ARC CENTRE OF EXCELLENCE FOR
THE DYNAMICS OF LANGUAGE

THE UNIVERSITY OF MELBOURNE

Applications of AM to Under-described Languages

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FOR
INDIGENOUS LANGUAGE

Overview

- Continuation of our exploration of AM
- How do you go about constructing an AM model for understudied languages
- where do you start?
- What pitfalls should you try and avoid?

- AM models of a group of Australian indigenous languages (mainly Northern Australian languages)

Why study intonation in under-described languages?

- Many early AM models of intonation based on handful of well-studied languages – English, German, Japanese, French, Italian, Korean etc.
- Last 15 years has seen significant increase in diversity of non-European languages that have been analysed within an AM (and other) frameworks (e.g. see refs in Jun 2005, 2014, Burdin et al 2015, Baumann and Kügler 2015, Féry 2013)

Intonational Fieldwork

- Relatively few of the languages of the world have fully worked out intonational phonology
- Introduce you to some of the procedures that might help you go about doing some intonational fieldwork
- Many have been introduced already

What is our goal?

- It is a major goal of intonational research on any language to sort out what tunes occur in a language and "to be able to make explicit predictions of how a given tune will be realized when it is applied to different texts".
  (Ladd 2008: 201)

Why a phonological model of intonation?

- Intonation is part of a language's grammar
- Representations must
  - Reflect key features of the system
  - capture meaningful contrasts
- These properties allow a speaker or a learner to
  - use the appropriate melody in a given situation
  - process F0 contours as instances of the same melody independently of their exact phonetic realization

Recapping points from yesterday

- Analysis should be as simple as possible
- Analysis should take into account possible sources of variation
- Decisions about intonational contrasts should be guided by meaning
- It is ok to change your analysis in view of new evidence

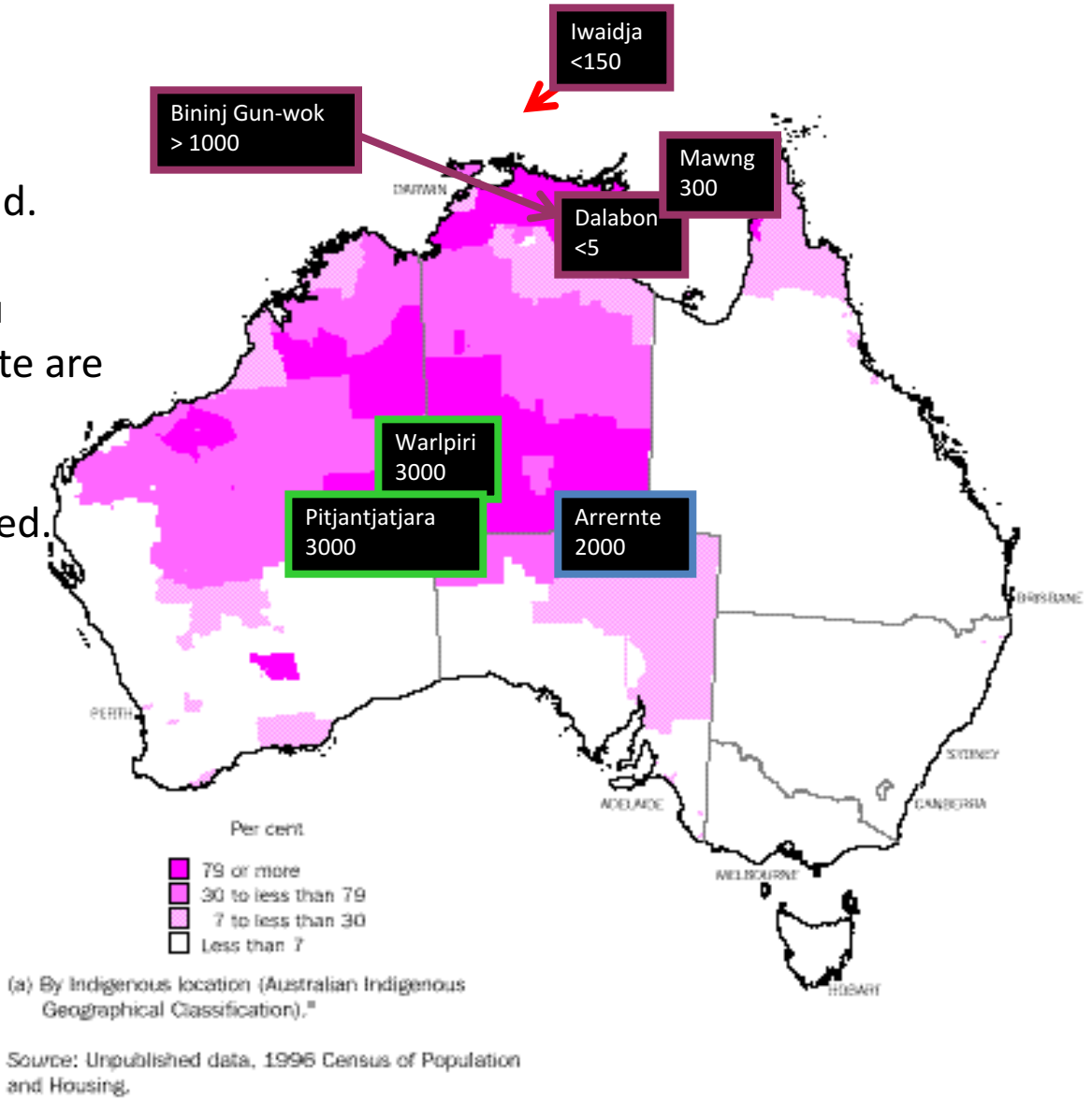
Some Australian Indigenous languages

Dalabon is almost moribund.

Bininj Gun-wok (Kunwinjku variety), Pijtantjara, Arrernte are healthy.

Mawng is still being acquired.

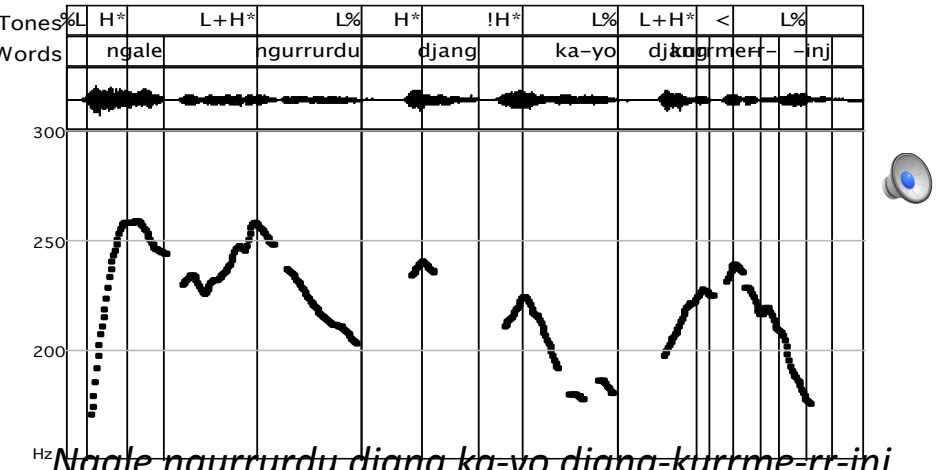
Iwaidja is declining…



(My thanks to Andrew Butcher for allowing me to use this map)

What do they sound like?

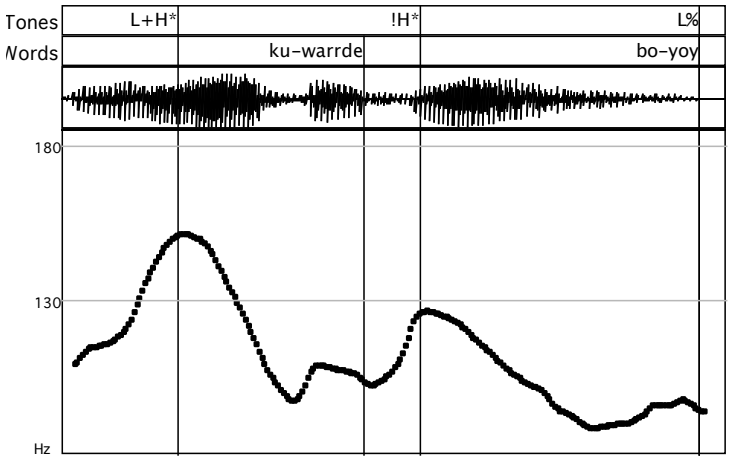
Kundjedjedmi (BGW)



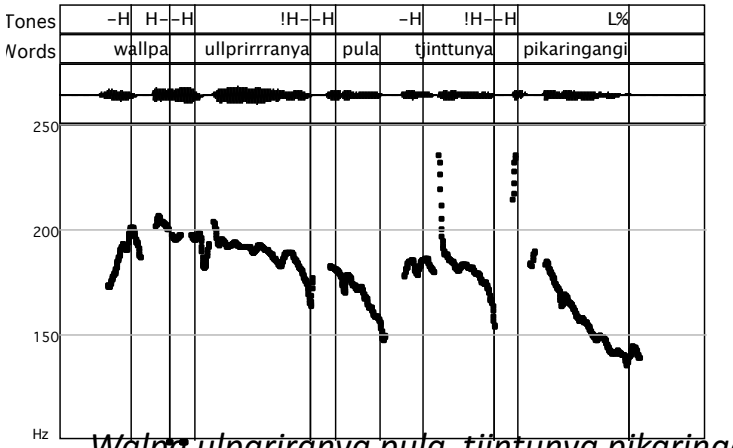
Ngale ngurrurdu djang ka-yo djang-kurrme-rr-inj

"That emu of ours is a dreaming, she put herself in the landscape as a dreaming"

Kunwinjku (BGW)

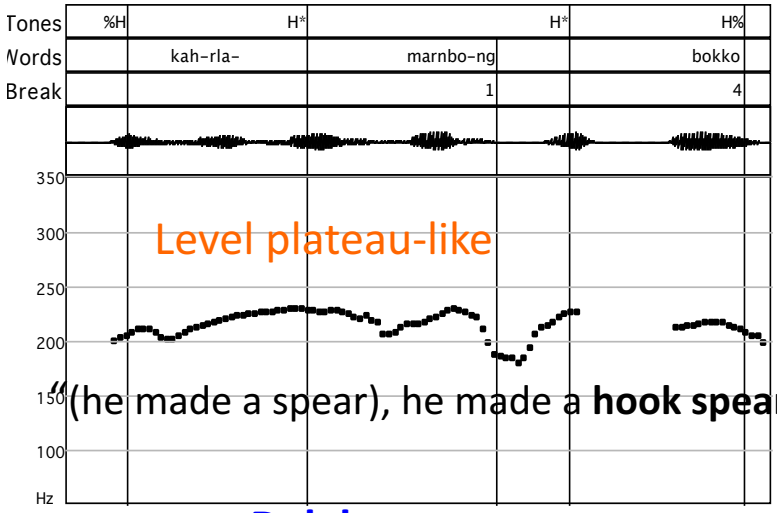


Ku-warrde bo-yoy "Water lay in the cave"

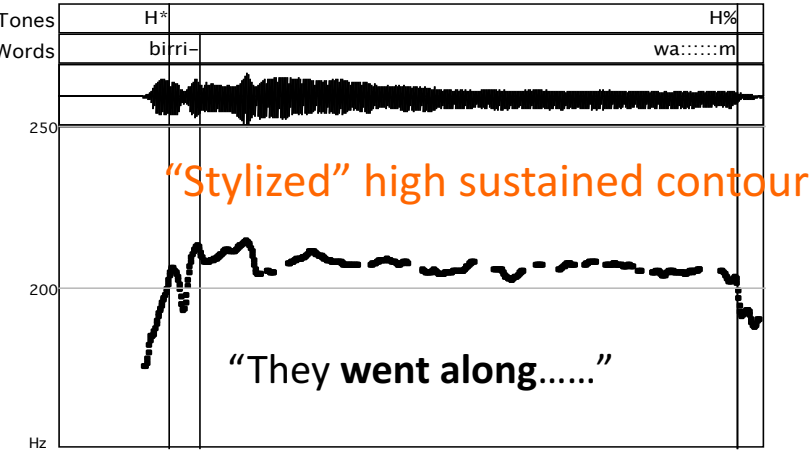


Walpa ulpariranya pula tjintunya pikaringangi.
Wind south they two sun got angry.

