Meanings of Prosody

Music – Discourse - Lexicon

2019-07-19, 14:30-16:30 Beijing, 08:30-10:30 Berlin

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Chinese Summer School:
Contemporary Phonetics and Phonology

Plan

1. ## Lecture 1: Meanings of Prosody

   1. The Philosophy of Prosody: Metalocutionary Theory

   2. Case studies and traditional approaches

2. ## Lecture 2: Forms of Prosody

   1. Prosodic grammar: phonemes, morphemes and structures

   2. Deriving, constraining and computing prosody

3. ## Lecture 3: Sounds of Prosody

   1. Rhythm Formant Theory

   2. Practical Prosody Case Studies:
      1. Case studies
      2. Implementation: https://github.com/dafyddg/RFA

Methods

Lecture 1: Qualitative, hermeneutic analysis, with reference to the semiotics of discoursal and musical patterns, on the basis of the Metalocutionary Theory of prosodic meaning.

Lecture 2: Qualitative, formal analysis, with discussion of the complexity of prosodic patterns, for example recursion, on the basis of different computational and other models.

Lecture 3: From qualitative to quantitative analysis of the sounds of rhythm and melody based on Rhythm Formant Theory, and using automatic analysis of speech signals from different discourse types and automatic classification of spoken discourse types.

In general, the procedure is exploratory and cross-disciplinary and oriented towards outlines and overviews, rather than narrowly confirmatory within a specific paradigm.
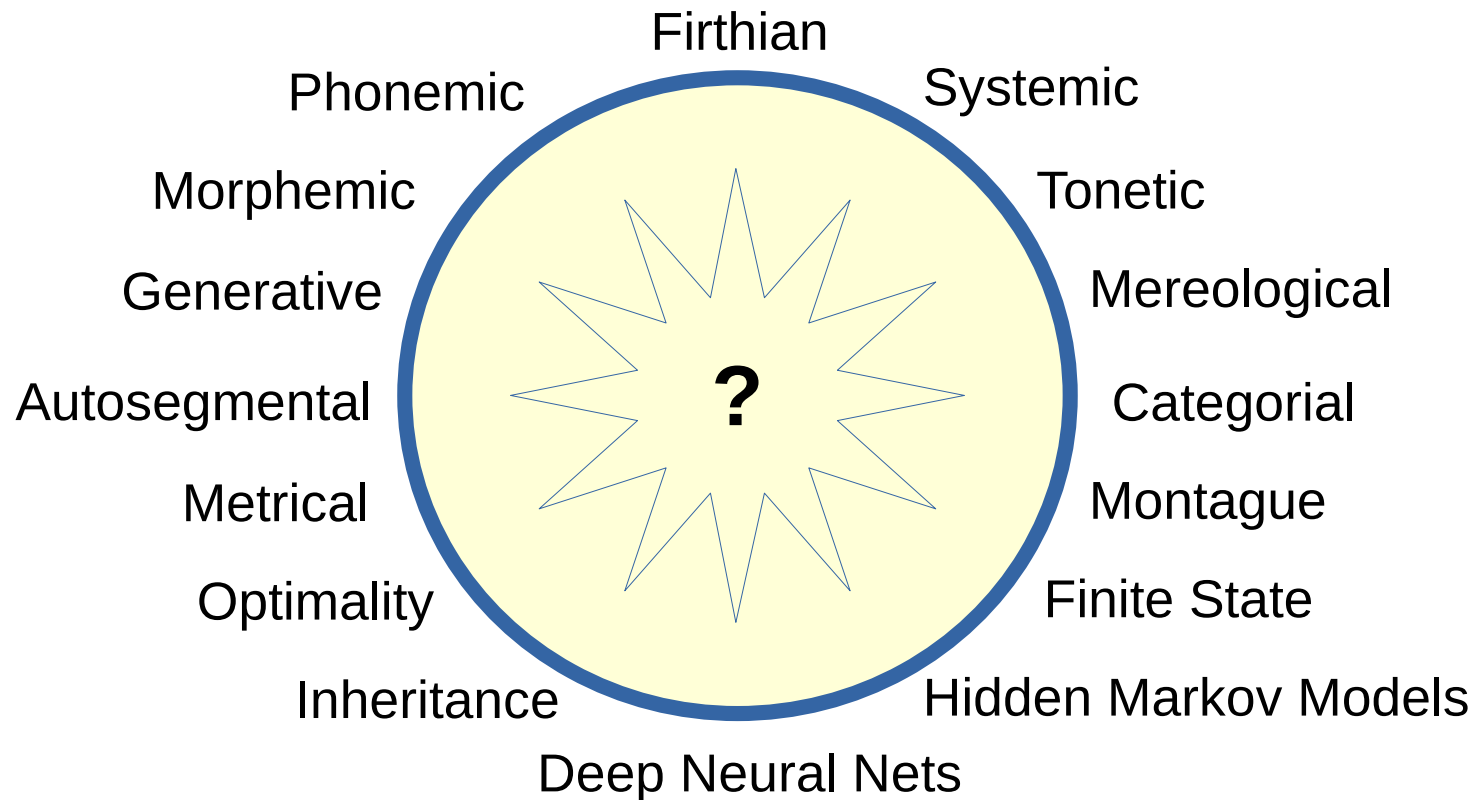
An exception is the last lecture!

Orientation

Paradigms

A paradigm is a set of theories, models, methods, concepts and assumptions shared by a group of cooperating scientists.

<div align="right">Cf. Kuhn 1962</div>

A selection of phonological and prosodic paradigms

Firthian
Phonemic
Systemic
Morphemic
Tonetic
Generative
Mereological
Autosegmental
?
Categorial
Metrical
Montague
Optimality
Finite State
Inheritance
Hidden Markov Models
Deep Neural Nets

How many kinds of prosodic model are there?

There are many paradigms in prosody description: the European 'tonetic' school in applied linguistics, the US 'phonemic tone levels' school of Pike or Trager & Smith, and more recent generative, autosegmental, metrical and optimality theoretic approaches.

For example,

☞ Prosodic Phonologies (Firth, etc., origins in Africanist linguistics)
☞ Functionalist Prosodies (Halliday etc., origins in traditional grammar)
☞ Generative Phonologies (Halle etc., origins in formal language theory and historical linguistics)
☞ Autosegmental Phonologies (Goldsmith etc., origins in Africanist linguistics)
☞ Metrical Phonologies (Liberman etc., origins in poetry)
☞ Inheritance Network Phonologies (Gazdar etc., origins in default logic)
☞ Optimality Phonologies (Smolensky etc., origins in biology)
☞ Finite State Phonologies (Kay etc., origins in formal language theory and theoretical computer science)
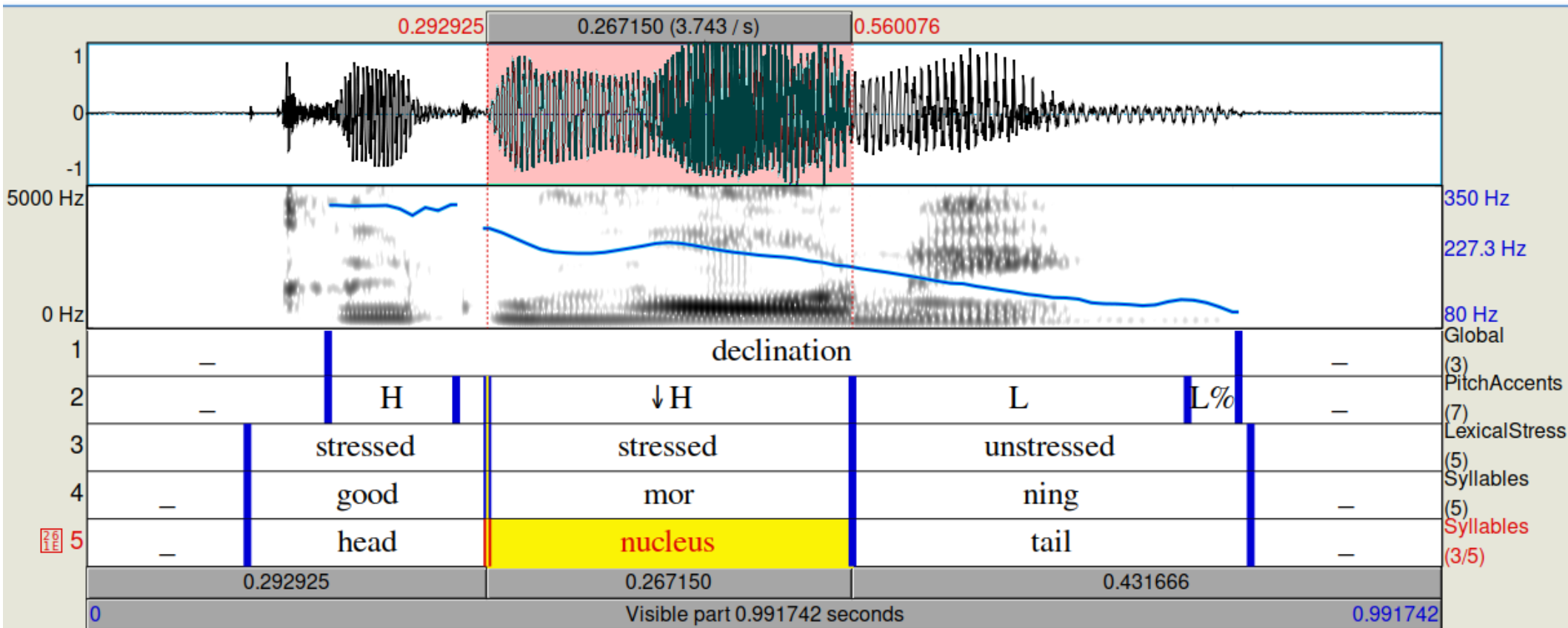☞ Speech synthesis and recognition (Jelinek etc., origins in audio engineering)

And other traditions, for example,

☞ the Chinese tradition of describing, for example, *syllables*, *tones*, *poetic patterning*
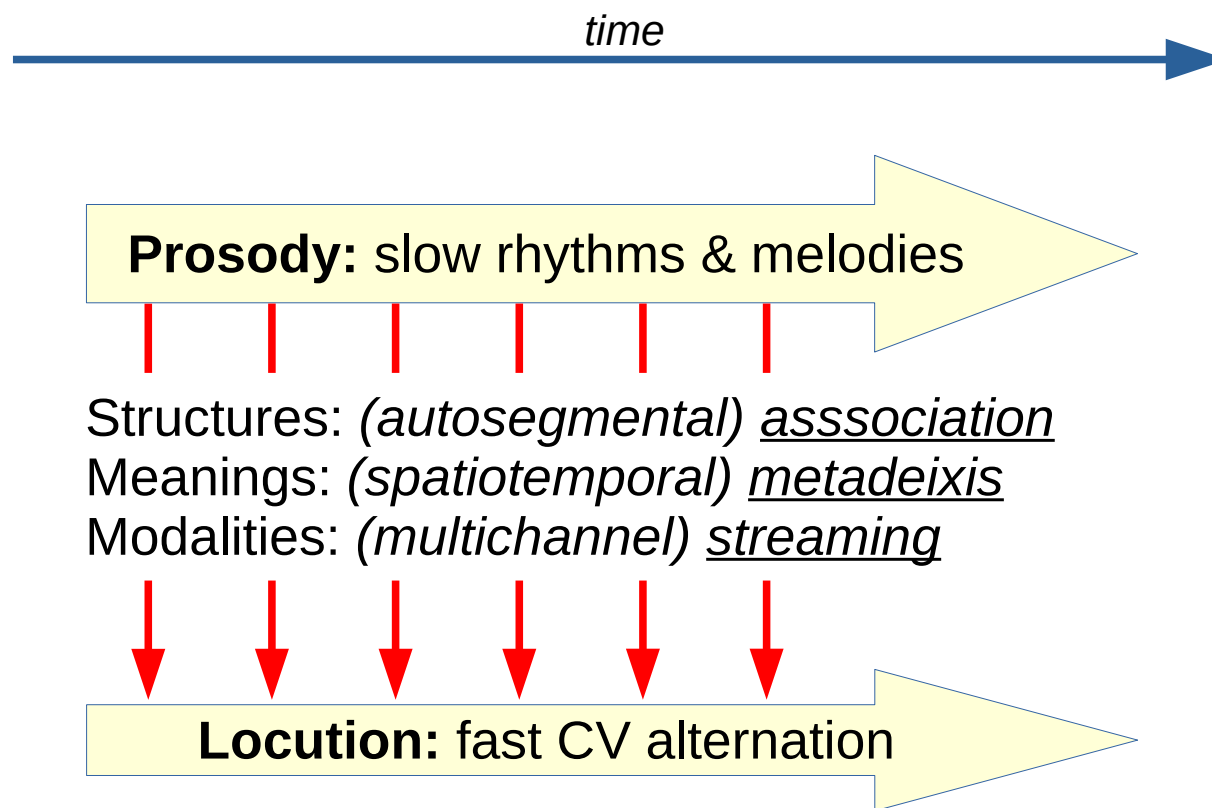☞ the Indian tradition of describing, for example, *sandhi*

It is worth looking beyond 'mainstream' paradigms and models at other sources of inspiration. This is what I will be doing.

Philosophy of Prosody: Metalocutionary Theory

Metadeixis: prosodic events point to events in locutions

Metalocutionary Theory of Prosodic Function

time

Prosody: slow rhythms & melodies

Structures: *(autosegmental)* <u>*asssociation*</u>
Meanings: *(spatiotemporal)* <u>*metadeixis*</u>
Modalities: *(multichannel)* <u>*streaming*</u>

Locution: fast CV alternation

Time Types:

cloud time   (intuitive everyday 'real' time)

clock time (Newtonian time, universal quantitative time)

rubber time (Aristotelian time: Event Phonology, tree structures)
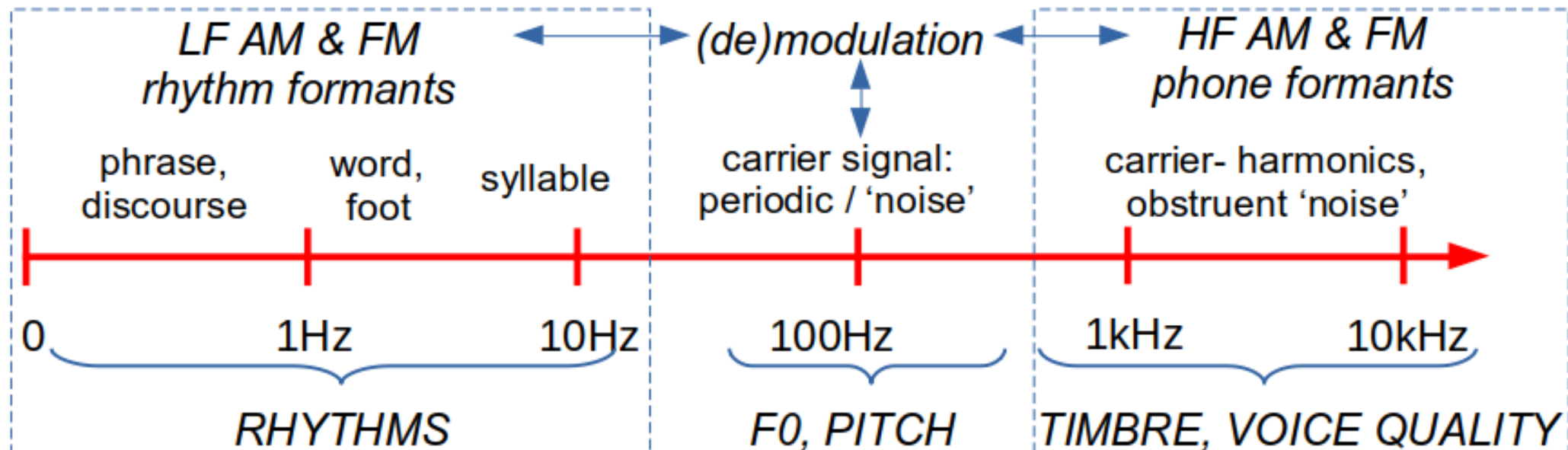
categorial time (abstract time points: duration contrast; context)

The Modulation Code: Time and the Frequency Scale
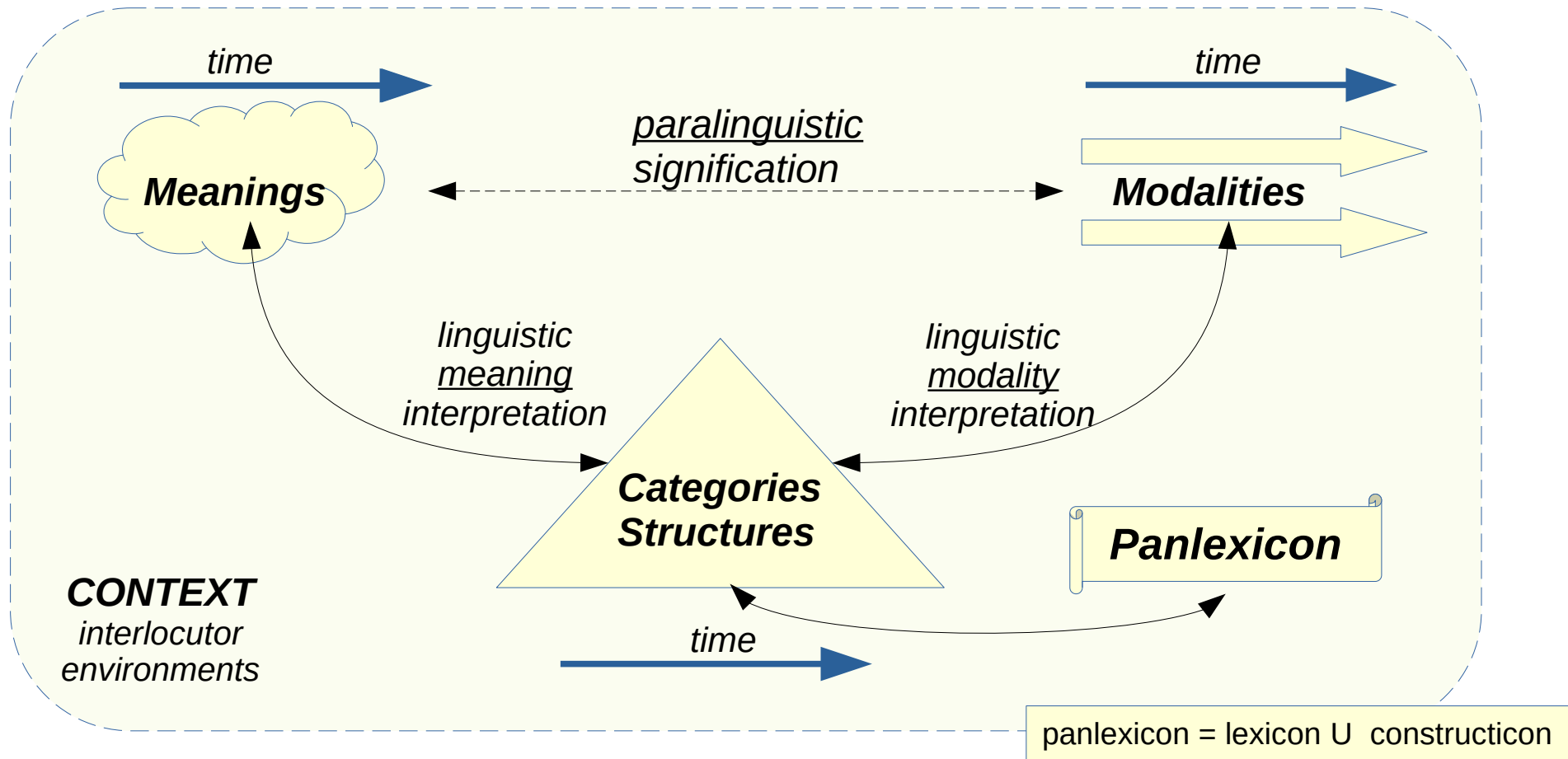

