

The Music of Speech

01 - Aspects of Language and Music

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<http://wwwhomes.uni-bielefeld.de/gibbon/2019-Mannheim-Summer-School/>

Spoken language influences music (but not always)

- Controversies:
 - Is music derived from speech?
 - I would say no.
 - Is there a ‘musical relativity’ (cf. ‘linguistic relativity’)
 - I would say yes.
 - It is claimed that Elgar’s music is heavily influenced by the intonation of Standard British English, with very wide pitch range and sudden changes of pitch height.

Hall, R. A. Jr. 1953. Elgar and the intonation of British English. *Grammophone* 31, 6.
 - Is speech derived from music?
 - I would say to some extent.
 - Are speech and music (partly) independent?
 - I would say yes: different but related evolutionary processes

Spoken language influences music (but not always)

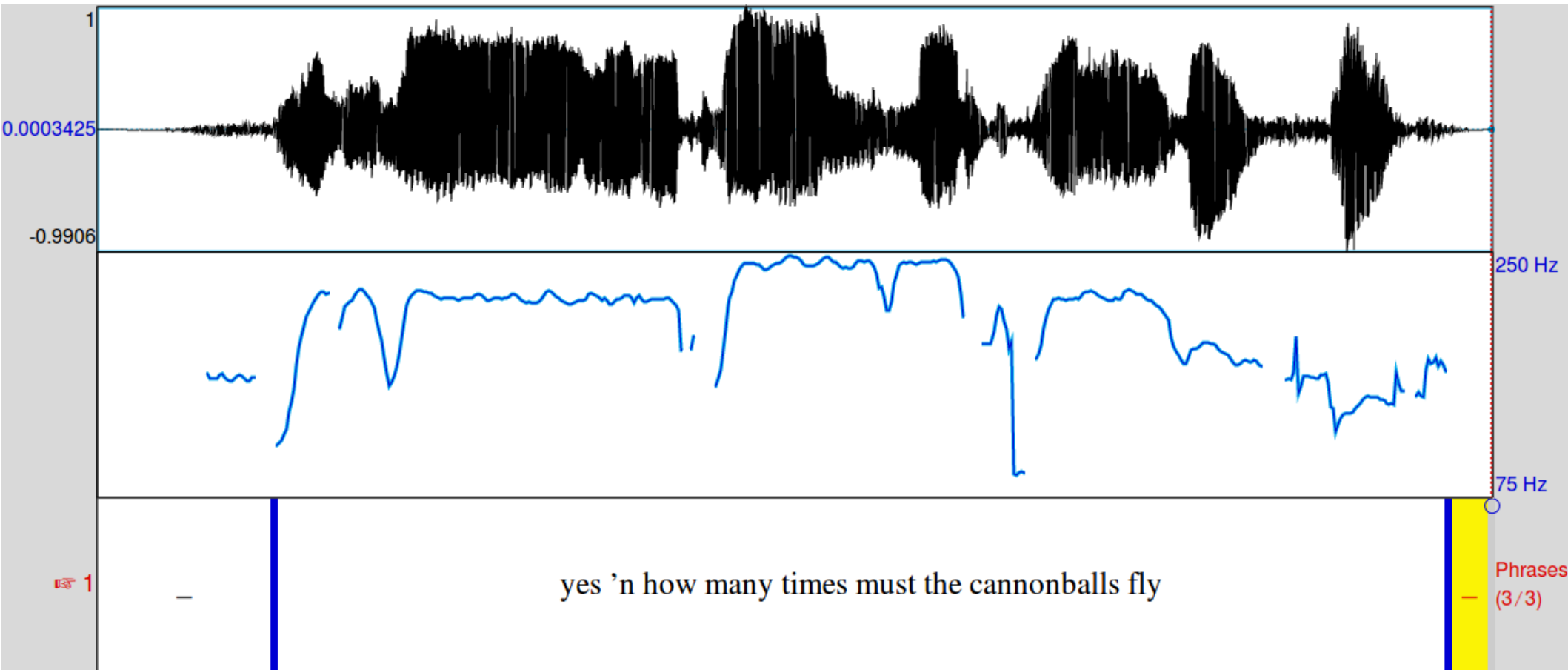
- Song – clearest case of speech-music relations:
 - spoken language may influence songs in
 - rhythm
 - melody
- But this is not always true
 - and may be completely wrong for instrumental music

Spoken language influences music (but not always)

- 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 English stress and focus
 - Melody:
 - Global tunes and local accents relate to intonation

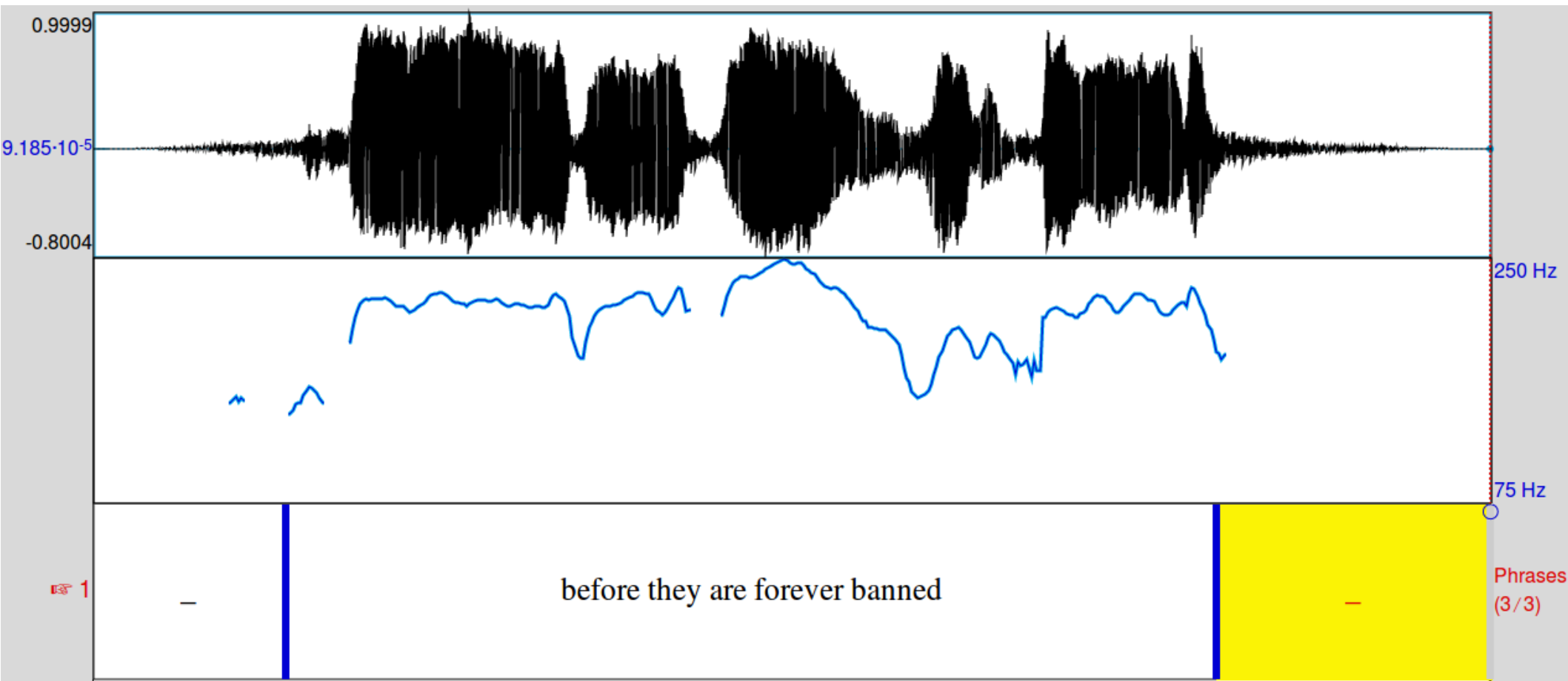
Spoken language influences music (but not always)

- Example:
 - Bob Dylan, “The answer is blowing in the wind”