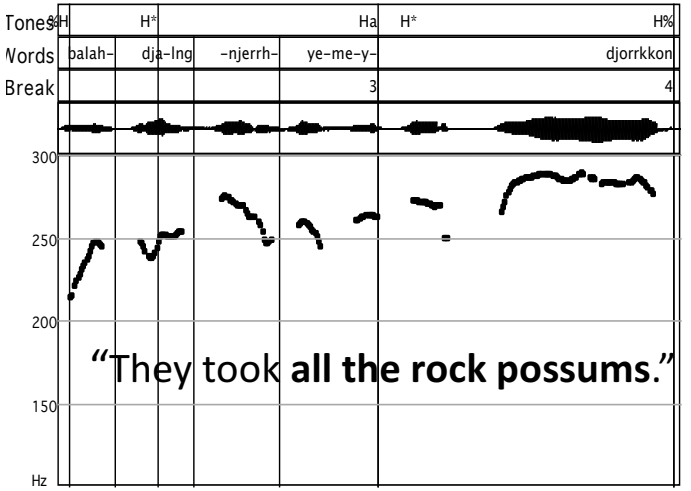
Pitjantjatjara



Dalabon



Kuninjku



Two Broad Intonational Categories

- Boundary phenomena or **edge-marking**, contribute to "chunking" function of intonation – boundary tones
- Intonational phenomena within an intonational chunk – head marking – **prominence-lending pitch** movements

Some of the questions we might want to answer?

- What kinds of edge tones delimit an intonational phrase?
- Are phrase-initial/final edge tones also prominence-lending tones ?

Some of the questions we might want to answer?

- Are “prominence-lending” intonational events phonetically realised in and around certain syllables, i.e. metrically strong syllables?
- Are “prominence-lending” tones attached to any syllable regardless or stress?

Do all languages have the same intonational system?

- No, some only have phrase tones or boundary tones to mark the **edges** of chunks of speech and no pitch accents

- Tendency when we approach Australian languages to want to assume there are pitch accents as well as edge tones

Why

- Many languages have preliminary metrical/ word stress analyses
- Strong perceived trochaic rhythm
- Useful source of hypotheses for experimental phonetic investigation

What does intonation contribute to spoken communication?

- Sentence Modality e.g. question versus statement
- Phrasing, discourse segmentation – “chunking” for ease of processing
- Grammar of Focus marking; pragmatics – “what information is highlighted by intonation?”

After Himmelmann and Ladd 2008

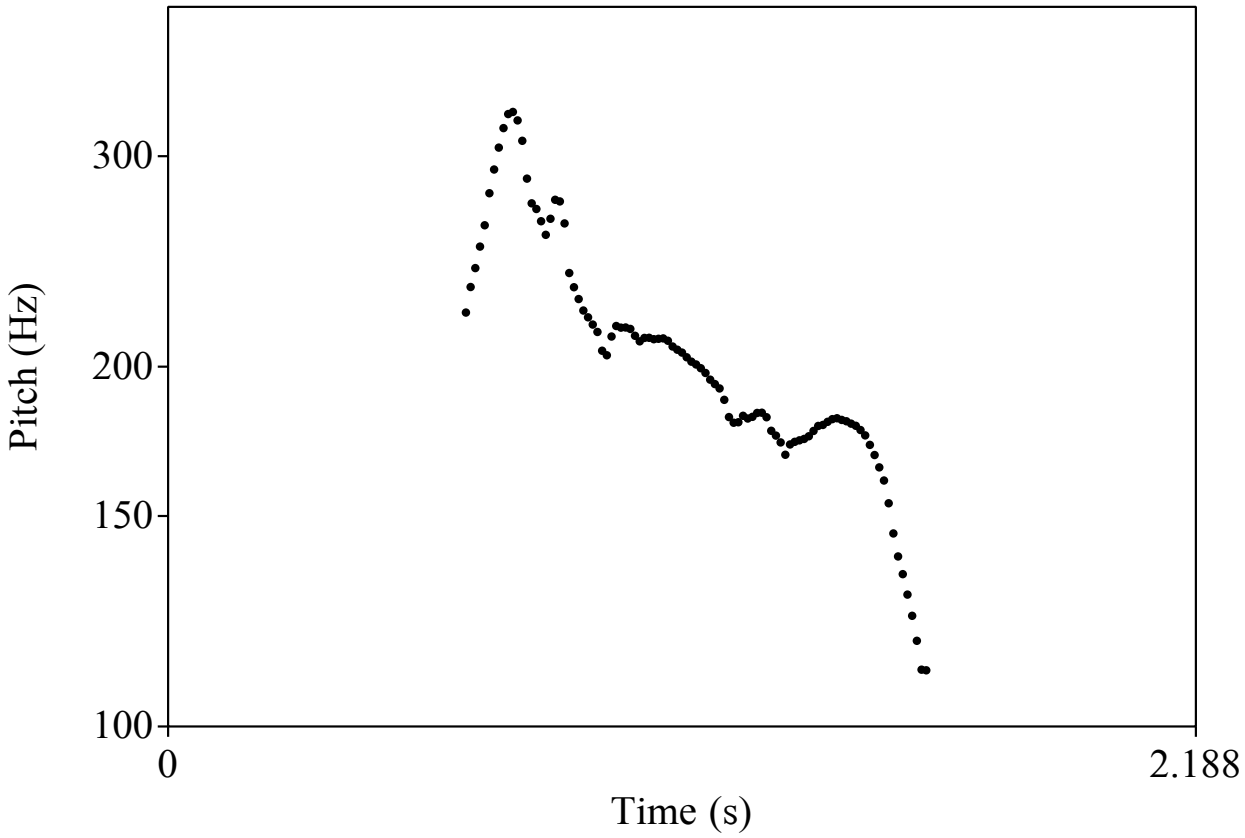
Common pitfalls

- Assuming that an existing tone target inventory for a well-worked out language or language variety can easily be applied to a less studied or unfamiliar language

Common pitfalls

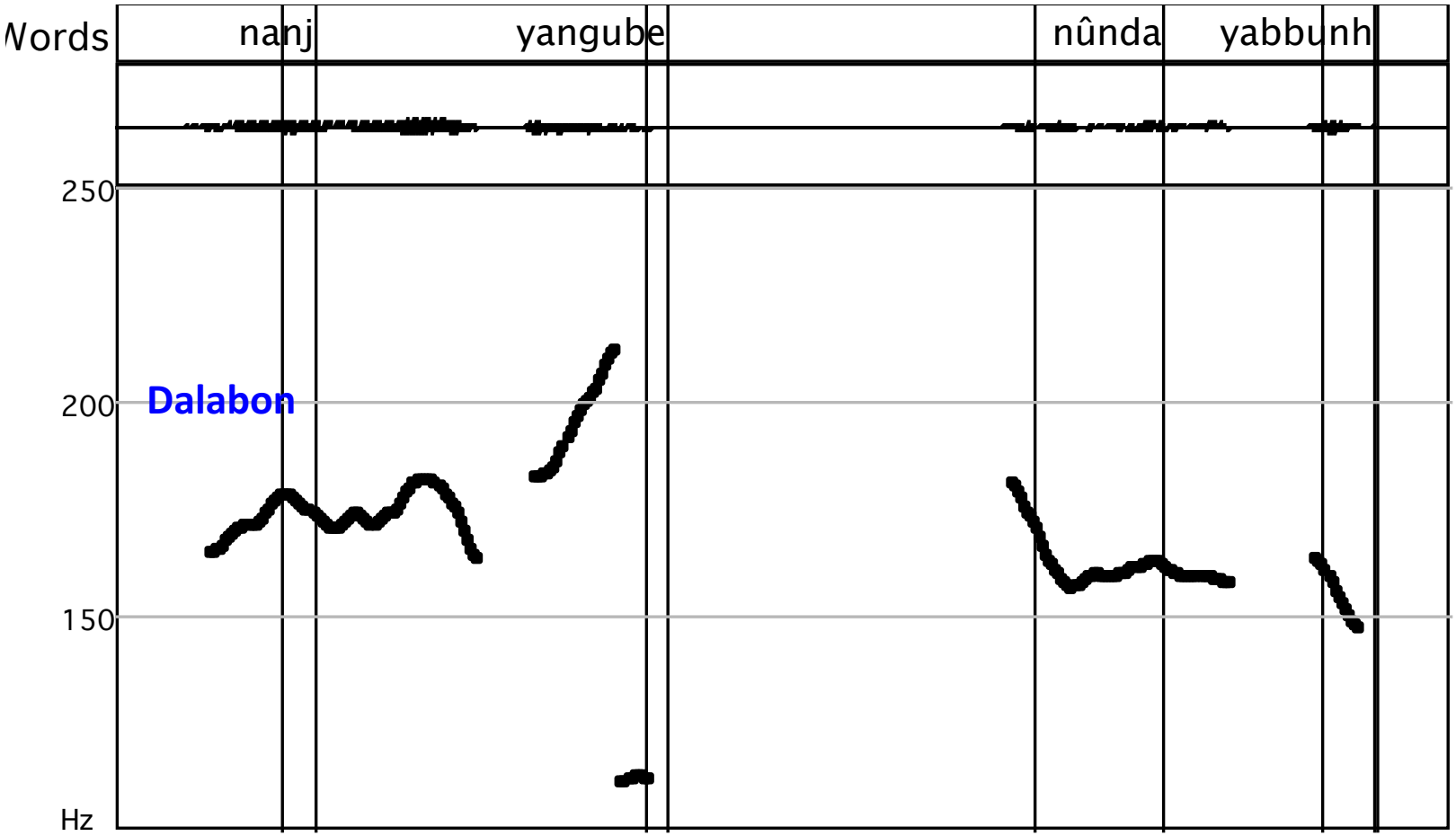
- Assuming that “tunes” in the language YOU speak will mean the same thing across the language(s) you are trying to analyse

An example



Mawng

An example



Overgeneralisation

- assuming that there has to be a fixed set of phonetic realisations for a tone category i.e. L+H* accents must align precisely with a syllable rhyme, be realised in a particular way (yesterday's class)
- descriptive and typological work has shown this needs to be more nuanced - so much contextual variation! (e.g Gooden, Beckman, Drayton 2009, Hyman 2014, Arvaniti 2016)

Undergeneralisation

- postulating too many “contrastive” intonational categories because they mean something different in English (for example)

Eg. Pitch accent inventory H*+L H+L* ^H* H*>, <H*, H* L* L+H* L*+H etc. - some of these may not be CONTRASTIVE

- result of positional factors, contextual variation, paralinguistic variation etc.

What is ideal?