Low frequencies:
rhythm

Mid frequencies:
rhythm

High frequencies:
consonants and vowels

LF AM & FM
rhythm formants

(de)modulation

HF AM & FM
phone formants

phrase,
discourse

word,
foot

syllable

carrier signal:
periodic / 'noise'

carrier- harmonics,
obstruent 'noise'

0   1Hz   10Hz   100Hz   1kHz   10kHz

RHYTHMS

F0, PITCH

TIMBRE, VOICE QUALITY

Low Frequency
AM and FM modulations

High Frequency
AM and FM modulations

Embedding Prosody in a Theory of Signs

time →

paralinguistic
signification

Meanings

Modalities

time →

linguistic
meaning
interpretation

linguistic
modality
interpretation

Categories
Structures

Panlexicon

CONTEXT
interlocutor
environments

time →

panlexicon = lexicon U constructicon

Summary:

sign = semiosis(time, structure, meaning, modality, context)

structure = order(time, phon, morph, syn, text, disc)

meaning = interpretation(time, structure, panlexicon, context)
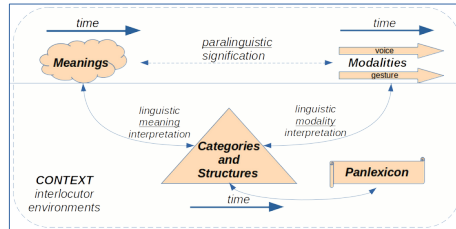
modality = interpretation(time, voice, gesture)

Rank-Interpretation Model of the Architecture of Speech
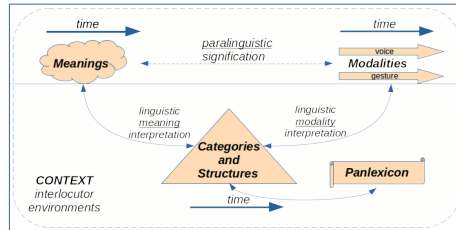
Ranks

Prosodic and Locutionary Signs

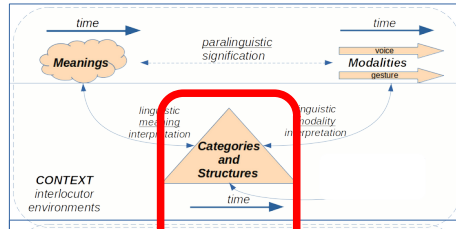**Prosodic Meanings as denotations**

Dialogue

turn initiation (calling)
uptake securing
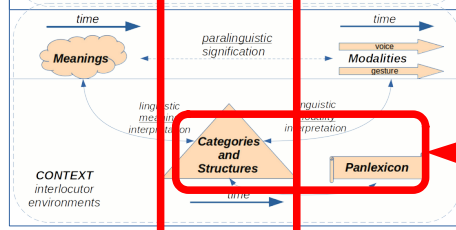turn-taking, dialogue genres

Utterance

speech acts, (non)-finality
frequency-size code (Ohala)
cohesion: configuration, culmination, delimitation
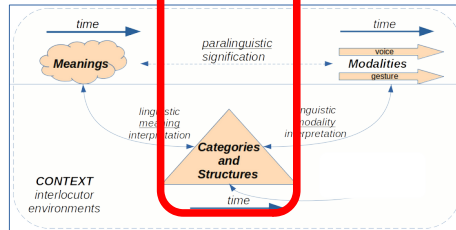coordination with facial and hand gestures

Sentence

cohesion: configuration, culmination, delimitation
information structure: focus; theme-rheme; given-new
phrasal contrast, phrasal emphasis
subordination, parenthesis

Word
Morpheme

head-modifier relations in compound words
lexical contr...
lexical emph...

The traditional domains of prosodic phonologies

Syllable
Phoneme

contrast wit...
onomatopoe...
synaesthesia

Rank-Interpretation Model of the Architecture of Speech

Ranks   **Prosodic and Locutionary Signs**   **Prosodic Meanings as denotations**

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turn initiation (calling)
uptake securing
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Word Morpheme

head-modifier relations in compound words
lexical contr…
lexical emph…

Syllable Phoneme

contrast wit…
onomatopoe…
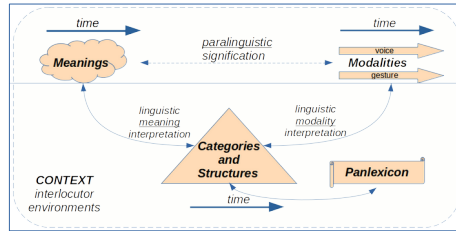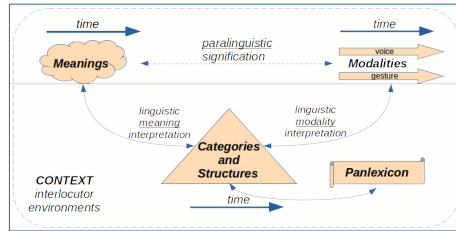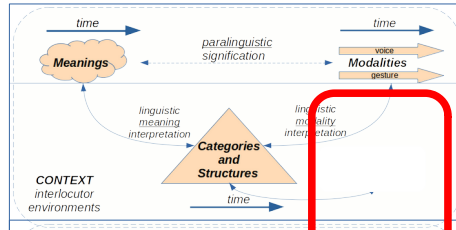synaesthesia

The traditional domains of prosodic phonetics

Rank-Interpretation Model of the Architecture of Speech

Ranks

Prosodic and Locutionary Signs

Prosodic Meanings as denotations

Dialogue

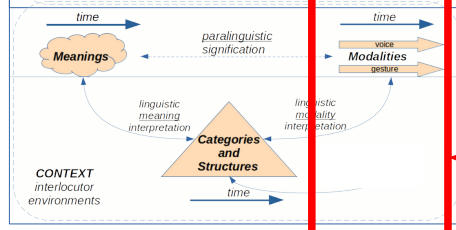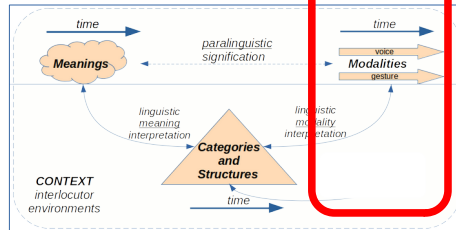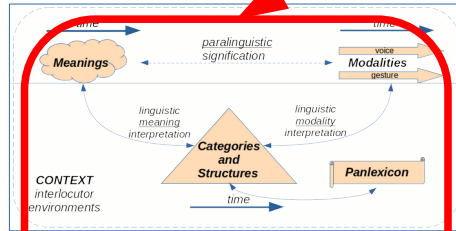turn initiation (calling)
uptake securing
turn-taking,

Utterance
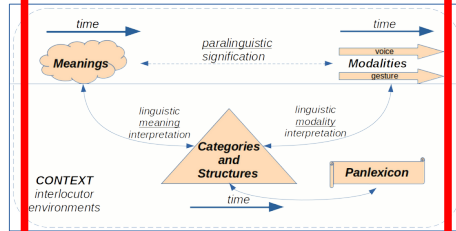
speech acts
frequency-s
cohesion: co
coordination

Sentence
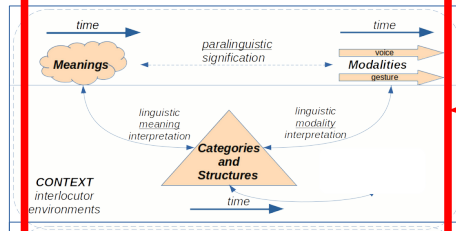
cohesion: co
information
phrasal con
subordinatio

Word Morpheme
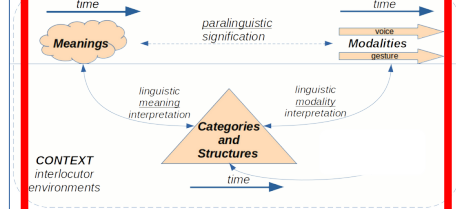
head-modifi
lexical contr
lexical emphasis

Syllable Phoneme
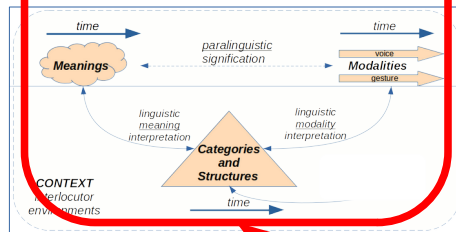
contrast with tones, pitch accents
onomatopoeia
synaesthesia

But the domain is far larger, and there are many more approaches than just 'mainstream'!

☺

Rhythm and Melody in Speech and Music

and

their Meanings:

Conventions, Questions and Controversies

Conventionality of music and speech

- ## Speech and music are both
  - complex modes of human behaviour
  - complex modes of human cognition

- ## Speech:
  - conventions shaped by local, especially family communation
  - formalised by public and written communication

- ## Music:
  - conventions shaped by social community activity:
  - formalised in larger communities: celebration, religion, courtship

Examining speech-music differences

- ## Speech:
  - focus on conversational spoken language, narration, reading
    - not written text
  - focus on complex behavioural performance
    - more than speculation on language cognition or 'competence'

- ## Music:
  - focus on solo song
    - more than instrumental music
    - and not 'written' or orchestral music
  - focus on complex behavioural performance
    - more than speculation on musical cognition or 'competence'

- ## Method:
  - discipline:
    - phonetic plus linguistic
  - syncretistic:
    - intuition plus measurement
    - qualitative plus quantitative phonetic analysis

Examining speech-music differences

- Meaning in language and music

  - semantic:
    - for example sound symbolism
      - such as imitating voices, animals, natural events

  - pragmatic:
    - for example emotions
      - It is claimed that <u>music</u> can express emotions such as

        joy, *tenderness*, ***longing***, *coquetry*, ***surprise***, ***fear***, *complaint*, *scorn*, ***anger***, *sarcasm*

        Fonagy, I. and K. Magdics (1963). Emotional patterns in intonation and music. *Zeitschrift für Phonetik, Sprachwissenschaft und Kommunikationsforschung 16, 293-313.*

        - for example musical genres as stylised emotions

          (Western genres: classical, romantic, blues, ...)
      - It is claimed that <u>speech</u> can express emotions such as
        - ***anger***, disgust, ***fear***, happiness, sadness and ***surprise*** (Ekman's initial set)
        - amusement, awe, contentment, ***desire***, embarrassment, pain, relief, and sympathy (Cordaro and Eltner)
        - boredom, confusion, interest, pride, and shame (facial expressions)
        - contempt, relief, and triumph (vocal expressions)

Examining speech-music meaning similarities

- Meaning in speech and music

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    - for example sound symbolism
      - such as imitating voices, animals, natural events

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> The two sets seem to be rather subjective and do not seem to have much in common

Controversies – musical relativity and universality

- ## Musical relativity:

  - Is music shaped by speech? - To some extent:
    - chant: adapted to restricted rhythms and melodies of speech
    - song: often adapted to a broader range of rhythms and melodies of speech
    - instrument: phonaesthetic imitation of speech rhythms and tonal melodies
    - surrogates: drumming, whistling with speech rhythms and tonal melodies

  - Is speech shaped by music? - To some extent:
    - music-like contours in greetings and calls - "Good morning!", "Jooohnyyy!"
    - song: speech rhythms and melodies adapted to musical conventions

Controversies – musical relativity and universality

- Are there universals of language and speech?

- Is there language-specific 'musical relativity'?
    - does music shape language?
    - Does language shape music?
    - Does music shape thought?
        cf. 'linguistic relativity', the claim that language shapes thought

- A speculative example:
    - Robert Hall claimed
        - Elgar's music is mostly popular in Britain because it is heavily influenced by Standard British English intonation:
            - very wide pitch range
            - sudden changes of pitch height (e.g. musical 7th interval)
        - Hall, R. A. Jr. 1953. Elgar and the intonation of British English. *Gramophone* 31, 6.

Controversies – co-evolution of music and speech?

- Both speech and music may have
  - Shared phases in the evolution of behaviour
  - Shared phases in the evolution of cognition?

- A speculation on co-evolution of music and speech:
  - first simple vocalisations and gestures
    - sequential iteration leading to rhythm – synchrony with other bodily activities?
    - parallel iterated signals
    - speech and music with iterations (coordination)
    - hierarchical patterns (headedness, subordination)
  - Ontogenesis:
    - first rhythm and melody, then vocabulary then grammar
  - Zoosemiotics:
    - simple rhythms of animal speech, from barking dogs to birds
    - simple melodies from birdsong to complex primate ape cries

- So which came first – or did both come together?

Controversies – co-evolution of music and speech?

SHARED WITH
BIRDS, ANIMALS

Communicative
<u>timbre</u>: *speech,*
hierarchical patterns

Song

Communicative melody:
<u>frequency</u> modulation,
parallel patterns

Music, vocal and
instrumental:
hierarchical patterns

Communicative <u>rhythm</u>:
pulse modulation,
iterative patterns

Simple sound
events

Increase in complexity over time
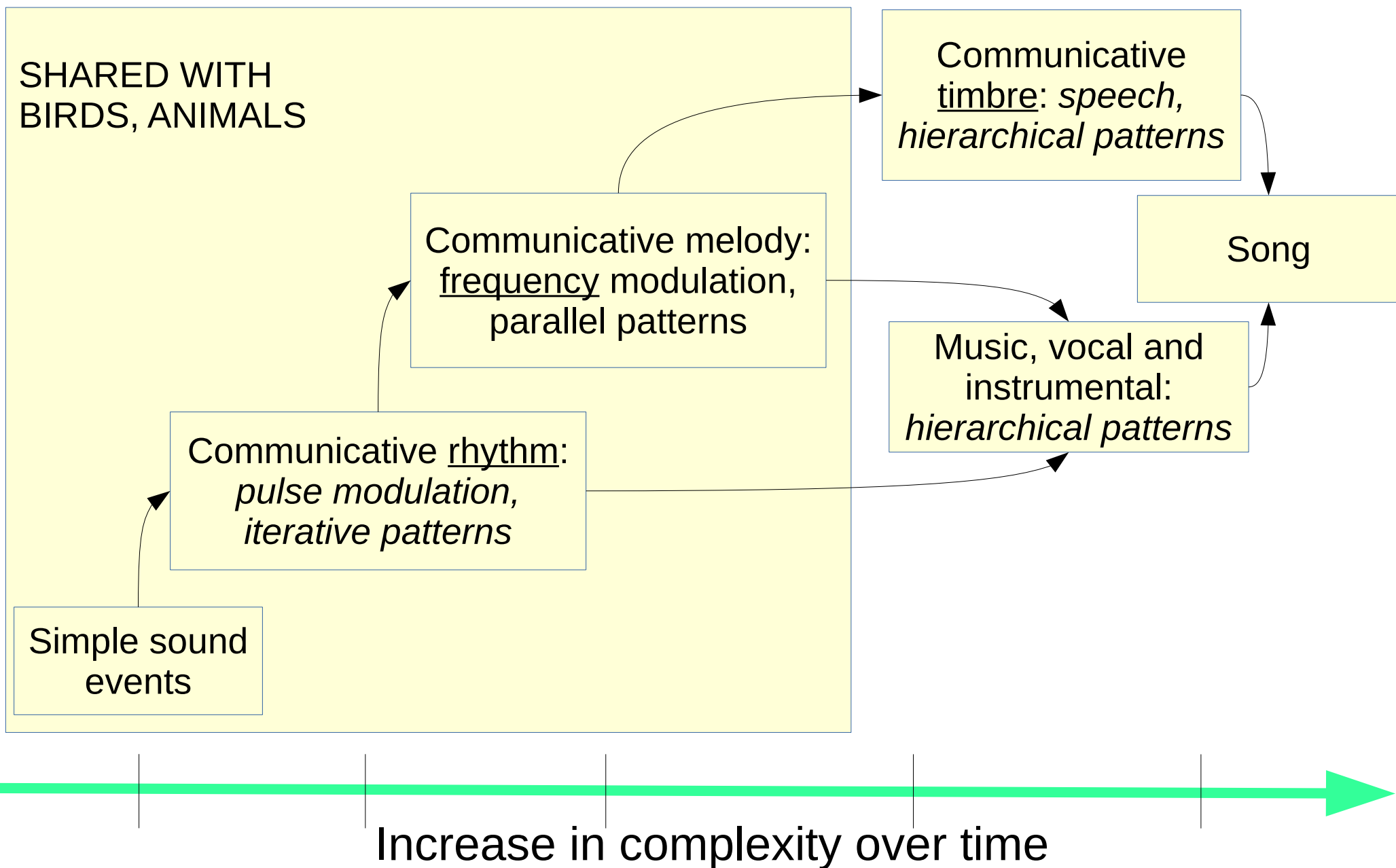
Music: Rhythm and Melody (and more)

Music: Rhythm and Melody (and more)

- ## What is rhythm?
  - Ella Fitzgerald: "I have rhythm."
    - Spoken English type of 'foot-timed' rhythm

- ## What is melody?
  - Bob Dylan: "The answer is blowing in the wind."
    - Spoken English type of intonation-like melody

- ## Rhythm and melody:
  - other cultures, languages, registers:
    - West African parable songs, dirges (funeral songs / chants)
    - Blues
    - Chinese popular songs: tone match in speech and song?
    - Children's chants: speech or music?
    - Surrogates: whistled speech (e.g. calls, interjections)

What do speech and music share?

- Song:
  - spoken language may influence music in
    - rhythm
    - melody
  - but this is not always true
  - and may be completely wrong for instrumental music

- English popular songs: speech tends to influence music
  - Rhythm:
    - phrasing adapted to English grammar
    - accents adapted to Engllish stress and focus
  - Melody:
    - local accents on syllables and words
    - global tunes and accents on phrases

- So which came first? Or did both arise together?

What do speech and music share?

- Both music and speech are based on temporal constraints on the human body:
  - Body rhythm timing:
    - approximately one main movement per second:
      - foot stamping, running, walking
      - hand clapping, head nodding
      - chewing, sucking
      - hand-shaking, intimate interaction
      - and ... syllable sequences
  - Musical rhythms follow these rhythms and their timing
    - In European music, for example:
      - 2/4: Johnny walked along the narrow road
      - 3/4: Jonathan Appleby trundled along to the market place
  - Fundamental frequencies of musical instruments sound within the range of of the fundamental frequency of the human voice
  - The criterion is VOICE, not HEARING

What do speech and music share?

- Three kinds of information-bearing modulation:
  - melody
    - <u>modulation</u> of fundamental frequency of signal over time

  - timbre
    - <u>modulation</u> of overtone (harmonic) patterns:
      - voice: different vowels, different voice qualities
      - music: resonance qualities of instrument

  - rhythm
    - <u>modulation</u> of
      - sequences of stronger and weaker elements
      - more or less regular intervals between stronger elements
      - varying patterns between weaker elements
        - voice: stress timing, syllable timing, mora timing
        - music: 3/4, 4/4, 5/4, 6/8, ...

