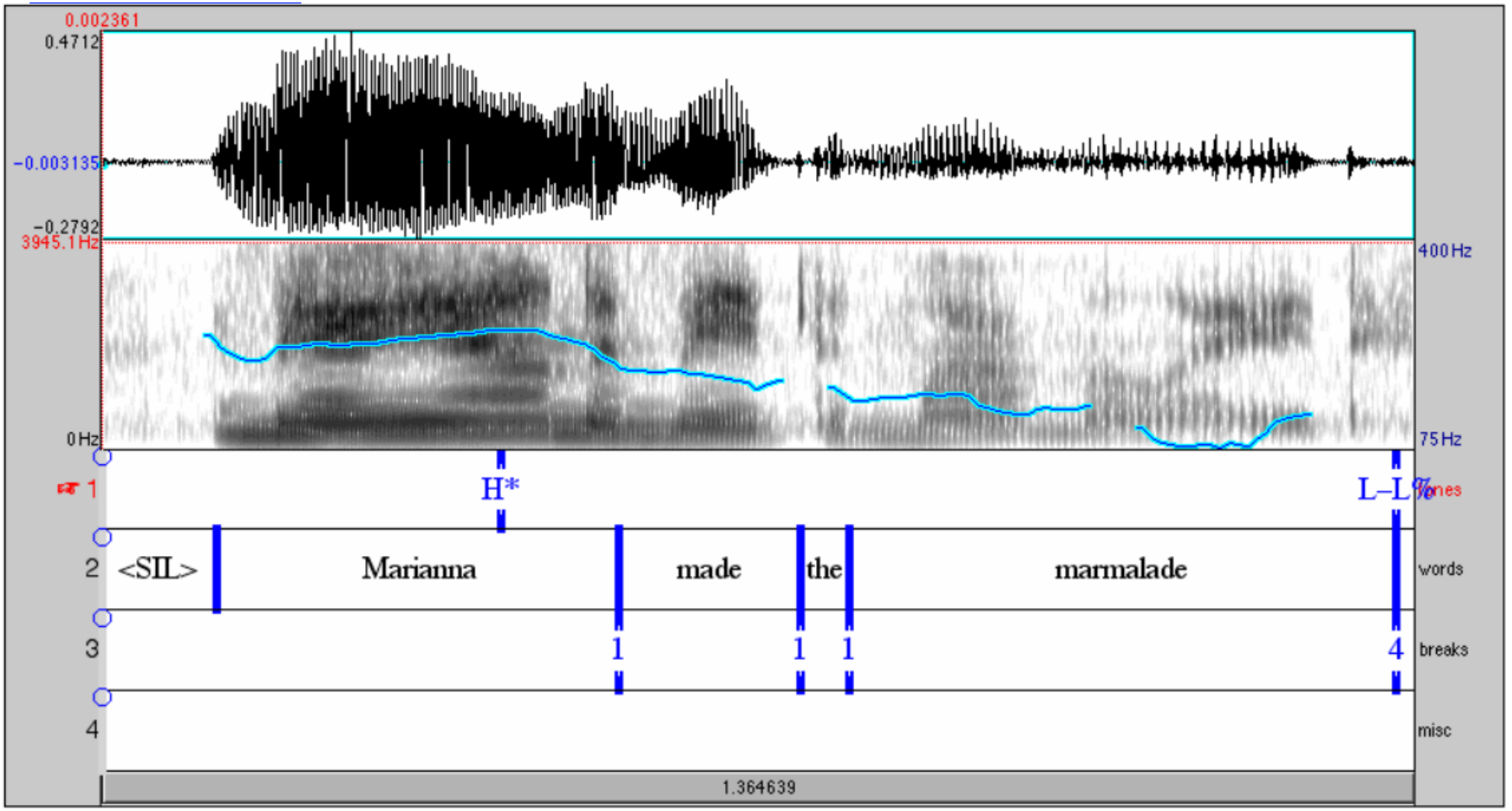
Changes in f0 can mark off the edges of **prosodic constituents** within an utterance

- Specific tones associated with boundaries (“boundary tones”)
- “Pitch reset” at the beginning of new phrase

Marianna made the marmalade (neutral)