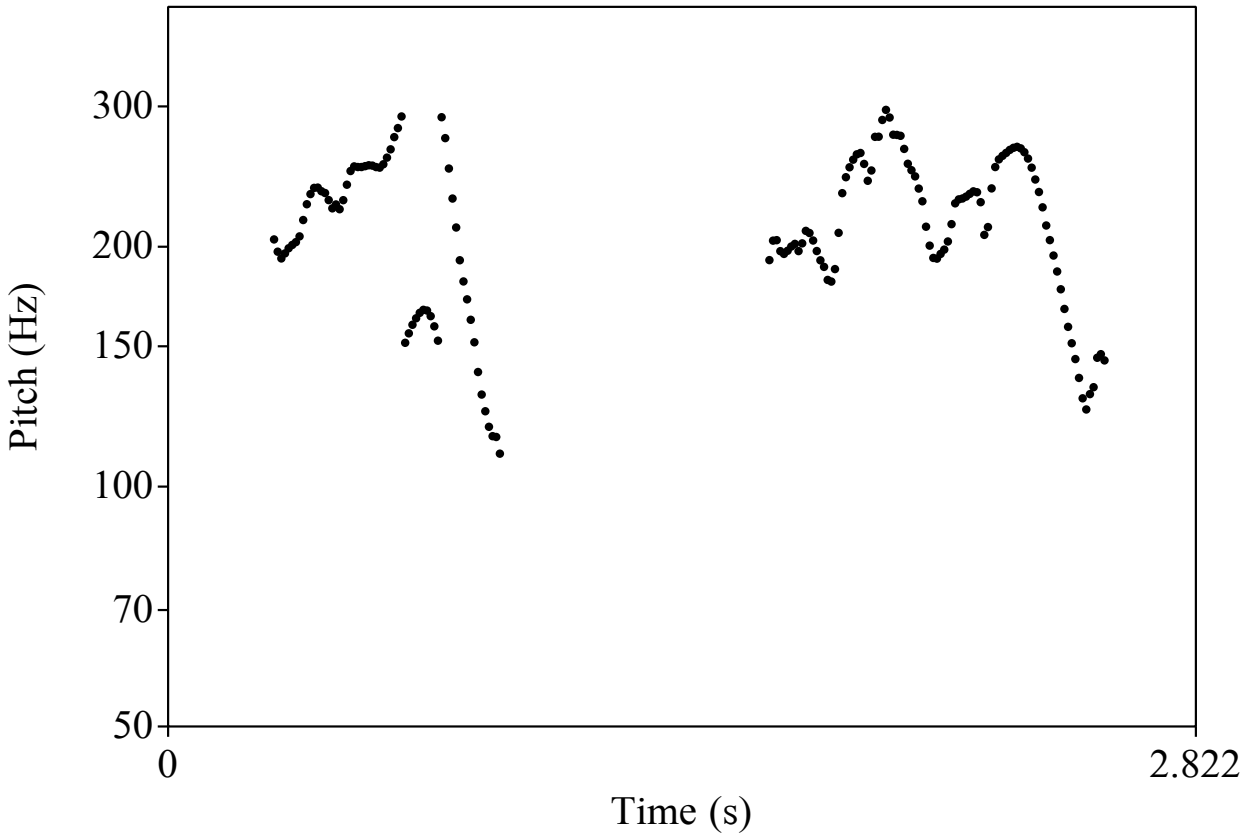
- phonetically-grounded study
- “meticulous control of contexts that allows the linguist to go beyond surface appearances to tease apart the lexical and phrasal contributions to the tunes and rhythms of utterances”

(Gooden, Beckman, Drayton 2009, p. 398)

- Sentence modality

  - typical first step in documenting intonational variation in an under-described language

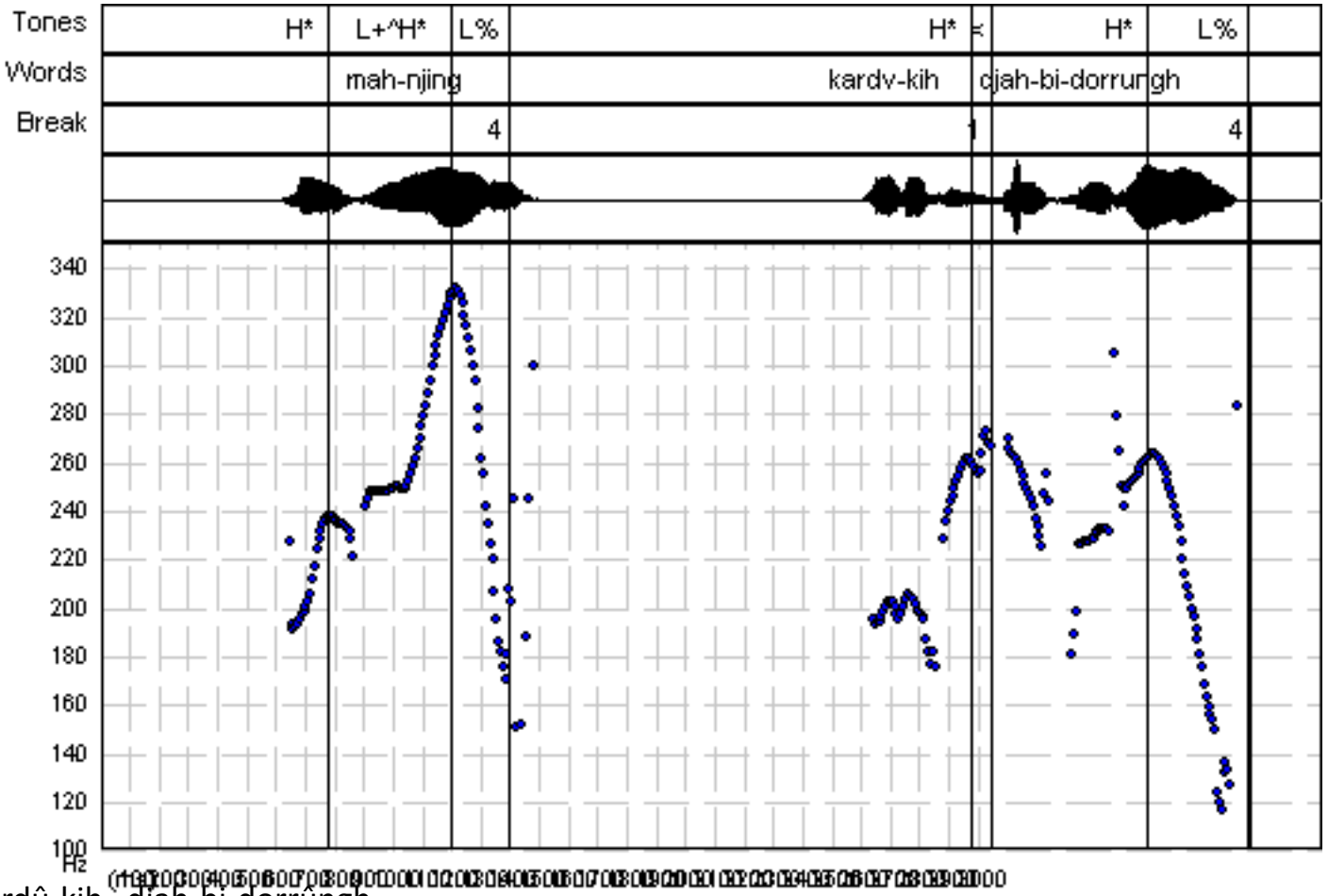
Example



Note pitch-halving!

Dalabon

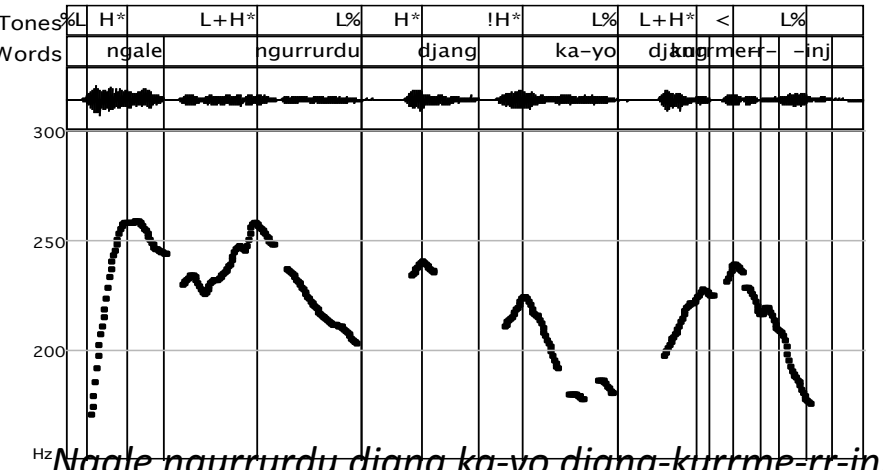
Dalabon – WH-question



mah njing? kardû-kih djah-bi-dorrûngh

“What about you? Maybe you have got someone with you?"

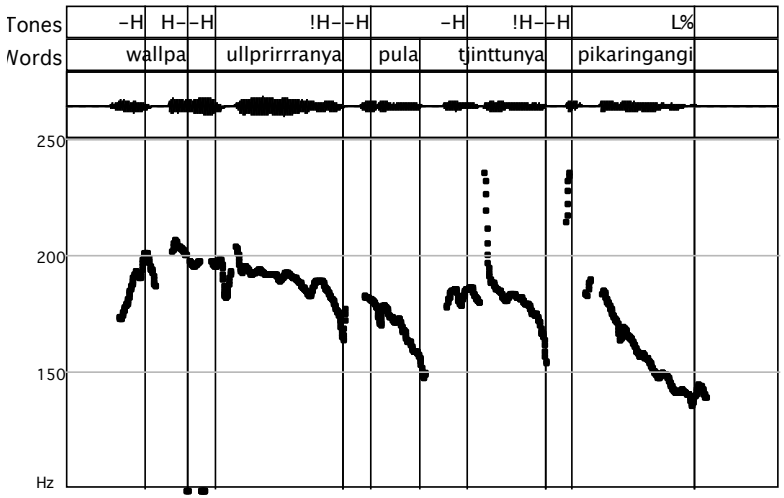
Kundjedjedmi (BGW)



Ngale ngurrurdu djang ka-yo djang-kurrme-rr-inj

"That emu of ours is a dreaming, she put herself in the landscape as a dreaming"

Pitjantjatjara (read speech)



Walpa ulpariranya pula tjintunya pikaringangi.
Wind south they two sun got angry.