Pitch (melody) – Spectrum (timbre) – Time (rhythm)
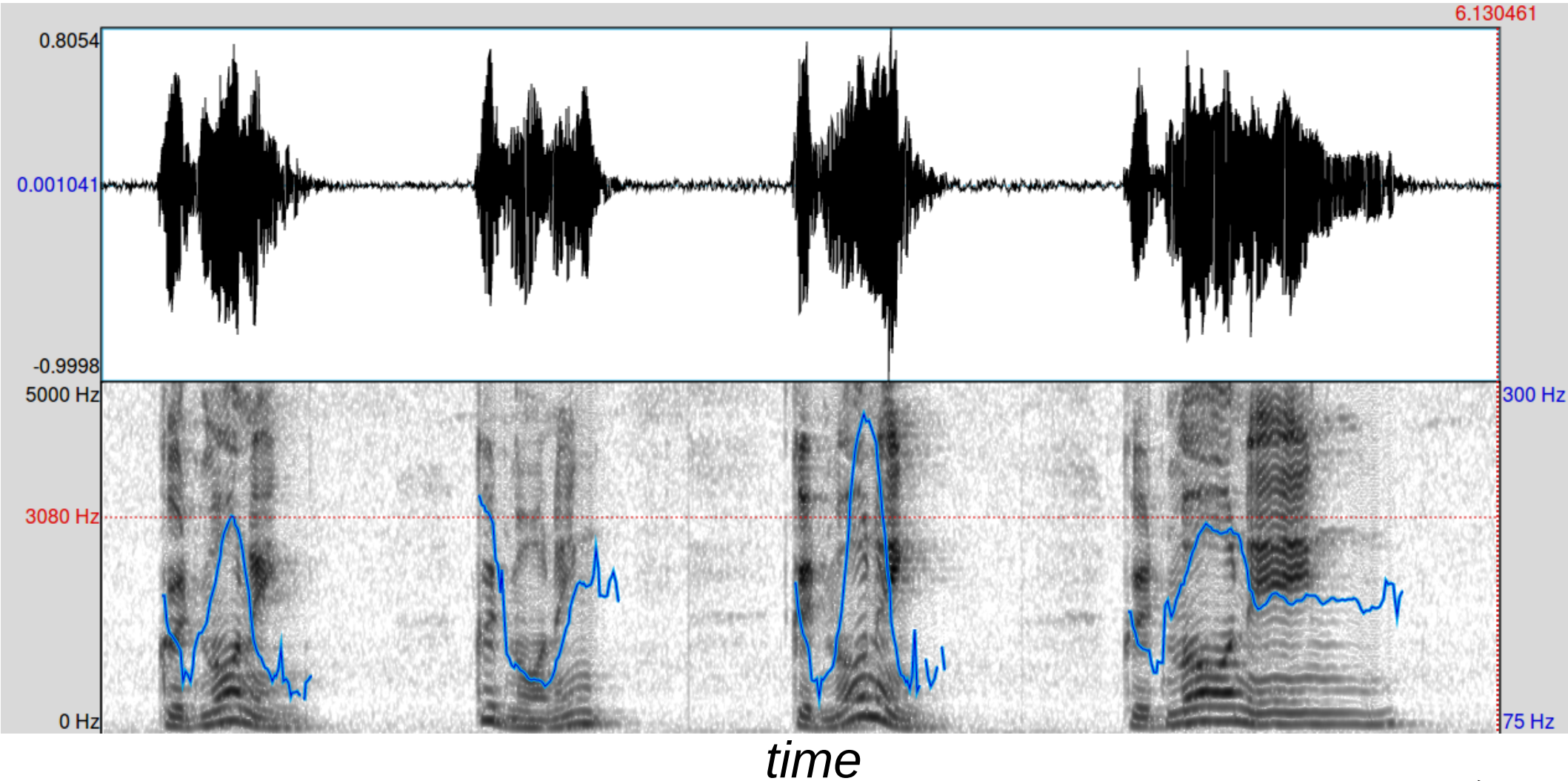
time
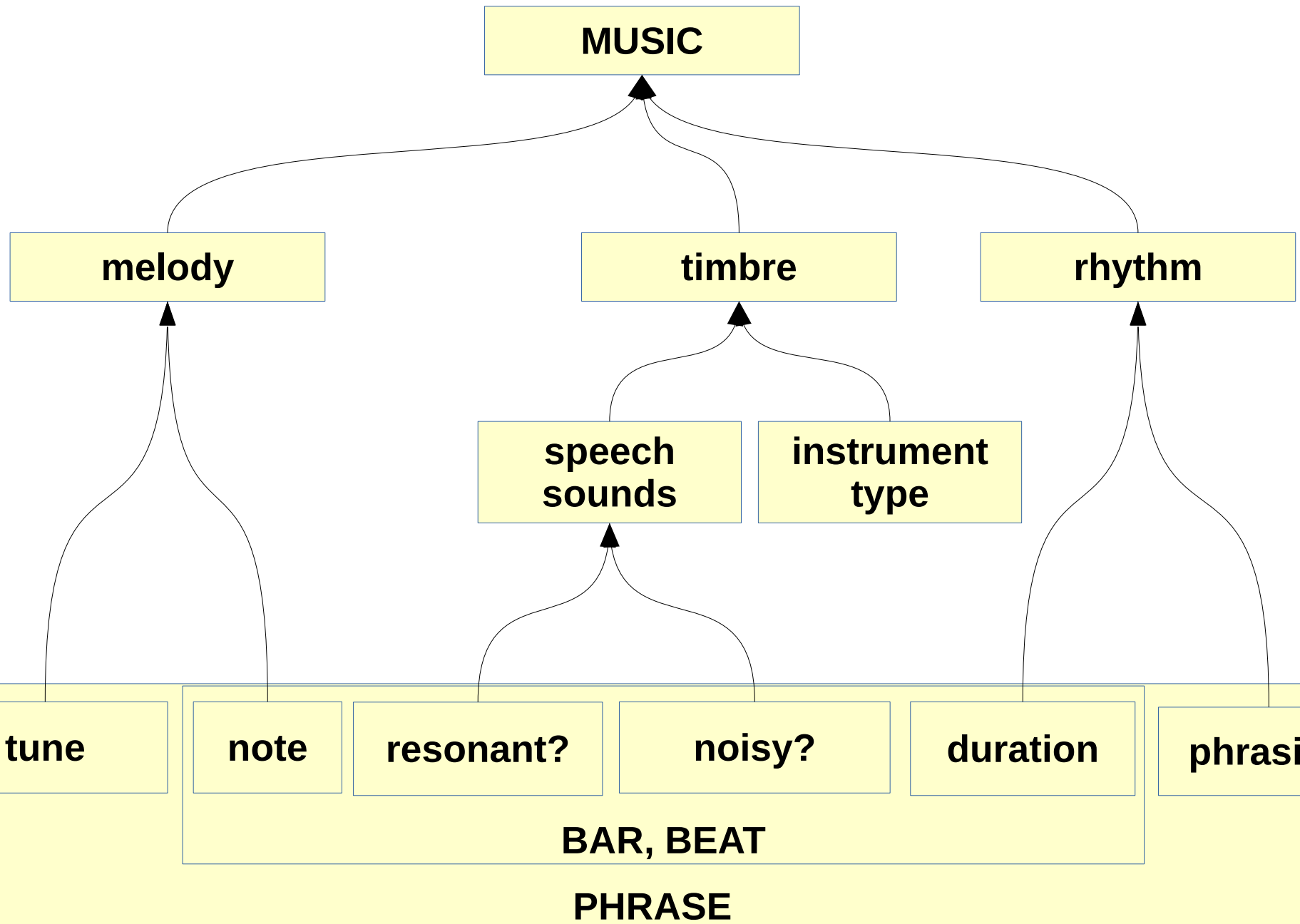
Signal time domain ≈ waveform (oscillogram): top, black
Melody ≈ fundamental frequency (F0, f0, pitch track/trace): bottom, blue
Timbre ≈ spectrogram (harmonics/overtones, formants)

Speech (Spoken Language)
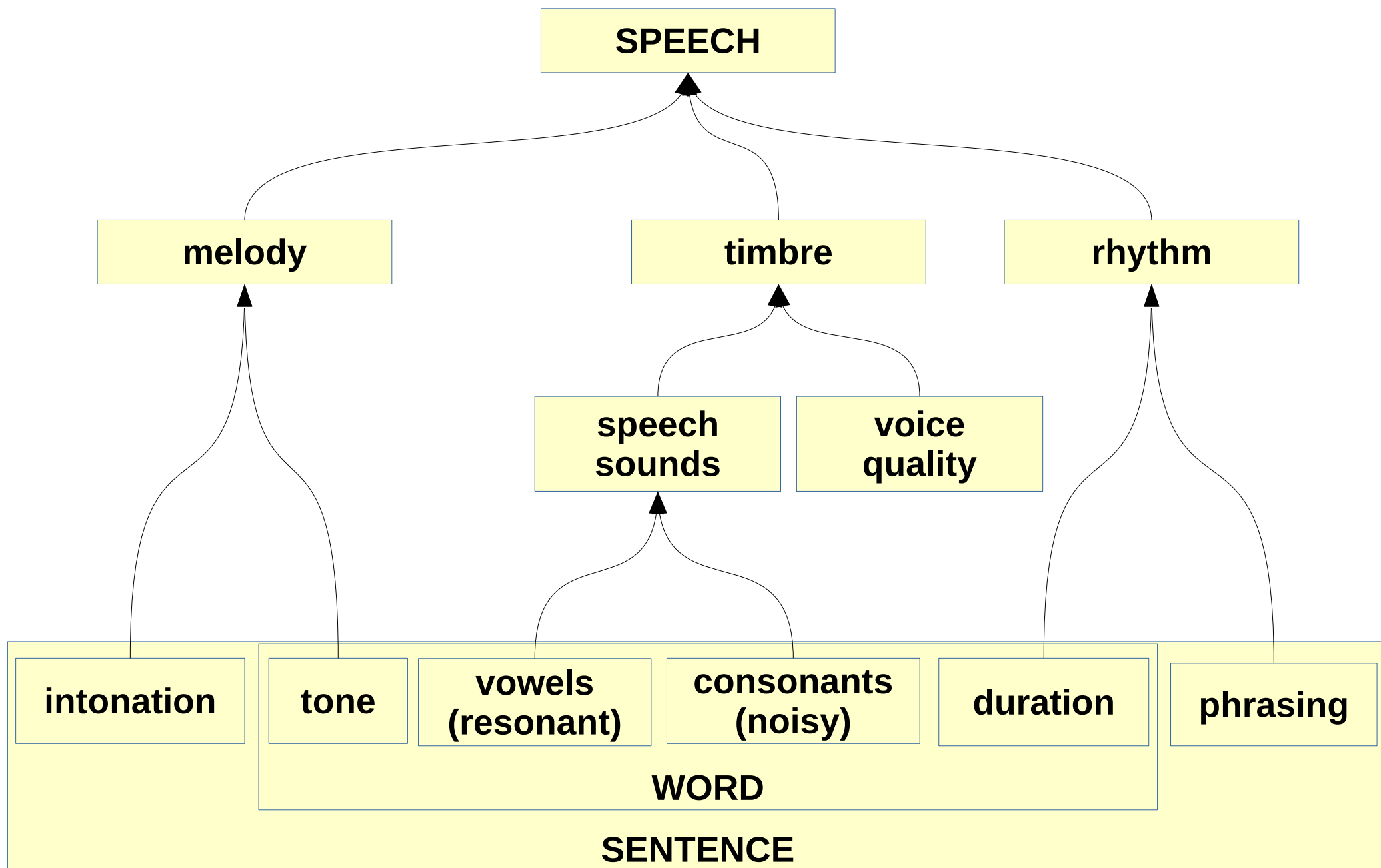
Music

Jakobson's Constitutive Factors and their Functions

Levin's Syntagmatic Coupling

The Meanings of Discourse Structure

Jakobson's Constitutive Factors and their Functions

ADDRESSER

CONTEXT
MESSAGE
CONTACT
CODE

ADDRESSEE

REFERENTIAL

EMOTIVE

POETIC

PHATIC

CONATIVE

METALINGUAL

Functions of prosody:

emotions
hyperarticulation

metalocutions:
metadeixis

calls
uptake

cohesion
coupling

conventional prosody
rising pitch
hypoarticulation
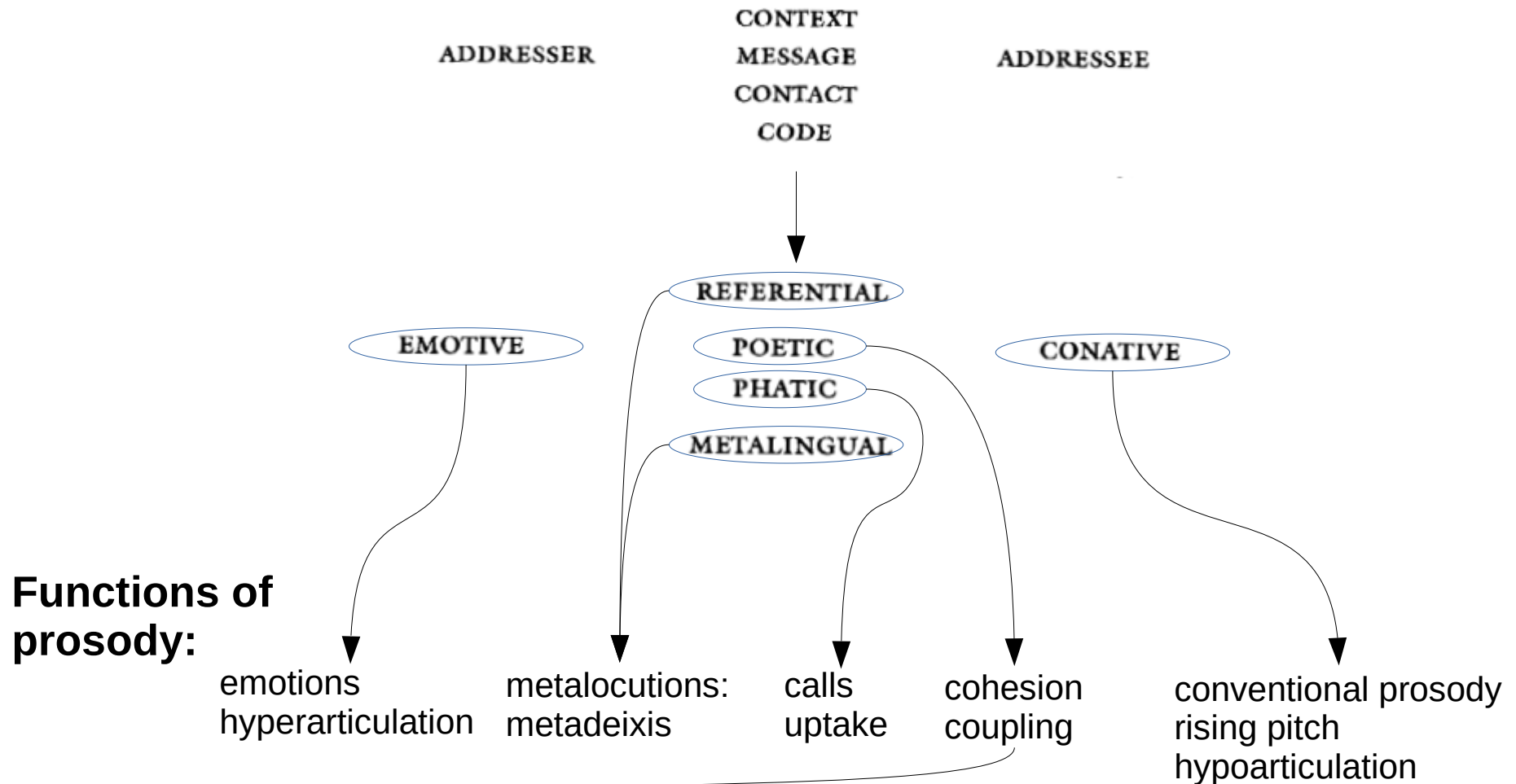
Roman Jakobson:
"The poetic function projects
the principle of equivalence
from the axis of selection into
the axis of combination."

Samuel Levin:
  Coupling at more than
  one level, e.g. sound,
  form, meaning

This includes prosody

Levin's Jakobsonian "coupling"

4.4 Even convergence as defined above, that is, as the intersection of an independent phonic or semantic component with an independent positional component, is trivial, however, since it too is always present in any linguistic sign. It is thus not convergence merely that is important, but the relation between one convergence of this sort and another.. It is only when we compare two such convergences and find a certain relation between them that we have the structure which is important for poetry. This relation is one in which the two convergences comprise naturally equivalent forms (i.e., equivalent as to sound or meaning, or both) occurring in equivalent positions; in other words, where we have a particular coupling of convergences. Now, any two forms occurring in equivalent positions represent a pairing of convergences; only if the forms are naturally equivalent, however, do we have COUPLING, the structure that is important for poetry.

Levin, Samuel. 1969. *Linguistic Structures in Poetry. The Hague, Mouton.*

Coupling as cohesion of poetic structure and function

Stylised rhythm, very little melody (for example: rap)
Dax – "The Next Rap God (Eminem Remix)

I aint PUTting no ONE on a PEdestal
I don't BEEF when I MEET with a BEAT i might SPIT but I PROmise i'm NOT homoSEXual
I got BARS in a TANdem they WALK on a LINE with the LITeral AND hypoTHETical
NIGgas is SNAKES all the WEED in the GRASS got it HI-on the-LOW like it's OFF of an EDIBLE

Stylised speech rhythm and melody (for example: ballad)
Paul McCartney – "Yesterday"

George: And it's a song with featuring just Paul and it's called "Yesterday"!   (spoken)
Paul:
    Yesterday, all my troubles seemed so far away.   (sung)
    Now it looks as though they are here to stay.
    Oh I believe in yesterday.   (sung)

Roman Jakobson (1960):
  "syntagmatic coupling" embodies a structural layer typical of poetry

  Jakobson did not refer to song, but in these examples:
        phonemic coupling: *alliteration* (consonantal), *assonance* (vocalic)
        syllabic coupling: *stress*, *rhyme*
        phrasal coupling: *rhythm*, *melody*

Metalocutionary Theory: Prosody is *about* locutions

Stylised rhythm (for example: rap)
Dax – "The Next Rap God (Eminem Remix)

I aint PUTting no O~~~~
I don't BEEF when I ~~~~   moSEXual
I got BARS in a TAN~~~~   ical
NIGgas is SNAKES ~~~~   FF of an EDIBLE

Temporal metadeixis

So the meaning of prosody in these

musical contexts is to draw attention

to poetic structure.