MMtM: Statement, focus on Marianna



Question marking

In general across languages, questions involve higher f0

- This isn’t universal though

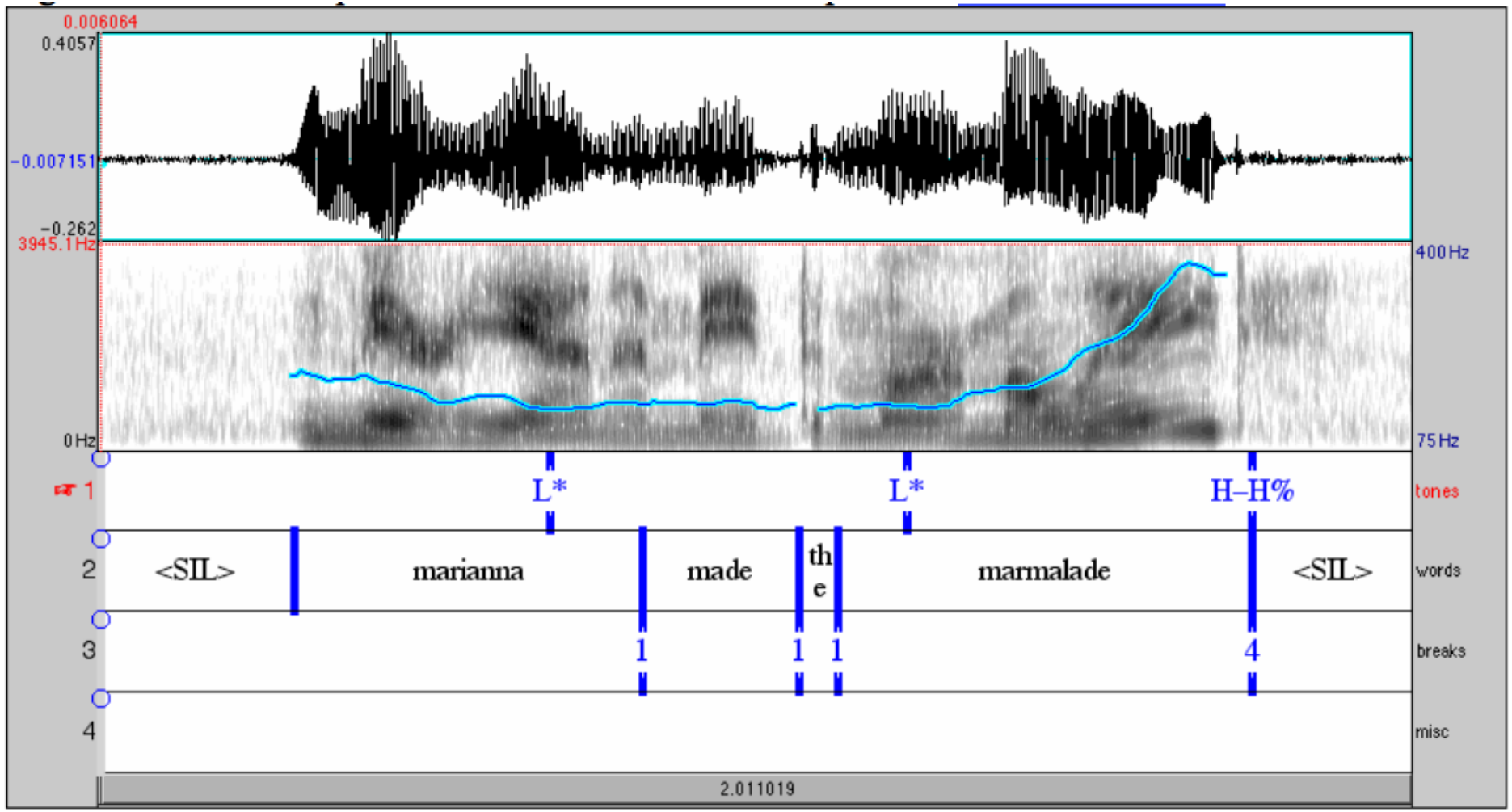
Some kind of intonational high tone

- E.g. a local f0 rise at the end of the sentence

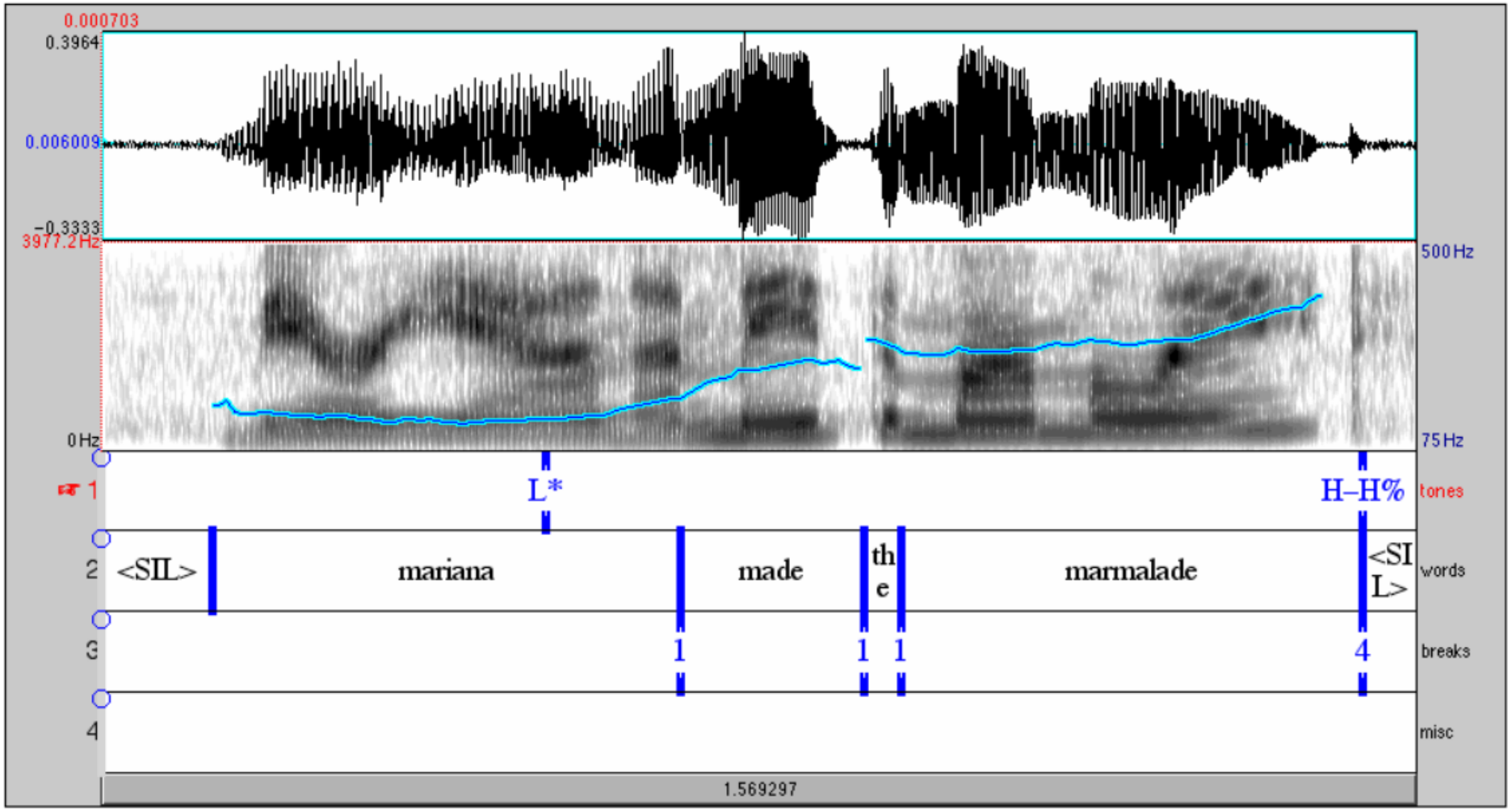
Overall higher f0

- Higher maximum f0 values
- Less declination

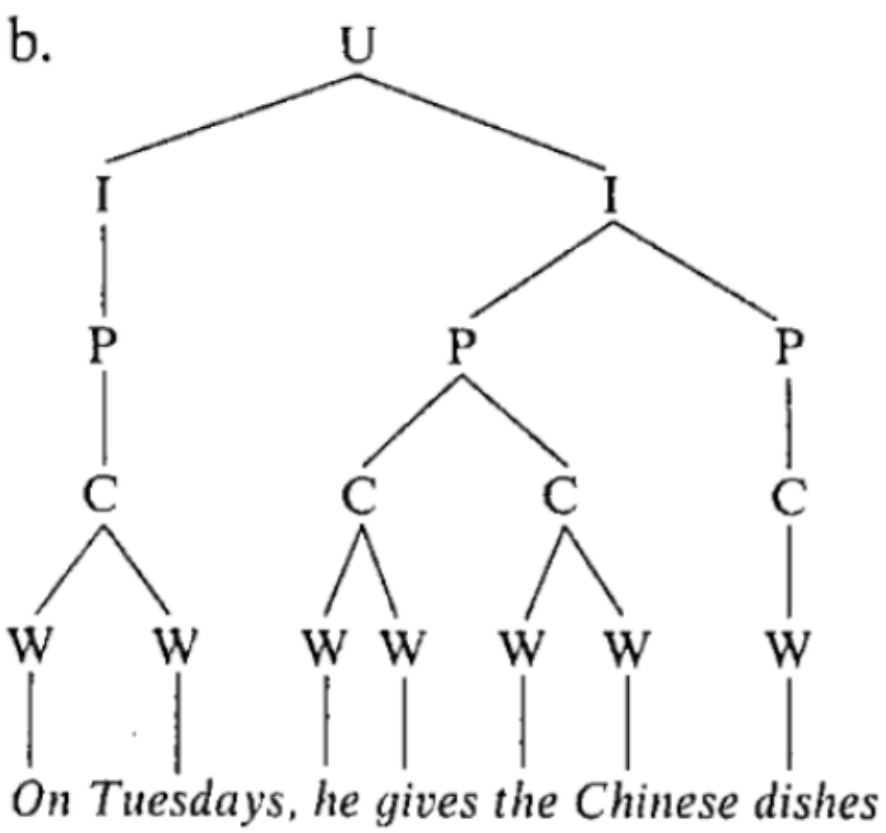
MMtM?: Question

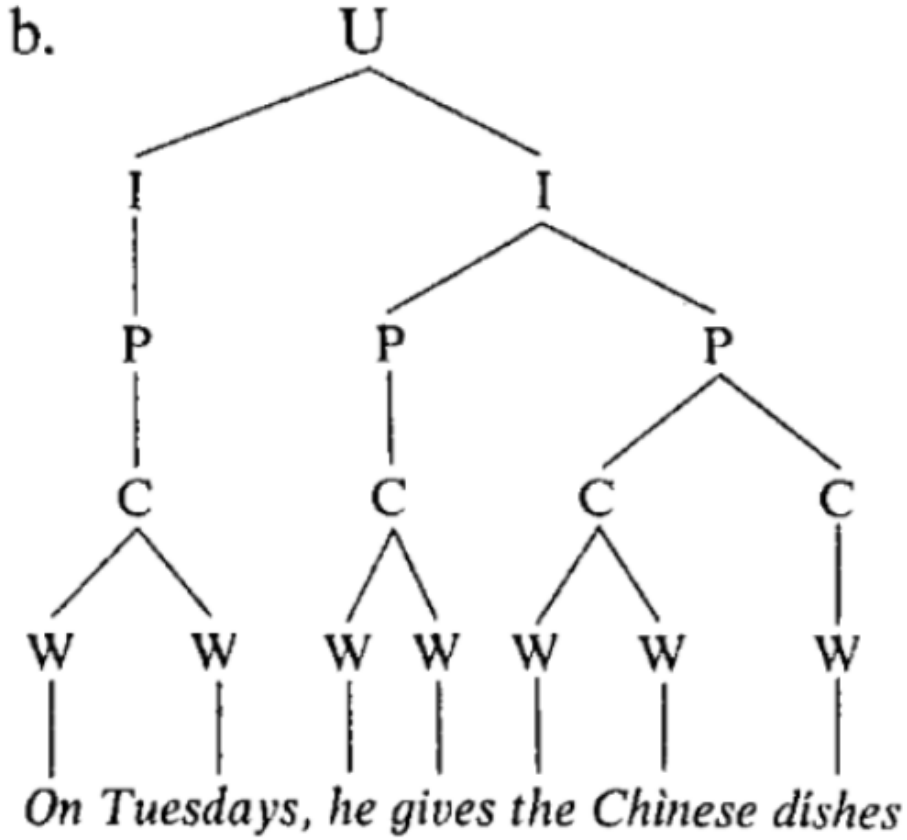


MMtM? Question with focus on ‘Marianna’



Prosodic constituents (Hayes 1989)





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Stress in Turkic languages

Stress in Turkic languages is not well understood

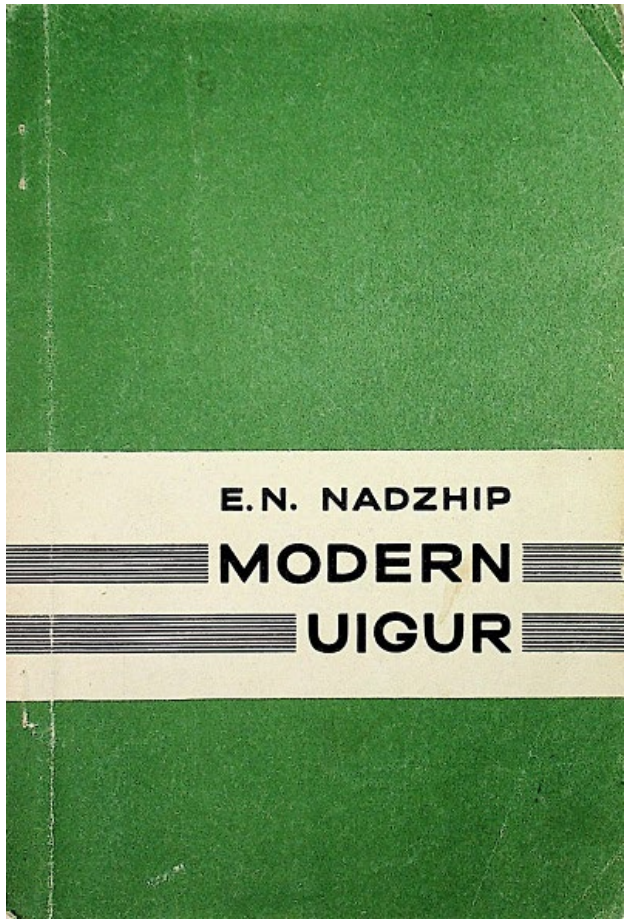
Turkish:

- A stress language with mostly final stress? (e.g. Kabak & Vogel 2001)
- A lexical pitch-accent language? (e.g. Levi 2005)

Nice resource for Turkish stress:
https://diu.edu/documents/gialens/Vol9-1/Woodard-Turkish.pdf

Stress in Uyghur

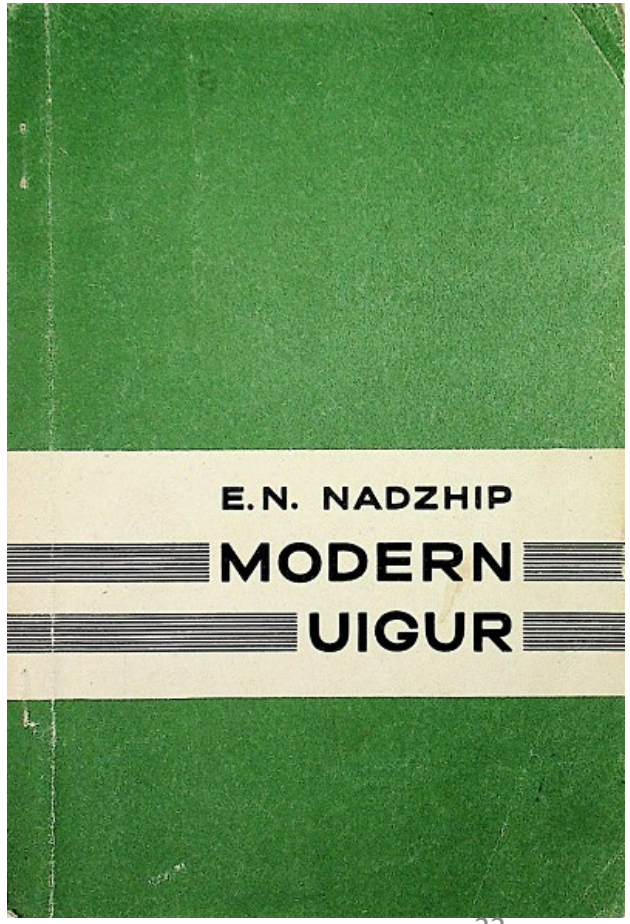
"[Uyghur stress is] remarkable for its complexity and instability"



Impressionistic claims

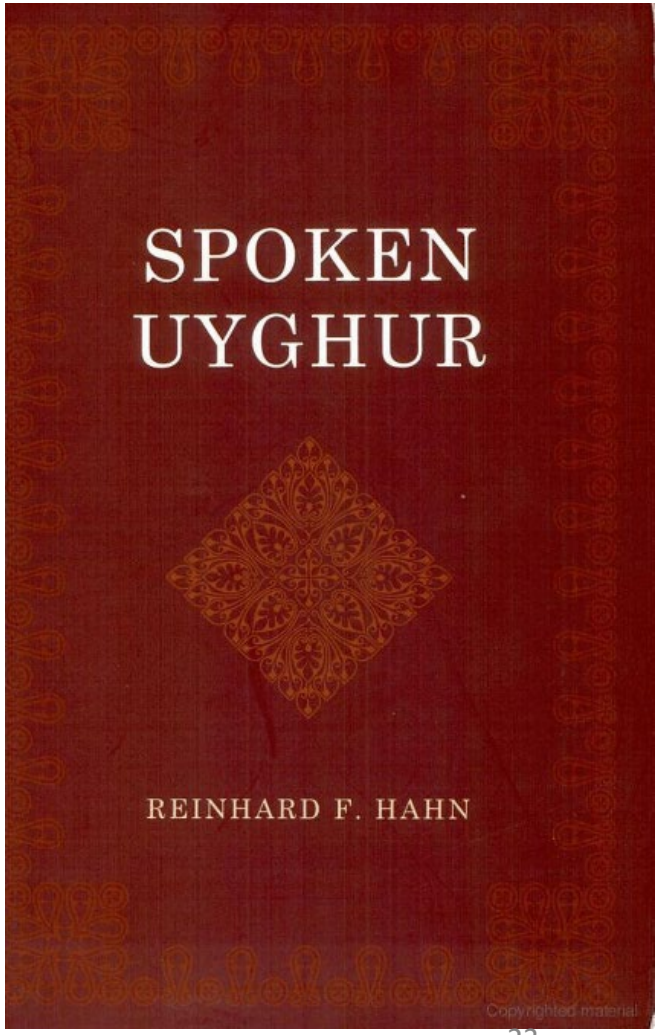
Nadzhip (1971)

- Stress typically falls on the final syllable of the word
- Numerous exceptions, especially for loanwords
- No real discussion of acoustic realization