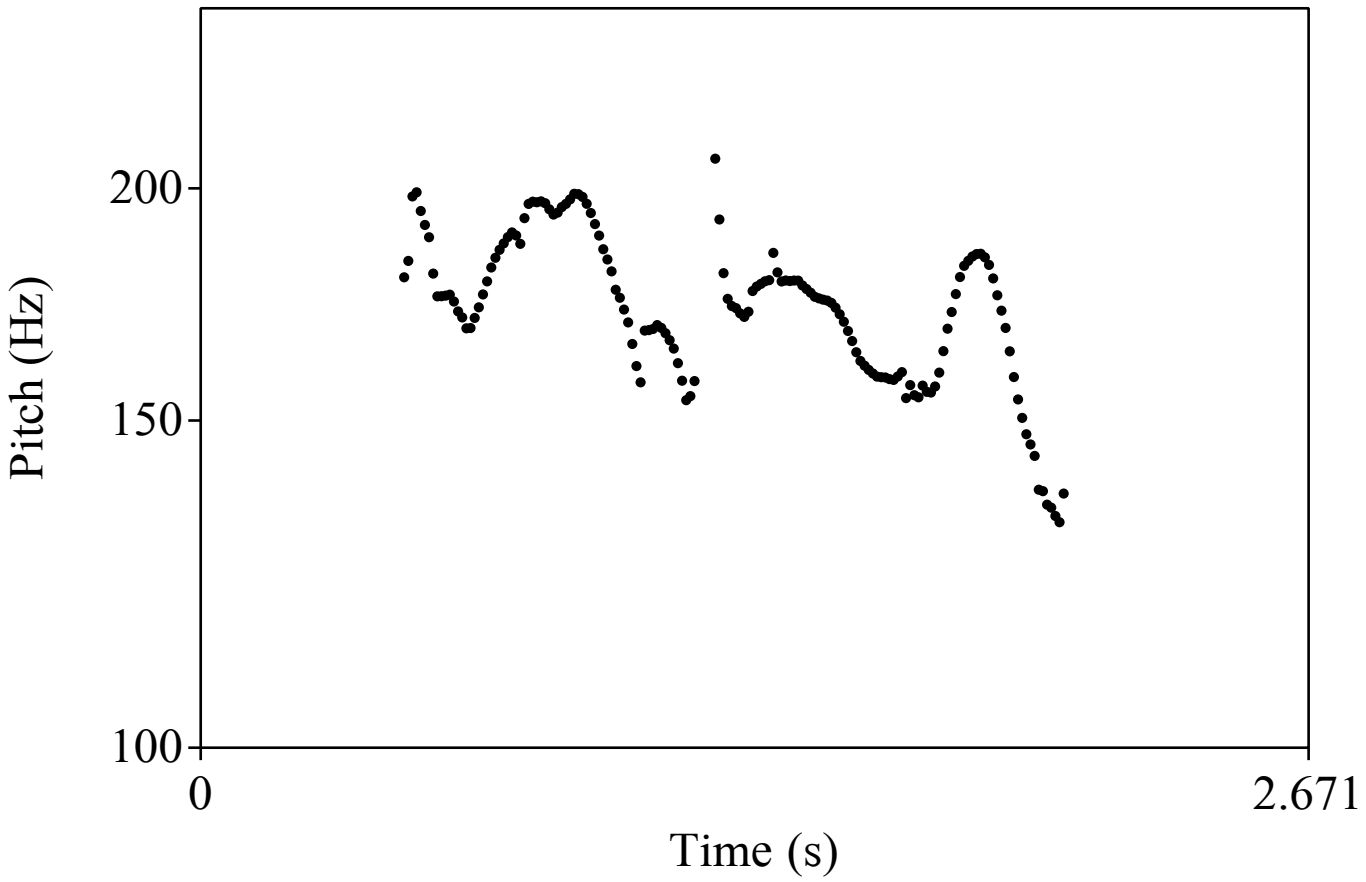
Declarative Intonation

What does intonation contribute?

- Phrasing and discourse segmentation e.g. strong falling/rising tunes can mark out “chunks”, pitch-range reset also contributes to demarcation

Himmelmann and Ladd (2008)

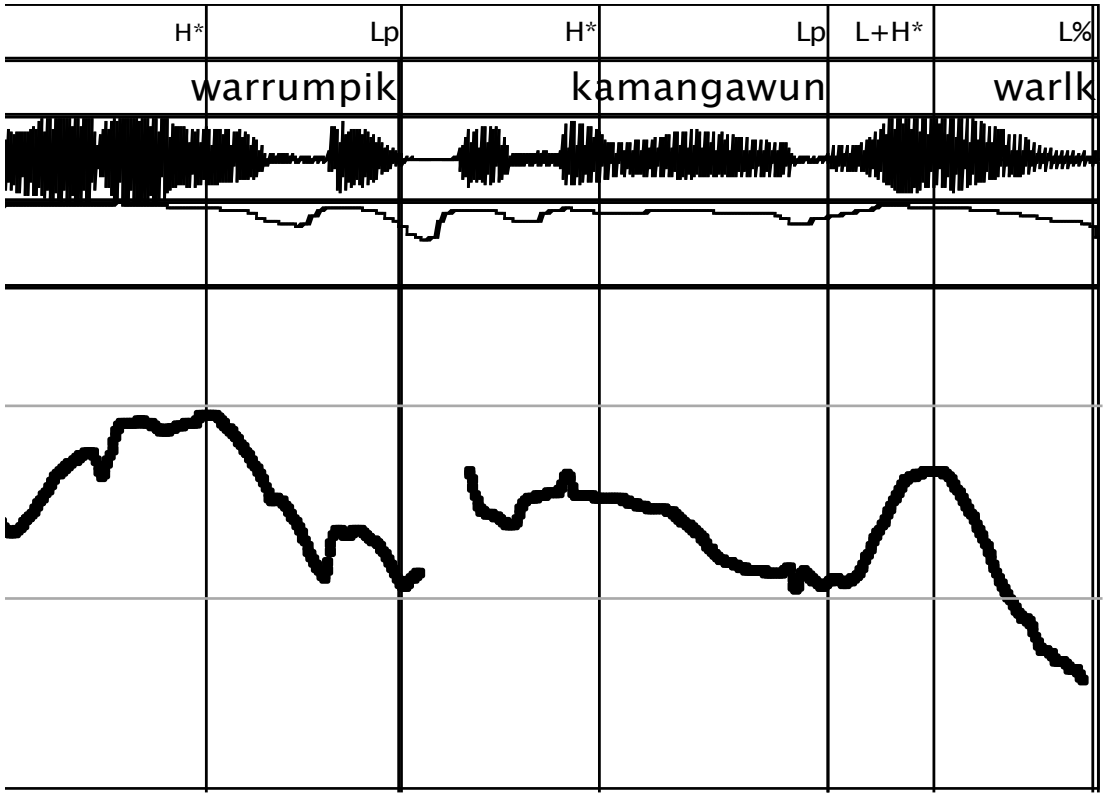
How many chunks?



Mawng

Mawng

Speaker SB



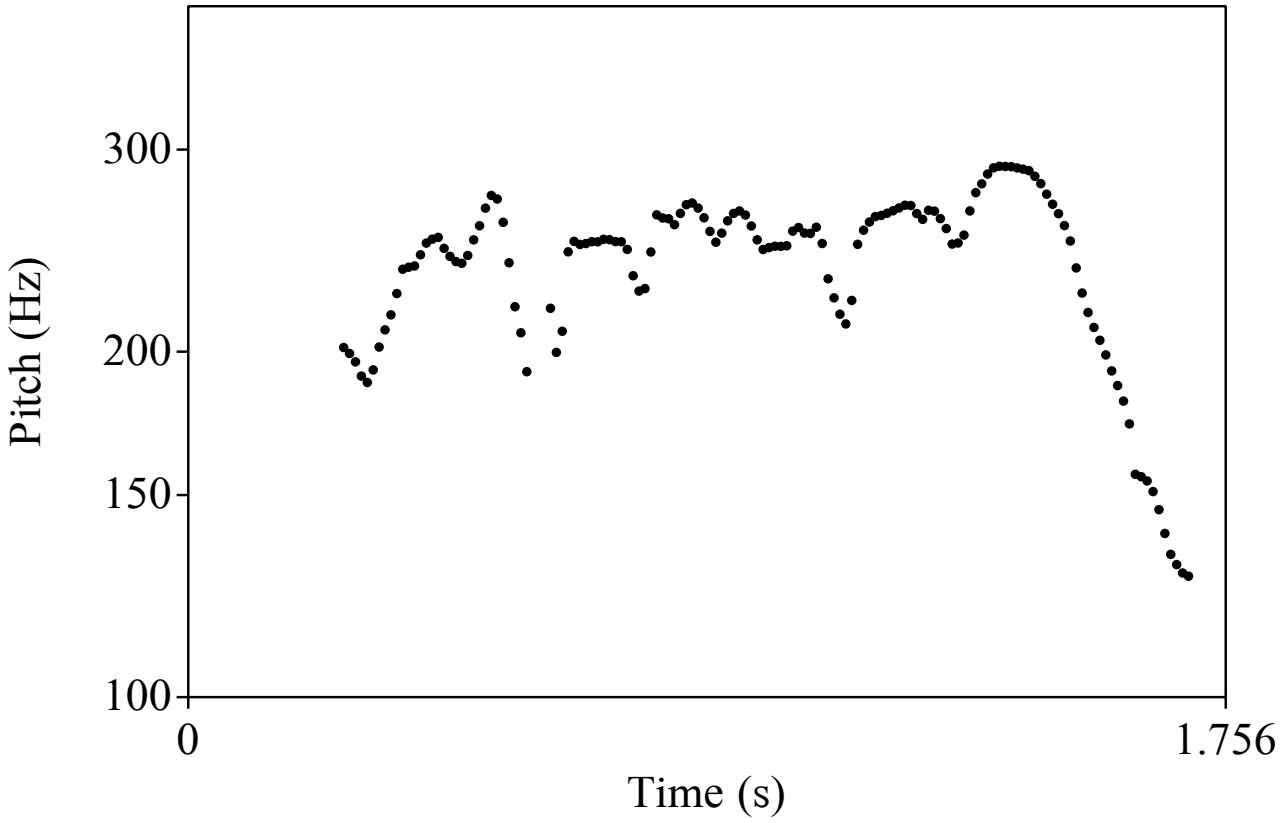
(Question: Is the woman hitting the man?)

Answer: *Jita warrumpik kamanga-w-un warlk*

"The woman is hitting the tree."

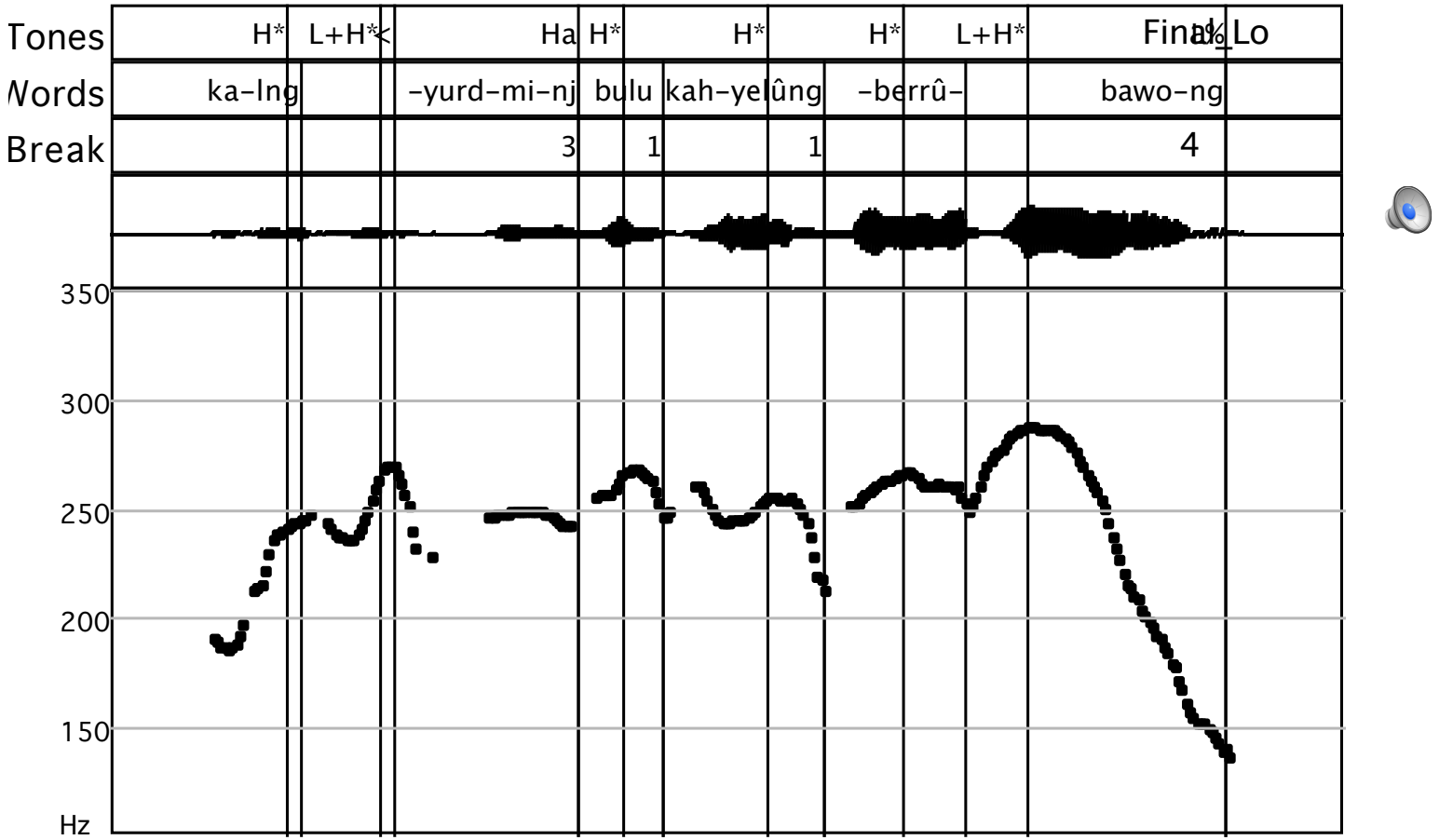
- Sometimes this isn’t so straightforward