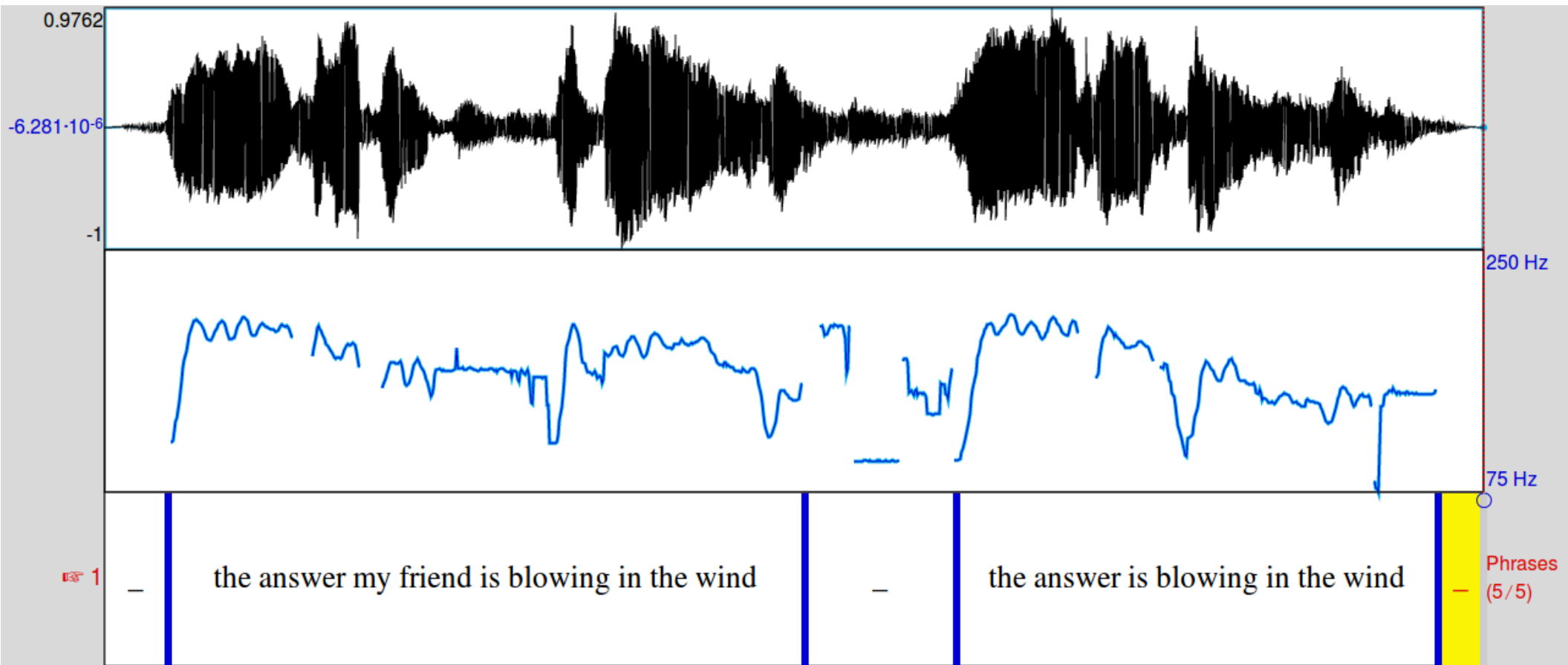
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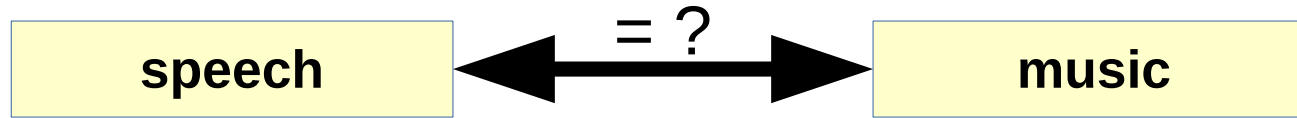


Rhythm and Melody

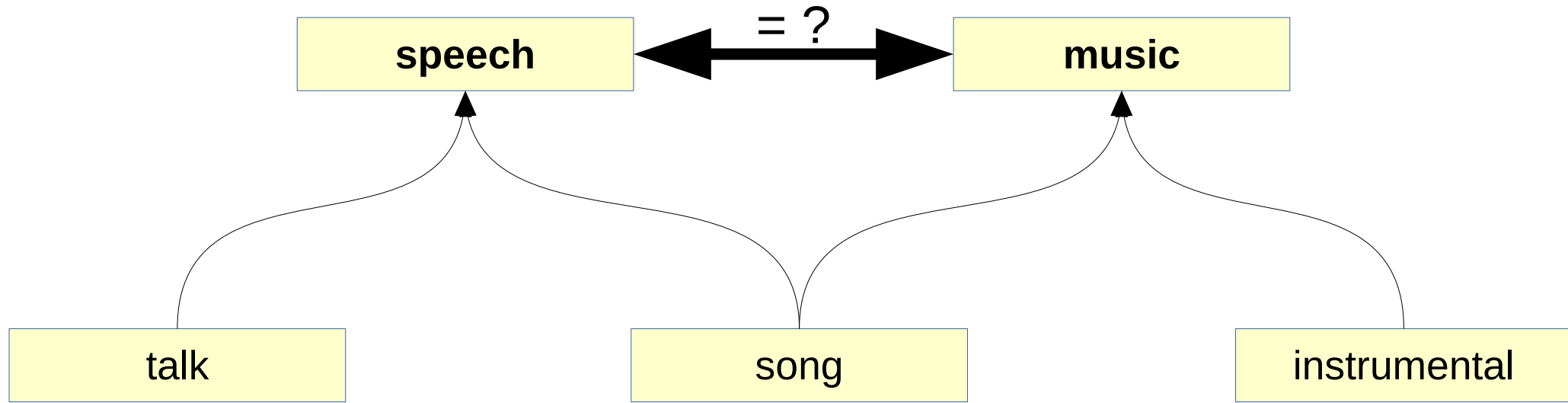
- Spoken language and music share
 - melody
 - changes in fundamental frequency of signal over time
 - timbre
 - overtone (harmonic) pattern of signal:
 - voice: different vowels, different voice qualities
 - music: resonance qualities of instrument
 - rhythm
 - patterns of
 - sequences of stronger and weaker elements
 - more or less regular intervals between stronger elements
 - types
 - voice: stress timing, syllable timing, mora timing
 - music: 3/4, 4/