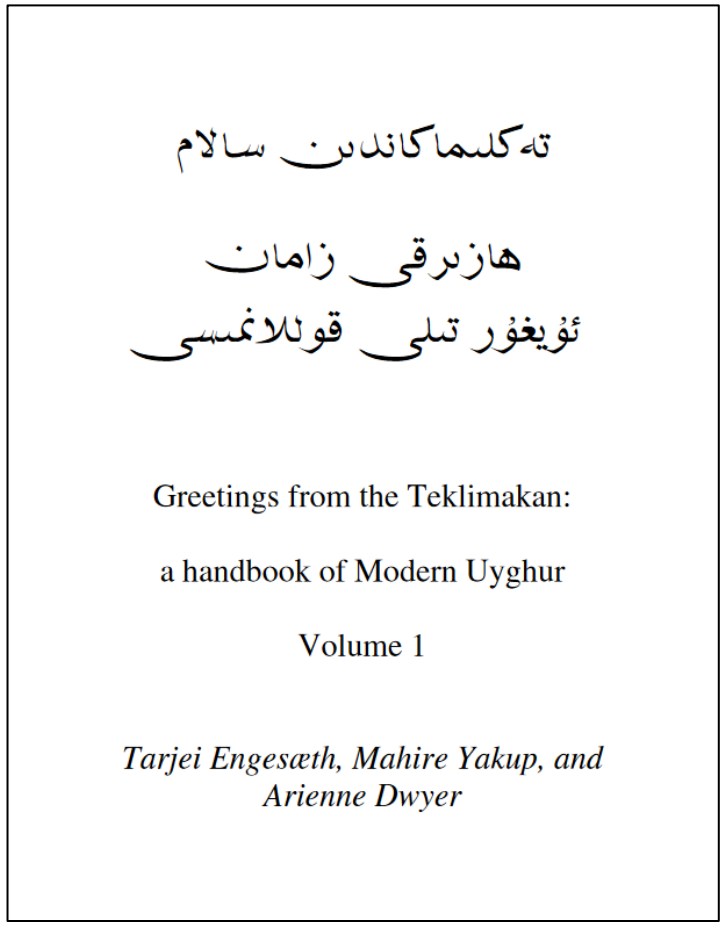
Hahn (1991a, 1991b)

- “The difference between stressed and unstressed syllables is less pronounced [in Uyghur] than […] in most European languages.”
- Stressed syllables are **louder** and **higher pitched**
- If ultimate or penultimate syllable is heavy (CVV, CVC, CVVC, etc) it receives stress
- Otherwise final syllable is stressed



Engesaeth et al. (2009/2010)

- Stress usually falls on *first* heavy syllable
  - TAPshuruq ‘homework’
- But not always
  - turPAN ‘Turpan’
- Loanwords keep stress of source language
  - gimNAStika ‘gymnastics’ (from Russian)
- **Key difference**: Only correlate of stress is **duration**


تەكلىماكاندىن سالام

هازىرقى زامان
ئۇيغۇر تىلى قوللانمىسى

Greetings from the Teklimakan:

a handbook of Modern Uyghur

Volume 1

Tarjei Engesæth, Mahire Yakup, and Arienne Dwyer

Empirical studies of Uyghur stress

Yakup (2013), Yakup & Sereno (2016)

Identified sets of minimal or near-minimal stress pairs with consistent stress judgments from Uyghur speakers

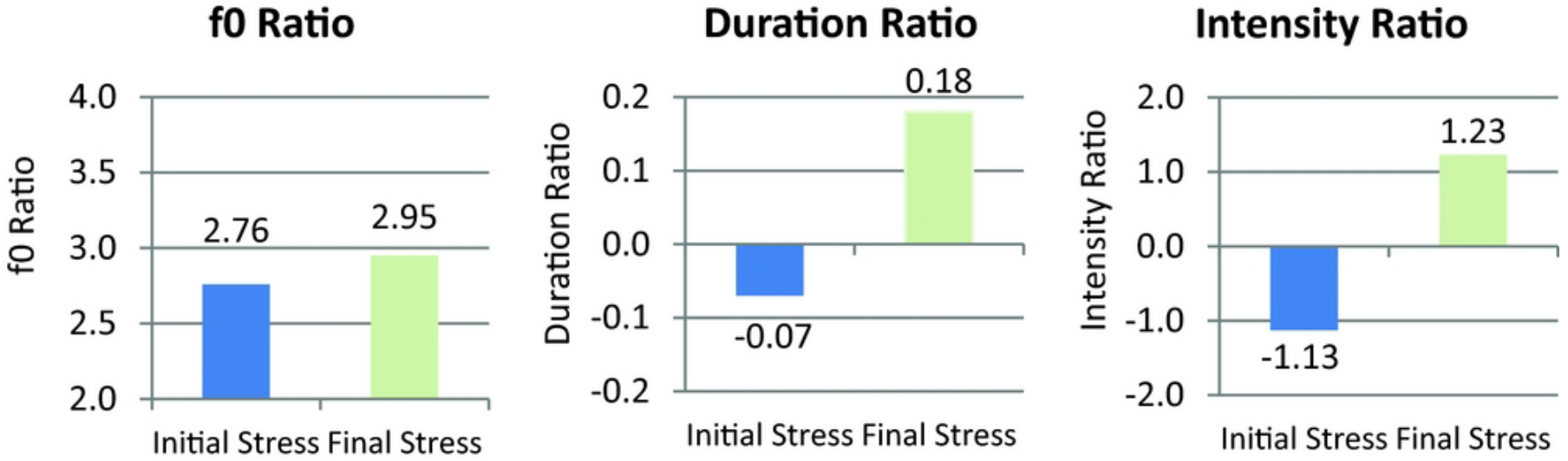
For many other words, Uyghur speakers disagreed on stress location!

#	Initial stress	IPA	English gloss	Final stress	IPA	English gloss
1	Acha	/ˈaʧa/	'elder sister'	aCHA	/aˈʧa/	'branching'
2	Ara	/ˈara/	'fork'	aRA	/aˈra/	'between'
3	TÖshük	/ˈtøʃyk/	'kitchen'	töSHÜK	/tøˈʃyk/	'hole'
4	BAla	/ˈbala/	'child'	baLA	/baˈla/	'disaster'
5	CHAtaq	/ˈʧataq/	'bad branch of tree'	chaTAQ	/ʧaˈtaq/	'problem'
6	PAchaq	/ˈpaʧaq/	'leg'	paCHAQ	/paˈʧaq/	'piece'

Yakup (2013), Yakup & Sereno (2016)

Speakers produced disyllabic words with initial or final stress in a carrier phrase

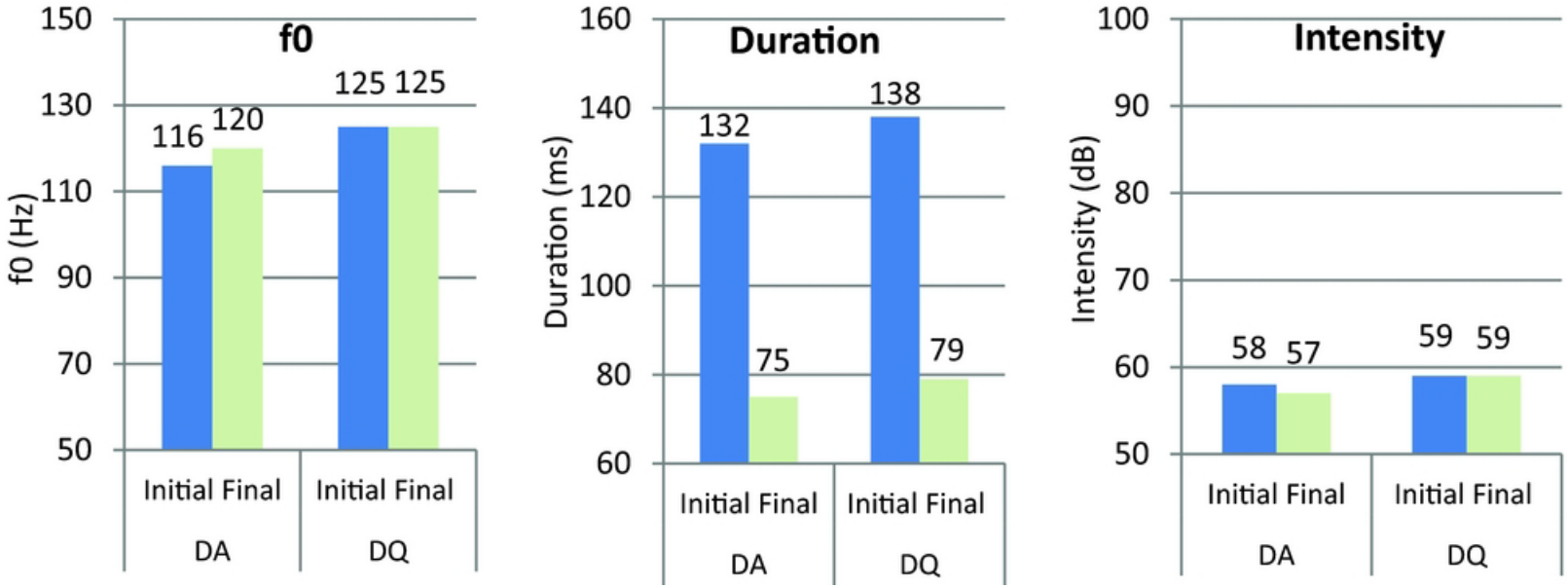
Duration and **intensity** differed based on stress location; **f0 did not**!



Yakup (2013), Yakup & Sereno (2016)

Also looked at declarative vs. interrogatives with target word at end of utterance

- Interrogatives had higher f0 overall
- No differences in f0 based on stress



Major & Mayer (2018; in press)

Replicated and extended Yakup (2013) and Yakup & Sereno (2016)

Elicited disyllabic stress (near-)minimal pairs in **sentence-initial** and **sentence-medial** position from eight speakers

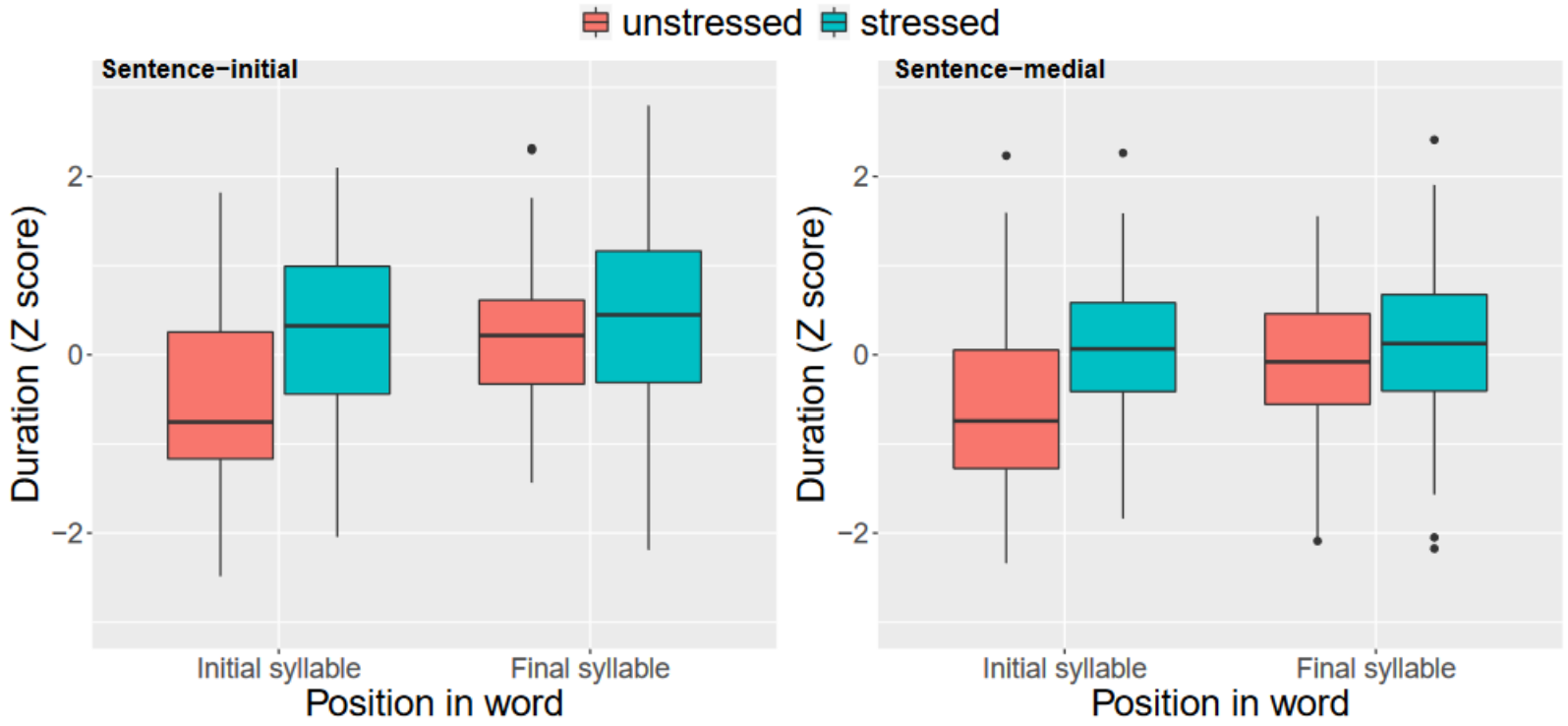
Initial:	_____ bek yaxshi söz	"_____ is a very good word"
Medial:	Mahinur _____ deydu	"Mahinur will say _____"