George: And it's a s~~~~   (spoken)
Paul:
   Yesterday, all my troubles seemed so far away.   (sung)
   Now it looks as though they're here to stay.
   Oh I believe in yesterday.   (sung)

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Prosodic Coupling: Song Terracing with Lexical Tones
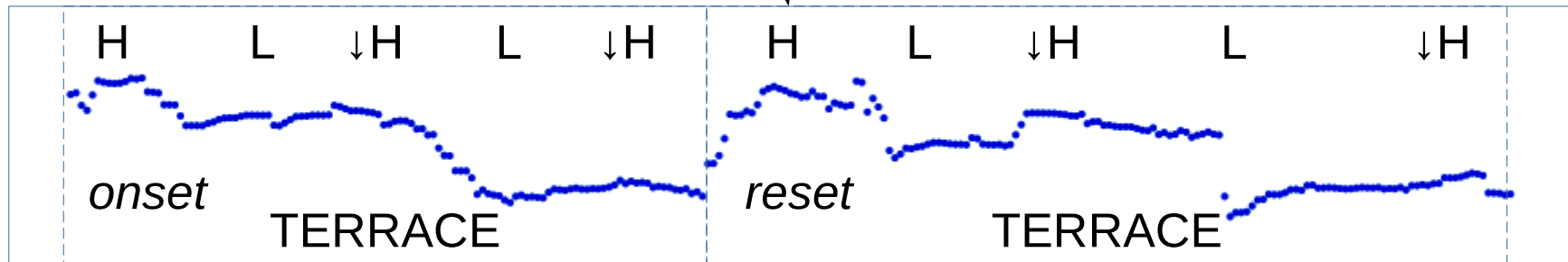
Transfer of Prosodic Coupling

Ibibio:
"Áfîm Édèré yè Útín"

English:
"The North Wind and the Sun"

Efik/Ibibio:
Traditional dirge (funeral song)

Specific tonal properties:

1. Two level tones: H, L
2. Automatic Downstep
3. Tone terraces
4. Nigerian English adopts tone terracing
5. Song genres may adopt tone terracing

H   L   ↓H   L   ↓H   H   L   ↓H   L   ↓H

onset   *reset*
       TERRACE   TERRACE

Two cultural / sociolinguistic tone system transfers:

1. Genre transfer: *speech → music*
2. Language transfer: *tone language → English*

Another scenario: Niger-Congo languages and the Atlantic slave trade

Geographical prosodic transfer – the Atlantic slave trade

Piedmont blues:
Sonny Terry & Brownie McGhee
"Red River Blues"

Specific properties of the language:
1. Pitch accents on stressed syllables
2. Automatic Downstep
3. Tone terracing
4. AAVE adopts tone terracing
5. Blues songs may adopt tone terracing

red   red   ri   ver   run
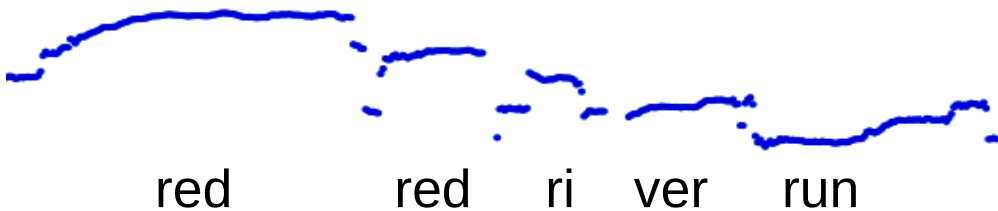
# Geographical prosodic transfer – the Atlantic slave trade

Ibibio:
"Áfîm Édèré yè Útín"

English:
"The North Wind and the Sun"

Efik/Ibibio:
Traditional dirge (funeral song)

Specific tonal properties:

1. Two level tones: H, L

2. Automatic Downstep

3. Tone terraces

4. Nigerian English adopts tone terracing

5. Song genres may adopt tone terracing

H   L   ↓H   L   ↓H   H   L   ↓H   L   ↓H

onset
TERRACE

reset
TERRACE
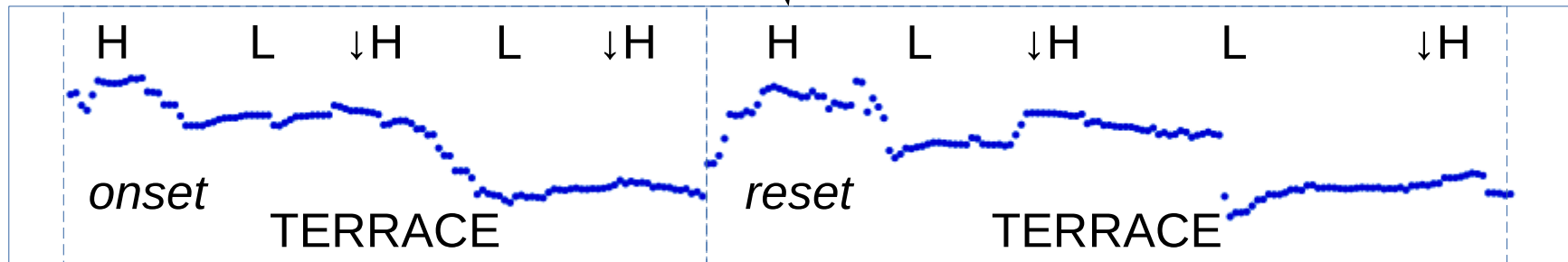
Piedmont blues:
Sonny Terry & Brownie McGhee
"Red River Blues"

Specific properties of the language:

1. Pitch accents on stressed syllables

2. Automatic Downstep

3. Tone terracing

4. AAVE adopts tone terracing

5. Blues songs may adopt tone terracing
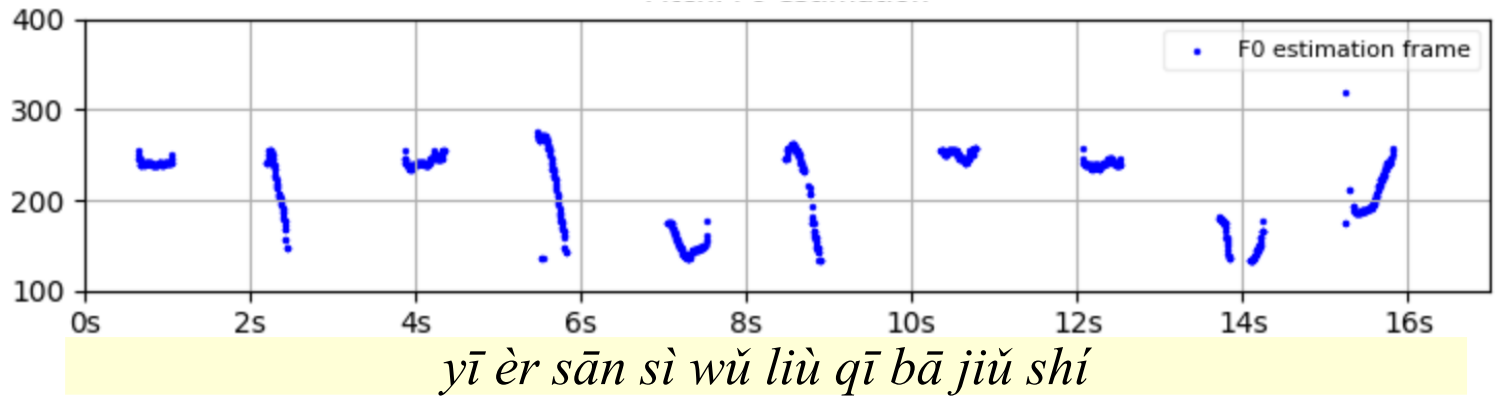
More on the Cohesion Function of Prosody

English pitch accent sequences
Dilley

Types of Prosodic Cohesion

Sino-Tibetan
Pǔtōnghuà
ISO-693-3 *cmn*

lexical tone

yī èr sān sì wǔ liù qī bā jiǔ shí

Niger-Congo
Ibibio
ISO-693-3 *ibb*

lexical and morphological tone

kèèd ìbà ìtá ìnààñ ìtíòn ìtíòkèèd ìtíàbà ìtiáìtá ùsúkkéèd dùòp

Indo-Germanic
English
ISO 693-3 *eng*

stress-pitch accent & intonation

one two three four five six seven eight nine ten

Types of Prosodic Cohesion

Sino-Tibetan
Pŭtōnghuà
ISO-693-3 *cmn*

lexical tone

yī èr sān sì wŭ liù qī bā jiŭ shí

Niger-Congo
Ibibio
ISO-693-3 *ibb*

lexical and morphological tone

quinary number system

kèèd ìbà ìtá ìnààñ ìtíòn ìtíòkèèd ìtíàbà ìtiáìtá ùsúkkéèd dùòp

Indo-Germanic
English
ISO 693-3 *eng*

stress-pitch accent & intonation

pitch accent iteration constraint

one two three four five six seven eight nine ten
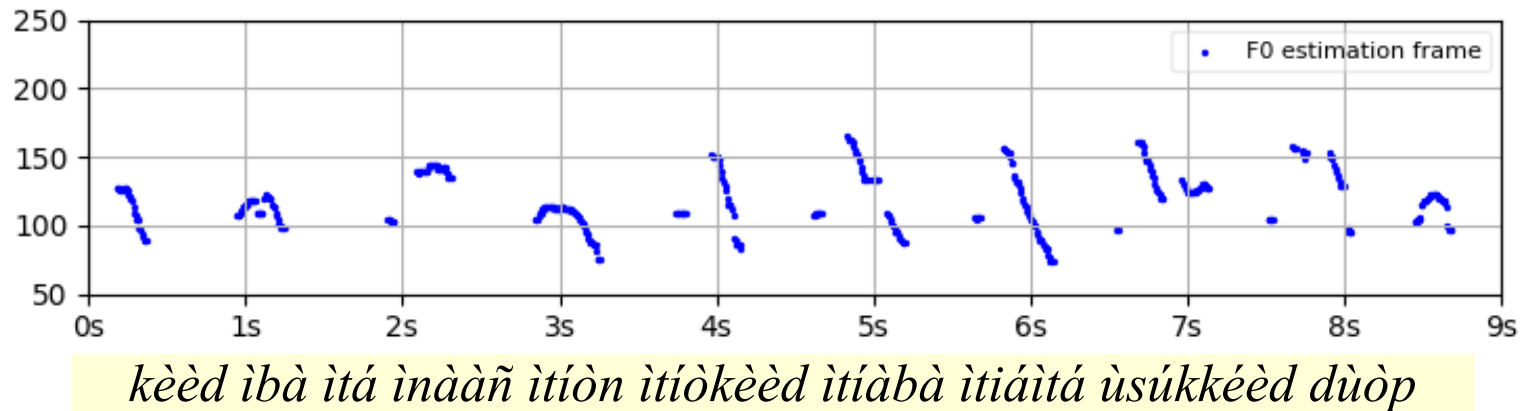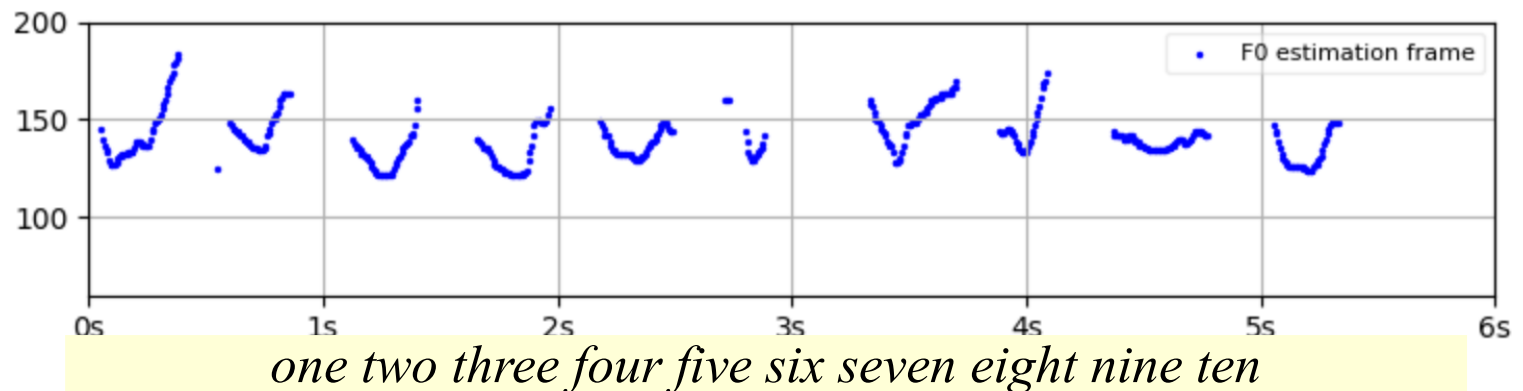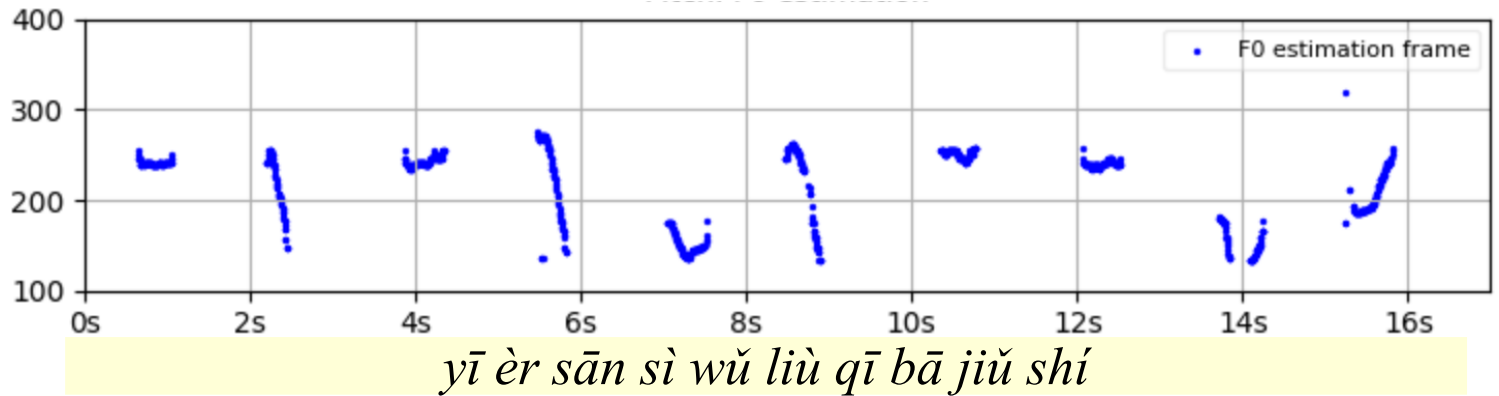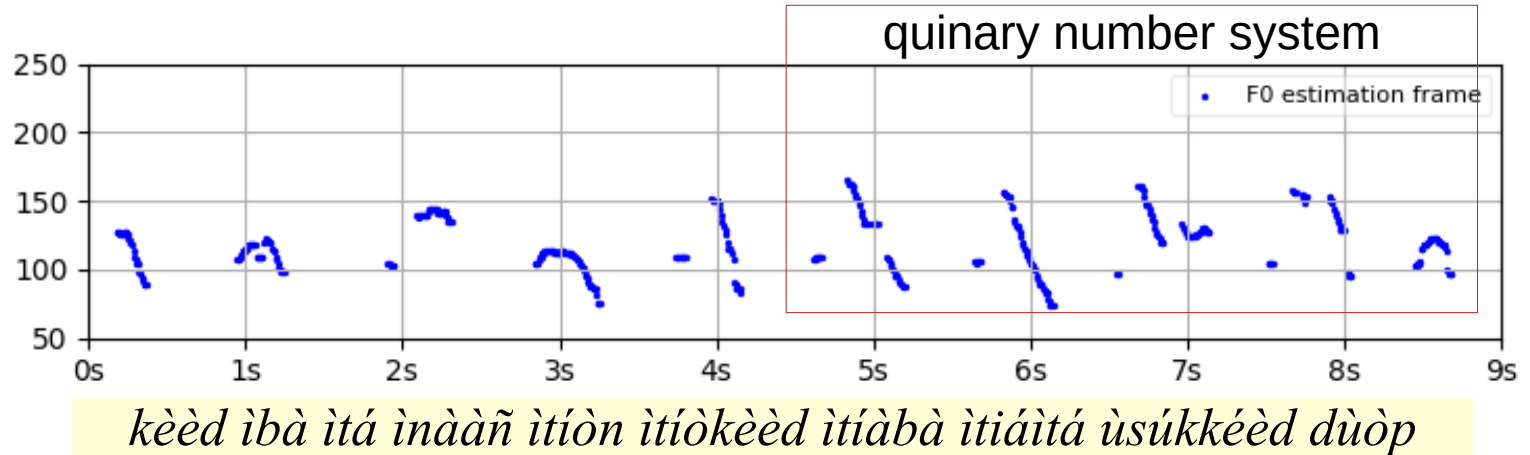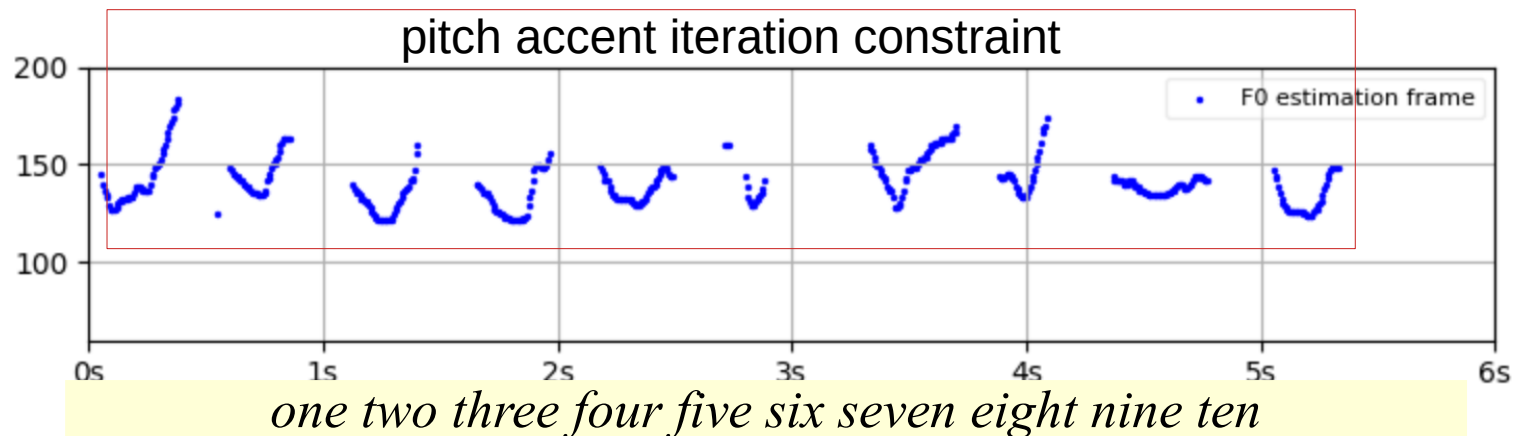
Types of Prosodic Cohesion: Dialogue
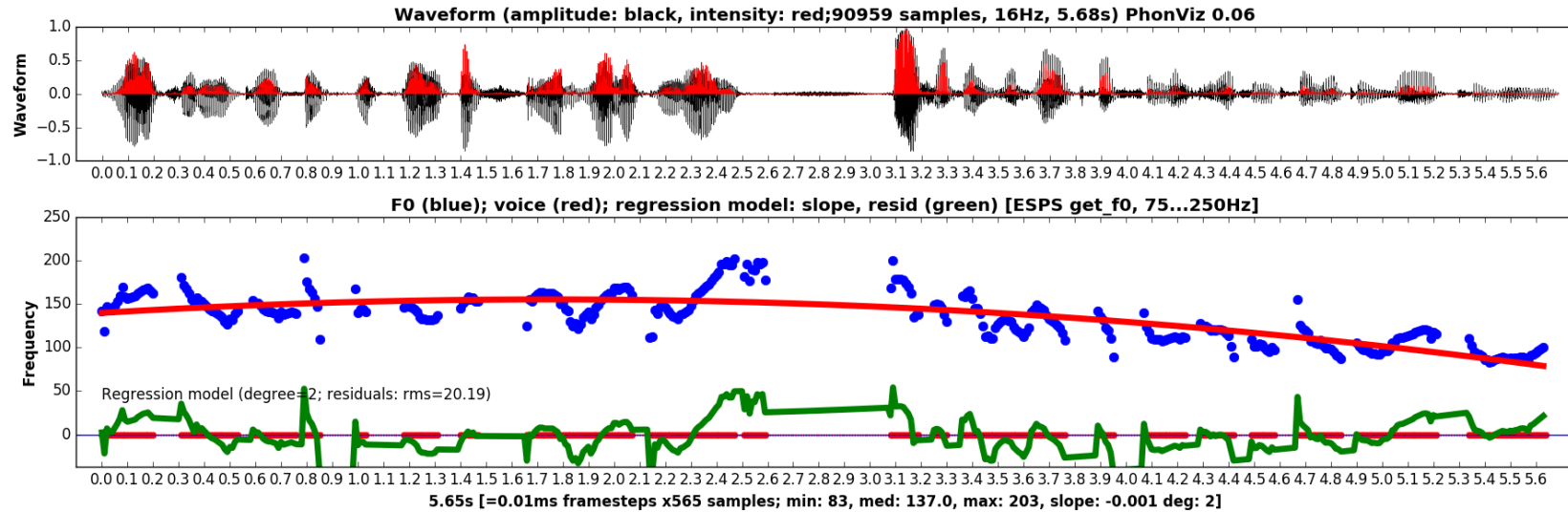
rising-falling
global
dialogue
contour

Waveform (amplitude: black, intensity: red;90959 samples, 16Hz, 5.68s) PhonViz 0.06

F0 (blue); voice (red); regression model: slope, resid (green) [ESPS get_f0, 75...250Hz]

Regression model (degree=2; residuals: rms=20.19)

5.65s [=0.01ms framesteps x565 samples; min: 83, med: 137.0, max: 203, slope: -0.001 deg: 2]

MODALITY
global rising-
falling F0

Adjacency Pair Contour

FUNCTION
metadeictic,
**iconic
cohesion**

Speech Melody and its Pragmatic Meanings

Speech Melody and its Pragmatic Meanings

Four ways of saying "Good morning!"