Melody

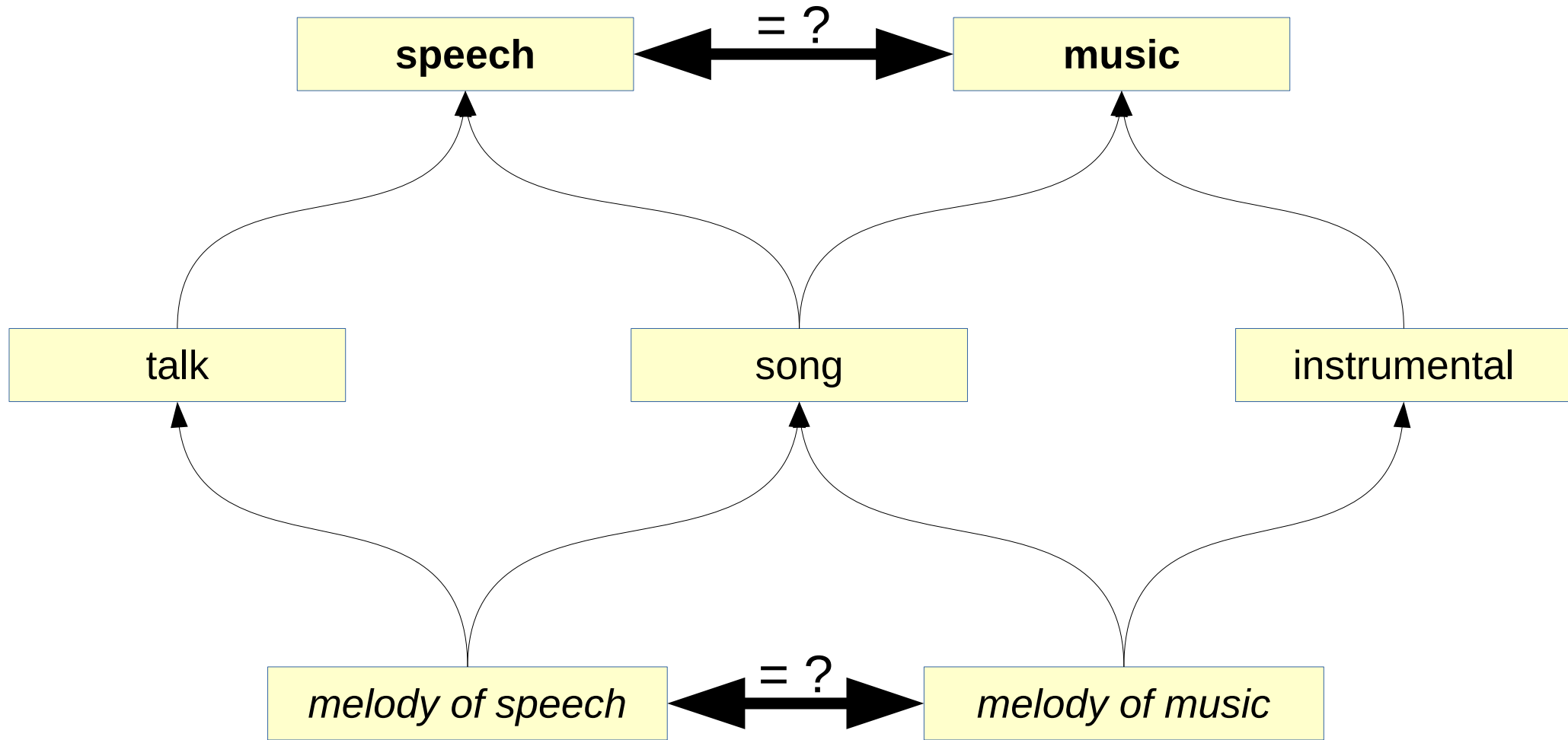
Melody



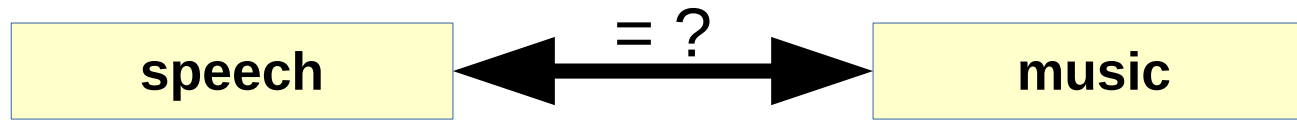
Melody



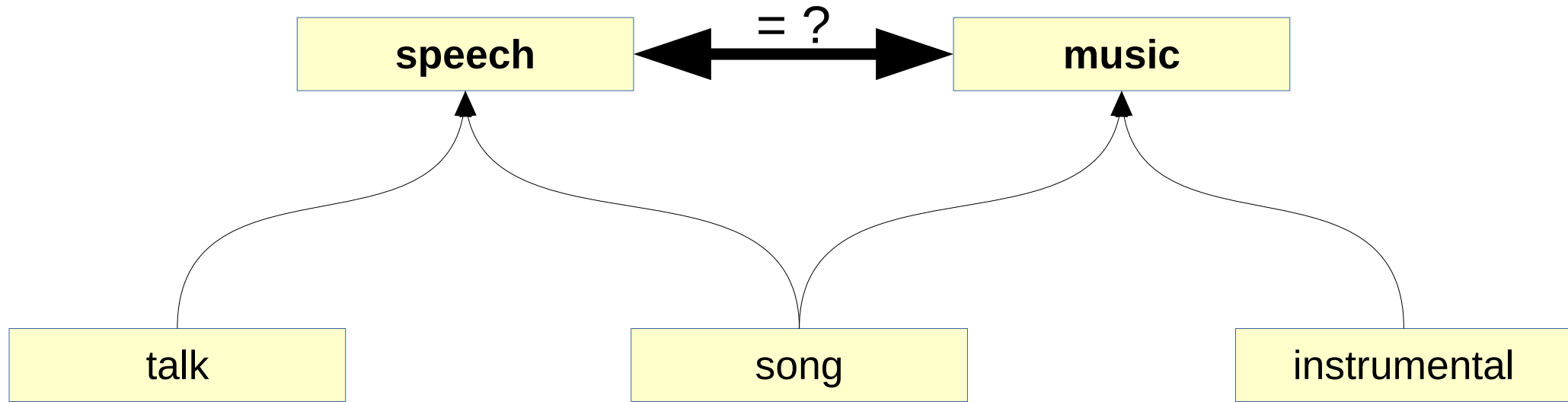
Melody



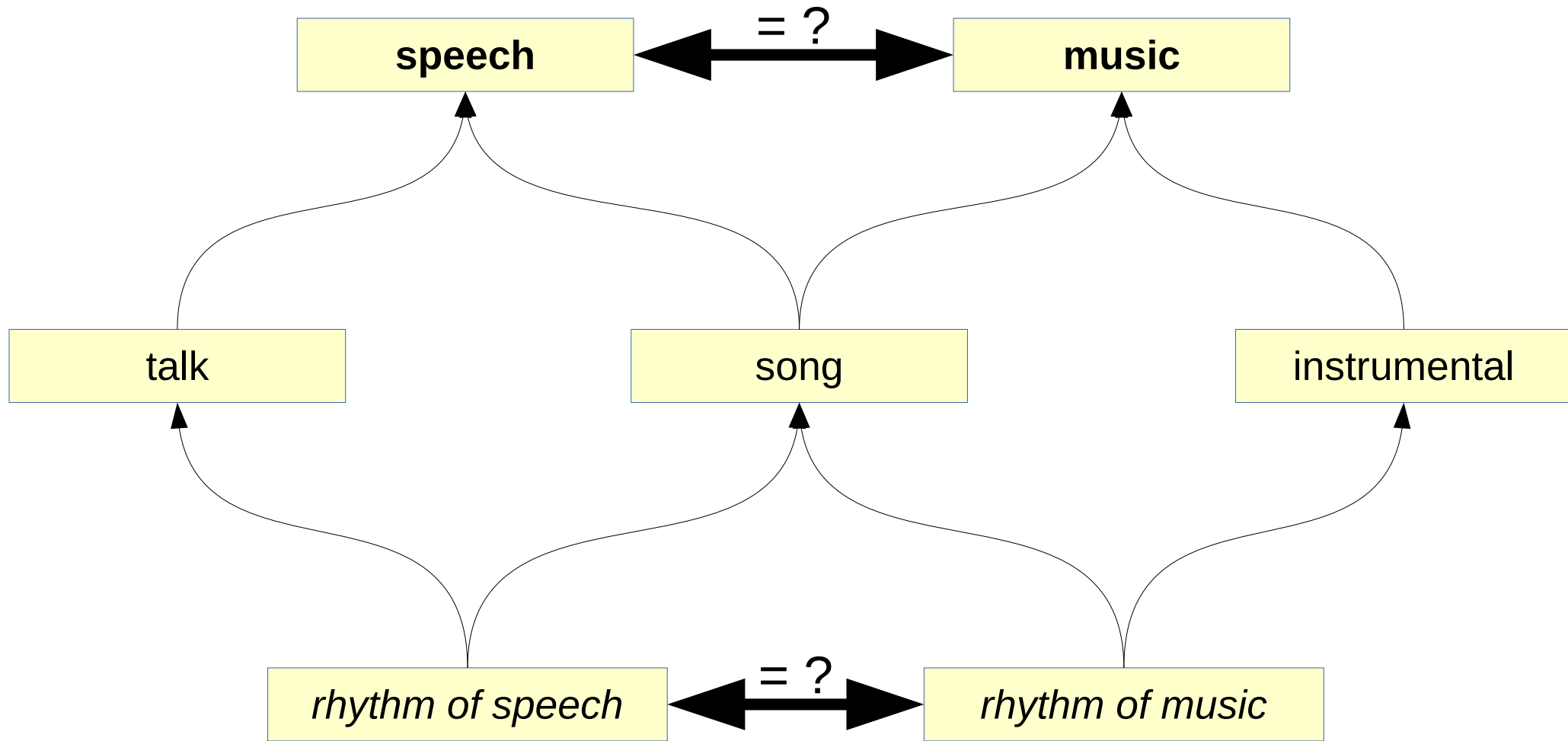
Rhythm



Rhythm



Rhythm



Other Aspects of Language and Music

- 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 music can express the emotions *joy, tenderness, longing, coquetry, surprise, fear, complaint, scorn, anger, sarcasm*
Fonagy, I., K. Magdics (1963). Emotional patterns in intonation and music. *Zeitschrift für Phonetik, Sprachwissenschaft und Kommunikationsforschung* 16, 293-313.
 - for example styles – classical, romantic, blues, ...
- But here we concentrate on sound patterns

Other Aspects of Language and Music

- Are there musical universals?
- Are there universals of speech?
- Are there universal similarities and differences between music and speech?

The Sounds of Language

The Sounds of Music

Speech (Spoken Language)

SPEECH

tone

**vowels
(resonant)**

**consonants
(noisy)**

duration

WORD

Speech (Spoken Language)

SPEECH

intonation

tone

**vowels
(resonant)**

**consonants
(noisy)**

duration

phrasing

WORD

SENTENCE

Speech (Spoken Language)

SPEECH

**speech
sounds**

intonation

tone

**vowels
(resonant)**

**consonants
(noisy)**

duration

phrasing

WORD

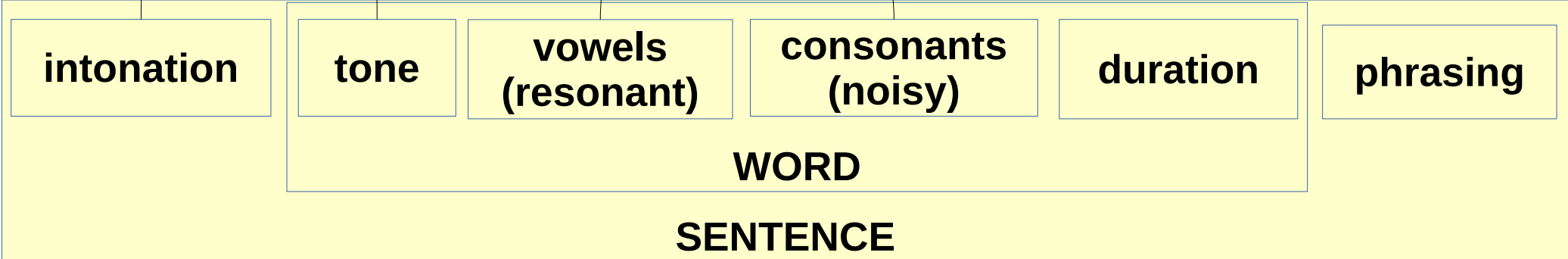
SENTENCE

Speech (Spoken Language)

SPEECH

melody

**speech
sounds**



Speech (Spoken Language)