Measured **duration, intensity,** and **f0** of both syllables

Duration results

Syllables are longer when they are:

- Stressed
- Word-final
- Sentence-initial

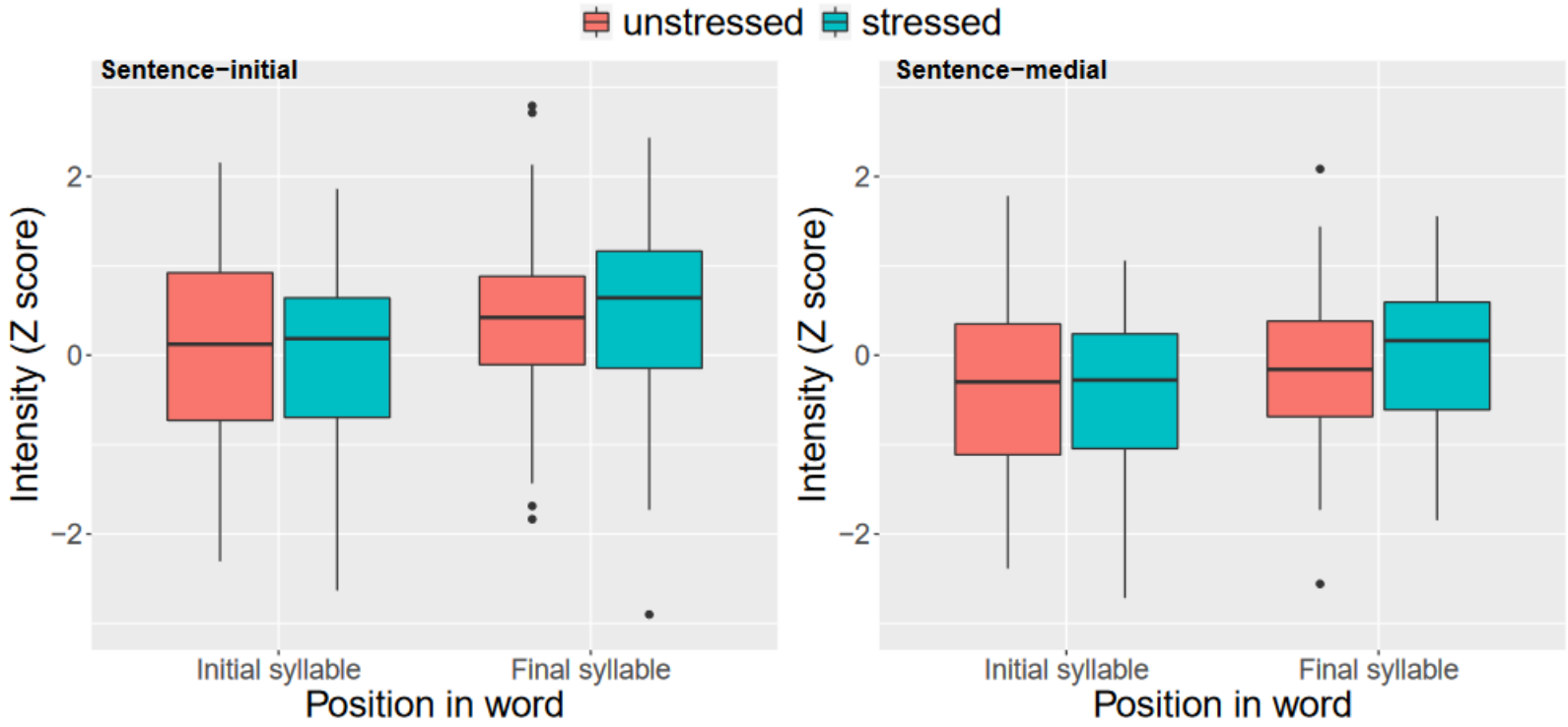


Intensity results

Intensity is higher in syllables when they are:

- Word-final
- Sentence-initial

No effect of stress

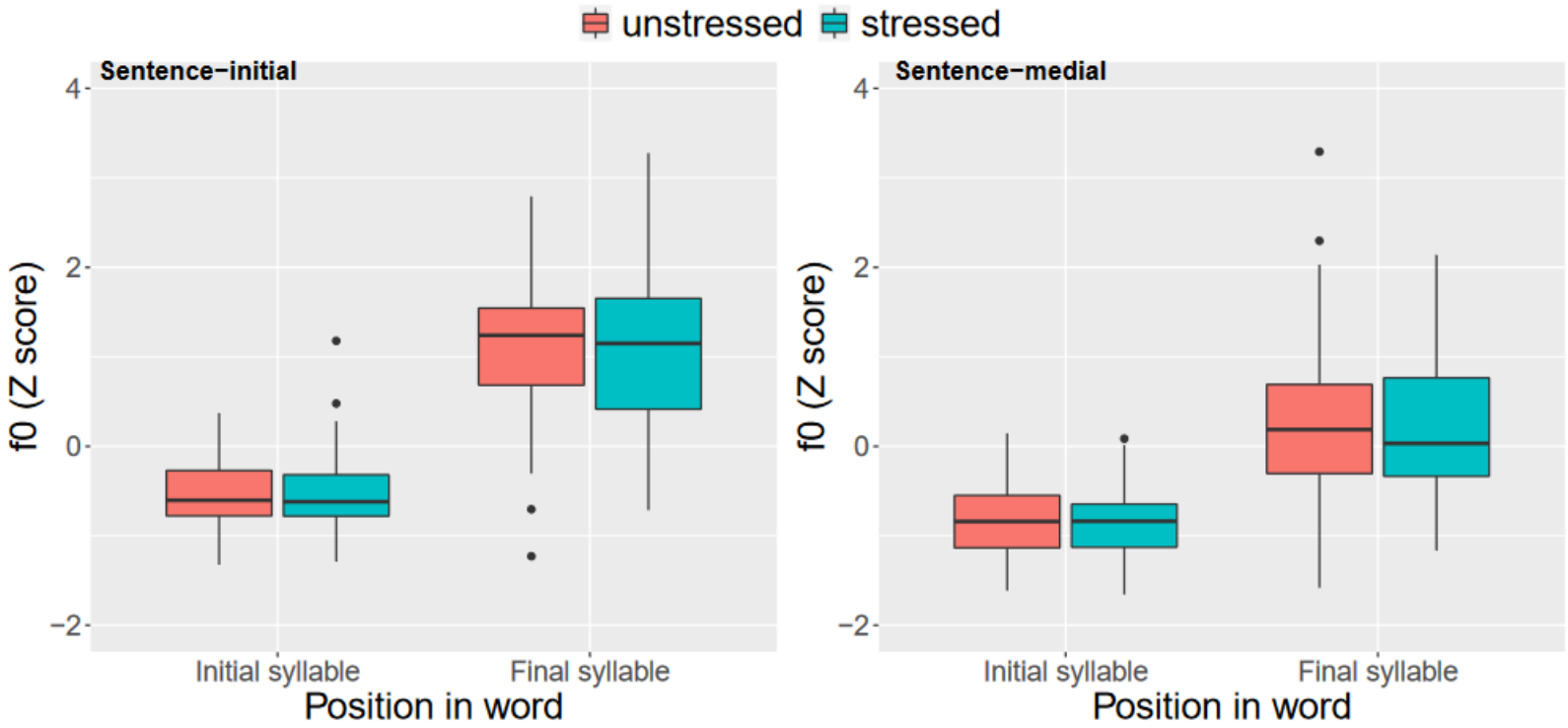


f0 results

f0 is higher in syllables when they are:

- Word-final
- Sentence-initial

No effect of stress



Summary of empirical studies

Duration is the only acoustic cue consistently associated with stress

No studies have found that f0 correlates with stress

- Different sentence types lead to differences in f0 (Yakup 2013; Yakup & Sereno 2016)
- Word-final syllables have higher f0 (Major & Mayer 2018; in press)

Intensity is less clear

What do we make of this?

Stress manifests as **durational differences** in Uyghur

f0 is used to mark **prosodic boundaries** and signal different types of linguistic information (sentence type, etc)

- Prosodic phrases often end with f0 rises

Claims that stress in Uyghur is signaled by f0 rises conflate prosodic boundary marking and stress

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The AM model and ToBI

The Autosegmental Metrical model is a common way to analyze intonational systems (Pierrehumbert 1980, Beckman & Pierrehumbert 1986)

Basic idea: the pitch contour of utterances can be broken down into a series of **discrete pitch targets** that **align** with:

- Prominent syllables
- Prosodic boundaries

Phonetic **interpolation** determines contour between targets

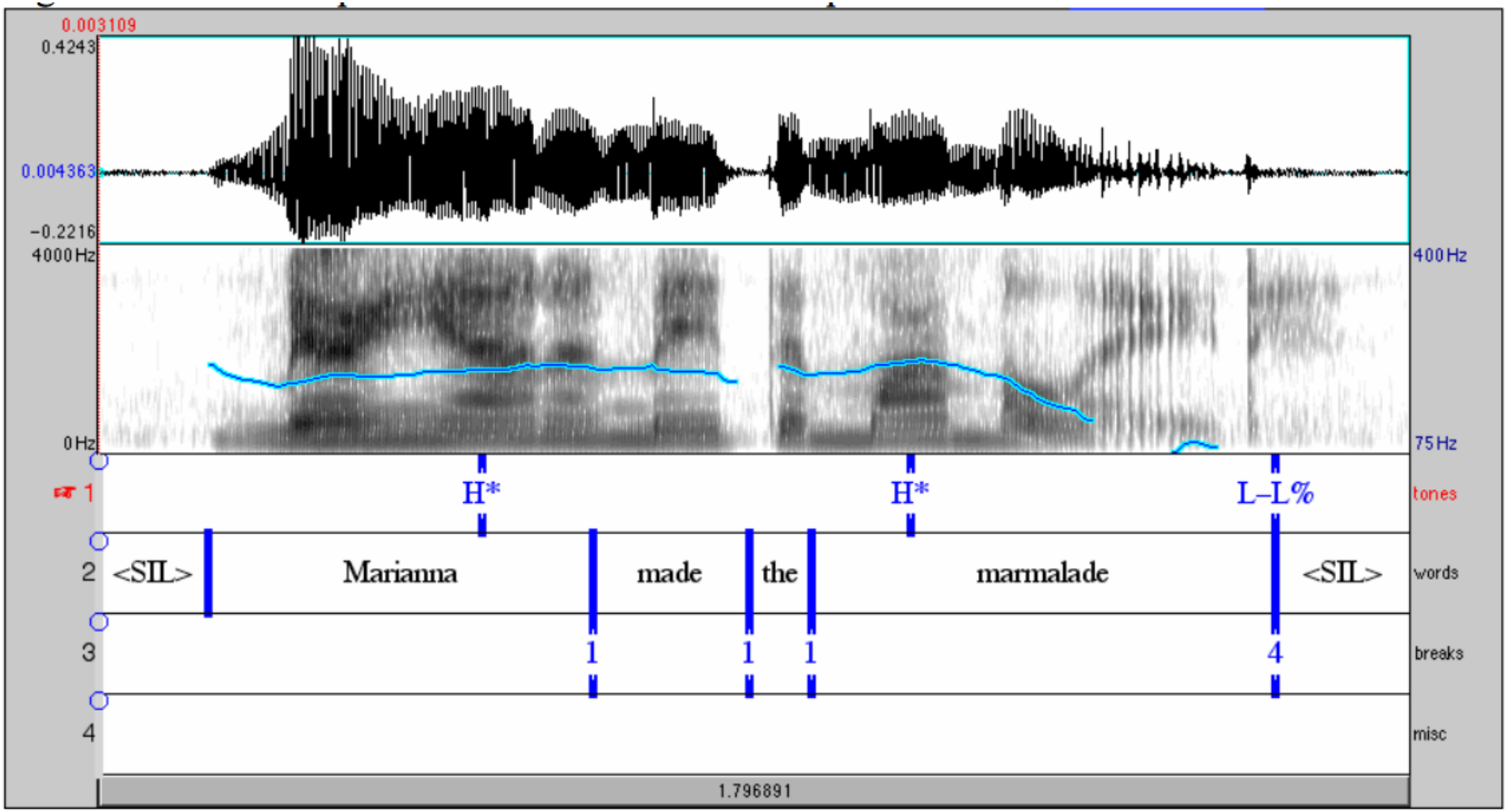
ToBI

The **Tones and Break Indices** (ToBI) framework is a set of conventions for transcribing and annotating speech under an AM model