An Example



Dalabon

Dalabon – multi-verb Intonational Phrase



ka-lng-yurdmi-nj buluka-h-yelûng-berrû-bawo-ng ...
3SG-SEQ-run-PP them 3SG-R-SEQ-many-leave-PP
'He ran away then and left them all.'

(Fletcher & Butcher 2014, Ross 2011)

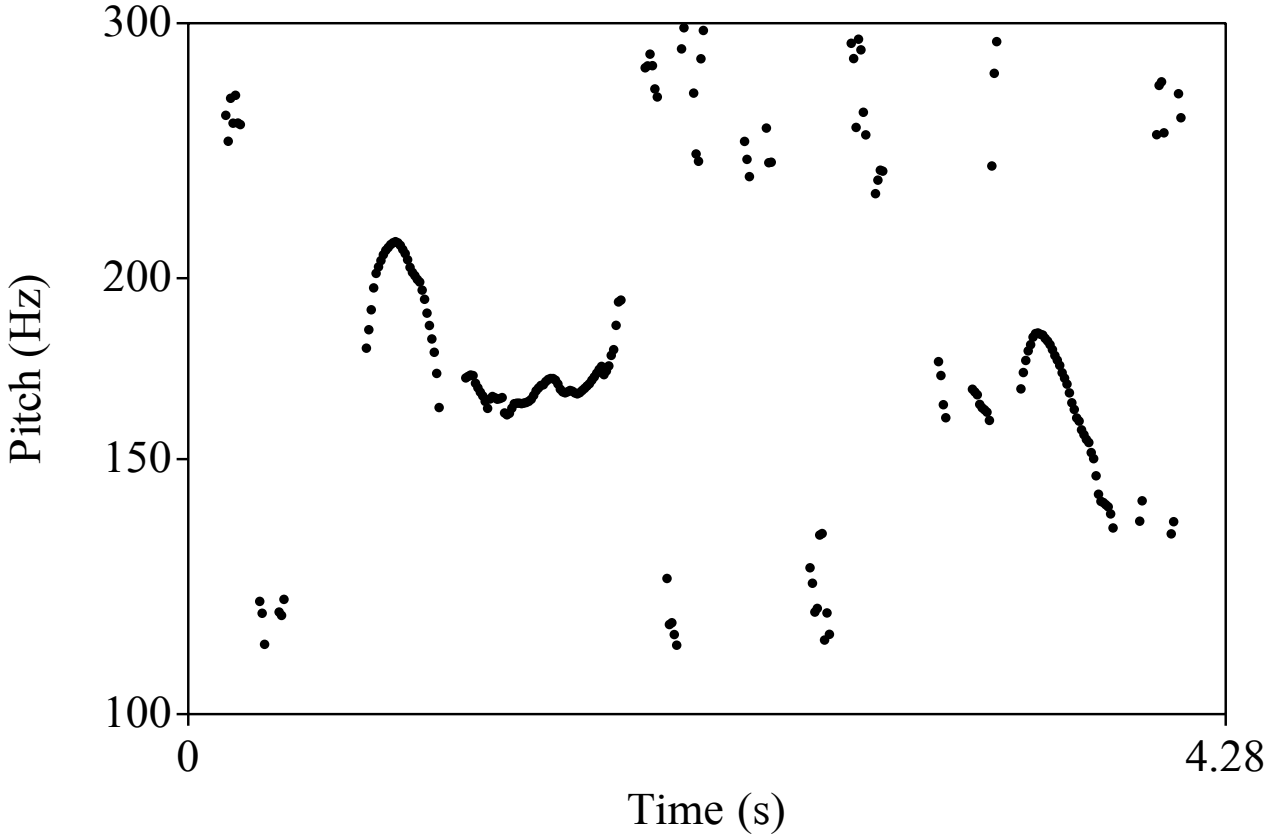
What does intonation contribute (Himmelmann and Ladd 2008)?

- Semantic focus

- An important source of intonational variation in many languages of the world – regardless of whether the language has lexical tone, stress, or has neither!

- (more on this later in the summer school!)

An example



Dalabon

Starting work on an unfamilar language

What do you need to know?

- Important to understand some basics of the grammatical typology of a language
- Many languages of the world are non-configurational languages
- Word order is **not used** to identify argument structure categories such as **subject** and **object** which may occur in various positions in the clause
- Languages may use **particles** to indicate focus or emphasis

What kind of data?

- Widest variety possible
- Need to be opportunistic
- Need to work with whatever linguistic resources are available for the particular language, language family
- Grammars, archives, other language resources
- We are not native speakers of any of the languages we work on

What kind of data?

- Work with a linguist if possible who has some knowledge of the language, access to communities

- It is basically v. difficult to describe the intonation of a language where there are few linguistic resources

What kind of data?

- Carefully constructed utterances - manipulate word, phrase length, word order, context, to work out intonation/ discourse relations
- Languages can use other means to mark grammatical focus - particles etc. so eliciting different types of pragmatic focus is important
- Can be a big ask in fieldwork setting but it is important to have a wide variety of sources and it is possible!

Can I rely on pre-recorded data?

- Yes it is possible, but you need to have good resources to back you up
- Narratives can be restrictive – typical kind of story-telling prosody unless this is a specific research question!
- Much of our earlier work – based on stories

Recording speakers?

- Record several speakers if possible, females and males (not always easy – we have a lot of recordings from women in our latest project)
- Child language acquisition – work with mothers, carers

(after Himmelmann & Ladd 2008)

Finding speakers

- Speaker demographics – some speakers may be last remaining speakers of a language
- Helpful to have access to someone in the community (teachers, medical workers) who can help put you in touch with speakers

(after Himmelmann & Ladd 2008)

Recording tasks

- Think carefully about recording environment, material construction to facilitate acoustic analysis
- You may not be able to replicate laboratory-like conditions but you can find a quiet room (e.g. School), use uni-directional, head-mounted mikes etc.

(after Himmelmann & Ladd 2008)

Elicited or spontaneous data?

- Cannot assume literacy
- Picture-based interactive tasks or games have been used with some success in many different recording contexts (e.g. Quis materials developed by Skopoteas et al. 2006, also see also interactive games, tasks outlined in Burdin et al., 2015)

Starting an analysis

- Important to tease apart word and phrase-level prosody
- Isolated words form their own prosodic phrase so this is not the place to start, often hyperarticulated, focused
- Need to examine words in the context of a multiword phrase, preferably manipulating position

Where to start

- If a language has been described by linguists as having “stress” we would expect some kind of non-default pitch movement/target in and around the putatively stressed syllable (e.g. falling, rising, high, low) – not withstanding segmental perturbation effects
- Choose a 3 or 4 syllable word and place it in short declarative utterance

Where to start ?
Declarative utterances

(1) Varying the location of stress in each word in a three-word declarative sentence (s = syllable, S = stressed syllable)

(a) **Sss** sSs sSs
sSs sSs sSs
ssS sSs sSs

(b) sSs **Sss** sSs
sSs **sSs** sSs
sSs **ssS** sSs

(c) sSs sSs **Sss**
sSs sSs **sSs**
sSs sSs **ssS**

(Jun & Fletcher 2014:495

(2) Increasing the number of unstressed syllables ("s") before and after a stressed syllable ("S")

(a) Ss ssSs sSs
sSs ssSs sSs
ssSs ssSs sSs
sssSs ssSs sSs
ssssSs ssSs sSs

(b) ssS Sss sSs
sSs Sss sSs
sSss Sss sSs or
sSsss Sss sSs or
sSssss Sss sSs or

sSs sSs sSs
sSss sSs sSs
sSss ssS sSs

Jun and Fletcher 2014:496

Why variable prominence placement?

- Your peaks may move depending on the specific structure you are manipulate
- Your peaks may NOT move within the word but stay in the same location regardless of position in the sentence

- This is generally taken as evidence that you may have something more like stress-accent

Bininj Gun-wok

- Tokens of different word length 2-4 syllables
- 2 carrier phrases

bobo ngarri-yime

‘ I say ‘bobo’