SPEECH

melody

rhythm

**speech
sounds**

intonation

tone

**vowels
(resonant)**

**consonants
(noisy)**

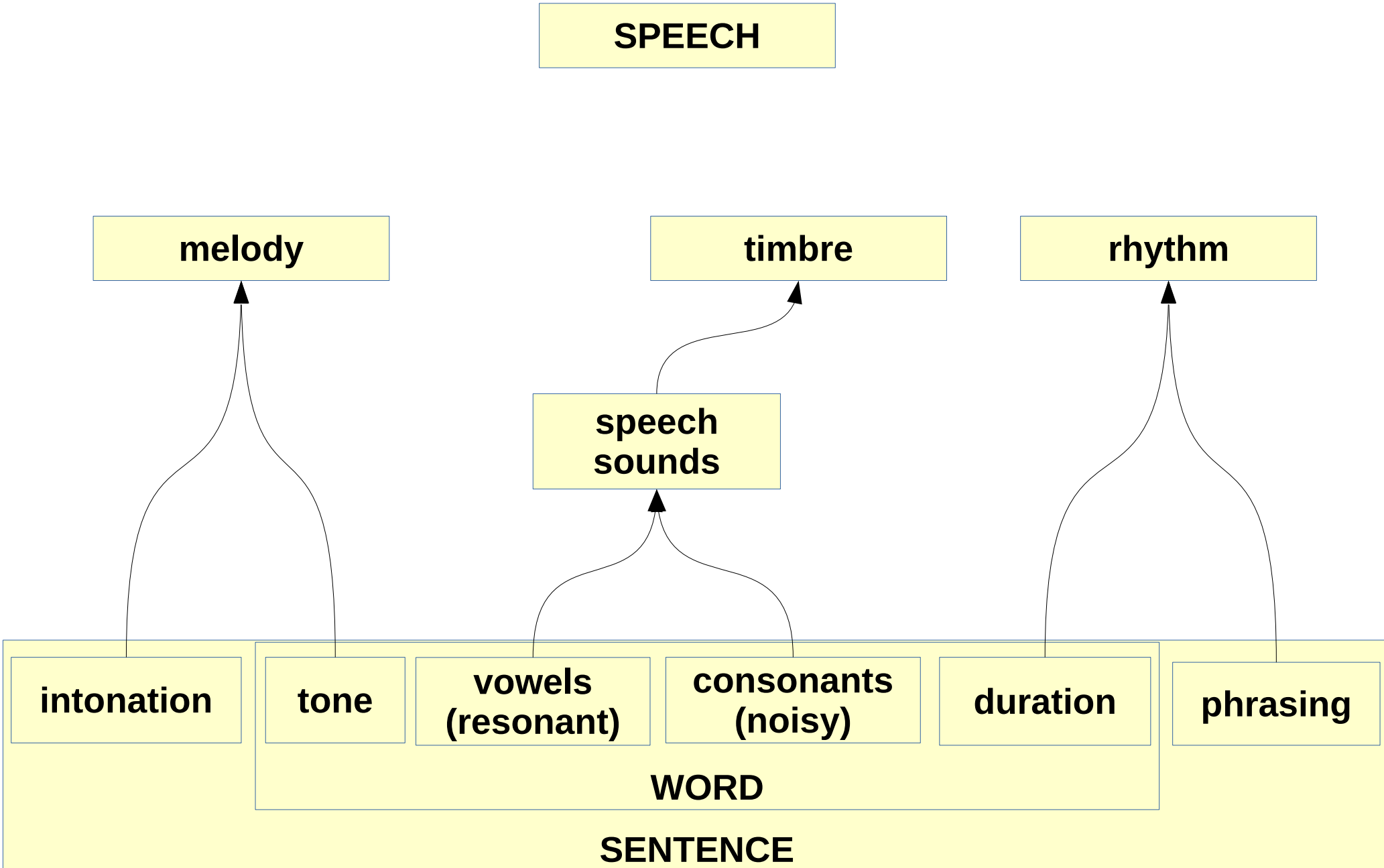
duration

phrasing

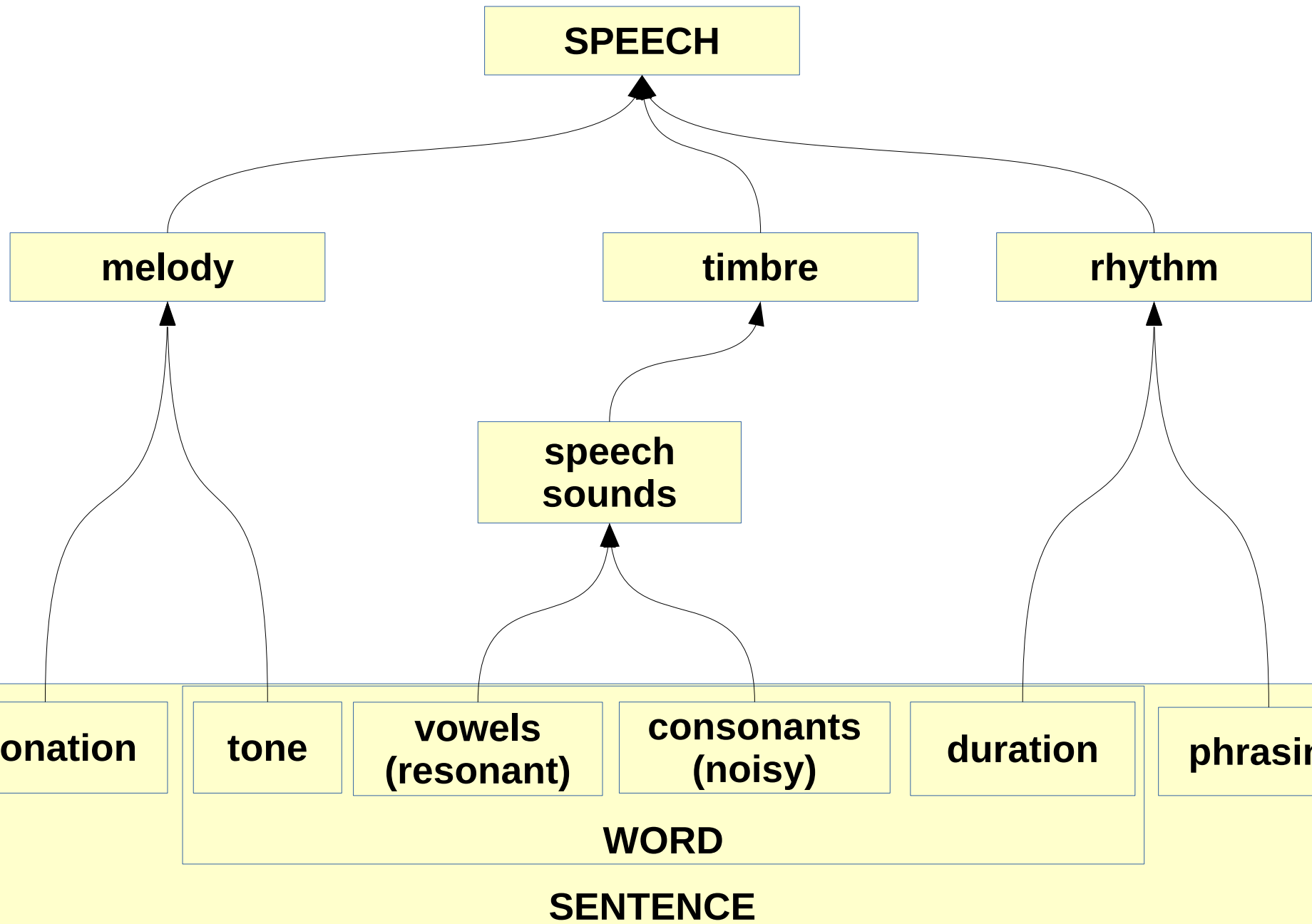
WORD

SENTENCE

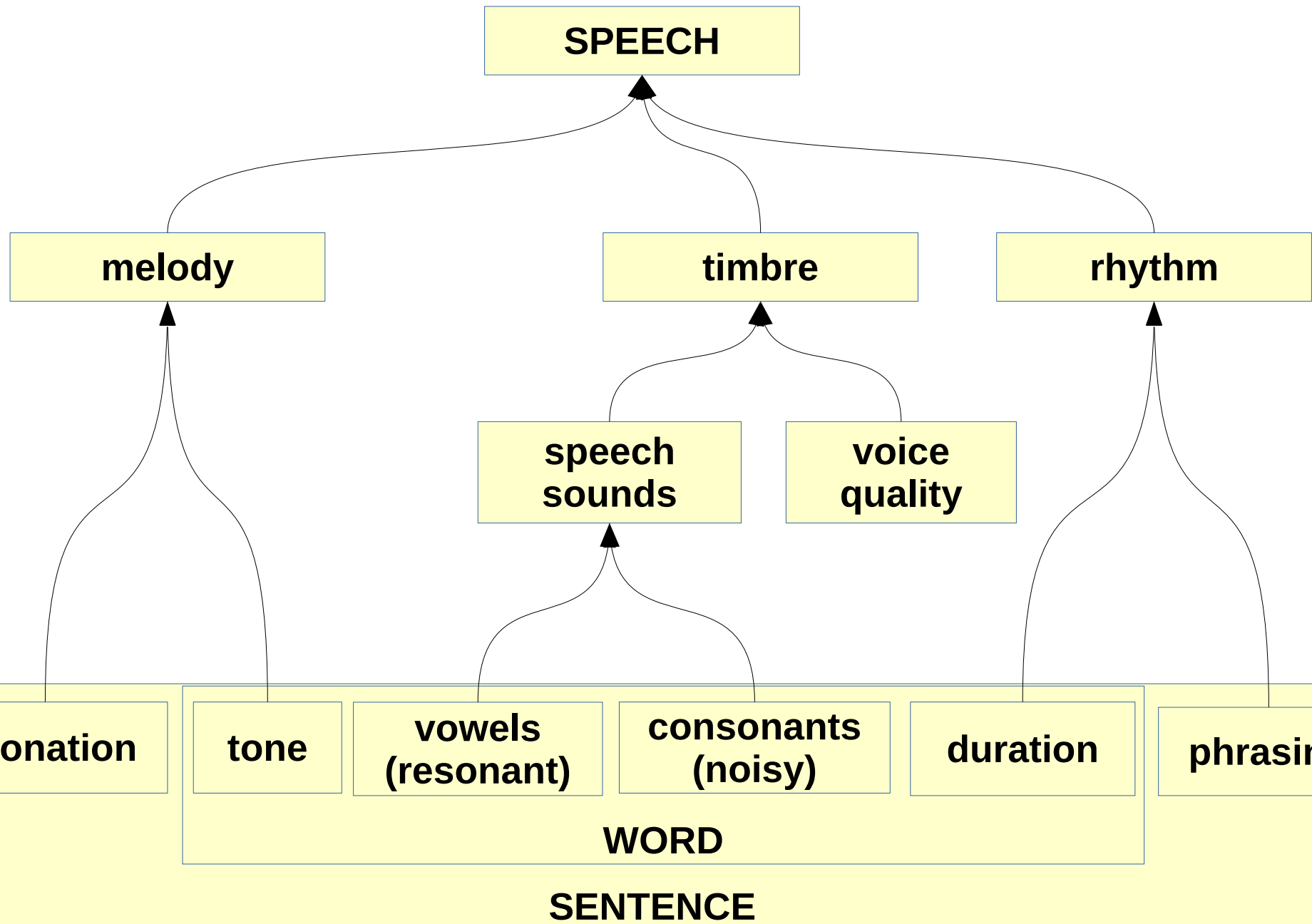
Speech (Spoken Language)