- Head-marking tones (H*, L*, etc.) mark **prominent syllables**
- Boundary tones (H%, L%, H-, etc.) mark **edges** of prosodic boundaries
- Break indices (numbers) mark **boundary strength**

Different languages have different ToBI systems (so not like the IPA)

Marianna made the marmalade (neutral)



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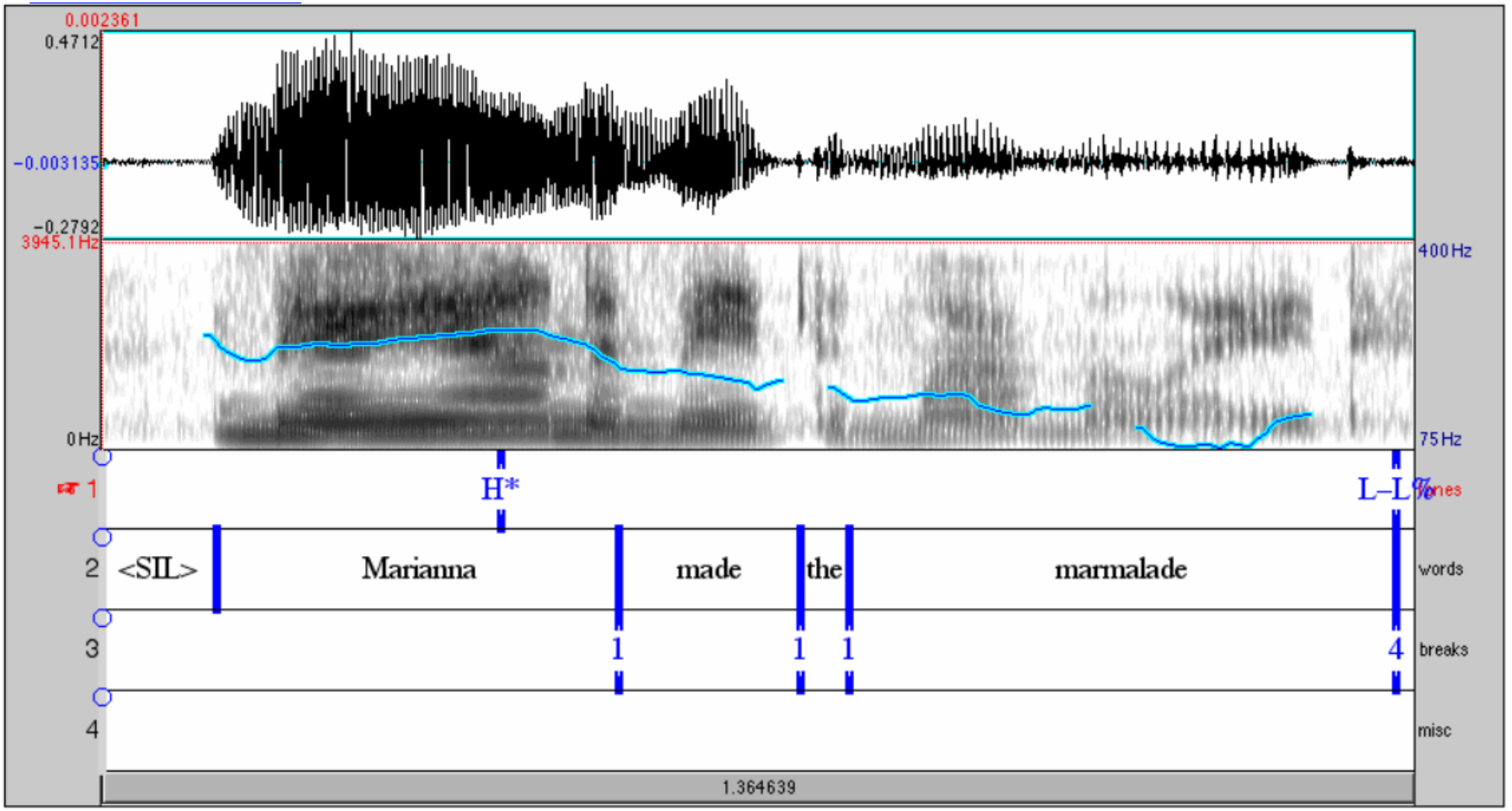
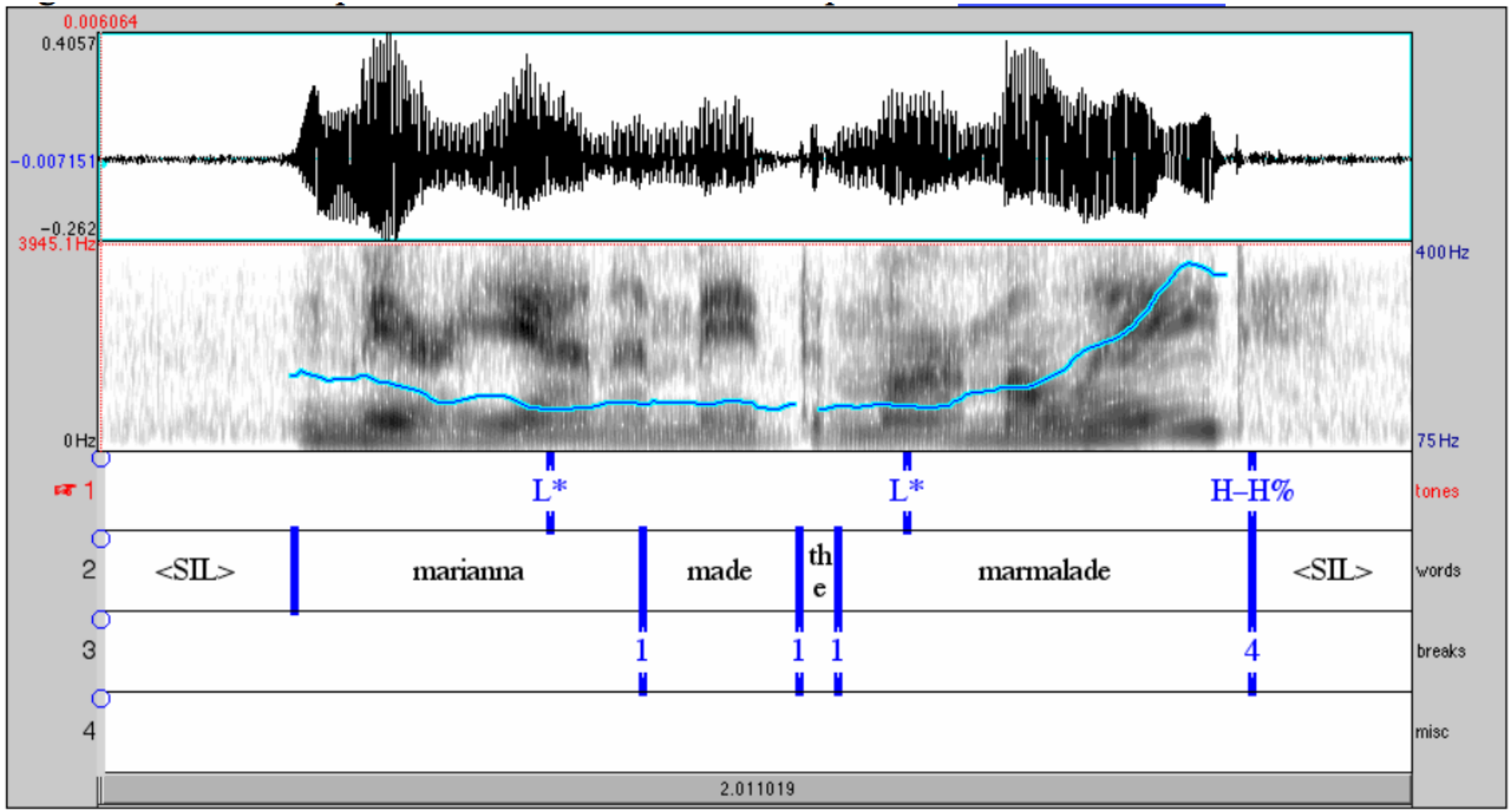


MMtM?: Question



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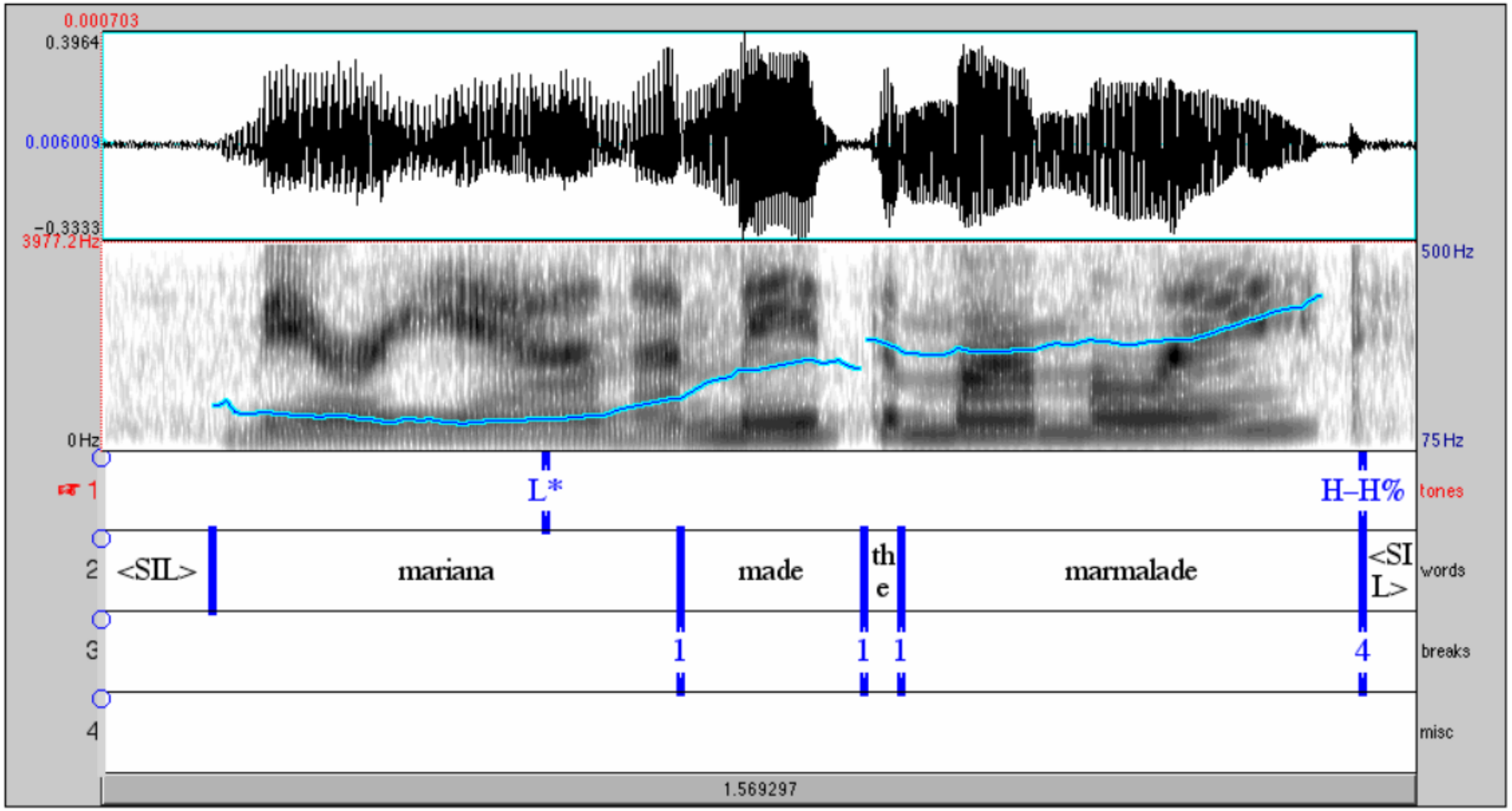


A phonological model of Uyghur intonation

Major and Mayer (2018; to appear) presents an auto-segmental metrical model of Uyghur.