Note that traditional notations do not account for
- extra high (emphatic)
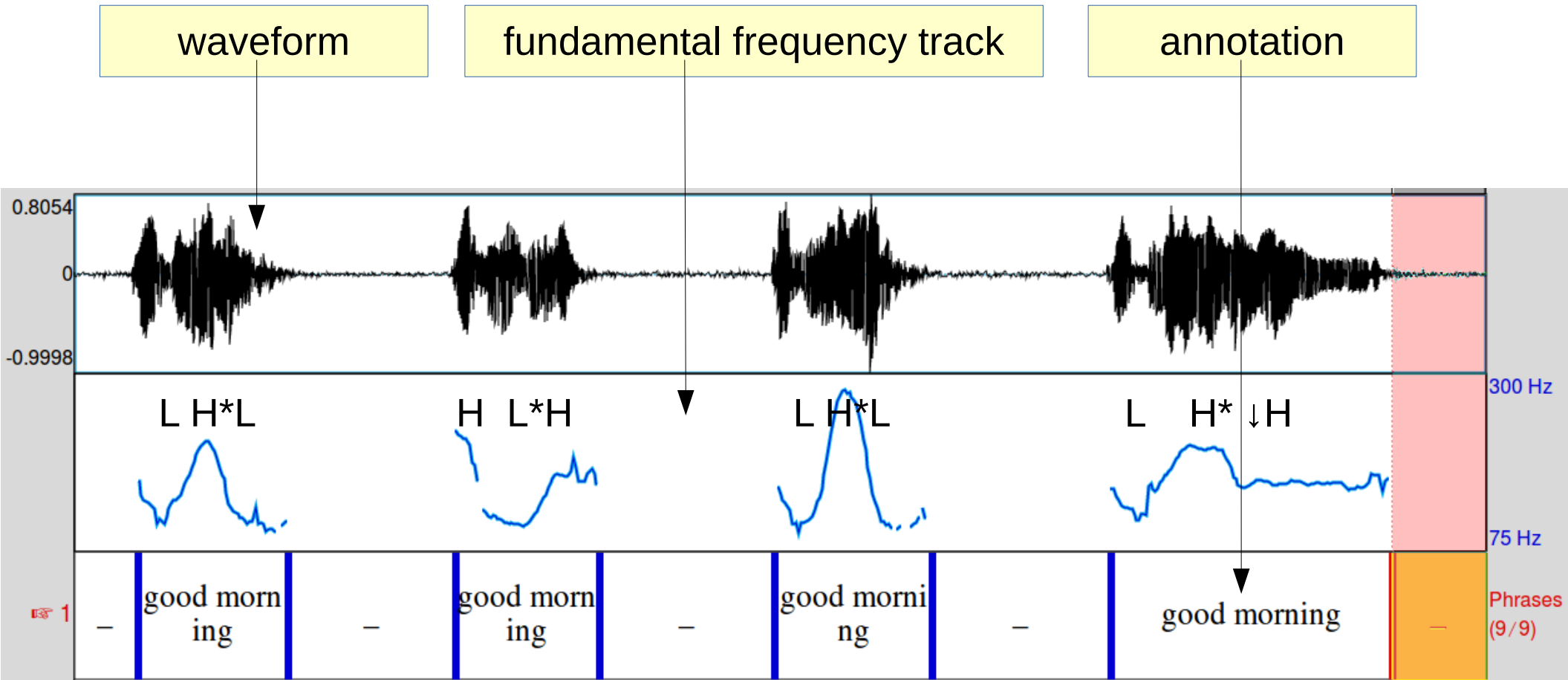- chromatic (stylised contour)

on examples 3 and 4, respectively.

Speech Melody and its Pragmatic Meanings

Four ways of saying "Good morning!"

Approximate pragmatic meanings			
Normal	Expecting interaction	Surprise encounter	Greeting at a distance
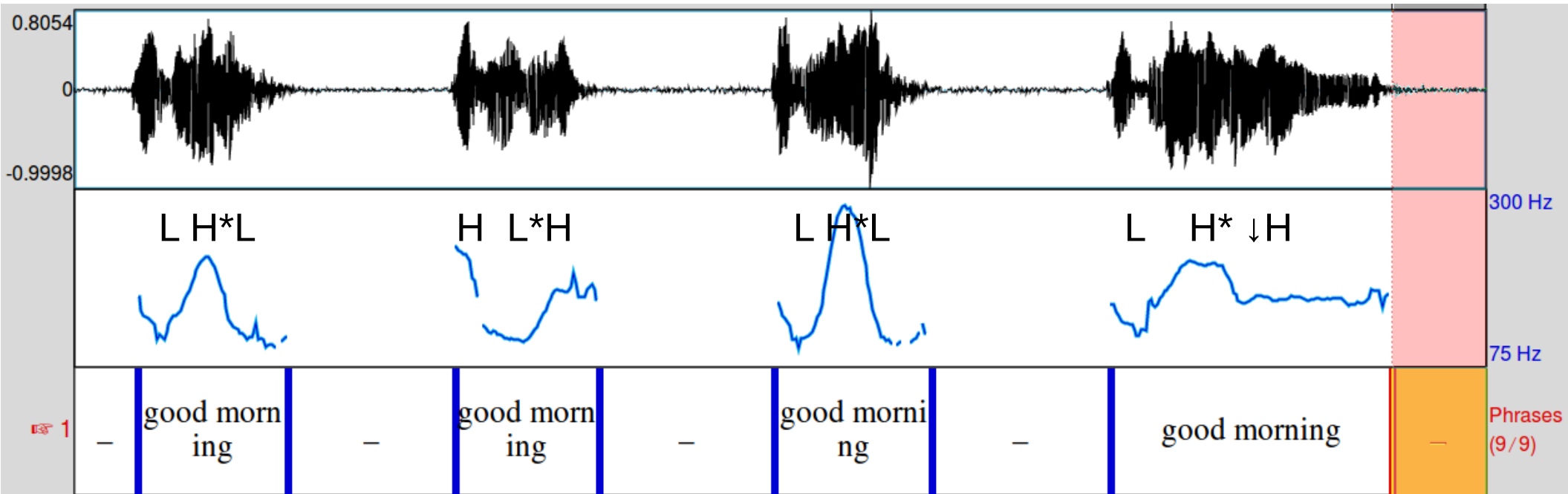
Note that traditional notations do not account for
- extra high (emphatic)
- chromatic (stylised contour)

on examples 3 and 4, respectively.

Between Speech and Song

- 'Call contours'
  - stylised, flat pitches
  - musical intervals, e.g. minor 3rd (3 semitones)

- Chants:
  - childrens' chants
    - it's raining, it's pouring, the old man's snoring, ...
    - cowardy cowardy custard, your face is made of mustard
  - vendors' sales chants
  - religious liturgical chants
  - rap

Universals of Melody: Call Contours and their meaning

Universals of the Melody Lexicon: 'Call Contours'
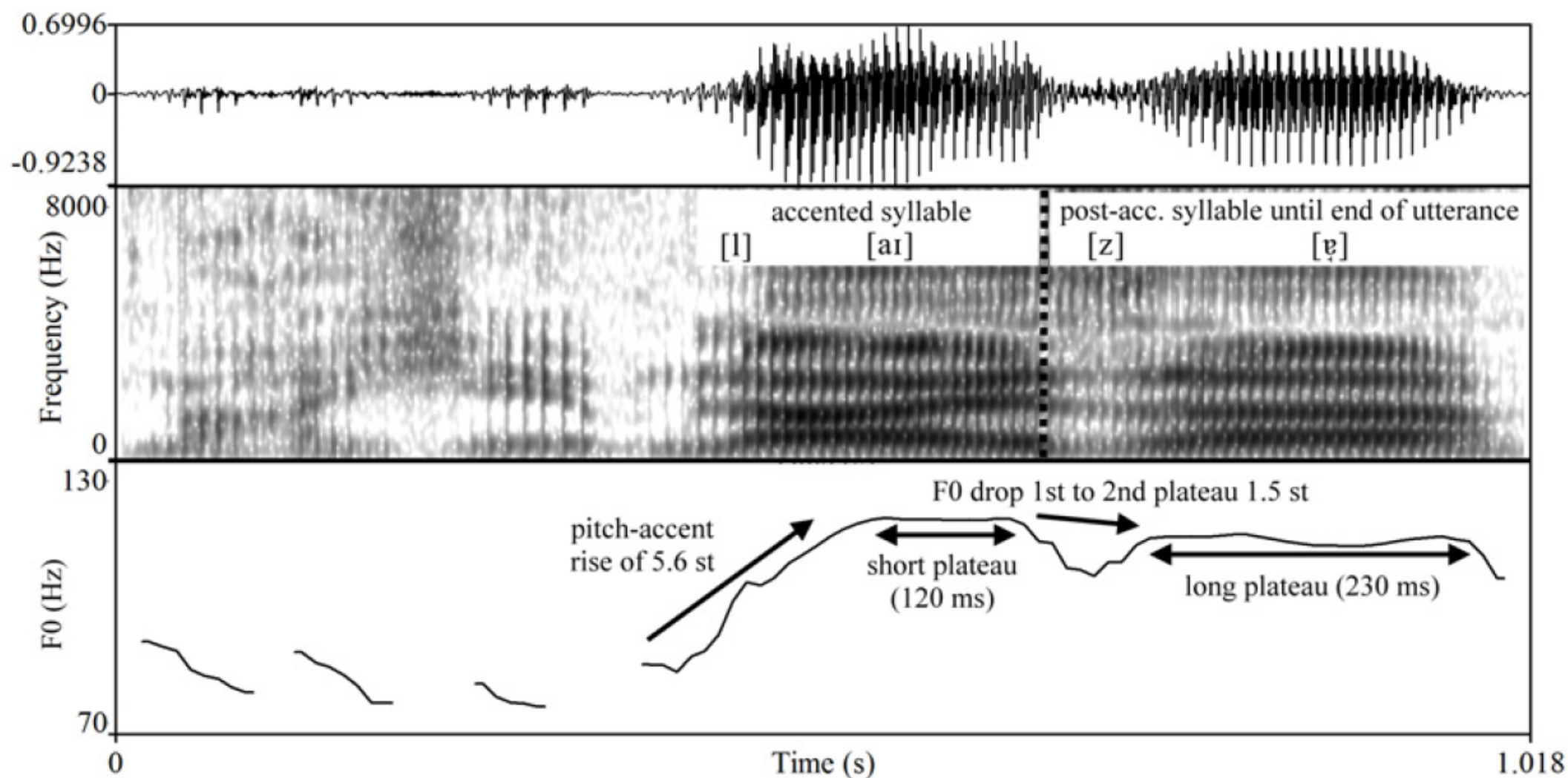
Universals of the Melody Lexicon: 'Call Contours'

Waveform (amplitude: black, intensity: red; 218606 samples, 44100kHz, 4.95s) PhonViz1.0

F0 (blue); voice (red); regression model: slope, resid (green) [ESPS get_f0, 80...300Hz] PhonViz1.0

4.92s [=0.01ms framesteps x492 samples; min: 132, med: 194.0, max: 243, slope: 0.096 deg: 1]
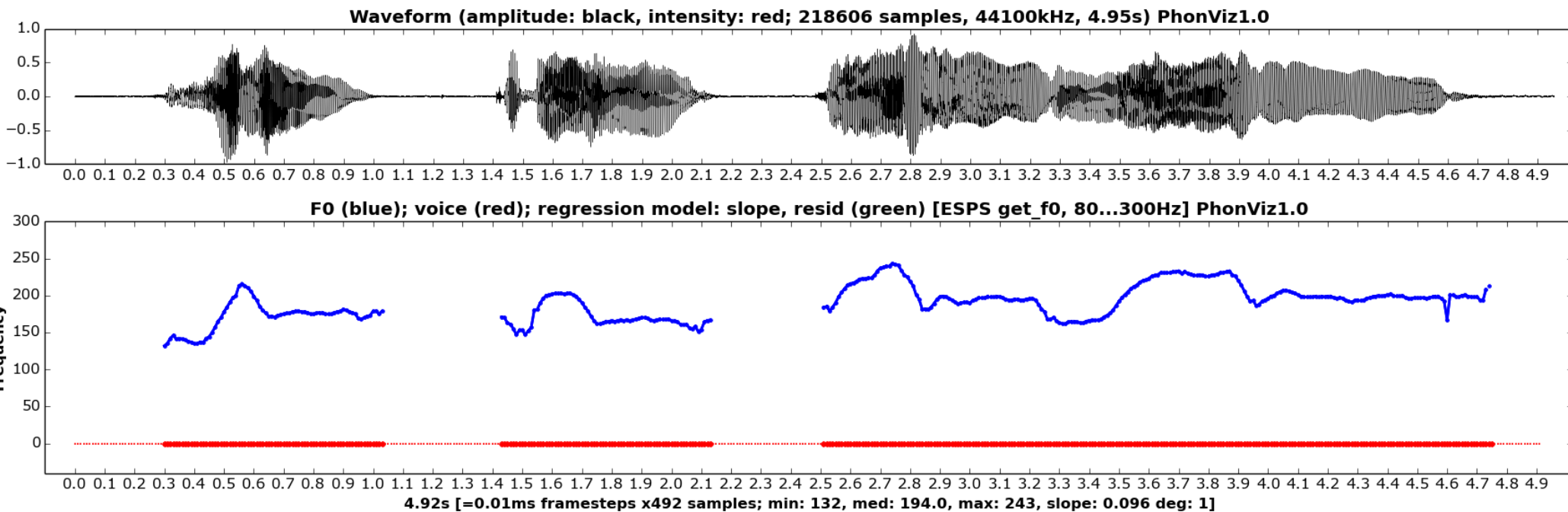
Universals of the Melody Lexicon: 'Call Contours'
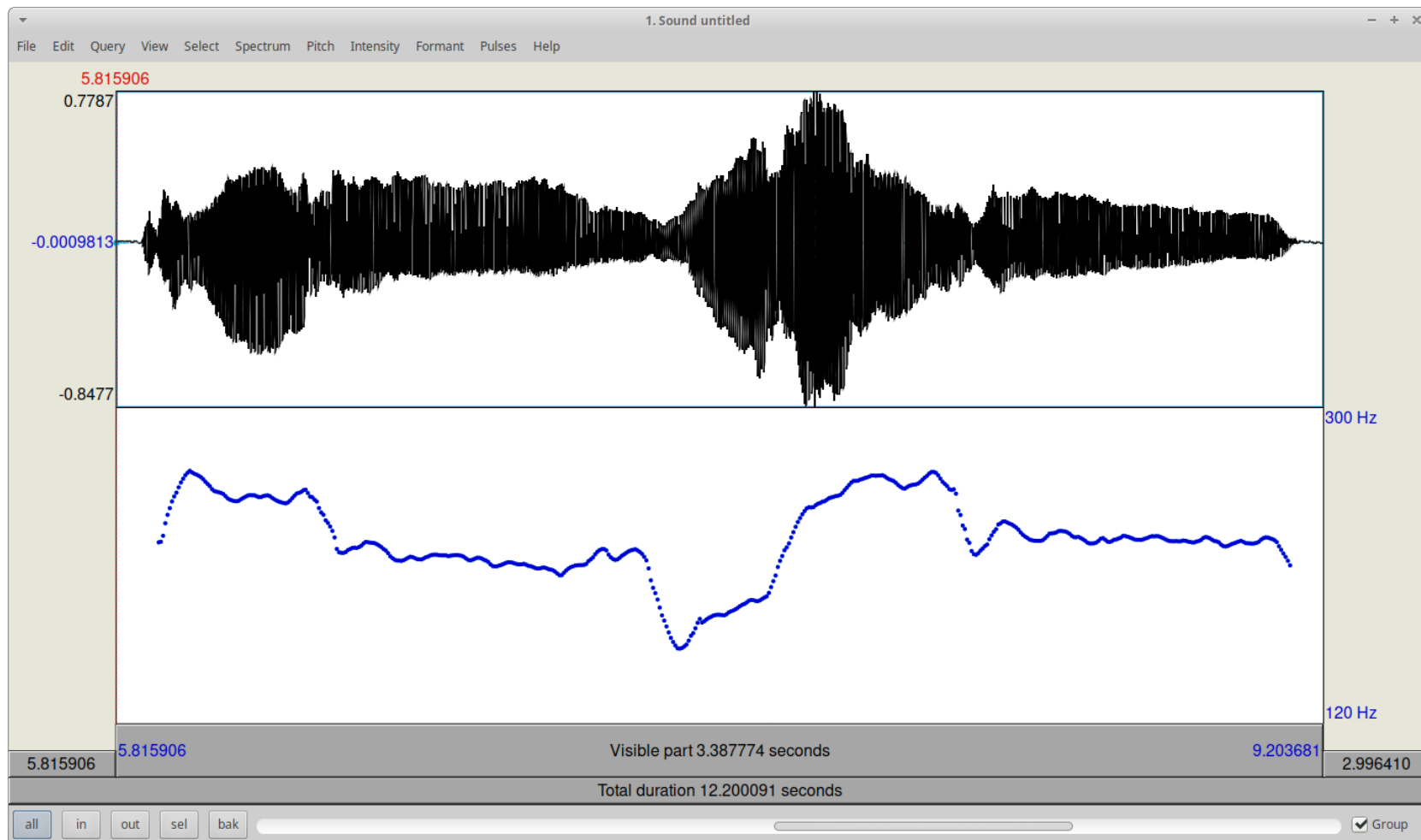
Johnny!   *Where are you?*