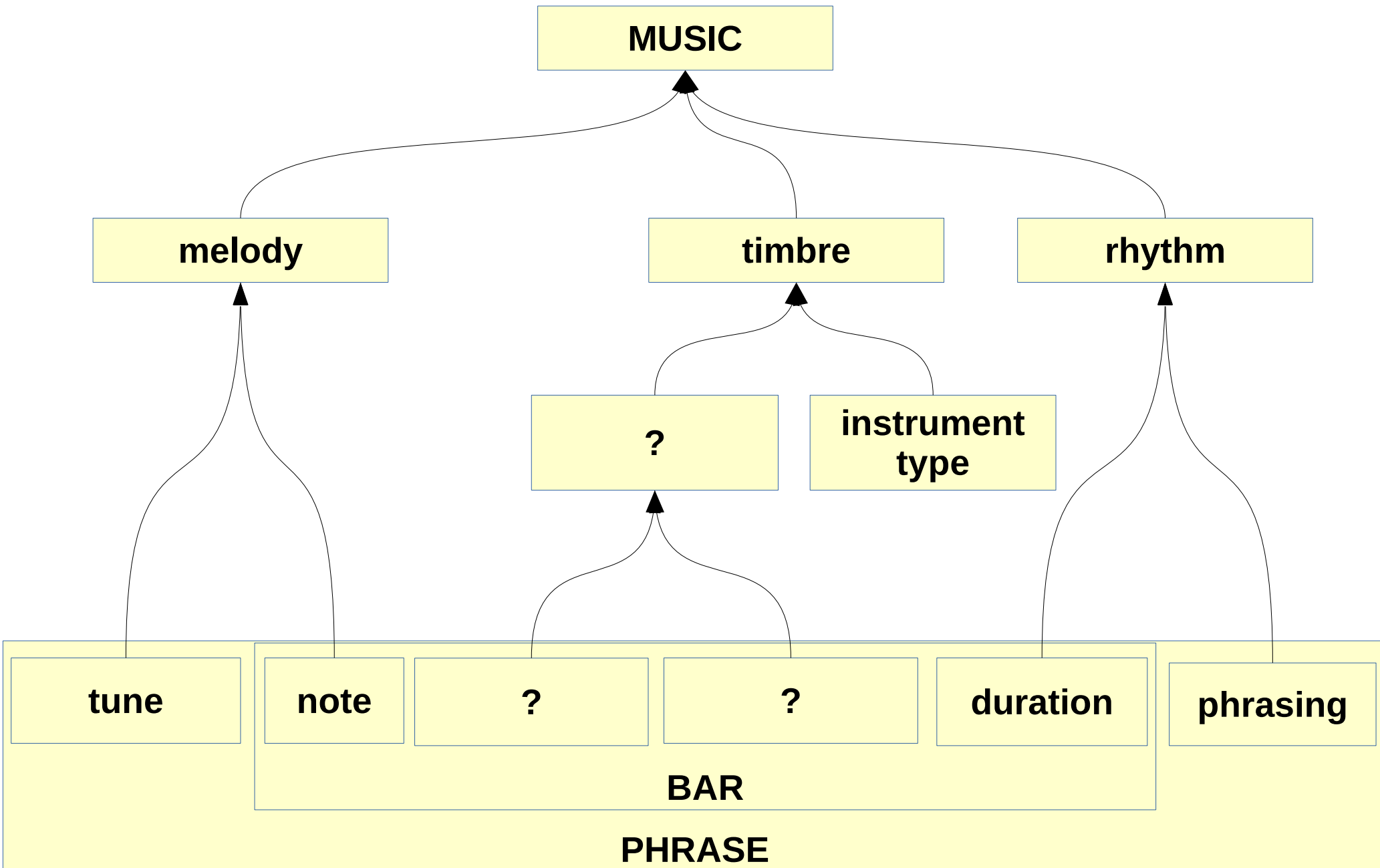
Speech (Spoken Language)



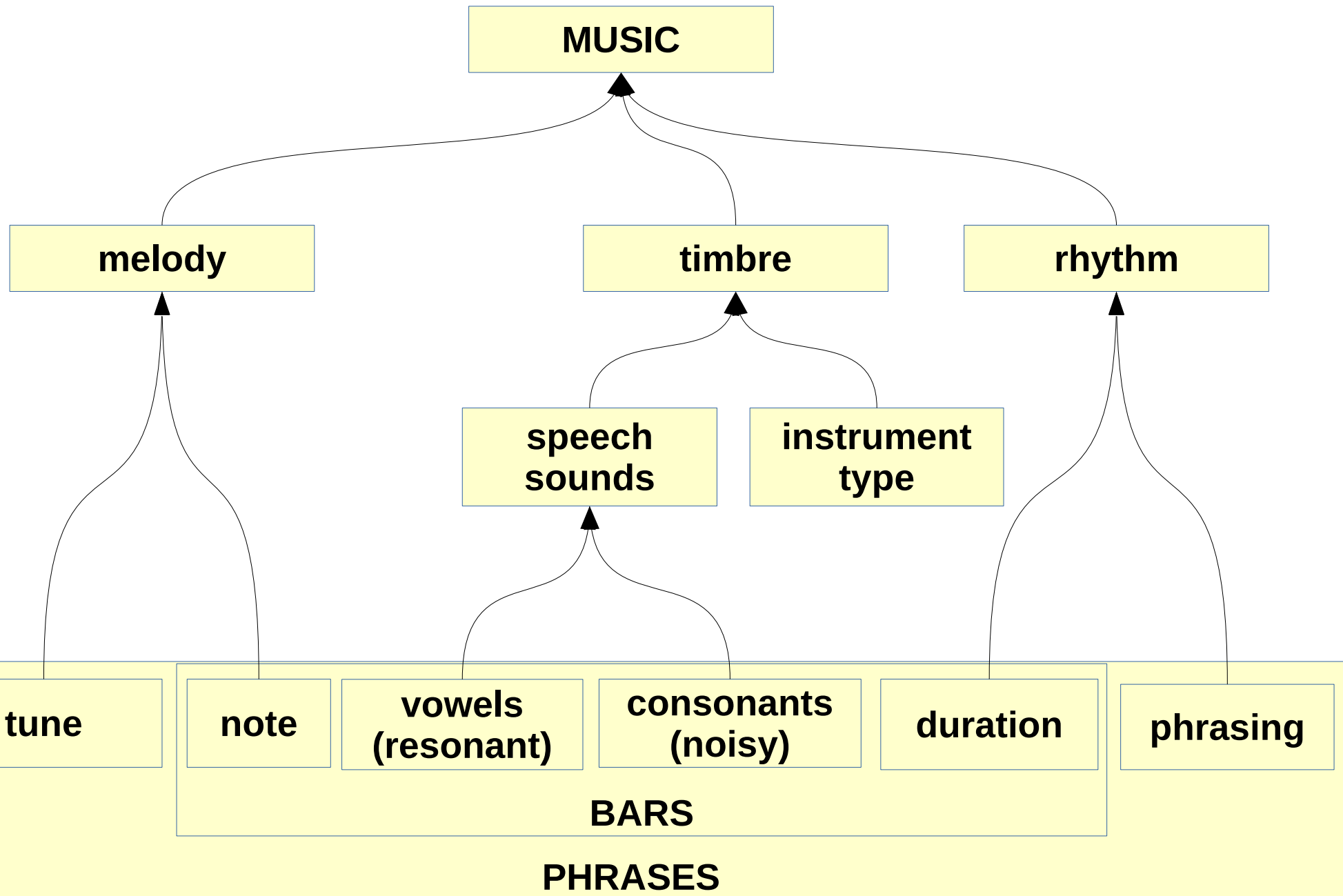
Speech (Spoken Language)