- Not a full ToBI model; no break indices

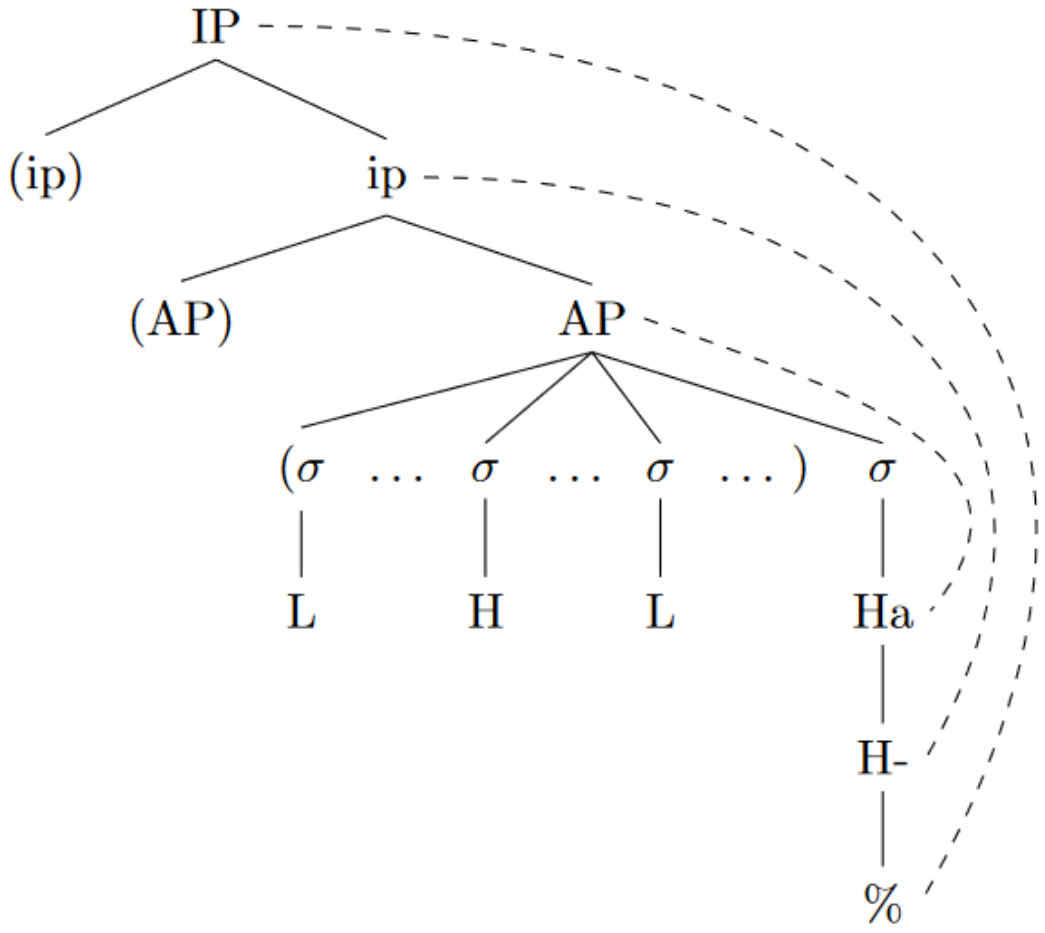
Based on elicitation of a large set of sentences from 10 speakers

- Some experimental validation of claims

Here we'll focus on how Uyghur uses different intonational properties to signal different kinds of information

The model

Phrase-internal tones	
AP-internal tones	
(LHL)	Optional AP-internal tones. The first tone that is realized is typically L, and is generally aligned with the first syllable of the AP. The alignment of the other tones is variable.
Boundary tones	
AP boundary tones	
Ha	Realized on AP-final syllable
ip boundary tones	
H-	Realized on ip-final syllable
IP boundary tones	
L%	Used in declaratives; realized on IP-final syllable
H%	Used in questions and continuation rises; realized on IP-final syllable
HL%	Used in declaratives; realized on IP-final syllable
LH%	Used in questions and continuation rises; realized on IP-final syllable



Key components

Both AP and ip end with a high tone (Ha and H-, respectively)

- ip boundaries have more substantial juncture than AP boundaries
- ip boundaries trigger pitch reset

IP can end in several different tones

- Different tones correspond to different linguistic events
- Utterance-medial IPs have a very large juncture (often a pause)

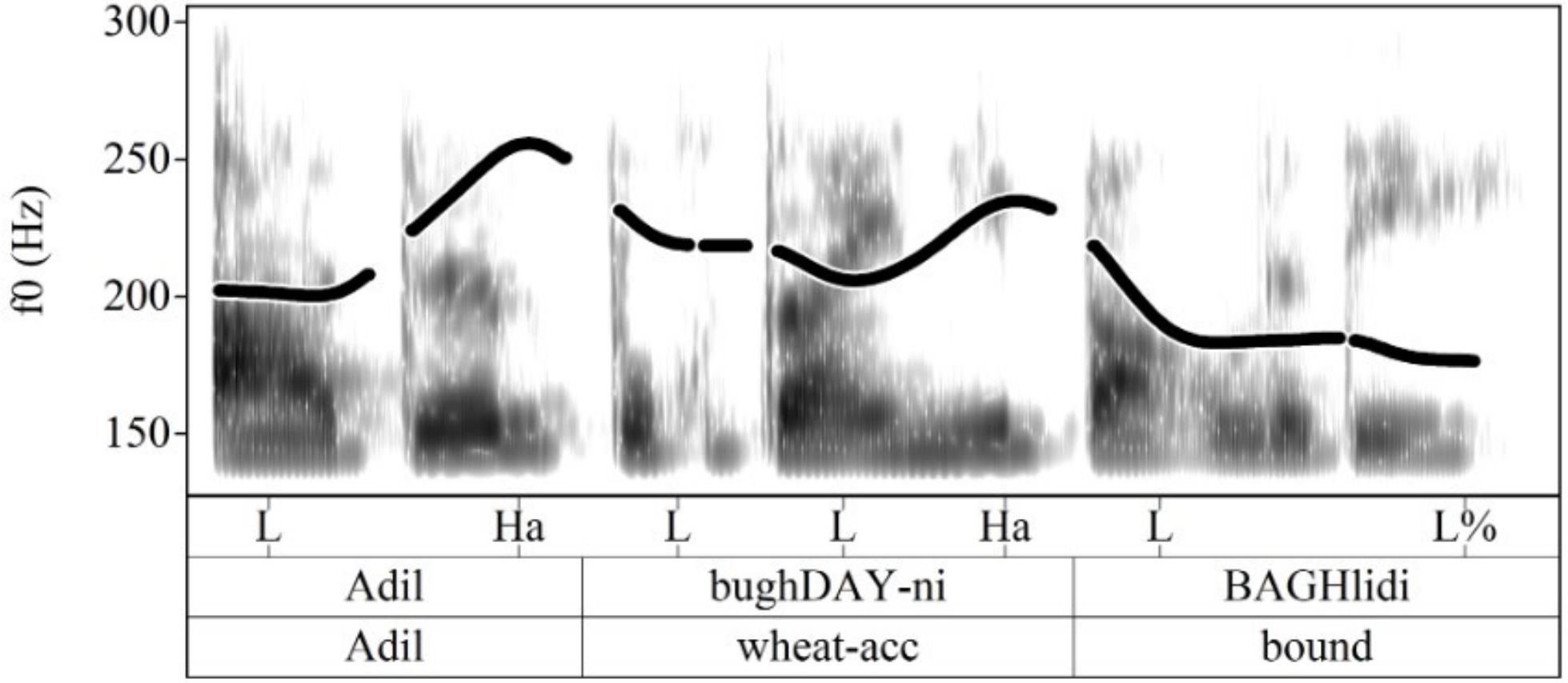
Declarative sentences

Typically end in L% or (less commonly) HL%

Subject and (sometimes) object usually form separate APs

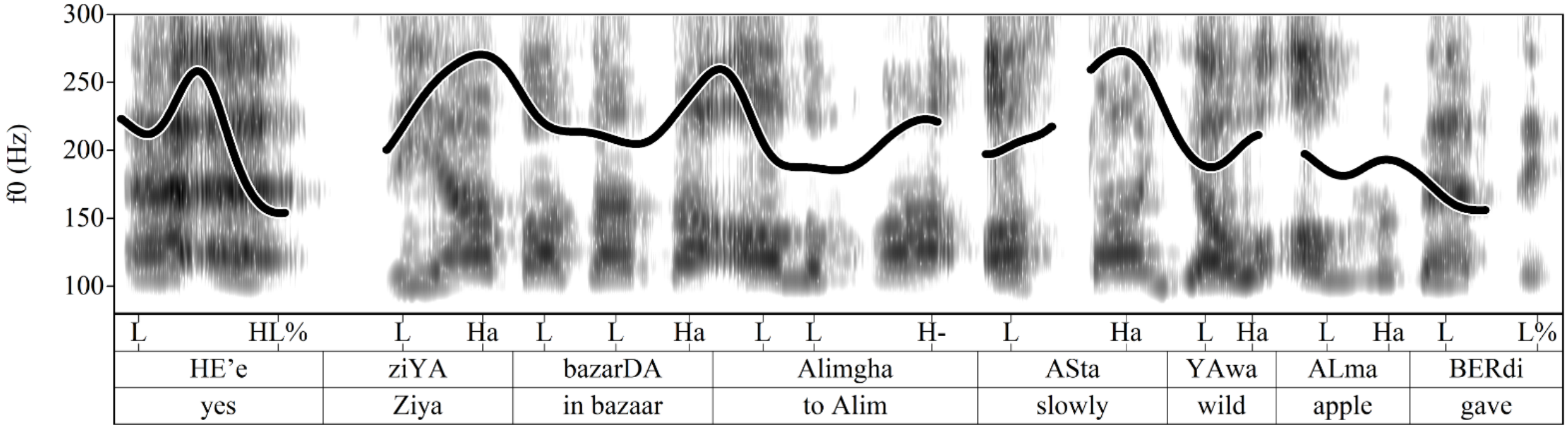
Longer sentences may be split into multiple ips

Declarative sentences



$[[[\text{Adil}]_{AP}\ [\text{bughdayni}]_{AP}\ [\text{baghlidi}]_{AP}]_{ip}]_{IP}$

Context: Did Ziya … ?