Universals of the Melody Lexicon: 'Call Contours'
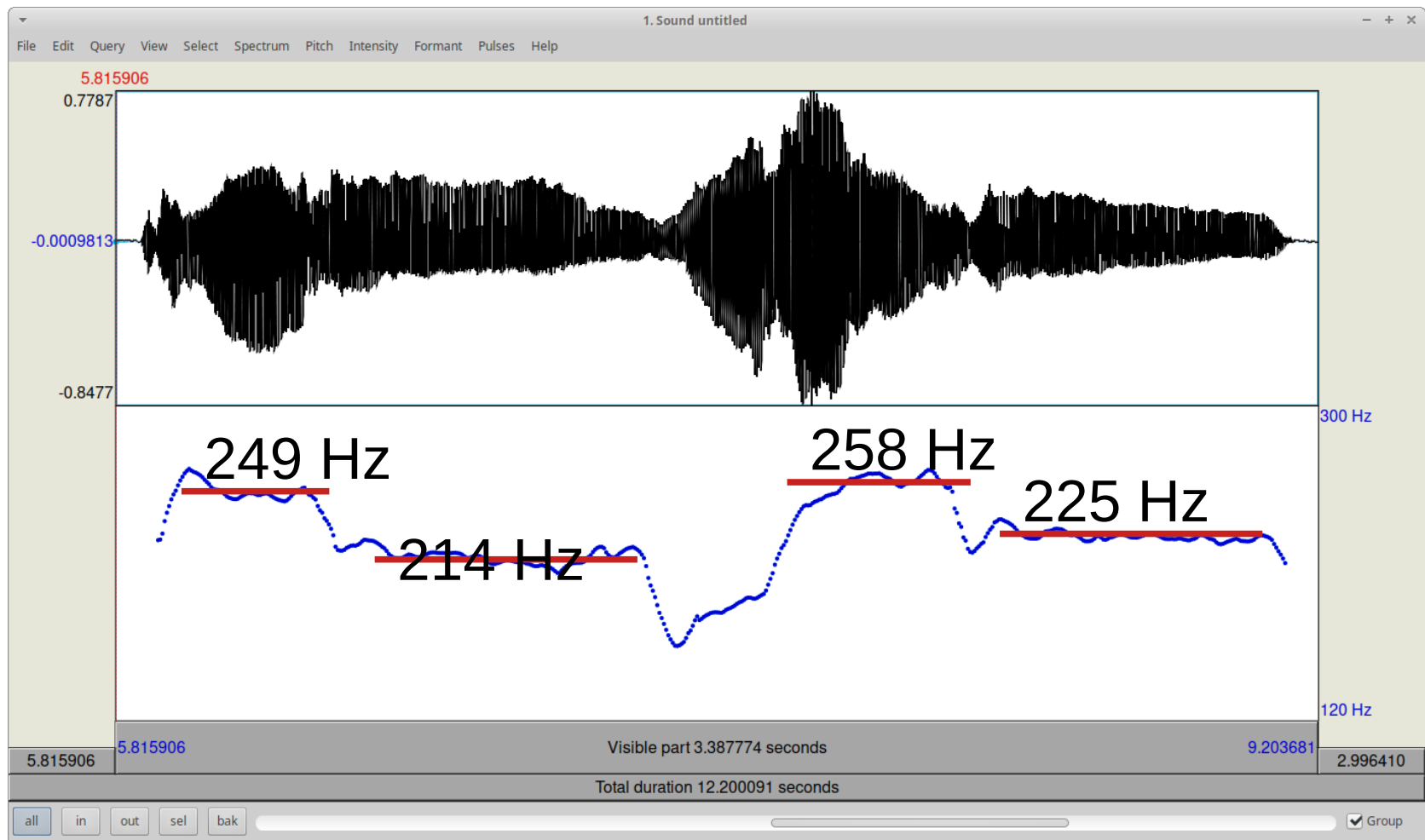
Universals of the Melody Lexicon: 'Call Contours'
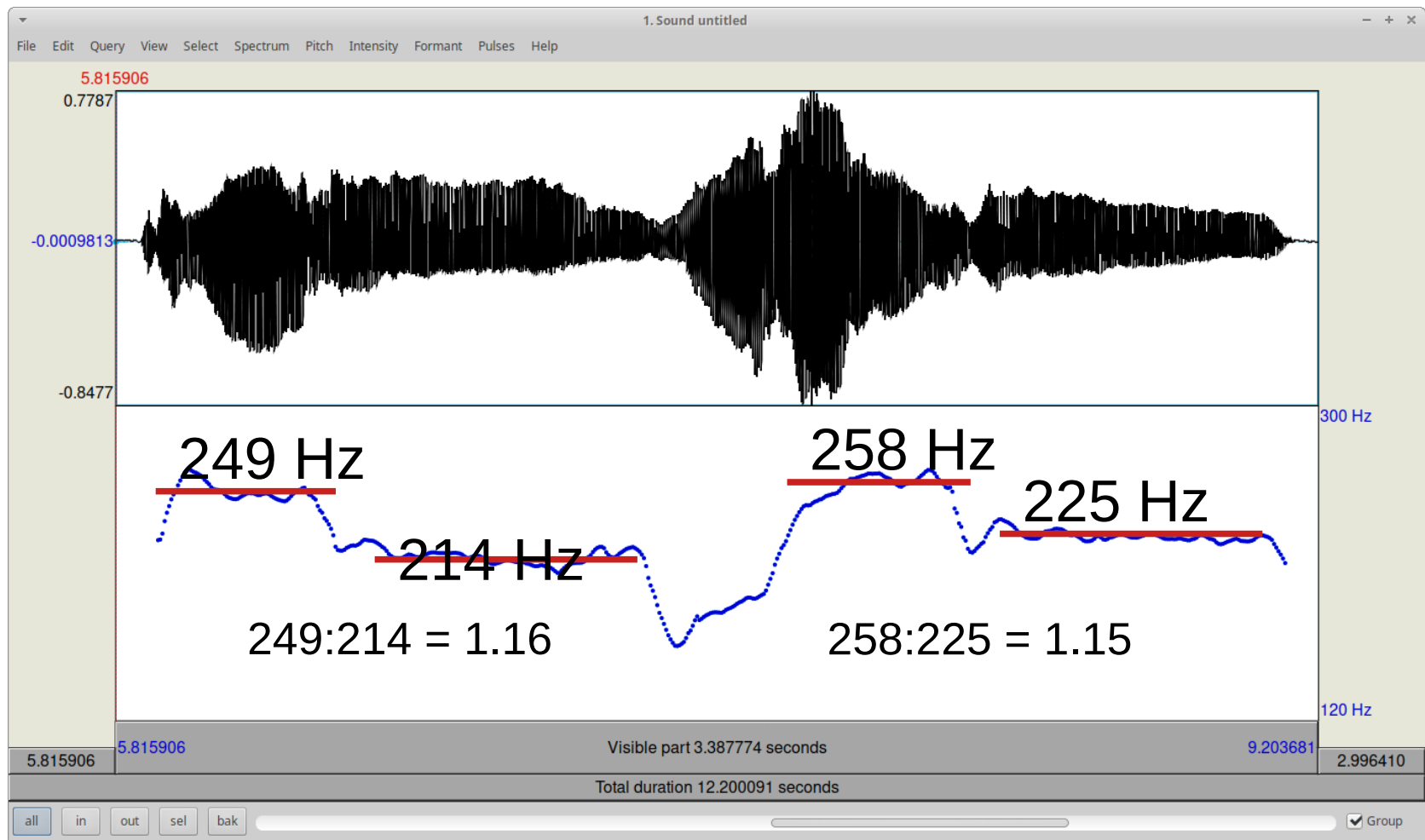
Universals of the Melody Lexicon: 'Call Contours'
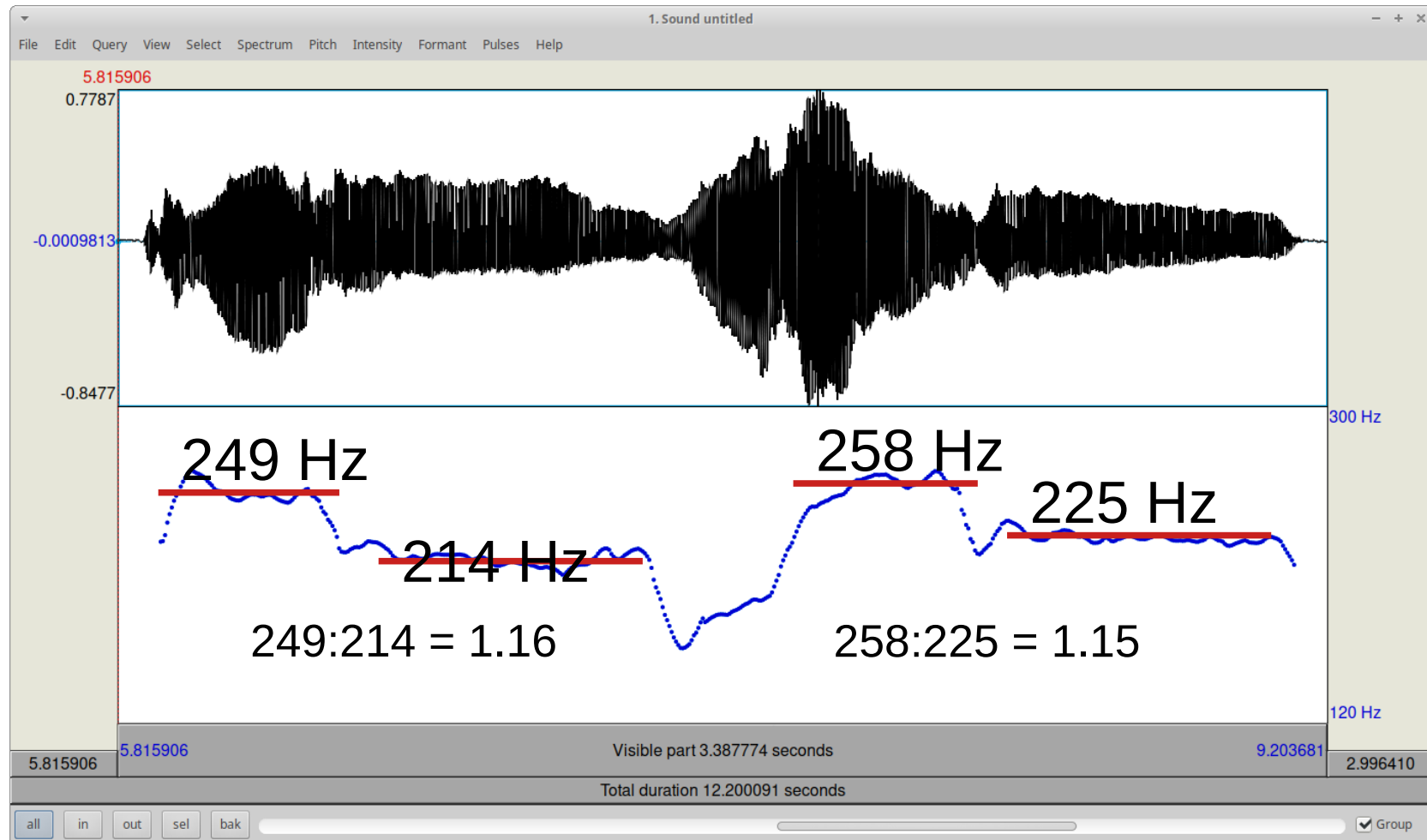
Untypical pitch contour
- Acoustically a sequence of 2 level tones (with natural irregularities)
- Acoustically constant musical interval (with natural irregularities)
- In European music,
  - 3 semitones, ¼ octave
  - minor third (ratio between **1.12** and **1.19**, depending on context in scale)

Universals of the Melody Lexicon: 'Call Contours'

Waveform (amplitude: black, intensity: red; 218606 samples, 44100kHz, 4.95s) PhonViz1.0

F0 (blue); voice (red); regression model: slope, resid (green) [ESPS get_f0, 80...300Hz] PhonViz1.0

4.92s [=0.01ms framesteps x492 samples; min: 132, med: 194.0, max: 243, slope: 0.096 deg: 1]
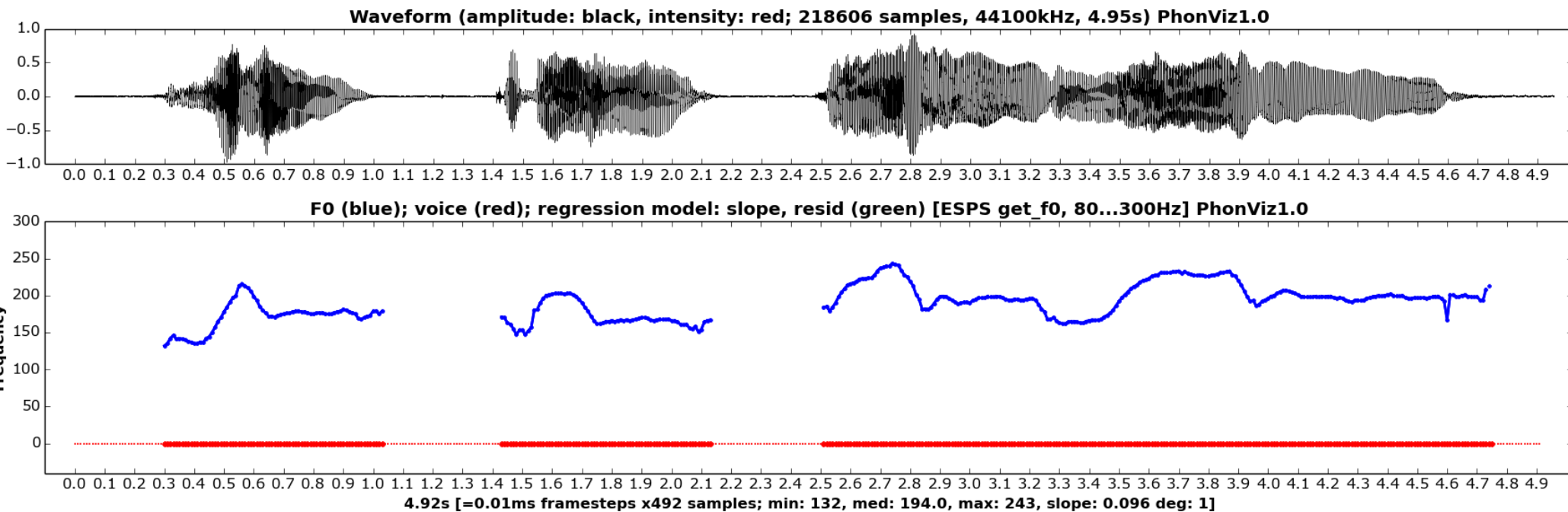
associated locution	1st F0 level	2nd F0 level	F0 ratio	minor 3rd ratio	
				just	Tempered
hello	212	177	1.198		
goodbye	201	168	1.196	1.2	1.189
Johnny	240	196	1.224		
where are you	230	197	1.168		

Case study 4: 'call contours'

MODALITY

pitch
musical interval

Chromatic, stylised
'call contour'

FUNCTION

metadeictic,
input-output condition
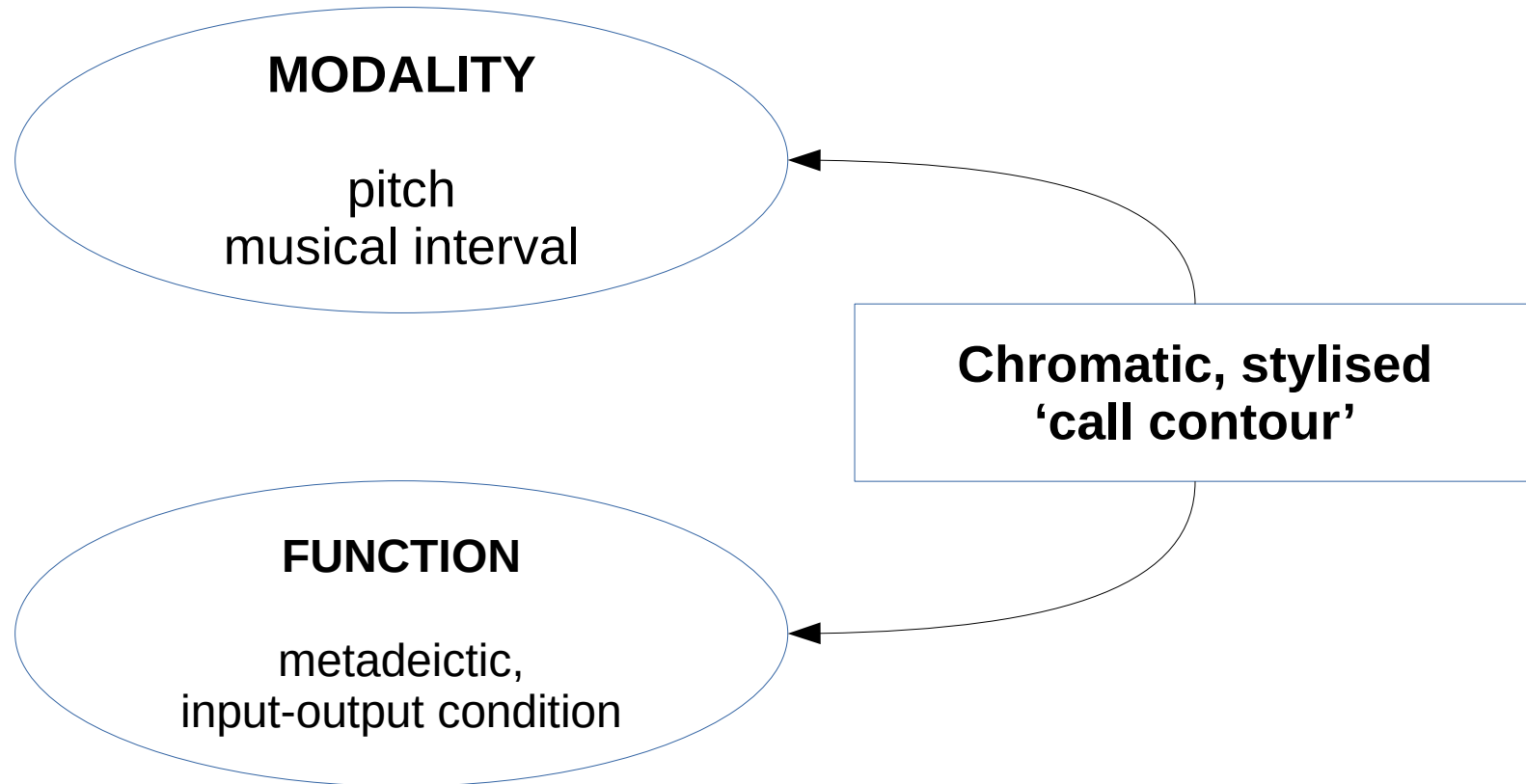
Case study 4: 'call contours' – FUNCTION

Discourse structure function in English:

Metalocutionary discourse framing:
Start: "Jooohn-neee!"
End: "Byyy-eee!"