From Speech to Music

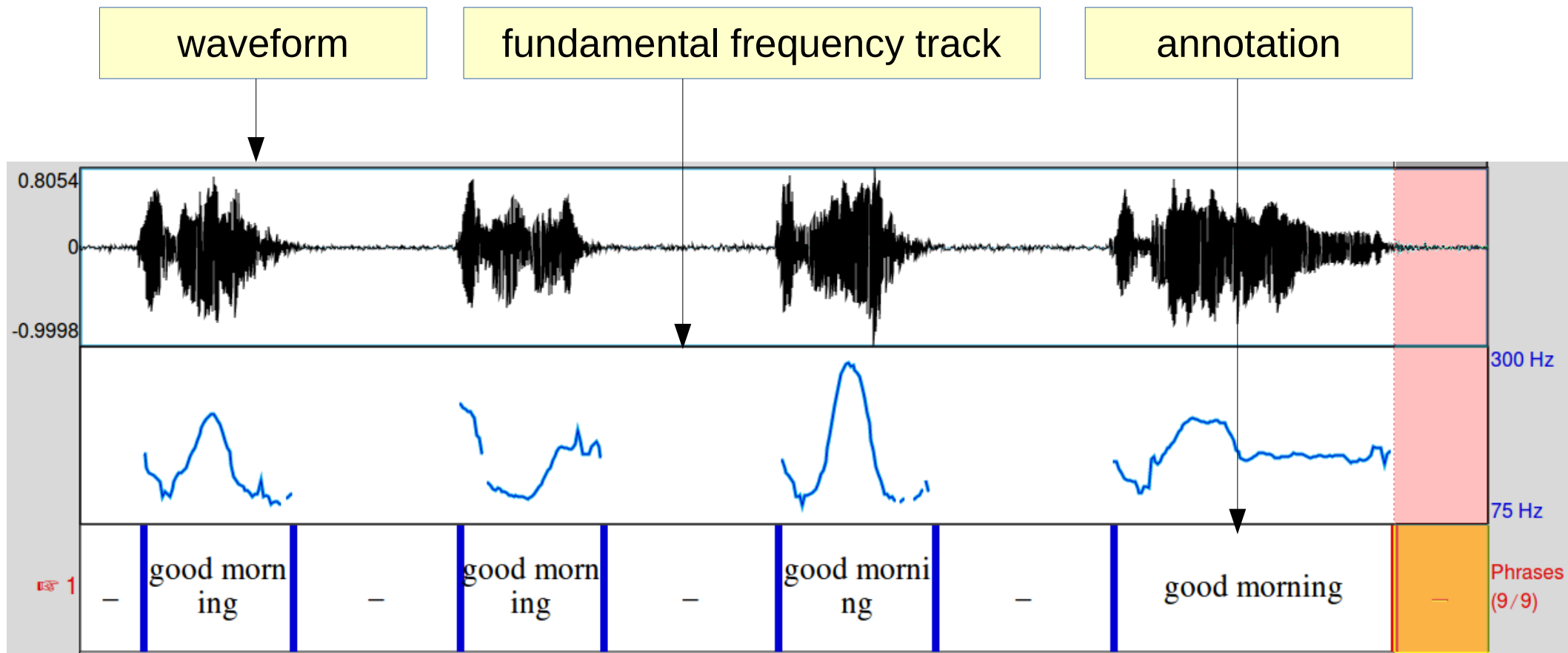


Music + Speech = Song



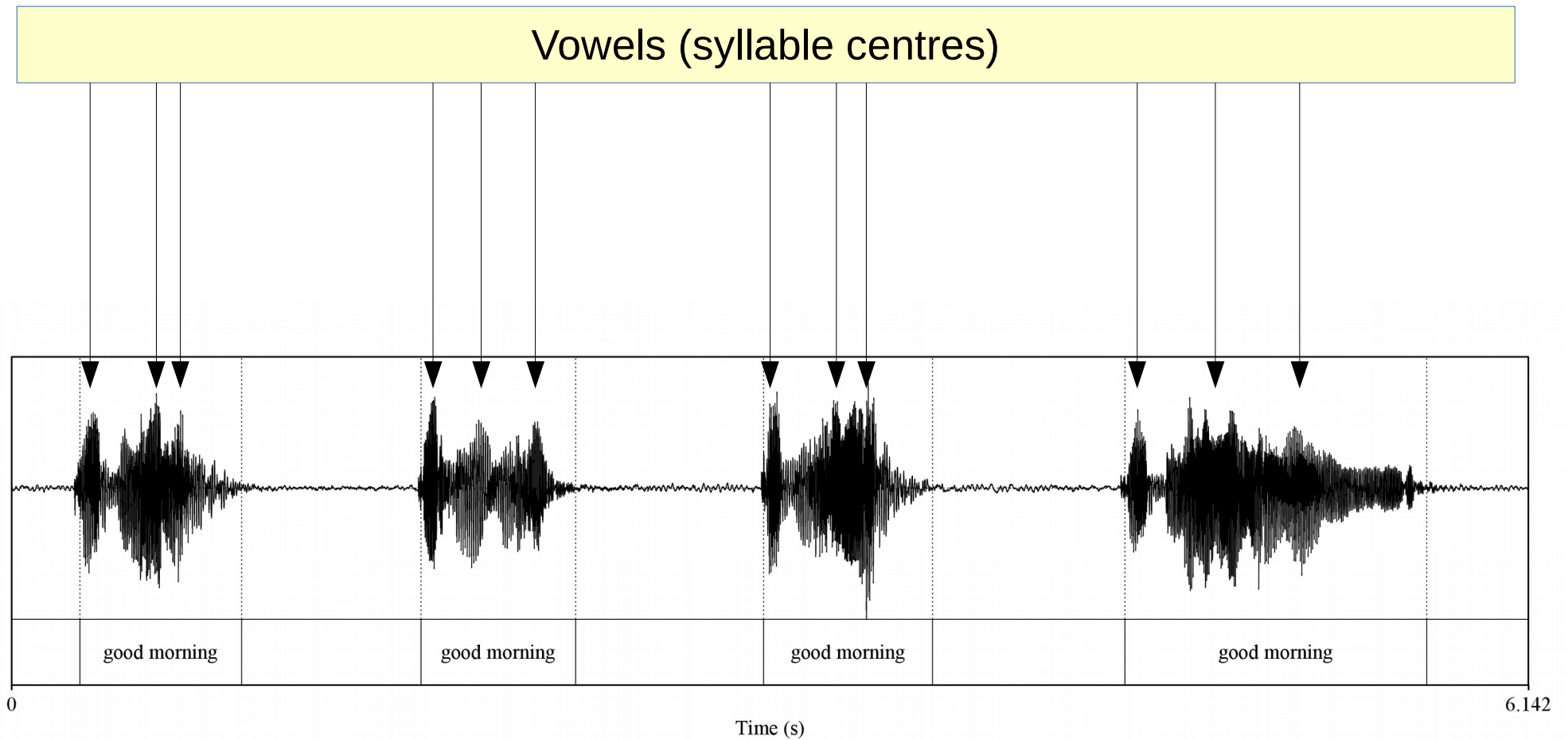
Visualising Speech Melody: “Good morning!”

Four ways of saying "Good morning!"



Visualisation with Praat phonetics software

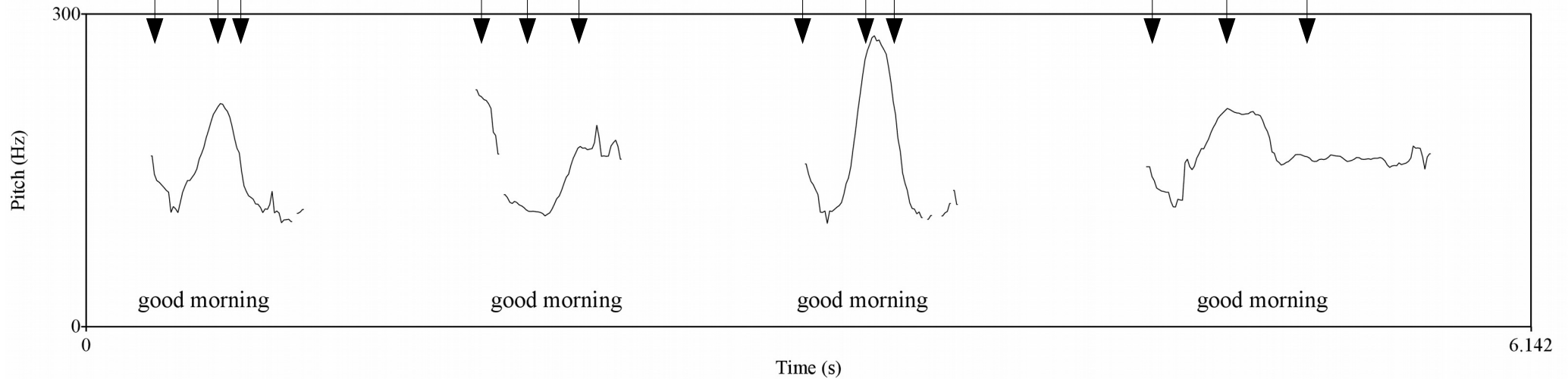
Four ways of saying “Good morning!”



Visualisation with Praat phonetics software

Four ways of saying “Good morning!”