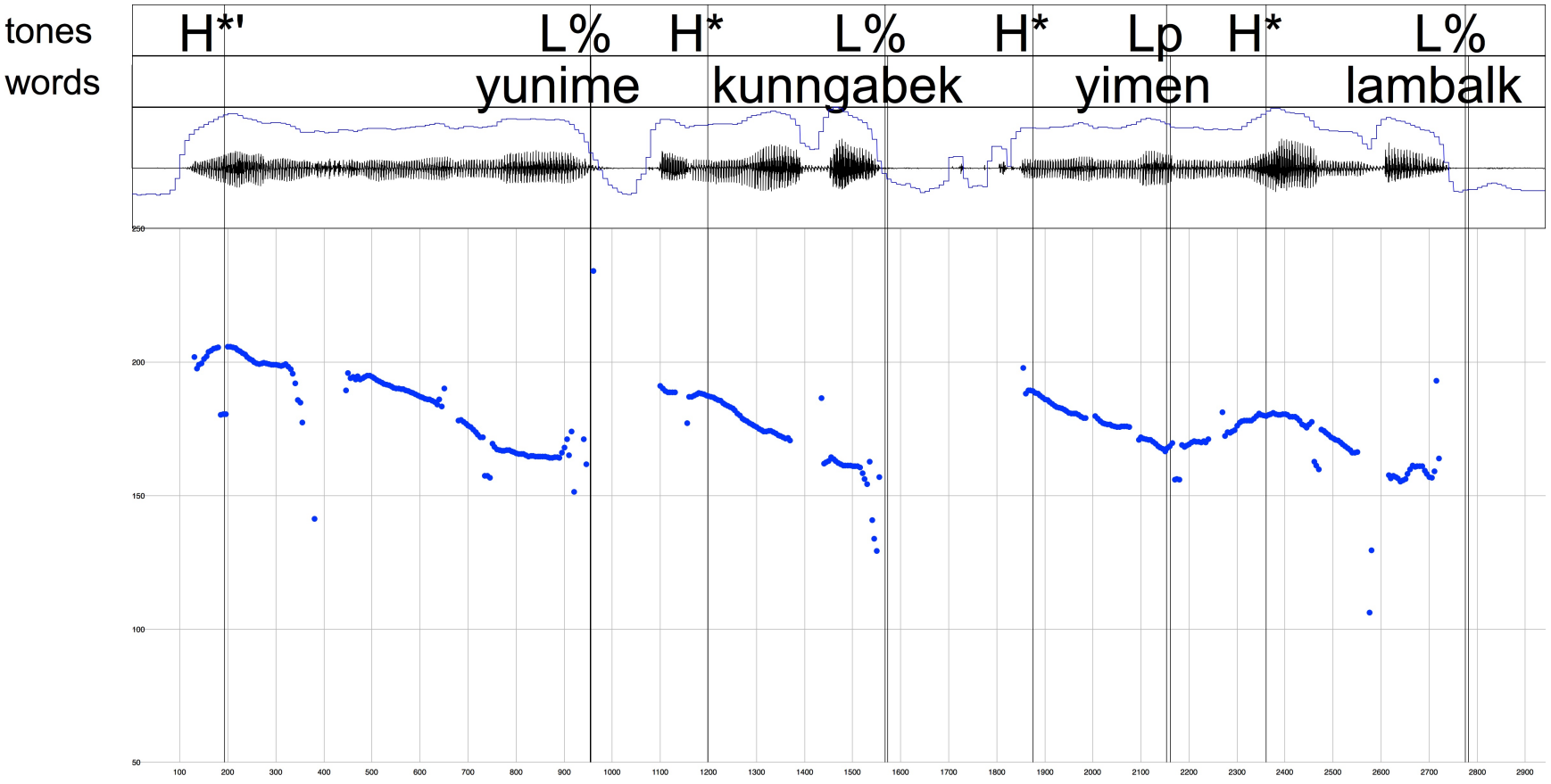
2 syllables	3 syllables	4 syllables
bobo	ŋabbaɭek	kunmaɖdaɖda
kodjok	wamuddjan	kabiridiri
makka	korroko	malambibbi
kabanj	ŋaɖbakkan	bikibiki
kikkik	kundudu	balabbala

yun yime **manjad** yimen **kunmud.**

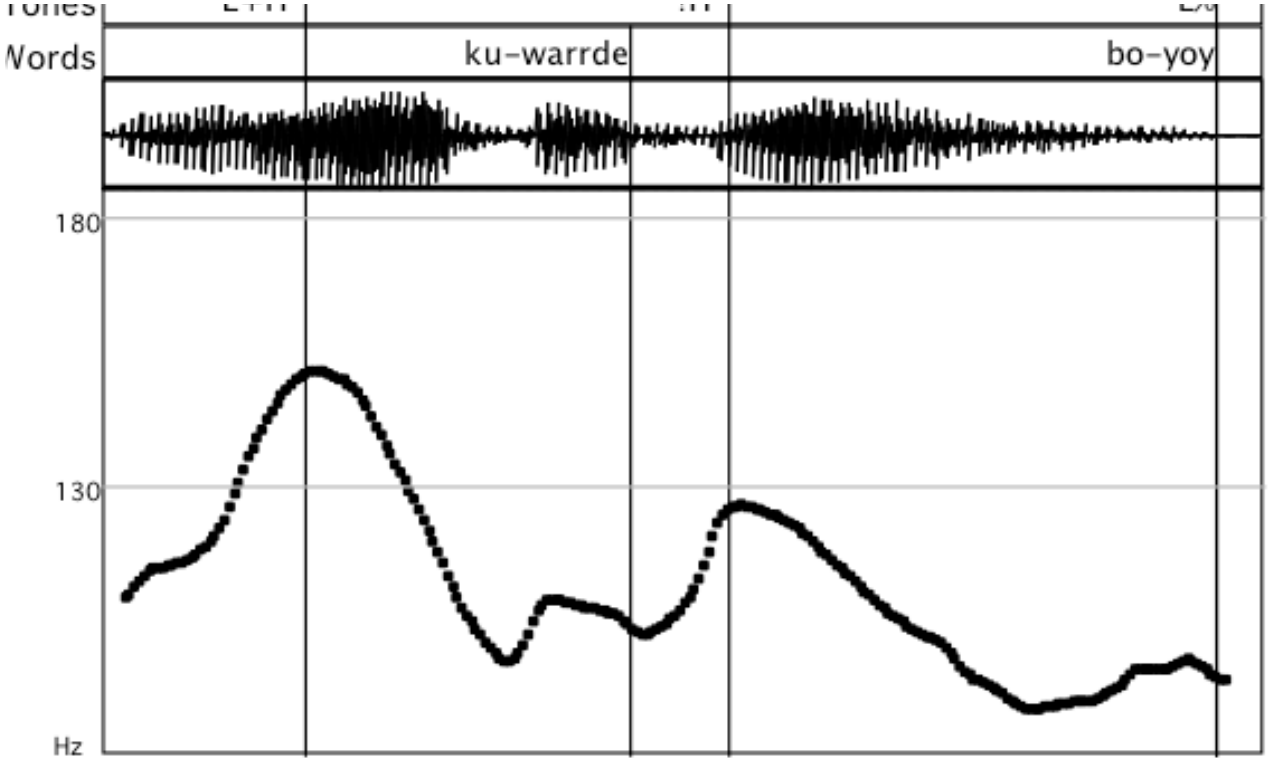
‘don’t say ‘manjad’ say ‘kunmud’

Fletcher et al 2007

Bininj Gun-wok



Example 1– Bininj Gun-wok

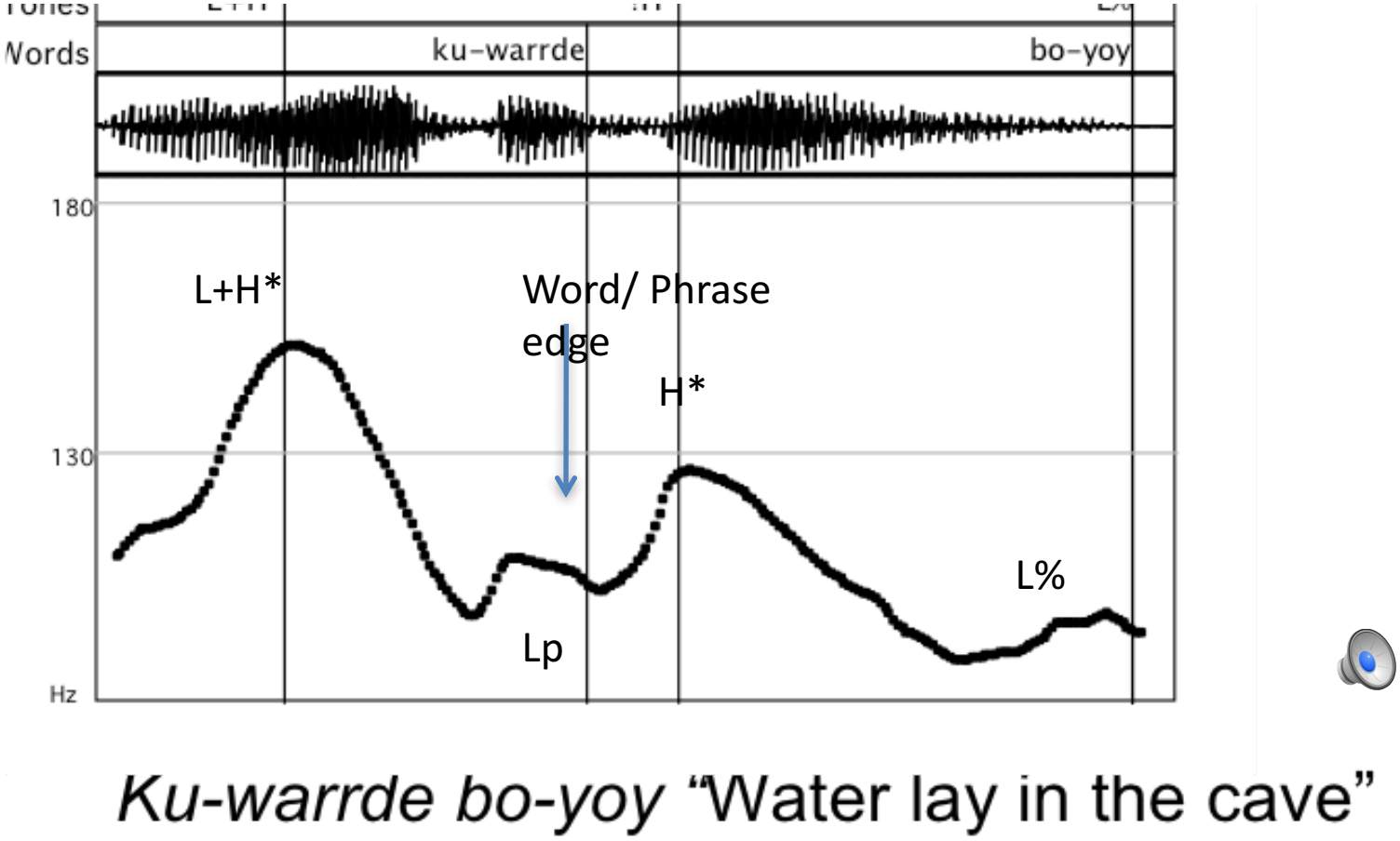


Ku-warrde bo-yoy "Water lay in the cave"

Always good if you can also find similar patterns in spontaneous narratives

Bishop 2002, Bishop & Fletcher 2005

Example 1– Bininj Gun-wok



Ku-warrde bo-yoy "Water lay in the cave"

Always good if you can also find similar patterns in spontaneous narratives

Bishop 2002, Bishop and Fletcher 2005

Word edges?

- Quite possible that words are marked out by tones

- E.g. Tamil L* at left edge, Ha at right edge, tonal melody might be realised across prosodic word/accentual phrase (e.g. Keane 2014)
- If the tonal melody e.g. HL and F0 valley is associated near end of word – word-boundary tone
- If the valley (low F0) is realised beyond word boundary – could be an Accentual phrase boundary tone

- This also seems to be the case in many Australian languages although * tone can either be first or second syllable

What if there is no word-level prosody?