But <u>not</u> at sentence or phrase rank:

* Yesterday I saw ˉJooohn‑neee in town.

Also a metalocutionary discourse repair function in German:

ˉLau‑ter   ("Lauter!", louder)

Ich habe ˉJooohn‑neee gesagt!

Case study 4: 'call contours' – FUNCTION

It has been claimed that the "call contour" is a speech act marker.

The question arises: What kind of speech act marker?

The question can be answered with reference to Searle's version of Speech Act Theory:

There are three basic conditions on speech acts:
- Uptake condition (pragmatics)

    Normal input and output conditions obtain

- Essential condition (pragmatics)

    Commitment to action

- Sincerity condition (semantics)

    truth – probability – certainty

Case study 4: 'call contours' – FUNCTION

The function can be described in terms of Searle (1969) Uptake Condition for successful speech acts

"1. Normal input and output conditions obtain."

In other words, in the discourse structural terms of Rank Interpretation Theory:

channel opening, repair or closing function in discourse grammar

ENGLISH: ¯JOHN-NY - ¯BY-E

GERMAN: Manu¯E-LA - - - - ¯LAU-TER - - - - - ¯WIEDER-SEHEN

discourse-initial   discourse-medial   discourse-final

DISCOURSE FRAME TIMELINE
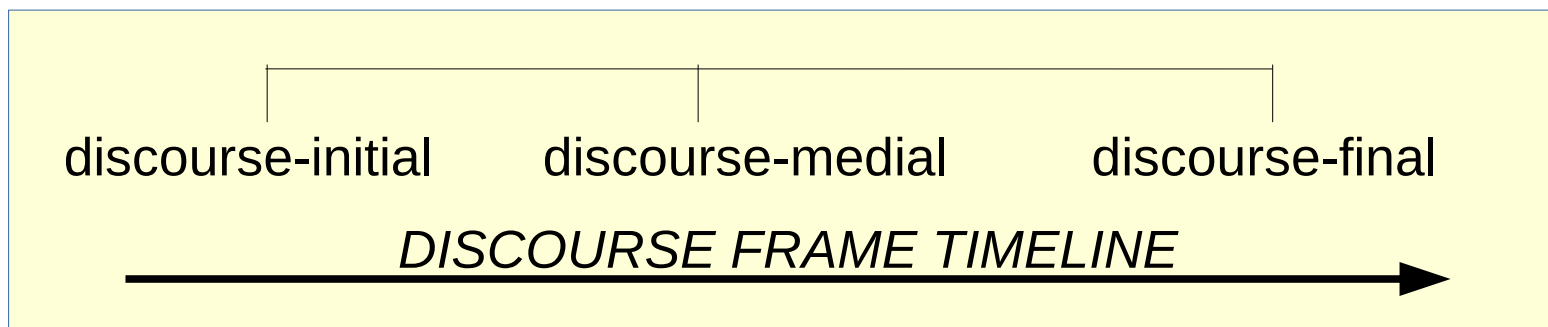
Stylised Speech Prosody

Cohesive Function in Song Revisited

Stylised Speech Prosody: Cohesive Function in Song

no declination, first phrase high (continuation), second phrase low (termination)

('wh' question)
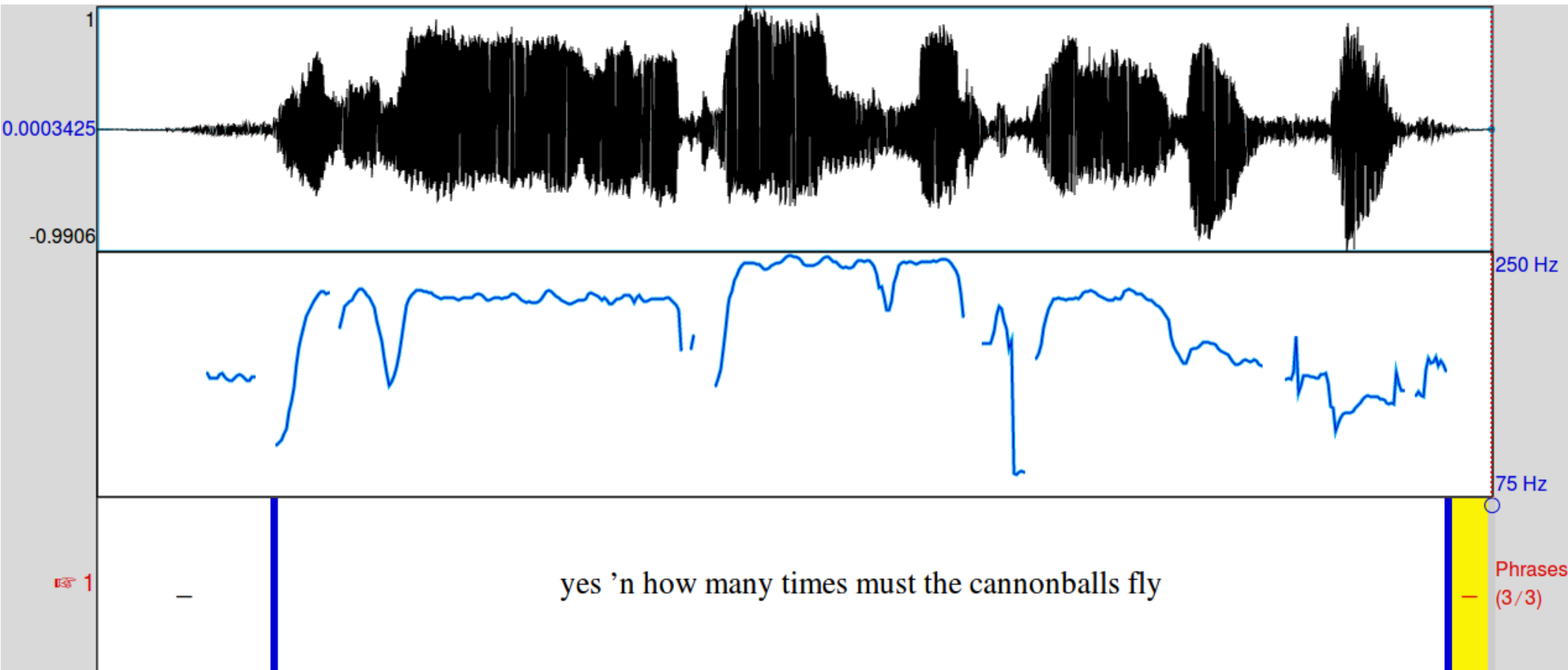
Bob Dylan, *The answer is blowing in the wind.*

Stylised Speech Prosody: Cohesive Function in Song

no declination in, final rise: emphasis of question function
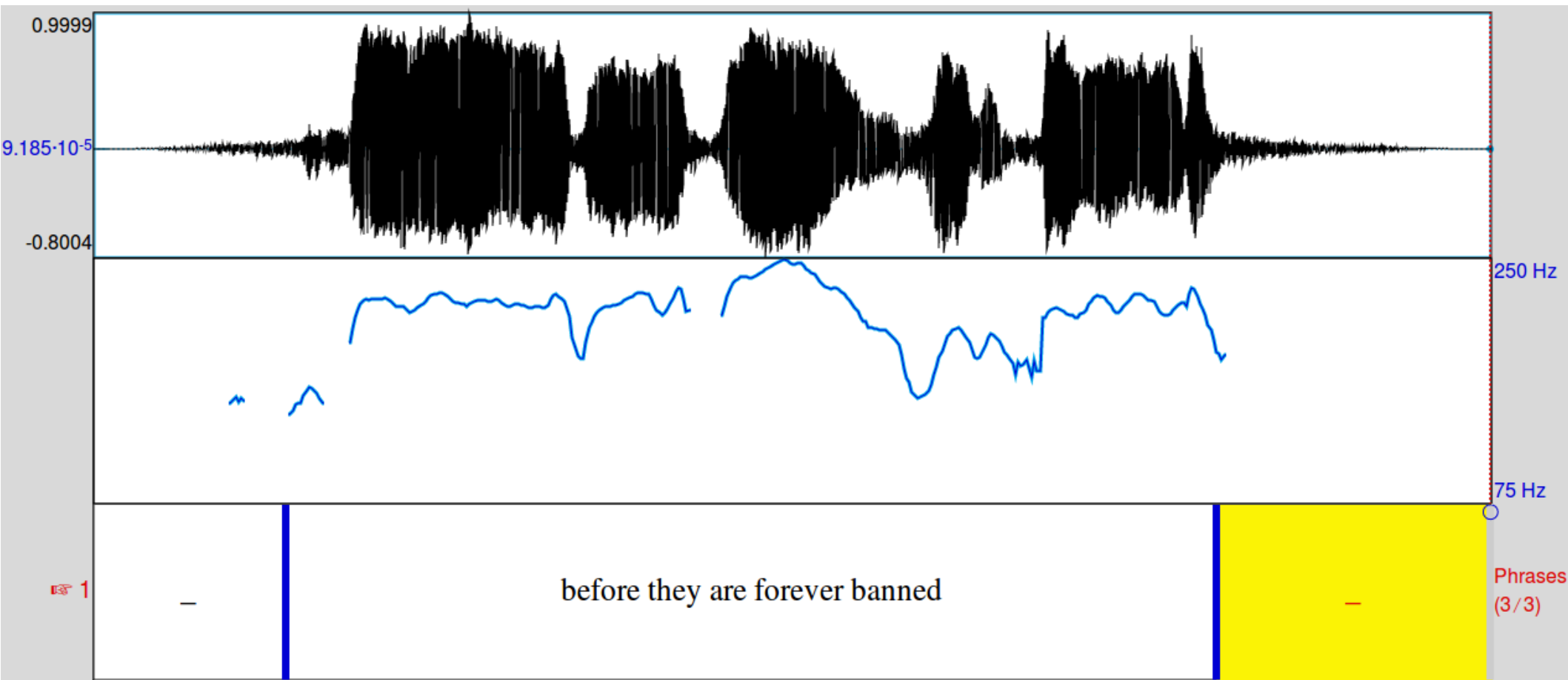
Bob Dylan, *The answer is blowing in the wind.*

Musical Melody and English Grammar

overall declination in each phrase

parenthesis

the answer   my friend   is blowing   in the wind   the answer   is   blowing in the   wind

the answer my friend is blowing in the wind   the answer is blowing in the wind
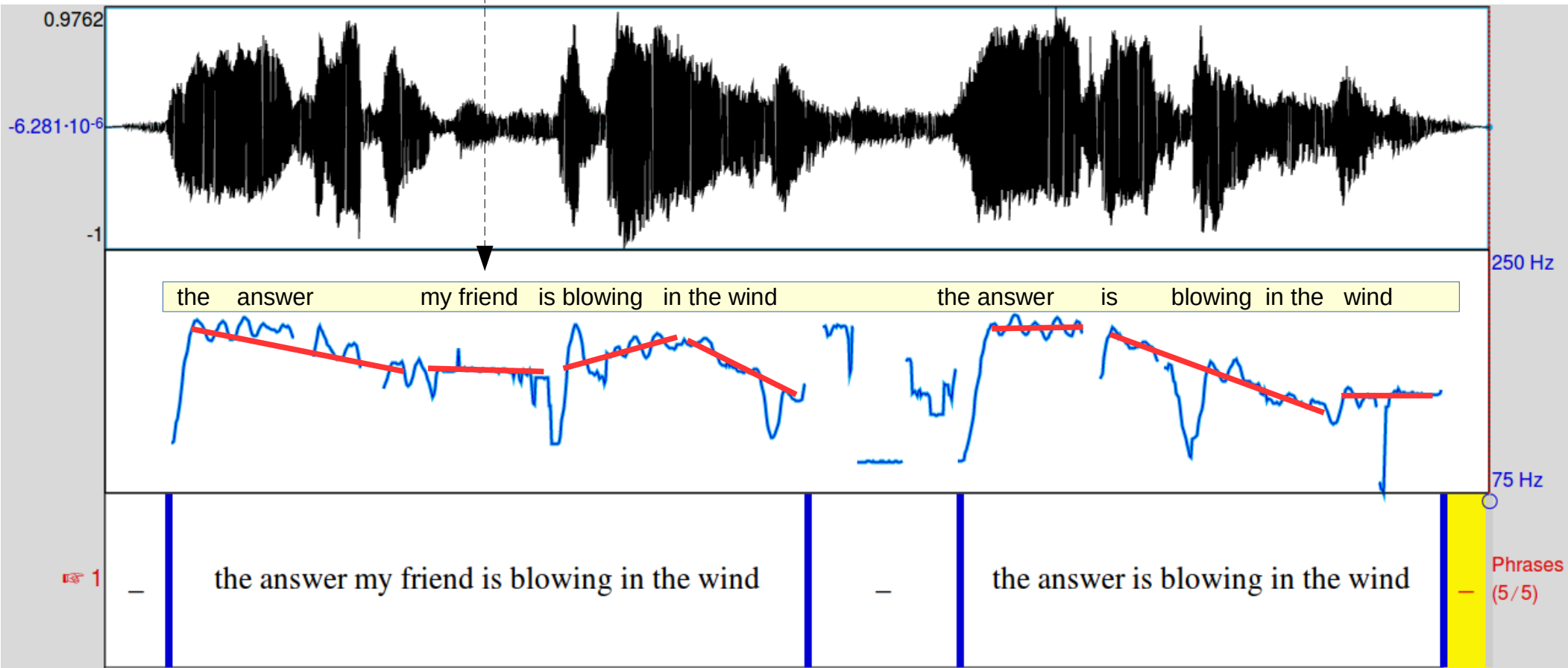
Bob Dylan, *The answer is blowing in the wind.*

Rhythm, Focus and Grammatical Meaning

Visualising Speech Rhythm

Regular rhythm, 'syllable timing', 'syllable isochrony'

| | big | john | swam | fast | past | Jane's | boat | |

Time (s)
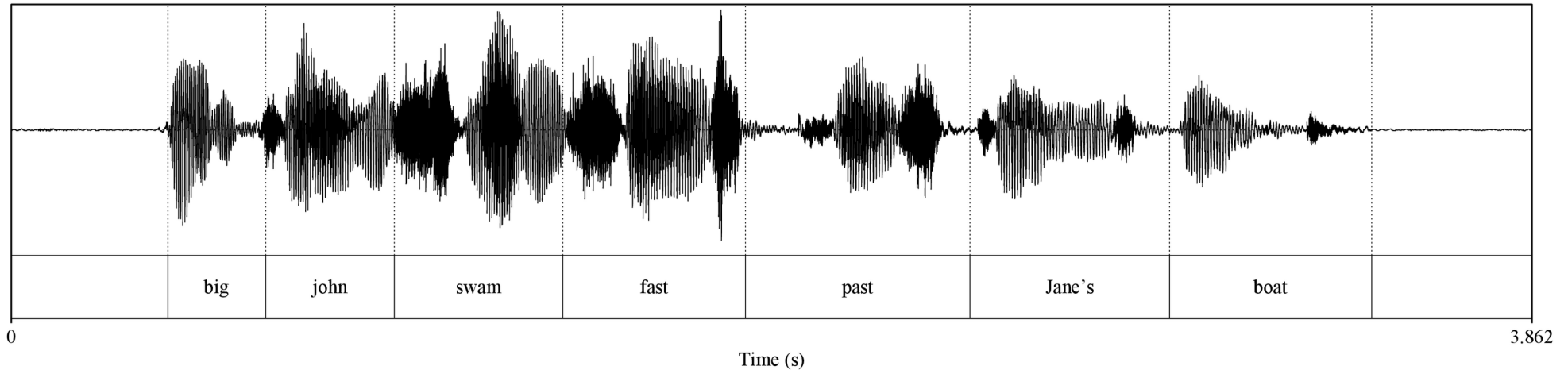
Regular rhythm, 'foot / stress timing', 'foot isochrony': here - *coupling*

| | JOH | na | than | AP | ple | by | TRUN | dled | al | LONG | with | a | TUNE | on | his | LIPS | |
| | JOHnathan | | | APpleby | | | TRUNdled al | | | LONG with a | | | TUNE on his | | | LIPS | |

Time (s)
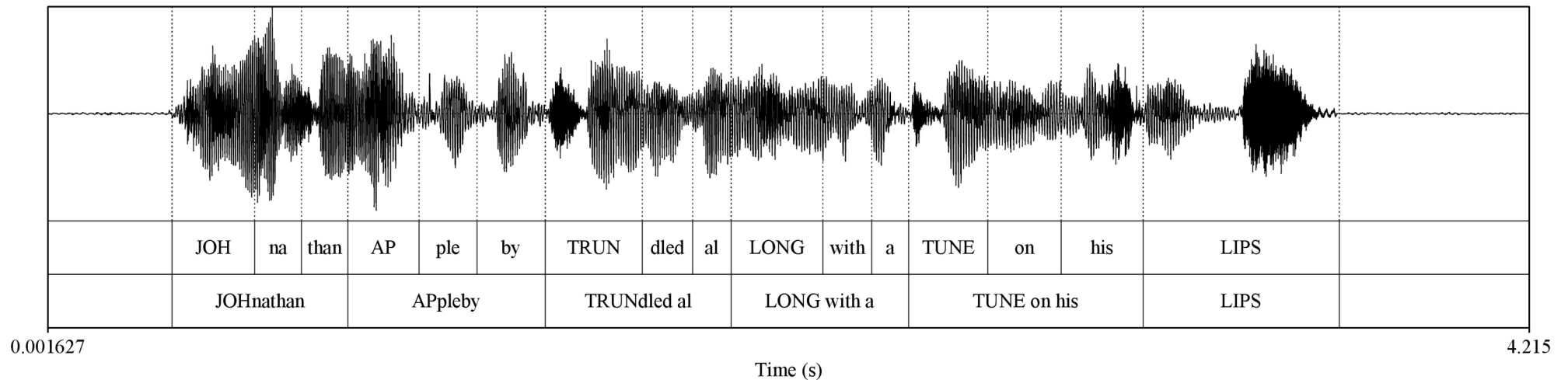
Speech Rhythm and Semantic Operator Scope

- Rhythm and phrasing:
  - Resolution of ambiguity of modifier scope:
    - old men and women will stay here
      - (old (men and women)) will stay here
      - ((old men) and women) will stay here
  - Resolution of ambiguity of operator scope:
    - he did not leave because he was tired
      - he did (not (leave because he was tired))
      - he did (not leave) because he was tired
  - Resolution of prepositional phrase attachment
    - I saw the man on the hill with a telescope
      - I saw (the man on the hill) with a telescope
      - I saw the man (on the hill with a telescope)

Speech Rhythm and Grammar

- ## Rhythm and focus:
  - Neutral focus:
    - I like red SHIRTS
  - Emphatic focus:
    - I **_LIKE_** red shirts
  - Contrastive focus:
    - Jack likes red SHIRTS
    - Jack likes RED shirts
    - Jack LIKES red shirts
    - JACK likes red shirts
    - JACK likes RED shirts

...

> Depending on the intensity of the pitch accent, these may be ambiguous

> With four constituents, there are 16 possibilities.