Vowels (syllable centres)

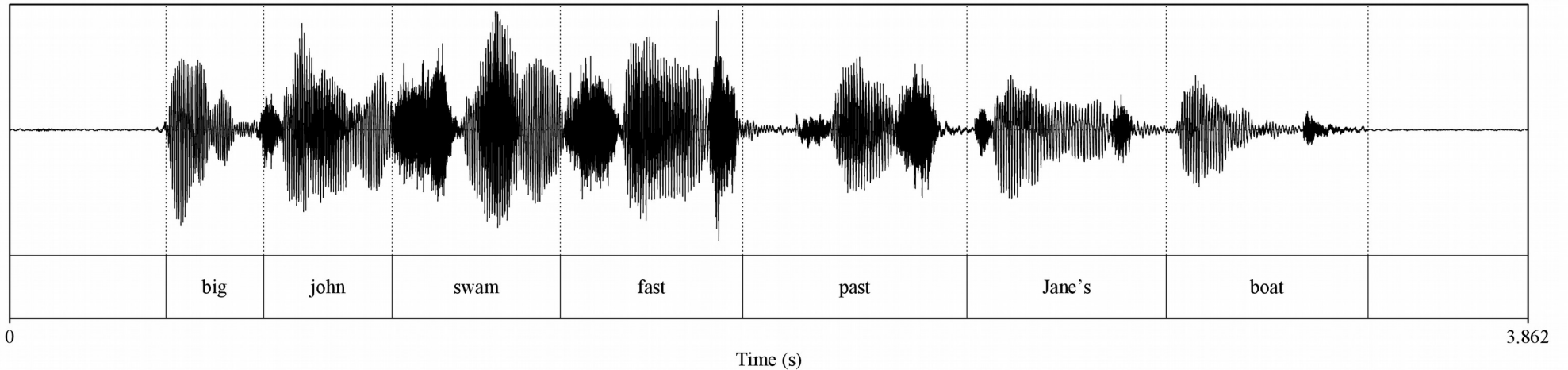


Visualisation with Praat phonetics software

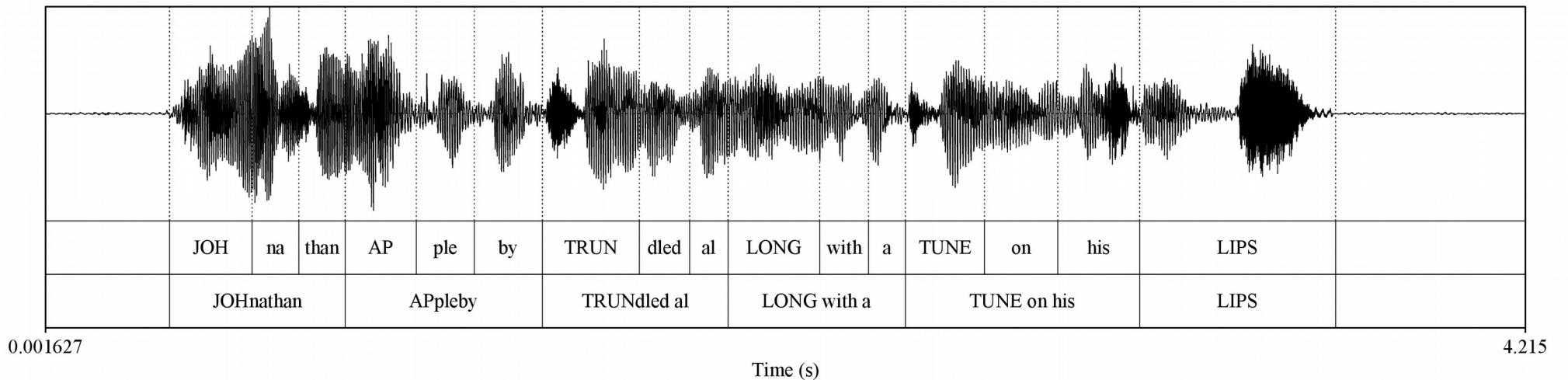
Visualising Speech Rhythm

Visualising Speech Rhythm

Even rhythm, 'syllable timing', 'syllable isochrony'



Even rhythm, 'foot / stress timing', 'foot isochrony'



Parallel Signals in Speech and Music

Parallel 'melodies' in speech and music

- Speech:
 - 2 (or more) speakers in dialogue: usually sequential
 - multimodal streams:
 - locutions
 - distinctive features
 - prosody
 - global intonation
 - local tones
 - gesture
- Music
 - 2 (or more) musicians in orchestra / band: usually parallel
 - multimodal streams
 - text, lyrics
 - music
 - harmonies
 -
 - accompanying behaviour

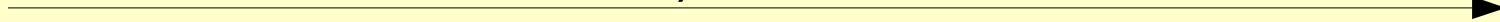
http://www.ted.com/talks/bobby_mcferrin_hacks_your_brain_with_music

Rhythm (or lack of it)

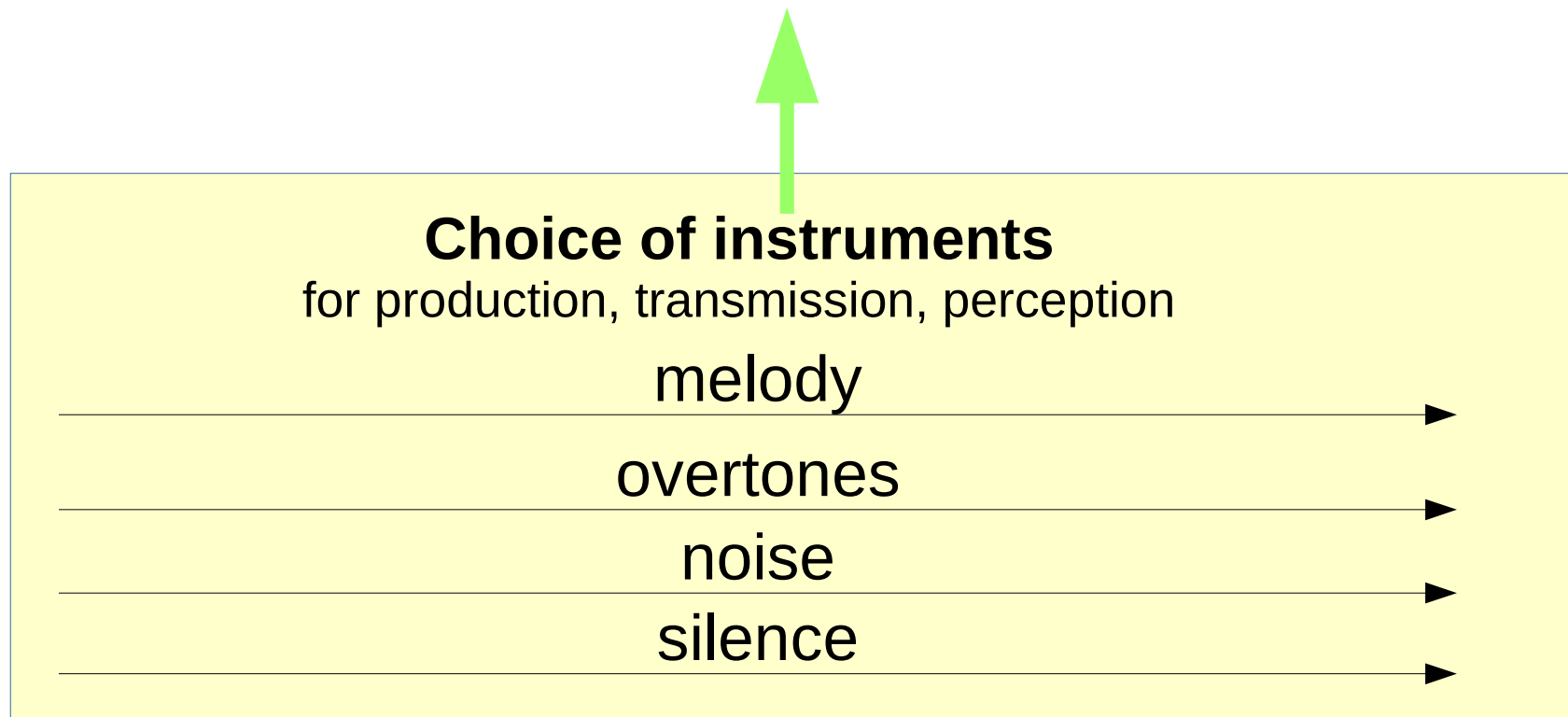
Speech (spoken language)

with physical forms and
semantic / pragmatic meanings

words, sentences



Parallel signal streams in communication

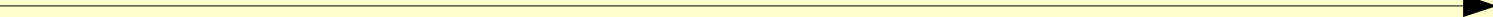


Parallel signal streams in communication

Speech (spoken language)