$[[[he'e]_{AP}]_{ip}]_{IP}$ $[[[ziya]_{AP}$ $[bazarda]_{AP}$ $[alimgha]_{AP}]_{ip}$ $[[asta]_{AP}$ $[yawa]_{AP}$ $[alma]_{AP}$ $[berdi]_{AP}]_{ip}]_{IP}$

Focus constructions

In English focus is usually indicated by head-marking tones

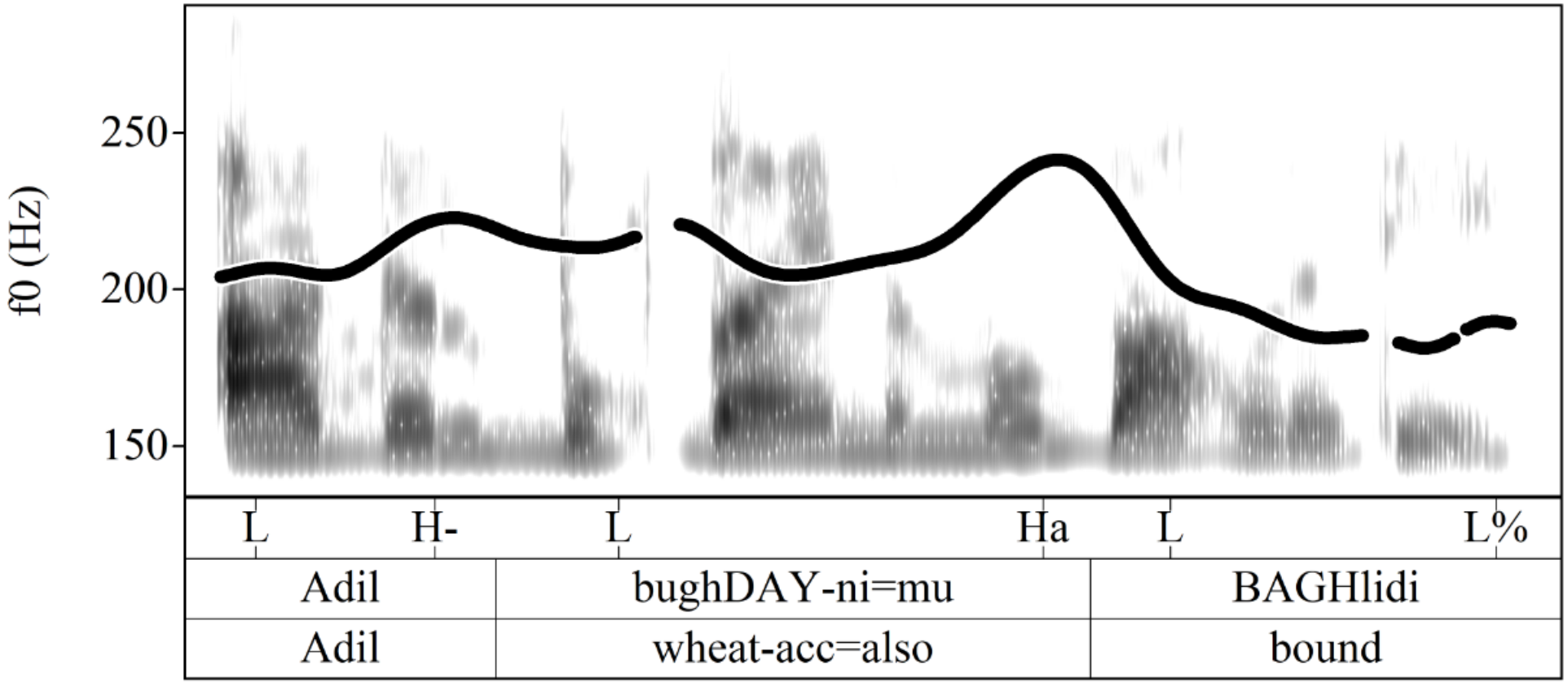
- John bound the wheat vs. JOHN bound the wheat

Uyghur has none!

Instead, the focused constituent is usually preceded by a H- boundary

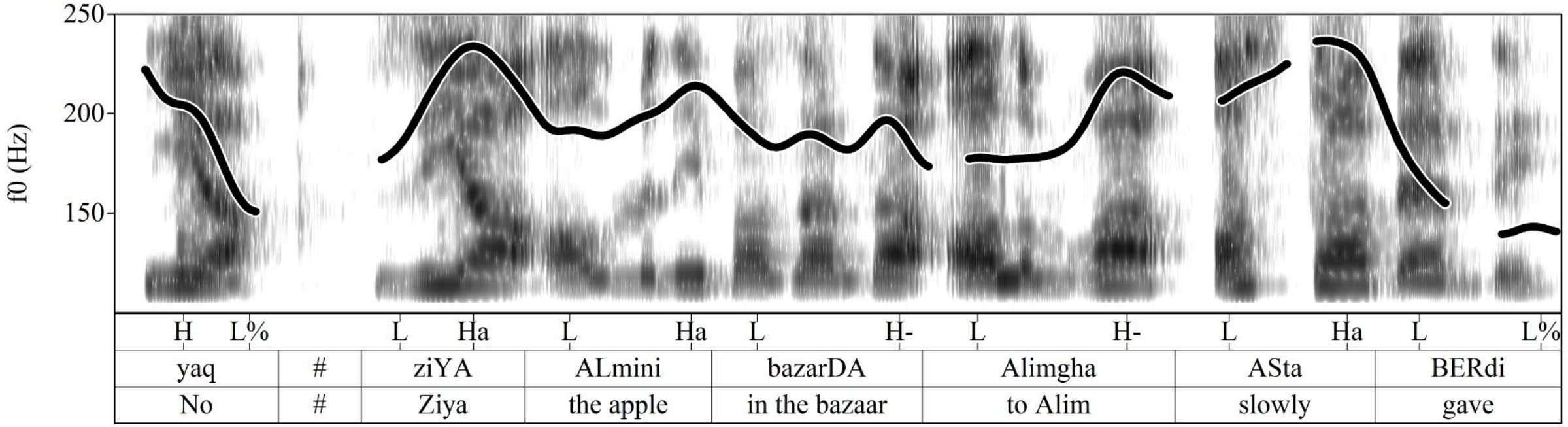
- Sets off focused constituent with **larger preceding juncture**
- **Pitch reset** on focused constituent
- (Partial) **dephrasing** and **pitch compression** of following material

Adil even bound the wheat!



$[[[Adil]_{AP}]_{ip}\ [[bughdaynimu]_{AP}\ [baghlidi]_{AP}]_{ip}]_{IP}$

Was the event carried out quickly?



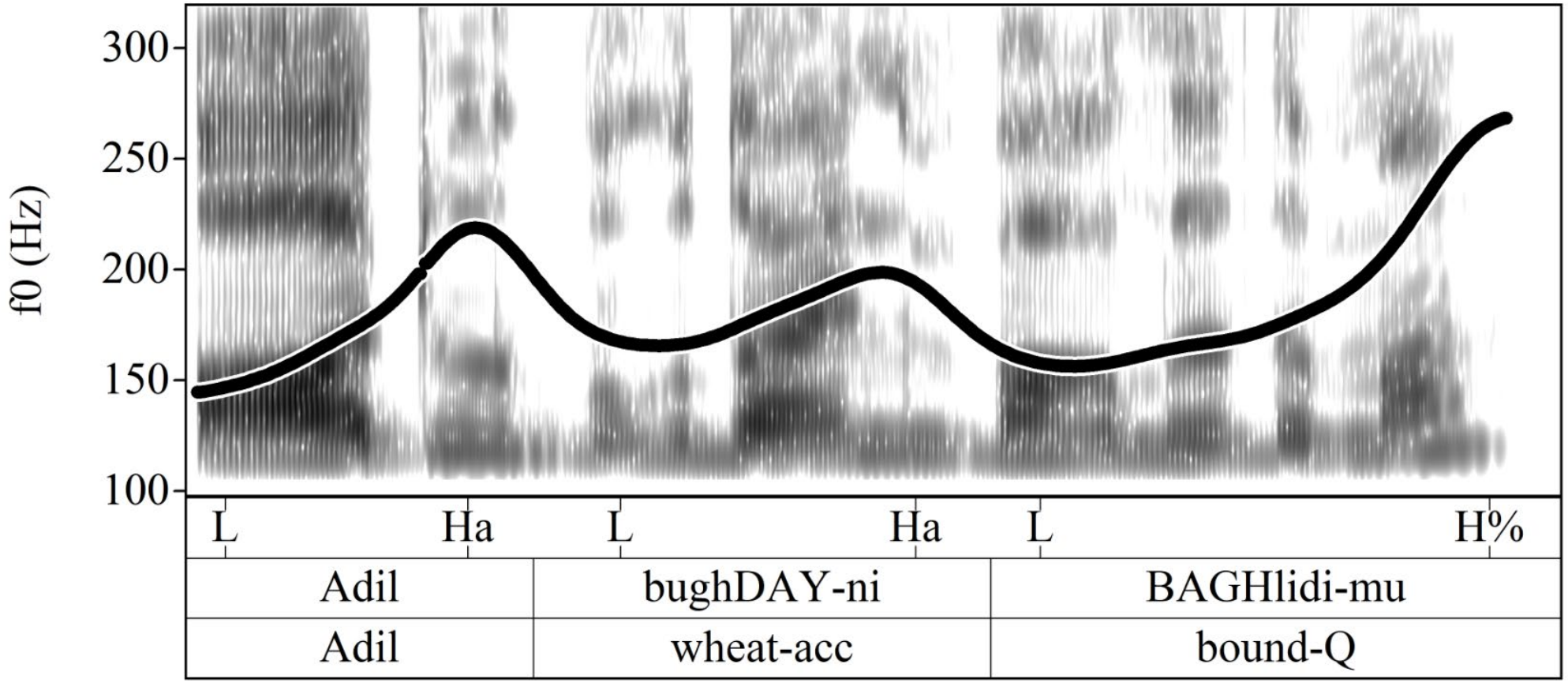
$[[[yaq]_{AP}]_{ip}]_{IP}$ $[[[ziya]_{AP}$ $[almini]_{AP}$ $[bazarda]_{AP}]_{ip}$ $[[alimgha]_{AP}]_{ip}$ $[[asta]_{AP}]$ $[berdi]_{AP}]_{ip}]_{IP}$

Questions

Questions typically end in H% or LH% (and sometimes HL%)

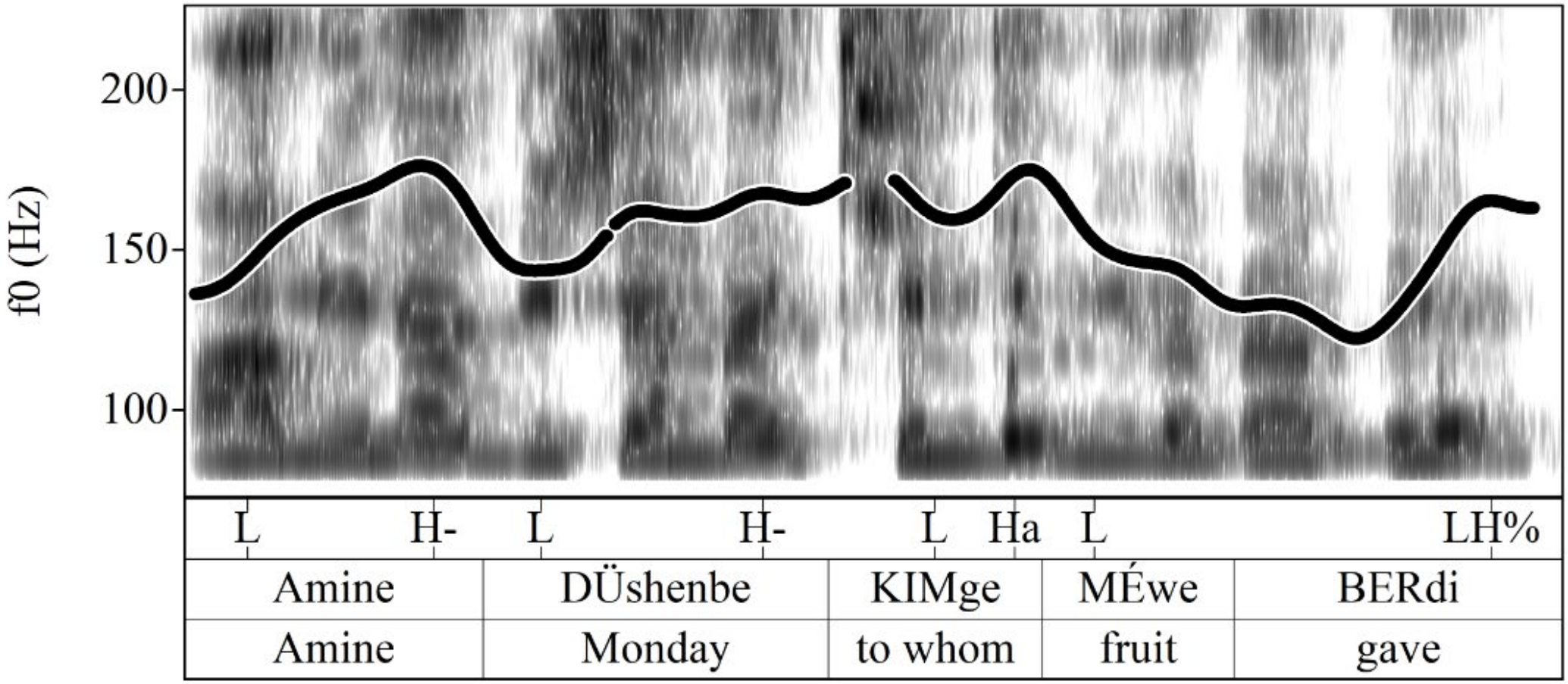
wh-questions also have focus on the wh constituent

Did Adil bind the wheat?