Rhythmic Structure in Song

Rhythmic Structure in Song: a Timing Hierarchy

I got rhythm						I got music						I got my man				Who could ask for anything more?				
I got		rhythm				I got		music				I got		my man		who could	ask for	anything	more	
I	got	rhy	thm			I	got	mu	sic			I	got	my	man	who could ask	for	a nything	more	
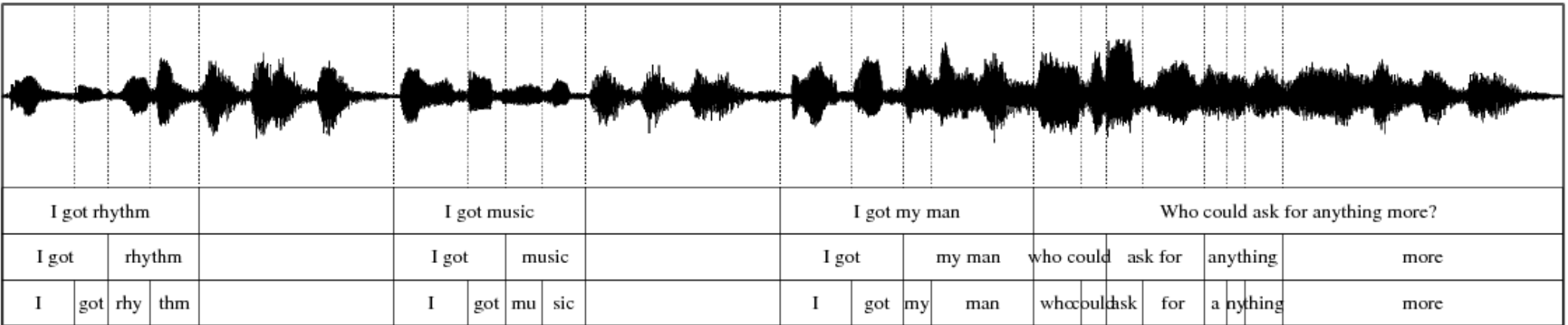
0   13.32
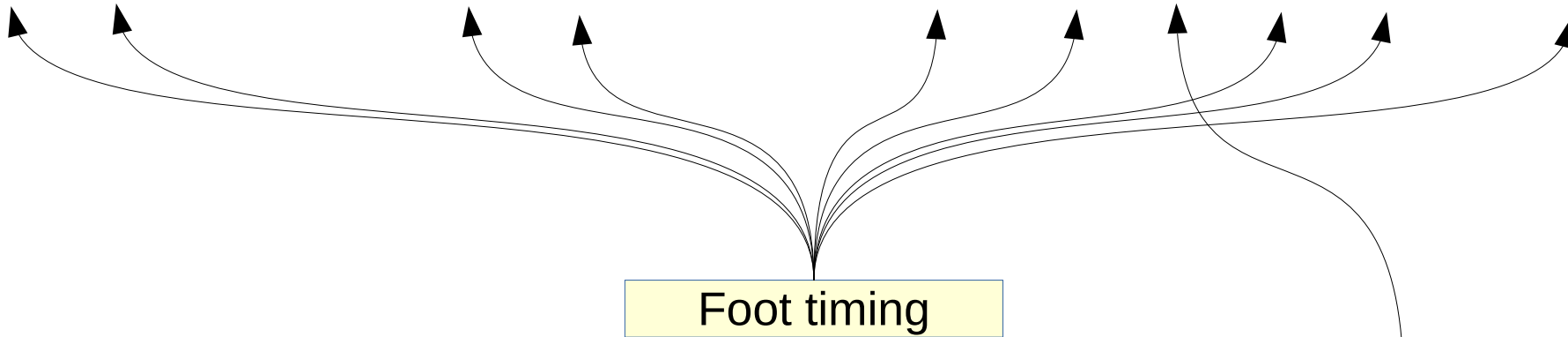
Foot timing

Special case: only unstressed syllables (anacrusis)

Ella Fitzgerald, "I got rhythm"

Rhythmic Structure in Song: a Grammatical Hierarchy

> *Note that the musical structures ALMOST fit the grammatical structures!*

I got rhythm					I got music				I got my man			Who could ask for anything more?			
I got		rhythm			I got		music		I got		my man	who could	ask for	anything	more
I	got	rhy	thm		I	got	mu	sic	I	got	my	man	who could ask	for	a nything	more

0   13.32
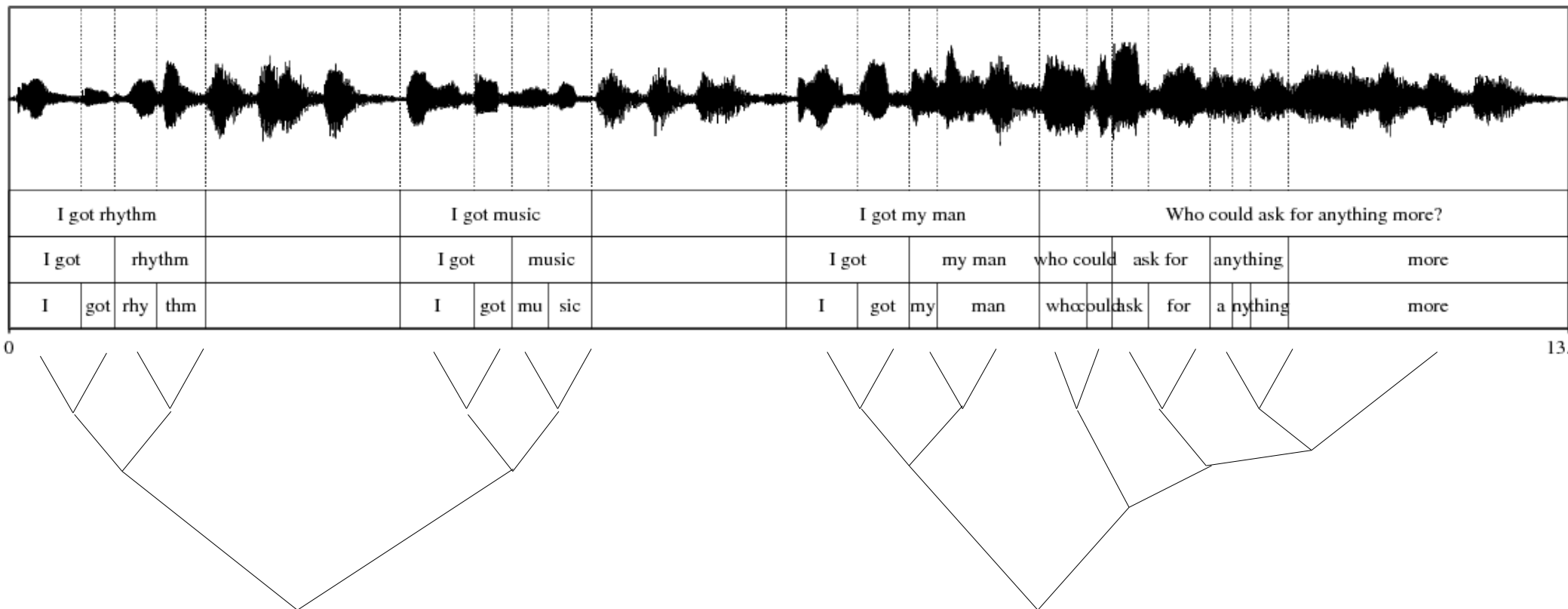
Ella Fitzgerald, "I got rhythm"

Further Descriptions of Prosodic Meaning

cf. also:

Büring, Daniel. 2016. Intonation and Meaning. Oxford: Oxford University Press.

Ward, Nigel G. 2019. Prosodic patterns in English conversation. Cambridge: Cambridge University Press, 2019.

Prosody in the Rank Interpretation Architecture

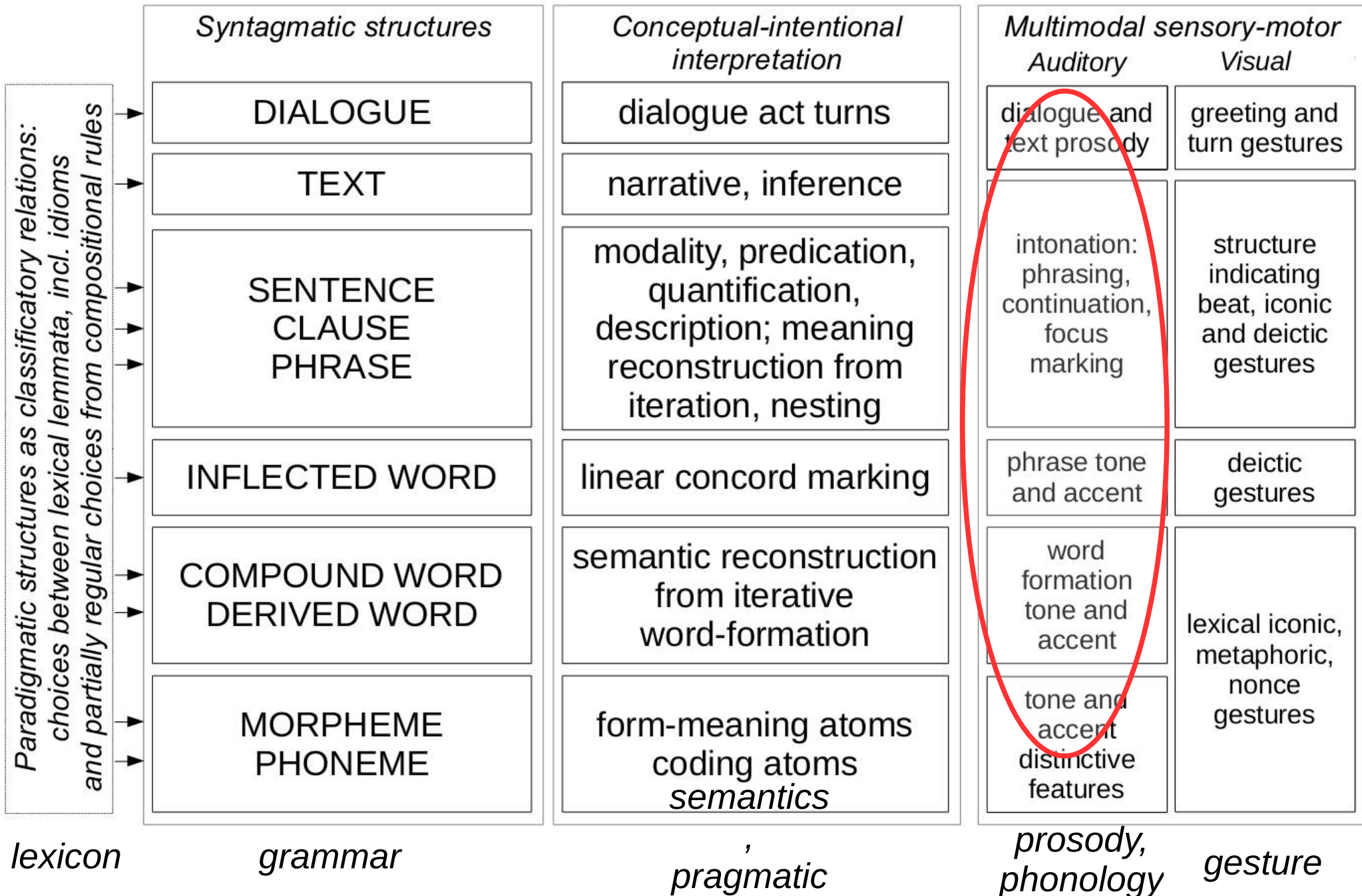| Paradigmatic structures as classificatory relations: choices between lexical lemmata, incl. idioms and partially regular choices from compositional rules	Syntagmatic structures	Conceptual-intentional interpretation	Multimodal sensory-motor	
			Auditory	Visual
	DIALOGUE	dialogue act turns	dialogue and text prosody	greeting and turn gestures
	TEXT	narrative, inference	intonation: phrasing, continuation, focus marking	structure indicating beat, iconic and deictic gestures
	SENTENCE CLAUSE PHRASE	modality, predication, quantification, description; meaning reconstruction from iteration, nesting		
	INFLECTED WORD	linear concord marking	phrase tone and accent	deictic gestures
	COMPOUND WORD DERIVED WORD	semantic reconstruction from iterative word-formation	word formation tone and accent	lexical iconic, metaphoric, nonce gestures
	MORPHEME PHONEME	form-meaning atoms coding atoms	tone and accent distinctive features	

lexicon   *grammar*   *semantics, pragmatics*   *prosody, phonology*   *gesture*

Prosody in the Rank Interpretation Architecture

Discourse functions

discourse framing

turn-taking continuity

speech act marking

Speaker characterisation

identity, personality

sentiment, excitement

Information structure

given-new

focus, contrast, emphasis

Grammatical cohesion

phrasing
boundary marking
rhythm grouping
contour coherence
disambiguation

morphosyntactic tone

Lexical functions

phonemic & morphemic
stress
pitch accent
tone

How do prosodic markers and functions relate to category ranks?

dialogue and text prosody	
intonation: phrasing, continuation, focus marking	
phrase tone and accent	**?**
word formation tone and accent	
tone and accent distinctive features	

MODALITY

Prosodic markers
- call contours
- hesitation, vocalisations
- rise: continuity, uncertainty, subordination
- fall: termination, certainty, superordination
- rise-fall: topic-comment, question-answer, ...

FUNCTION

Discourse functions
- discourse framing
- continuity: topic-comment, turn-taking
- grammatical mood, speech act marking
- speaker characterisation

Lexico-grammatical semantic-pragmatic functions
- metalocutionary deixis (metadeixis)
- lexicon: distinctive/contrastive, phoneme/morpheme
- structure: cohesion, configuration: delimitation, culmination

Prosody-relevant complementary taxonomies of speech functions

dialogue and
text prosody

intonation:
phrasing,
continuation,
focus
marking

phrase tone
and accent

?

word
formation
tone and
accent

tone and
accent
distinctive
features

Peirce: semantic-pragmatic functions
- symbol (morphemic)
- icon (teeny weeny mouse with low pitch)
- index (relation to time, place, person, cause)

Austin (1962), Searle (1969): speech act theory
- locution (syntax, semantics)
- illocution (pragmatics: interactive obligations)
- perlocution (effect: impression, insult, ...

Grice (1975): Cooperative Principle, Maxims of Conversation
- Maxim of quantity (long/short, deep/shallow in detail)
- Maxim of quality (truth/falsity, lying, ignorance, error)
- Maxim of relation (relevance/irrelevance)
- Maxim of manner (clarity/obscurity, direct/indirect)

Hirschberg & Pierrehumbert (1984)
- "semantico-pragmatic effects"
- discourse segmentation, topic/information structure
- parallelism, subordination, topic shift, interruption, turn-taking
- disambiguation, reference resolution, given/new, contrast
- (indirect) speech acts

Grosz & Sidner 1986
- linguistic structure, intentional structure, attitudinal state
- focus, contrast, emphasis, given/new, theme/rheme

A prosodic lexicon: idioms and prosodic morphemes

Greeting:

- Good morning /
- Good morning \

Ambiguity:

- Excuse _me /
- Excuse \ me /

Reproach:

- And so ‾ you should \
- And so / you should \

Appraisive exclamation:

- Oh / wow /\   (cf. also the "wolf whistle" or "cat-call")

And of course for the 'call contour' idioms

Universal paralinguistic indexical and iconic functions

Are pitch properties universal?

pitch height – biological size

intensity, range – energy and precision

boundary tones, declination – structure marking

Are pitch functions universal?

paralinguistic:
global: excitement (range)
local: insistence (prominence), e.g. No-wo-wo-wo-wo!

linguistic:
intonation hierarchy (paratone)
accent sequence constraints

Universal paralinguistic indexical and iconic functions

Are pitch properties universal?

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Are pitch functions universal?

paralinguistic:
global: excitement (range)
local: insistence (prominence), e.g. No-wo-wo-wo-wo!

linguistic:
intonation hierarchy (paratone)
accent sequence constraints

Note that some markers and paralinguistic functions are shared with animals.

Universal paralinguistic indexical and iconic functions

Indexical functions of prosody

Speaker characterisation:
- indexicality: identity, personality
- emotionality: attitude, sentiment, excitement
- size, gender, age

Direct iconic-indexical relation between modality and function leads to universal codes?
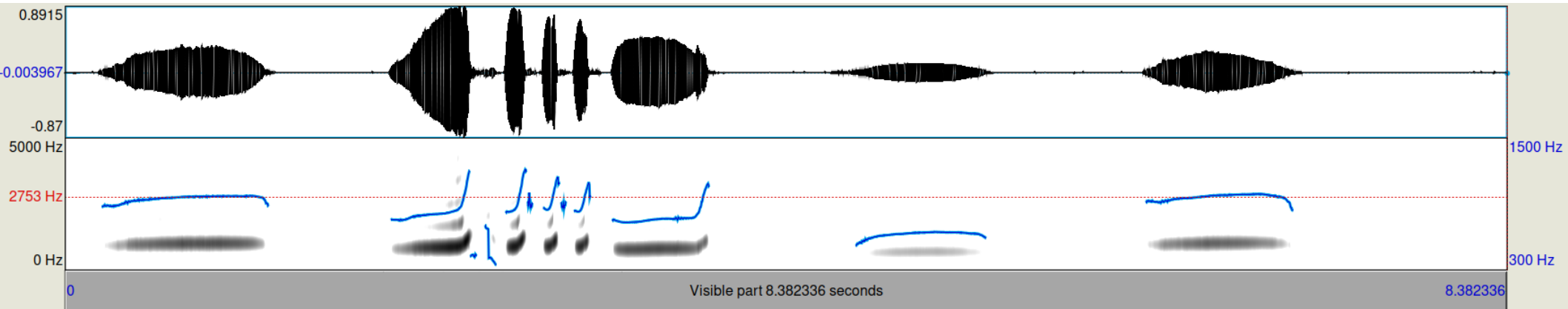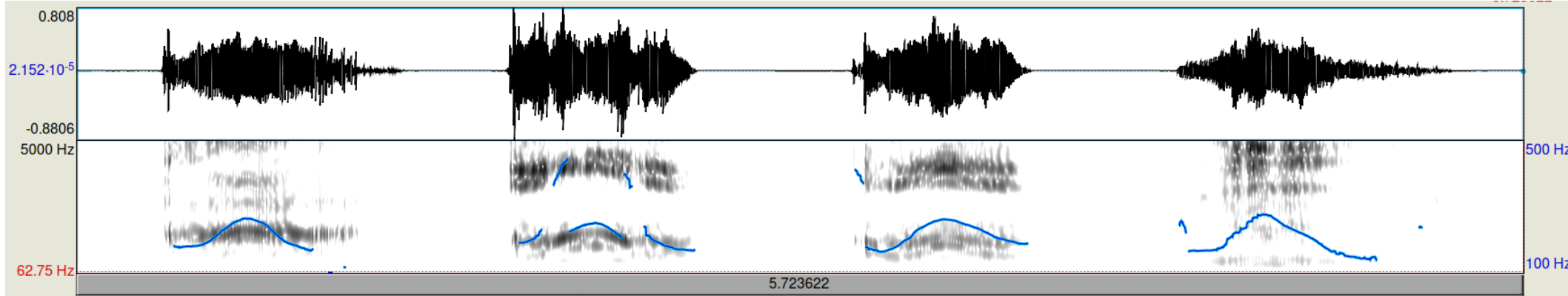
Acoustic:

Ohala: Frequency code: size, status, ...

Gibbon: Modulation Code: rhythms and melodies

Articulatory:

Gussenhoven: Size Code, Effort Code, Production Code

Expressive Intonations

End