(3) Increasing the number of syllables in each word in a sentence

(a)	(b)	(c)
s sss sss	sss **s** sss	sss sss **s**
ss sss sss	sss **ss** sss	sss sss **ss**
sss sss sss	sss **sss** sss	sss sss **sss**
sssss sss sss	sss **ssss** sss	sss sss **ssss**
ssssss sss sss	sss **sssss** sss	sss sss **sssss**

Jun and Fletcher 2014 , 498

Tonal melodies might be spread across the constituent as it increases in size or phrasal melody may be constrained by size of unit (e.g. truncated melodies in Korean, for example)

You may be dealing with an accentual phrase rather than a prosodic word

Criteria for phrasing

- Accentual Phrase
  - A prosodic constituent roughly intermediate between a prosodic word and a phrase
  - Defined by a pitch contour (e.g. by initial and final phrasal tones)
  - May be what an analyst ha been calling a prosodic word

Sentence modality

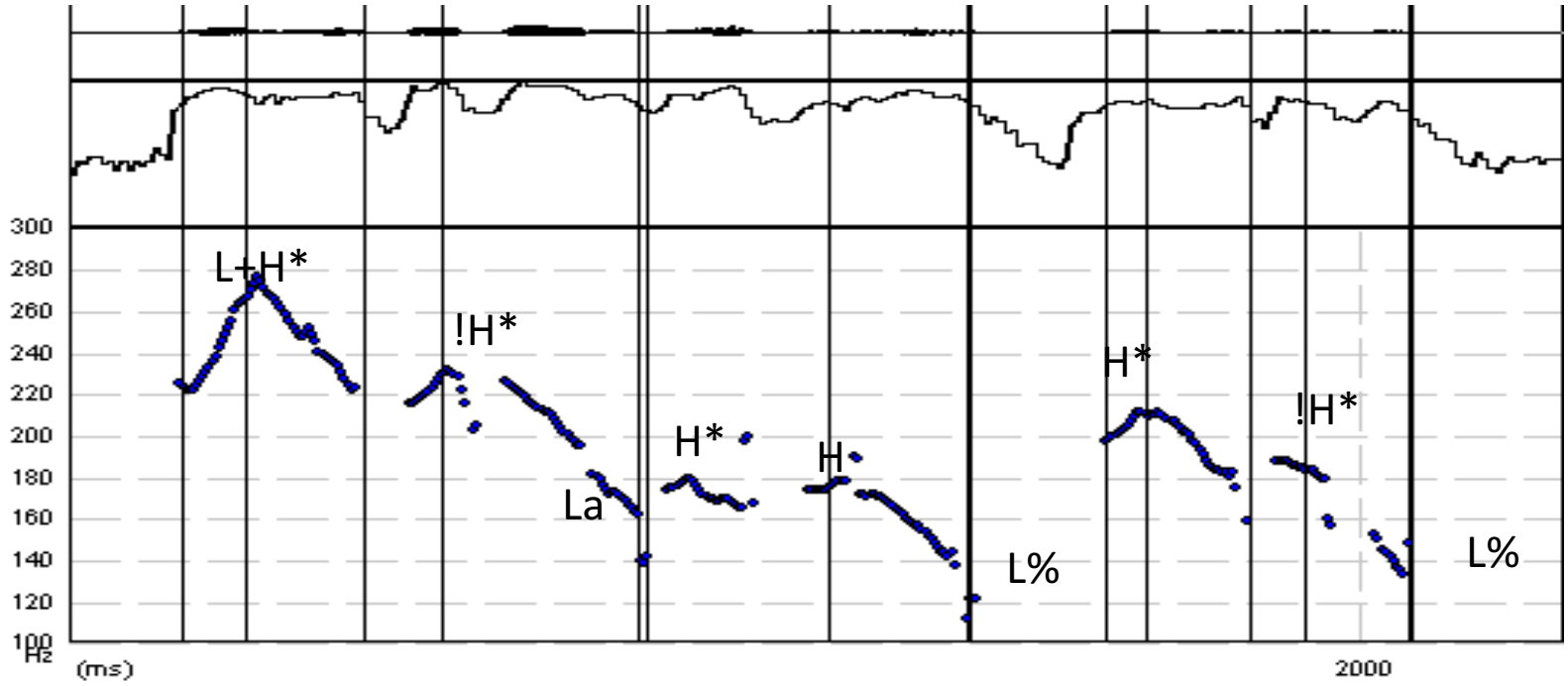
- Explore a variety of sentence modalities, e.g. questions (yes-no, echo questions, rhetorical questions) , imperatives

- Be aware of the context! For example, questionning may have socio-cultural implications

- Don’t assume that rising tunes will always signify questions recall Chickasaw (Gordon 2005)

Dalabon

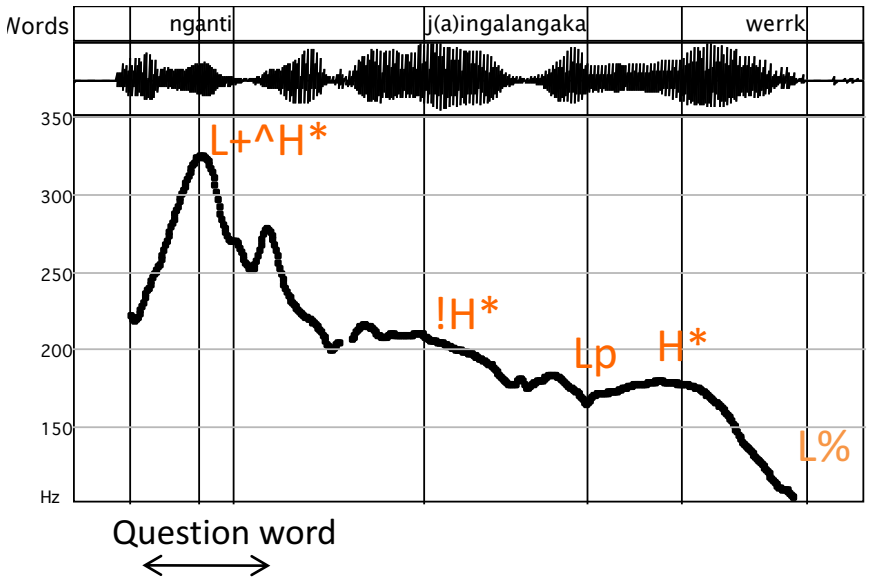
Question Intonation



"**Where** are you going"

Similar patterns observed in other Australian languages

“Wh” -Question words – Mawng QUIS corpus



“**Who** is the one that she sent first?”

Questions – expanded pitch range on initial question word; compressed pitch range on following material

Fletcher, Singer, Loakes in prep

Manipulating Pragmatic focus

Constructed dialogues can help

- Vary the word order, informational structure of an utterance to see how focus is realised
  - Elicitation of Informational and Corrective Focus on noun objects, subjects
  - Speaker 1:

  - **A**. *K-ini-la-ø* *kiyap* ***Martali***
  - PR-3MA/3MA-eat-NP fish Mangrove.Jack
  - “Mangrove Jack eat fish.”

  Informational Focus

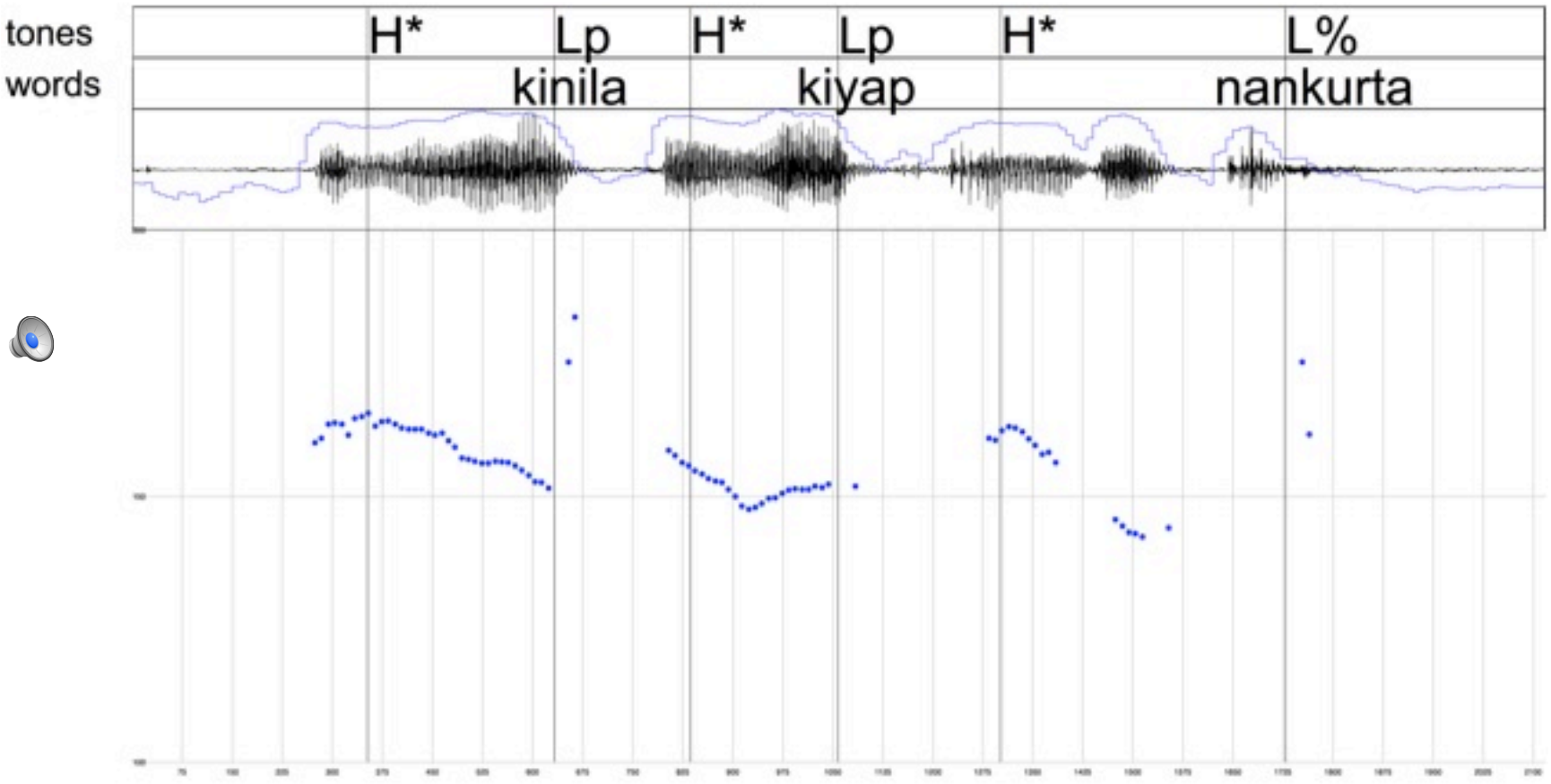
  - Speaker 2:
  - **B**. *Marrik ini-la-ng* *kiyap* ***Martali***
  - NEG 3MA/3MA-eat-l1 fish Mangrove.Jack
  - “Mangrove Jack don’t eat fish.”

  Potential non-focal context

  - C. ***Marrguny*** *k-ini-la-ø* *kiyap*
  - Freshwater.Nailfish 3MA/3MA-eat-NP fish
  - “Freshwater nailfish eat fish.”