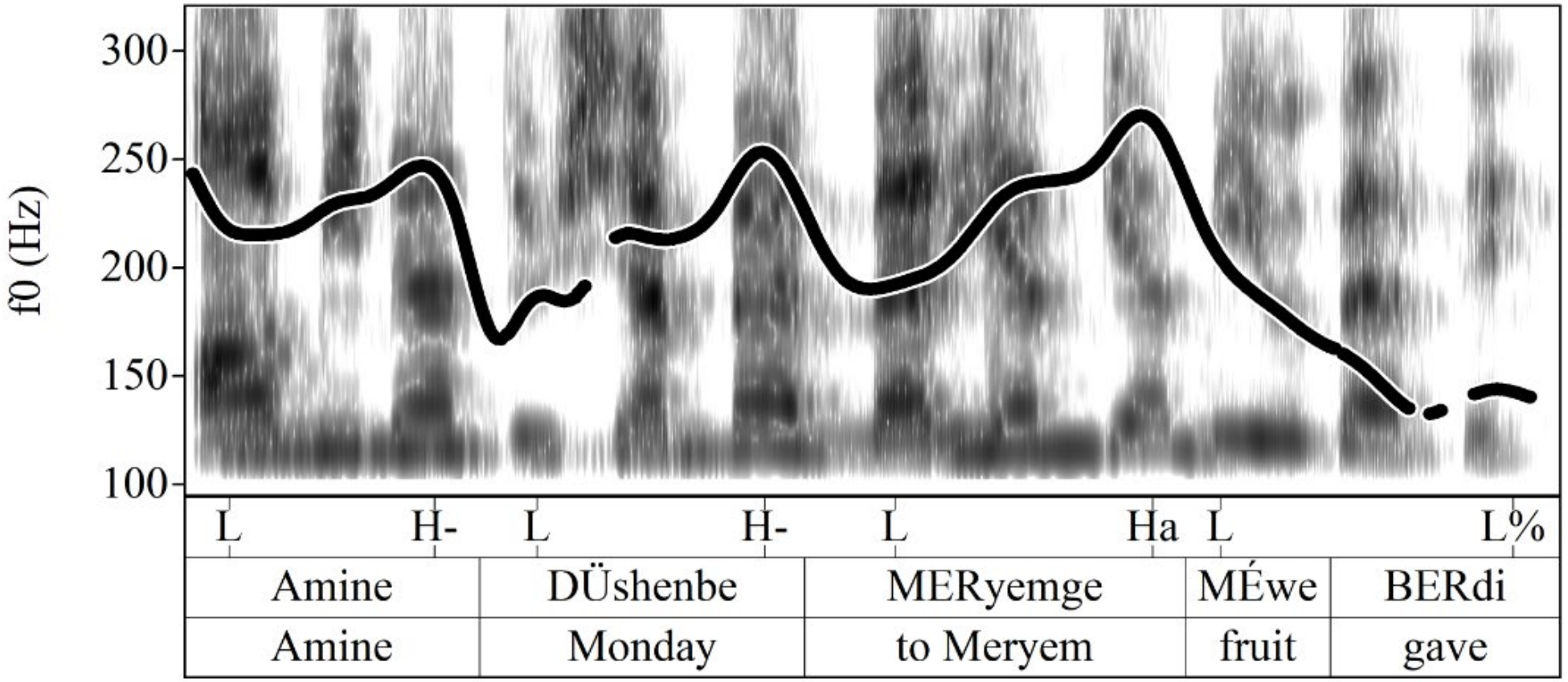
$[[[\text{Adil}]_{AP}\ [\text{bughdayni}]_{AP}\ [\text{baghlidimu}]_{AP}]_{ip}]_{IP}$

Who did Amine give fruit to on Monday?



$[[[amine]_{AP}]_{ip}\ [[düshenbe]_{AP}]_{ip}\ [[kimge]_{AP}\ [méwe\ berdi]_{AP}]_{ip}]_{IP}$

Amine gave fruit to Meryem on Monday



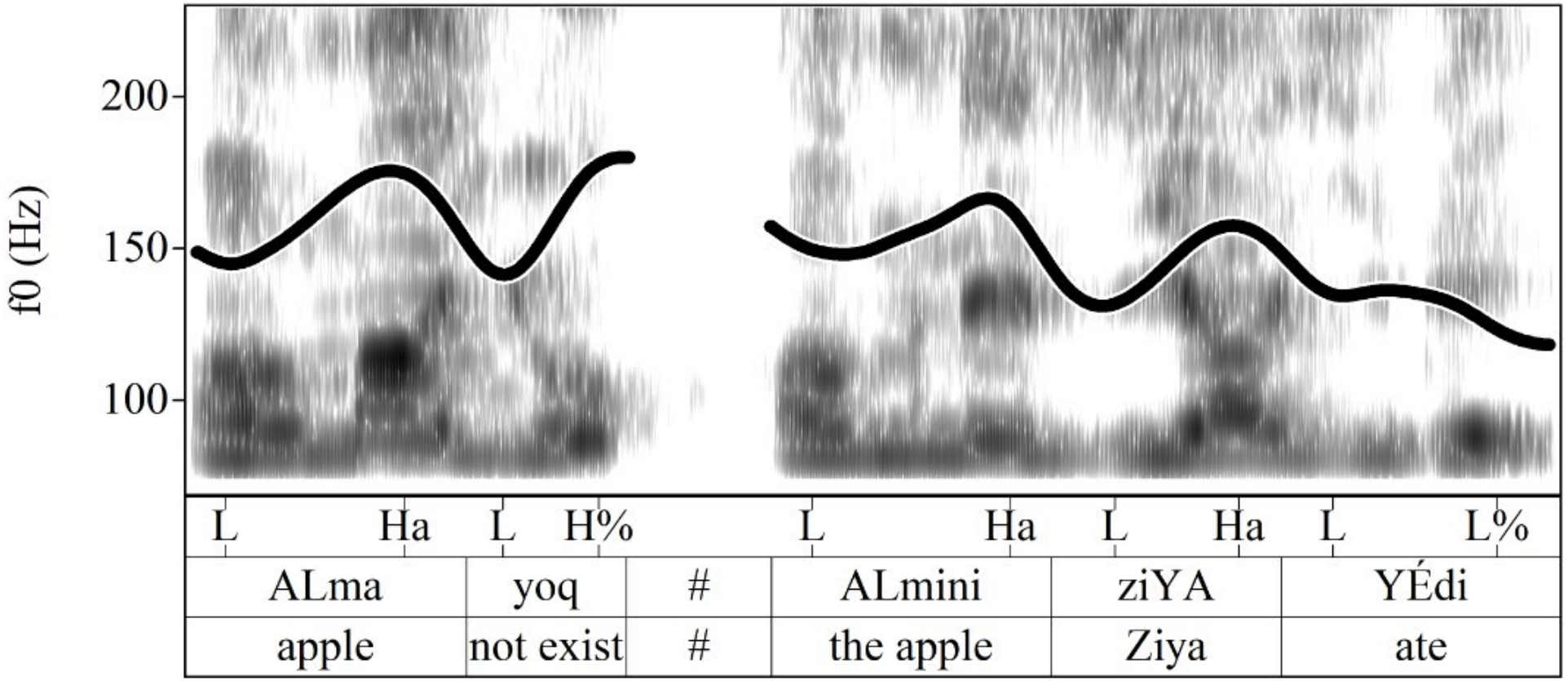
$[[[\text{amine}]_{AP}]_{ip}\ [[\text{düshenbe}]_{AP}]_{ip}\ [[\text{meryemge}]_{AP}\ [\text{méwe berdi}]_{AP}]_{ip}]_{IP}$

Discourse and turn-taking

H% and HL% are also used to mark **continuation rises**

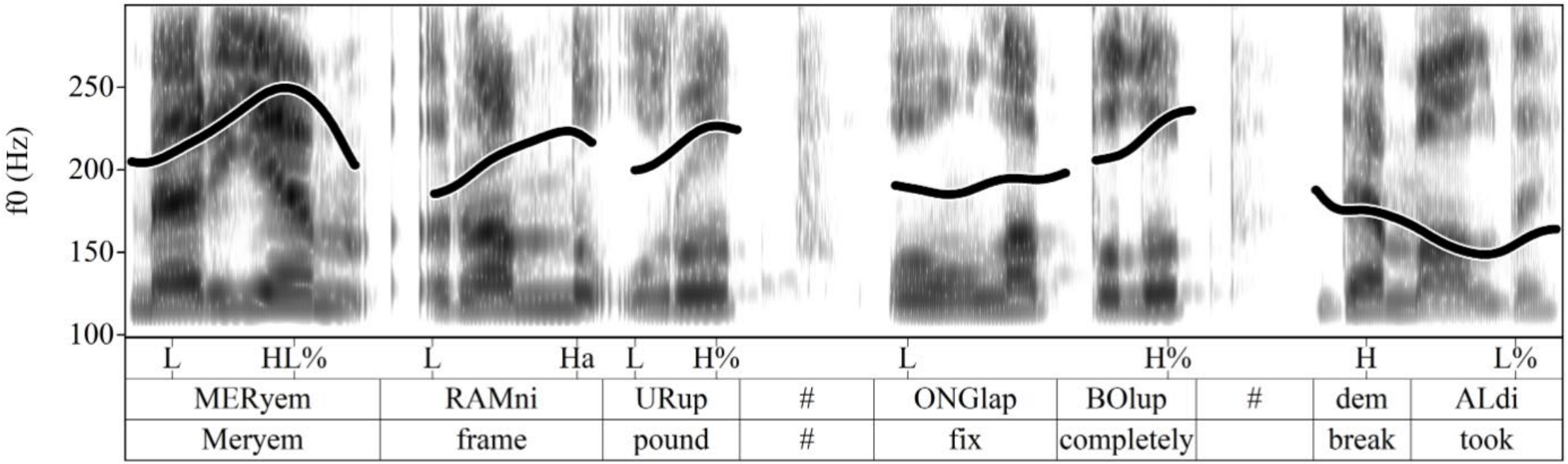
- Speaker intends to keep talking

Context: Where is the apple?



$[[[alma]_{AP}\ [yoq]_{AP}]_{ip}]_{IP}\ [[[almini]_{AP}\ [ziya]_{AP}\ [yédi]_{AP}]_{ip}]_{IP}$

Clause chaining



$[[[meryem]_{AP}]_{ip}]_{IP}$ $[[[ramni]_{AP}$ $[urup]_{AP}]_{ip}]_{IP}$ $[[[onglap\ bolup]_{AP}]_{ip}]_{IP}$ $[[[dem\ aldi]_{AP}]_{ip}]_{IP}$

Roadmap

1. A crash course on prosody
2. Studies of stress in Uyghur
3. A phonological model of Uyghur prosody
4. Conclusion and future directions

Conclusion

Uyghur is a lexical stress language whose intonational system appears not to be sensitive to stress. This is unusual!

- Chuvash may be similar (Dobrovolsky 1999)
- Farasani Arabic as well (Abbas 2021, Abbas & Jun 2021)

Major & Mayer (2018; in press) distinguish three prosodic constituents with different intonational properties

- Varying phrasing and boundary tones signals different types of linguistic information

Future work

Lots of details of Uyghur stress are poorly understood!

- Fertile area for future research (maybe by you!)

Model in Major & Mayer (2018; in press) is somewhat preliminary

- Details of distribution of AP-internal tones unclear
- Distinction between different IP-final boundary tones?
- Need to test more thoroughly against colloquial speech

Future work by us

Travis and I are collaborating with Katie Franich and Gülnar Eziz at Harvard to look at gesture in Uyghur

- Gesture is usually sensitive to prosodic properties like stress
- May provide insight into Uyghur where stress judgment can’t?

Thank you all!

كۆپ رەھمەت سىلەرگە!

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