  Corrective focus

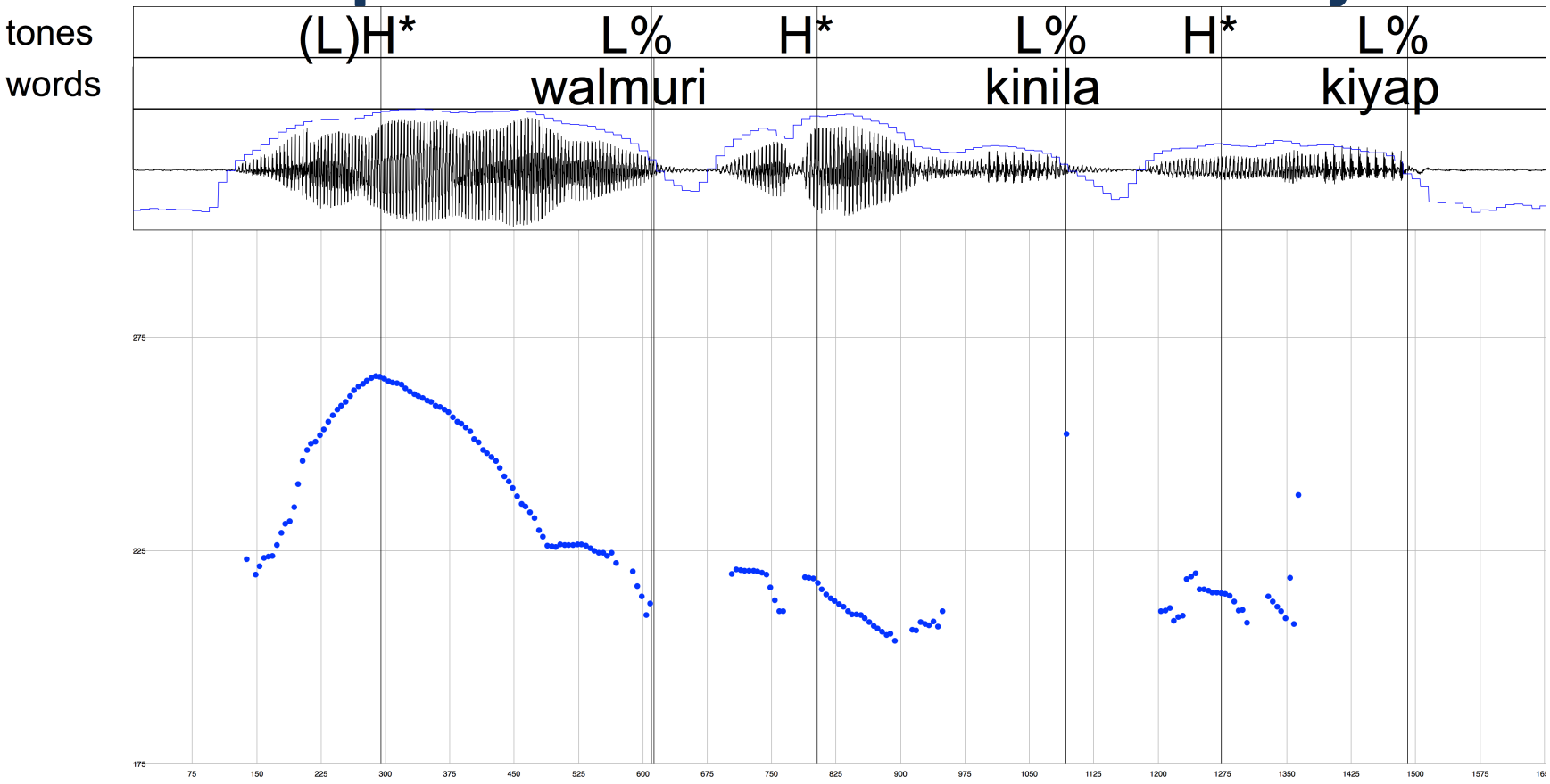
An example of informational focus – Final Subjects



“**Mullet** eat fish”

Fletcher et al. 2016

An example of corrective focus - Subjects

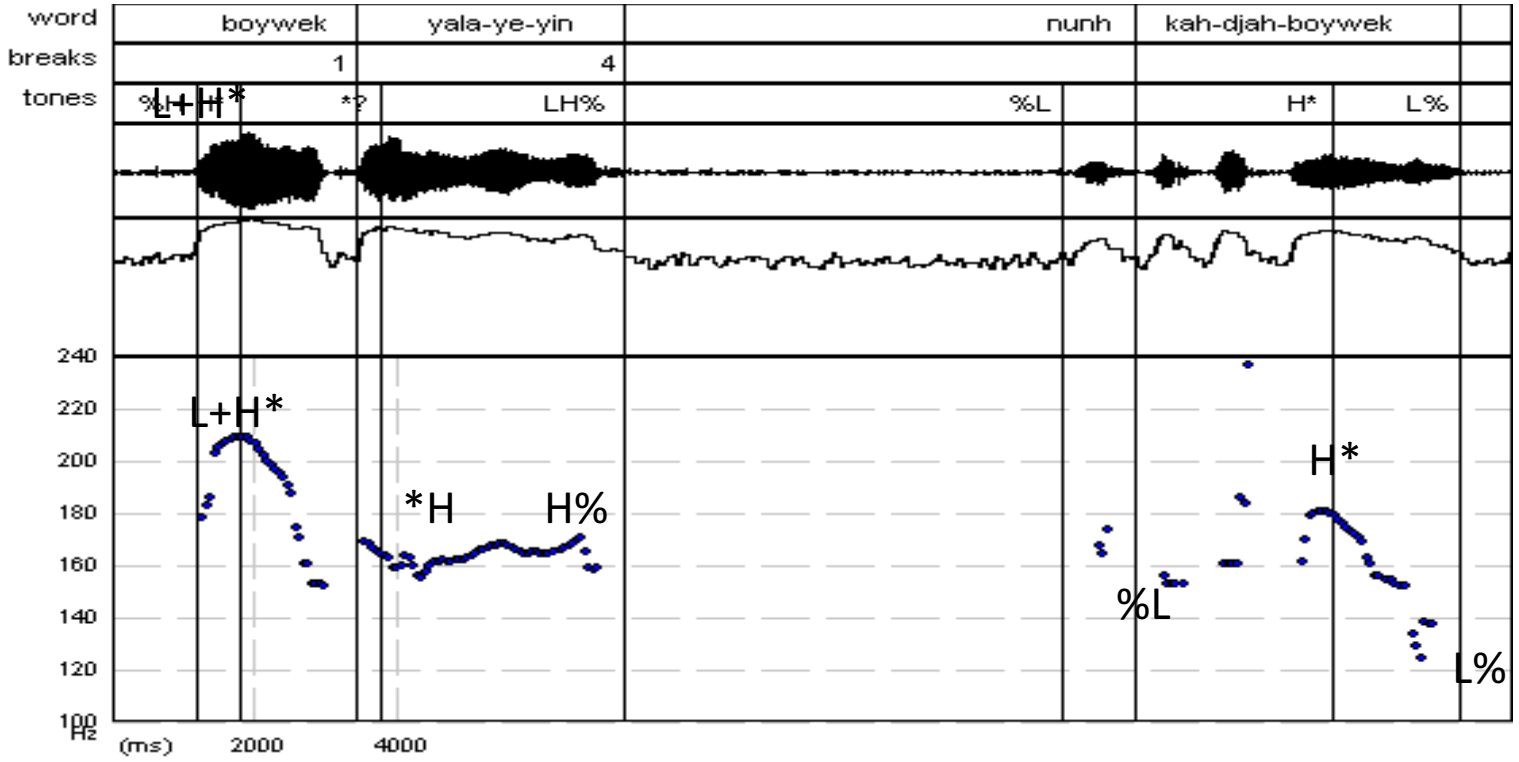


(Mullet don't eat fish)
"**Puffer-fish** eat fish"

Same word in different pragmatic contexts

Fletcher et al. 2016

Informational focus – unscripted speech



: "*They call it the **velvet-tailed gecko**, this one is the **velvet-tailed gecko***"

Annotation Conventions

- Recapping yesterday's points

What tone targets do I choose?

- How many tone levels?
- German ToBI - 4 levels H L !H ^H (Grice et al 2005)
- Tamil - 2 levels H L
- Syntagmatic vs paradigmatic e.g. L+H* !H*
- Australian languages – 2 levels H L

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What about tonal complexity?

- Single tone H or L
- 2 tone sequences LH or HL
- 3 or more targets LHL or HLH or LHLH

  - often boundary combinations e.g. HLH% Bangladeshi Bengali; LHLH% Korean

Tonal timing

- Where is my tone aligned in the text?
- H can be realised early, late, after the host syllable
- Do you need to transcribe this? Not necessarily
- How might I transcribe it? H* vs H*< in Kunwinjku

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Tonal timing

- Do I transcribe a rising prominence-lending movement as LH or L+H?
- Depends on how variable the realisation might be - LH* is used in Mawng because rises vary

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AM tonal inventories in Australian languages

- Fewer tunes i.e. fewer intonational pitch accent shapes, boundary tone combinations compared to Germanic languages
- E.g. LH* H* in Mawng vs L+H* H* H*+L L*+H L* in Australian English
- LH% H% L% vs L-L% H-L% H-H% L-H%
- -L, -H and H-, L- L% H% in Pitjantjara (e.g. Tabain et al, 2012)
- Lp Hp in Mawng

An example of a model - Mawng

Intonational Phrase

Pitch accent
H*, LH*

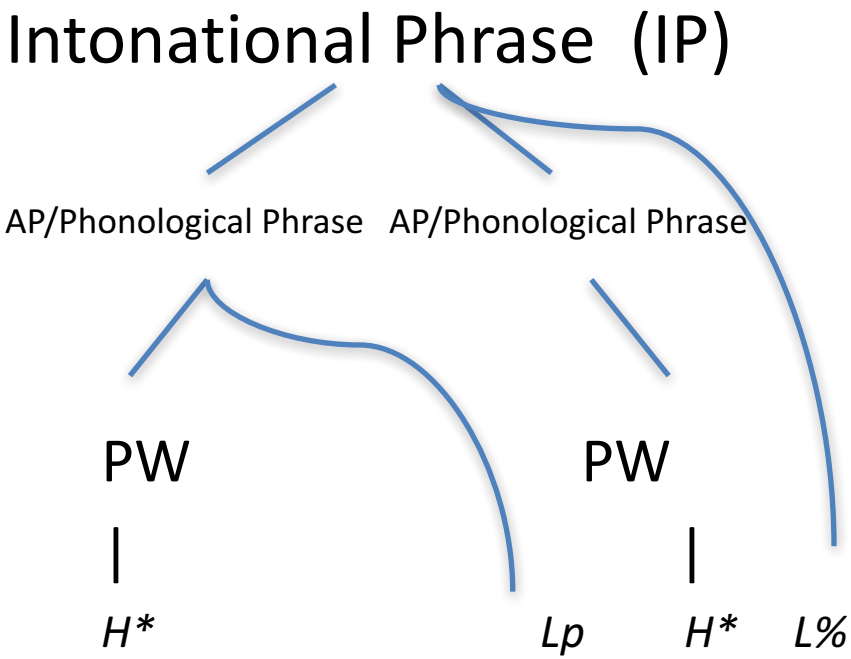
Boundary tone
(%L) L%, LH%, H%

Phonological Phrase

Pitch accent
H*, LH*

Phrase tone
Lp, Hp

Mawng



[[Arri-warnangajpun-n] [**Walmuri.]]**
1pl.in-call.name-NP Puffer.Fish
"We call it Pufferfish.

(Fletcher et al. 2016)

Summary of tone labels

- * a starred tone is aligned to a head syllable, mora e.g. H* L+H* L*H
- > Delayed peak
- < Early peak
- + a boundary between TBUs
- : prolonged tone target e.g. H:%
- Ta or aT Accentual phrase boundary
- T- or –T Intermediate (intonational) phrase boundary
- T% or %T Intonational phrase boundary

Perception and Processing?

- At the end of the day, we want to document and model meaningful intonational variation in languages that have AM models
- Are speakers sensitive to prominence-lending pitch movements in different contexts (the old “is this really stress” problem?)
- If you have analysed different acoustic correlates of accentual prominence – are these actually perceptible?

Take Home Message

- Don’t assume that strong F0 peaks and valleys are due to stress in non-lexical tone languages - tones/tunes may have flexible docking arrangements i.e. first/second syllable of initial word, anywhere in first foot (e.g. Bininj Gun-wok, Mawng Bishop 2002, Hellmuth et al. 2007)
- Be prepared that there may not be the same variety of tone categories that are found in English, German, Dutch, Greek, Italian, Spanish…

Take Home Message

- There may be more than one phonetic realization of a single tonal category (e.g. prominence lending F0 peaks that are realised on a syllable or show “peak delay” – i.e. F0 peak delay on a following syllable – may be one and the same pitch accent
- Be prepared to test and modify your anlysis as more phonetic data come on line

Take Home Message

- Look closely at phrasing and pitch range in all types of languages - chunking happens in all languages!
- Assume some kind of underlying symbolic structure – meaning is not directly transduced from the F0 signal!

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