with physical forms and
semantic / pragmatic meanings

words, sentences



Choice of instruments

for production, transmission, perception

melody



overtones



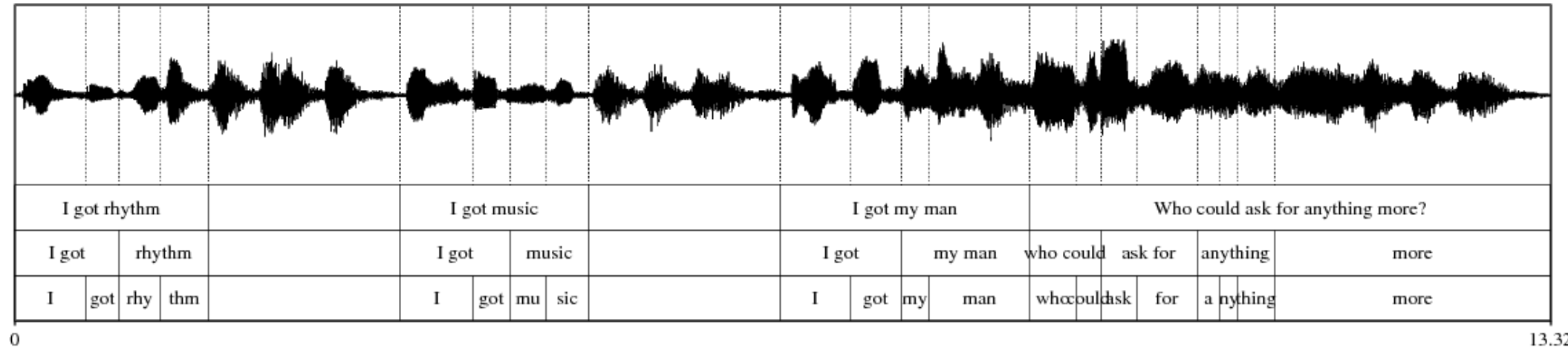
noise



silence

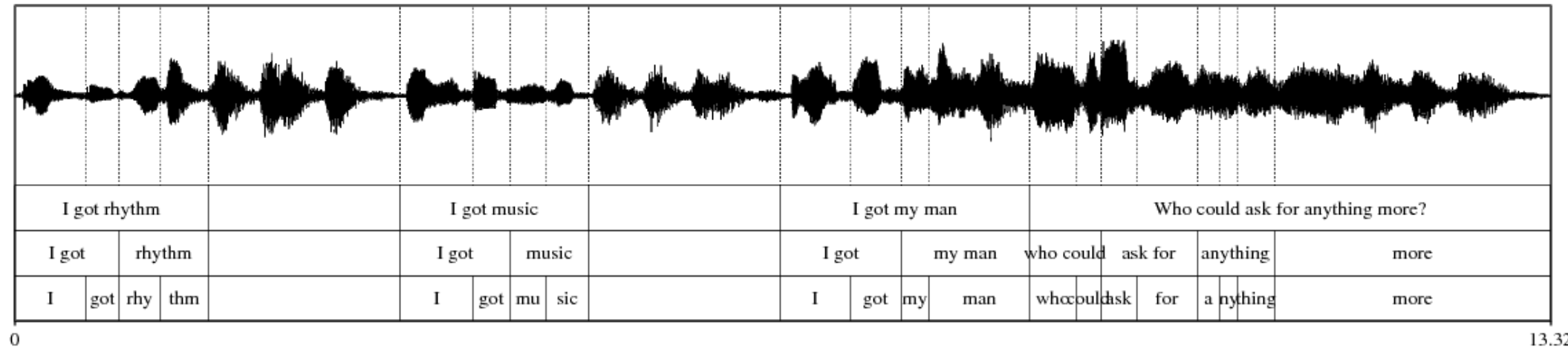


Rhythm in Music



Ella Fitzgerald, "I got rhythm"

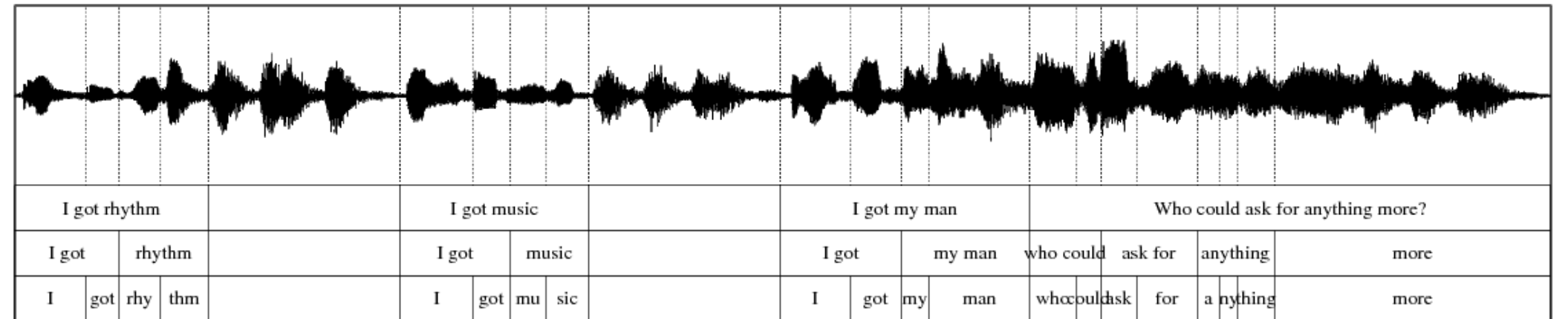
Rhythm in Music



Foot timing

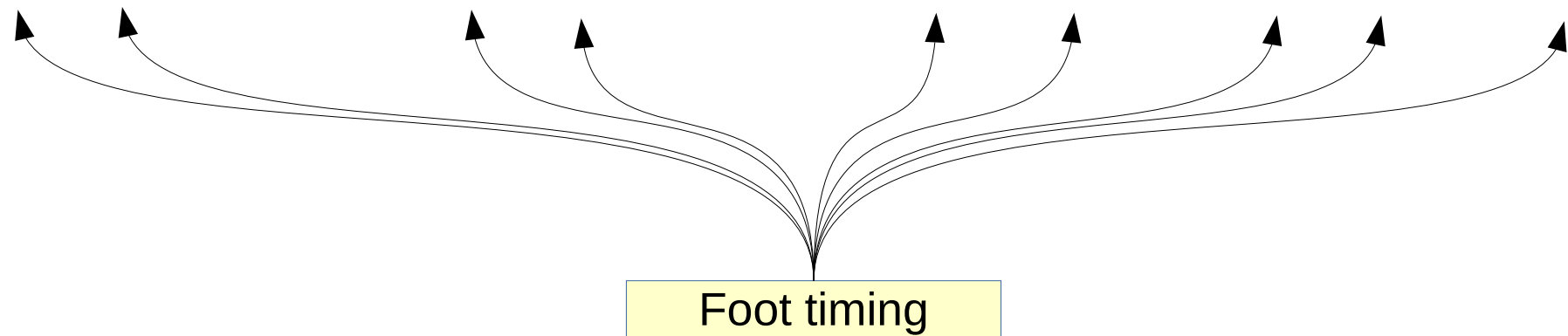
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Rhythm in Music



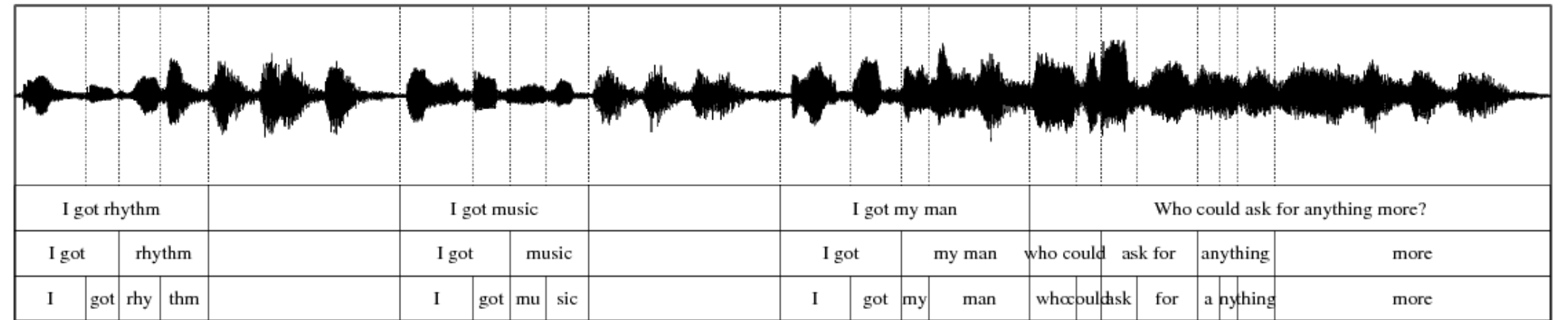
0

13.32



Ella Fitzgerald, "I got rhythm"

English Rhythm in Music



0

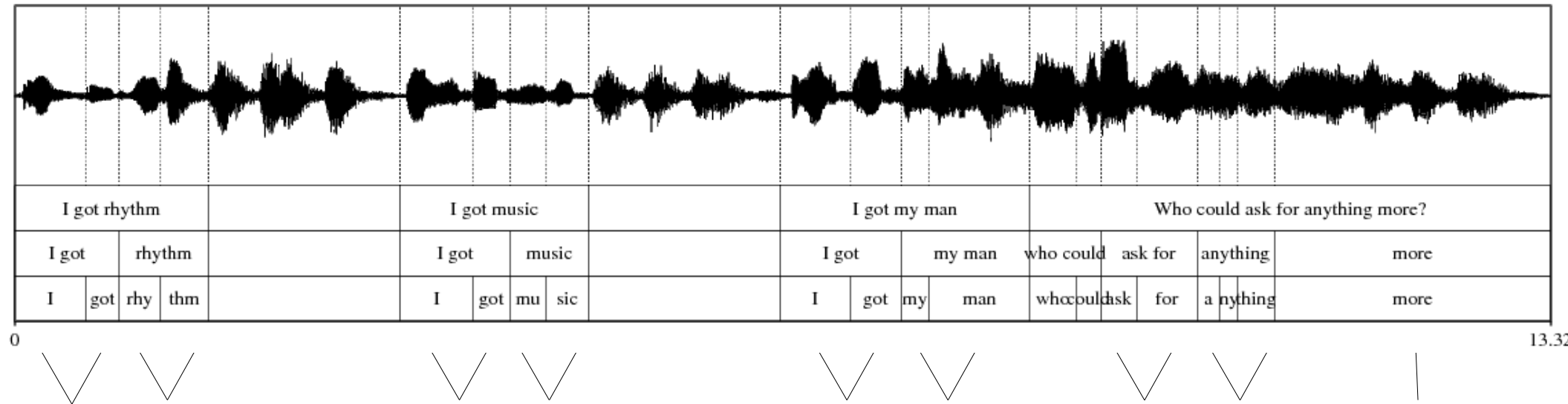
13.32

Foot timing

Special case: only unstressed syllables
(anacrusis)

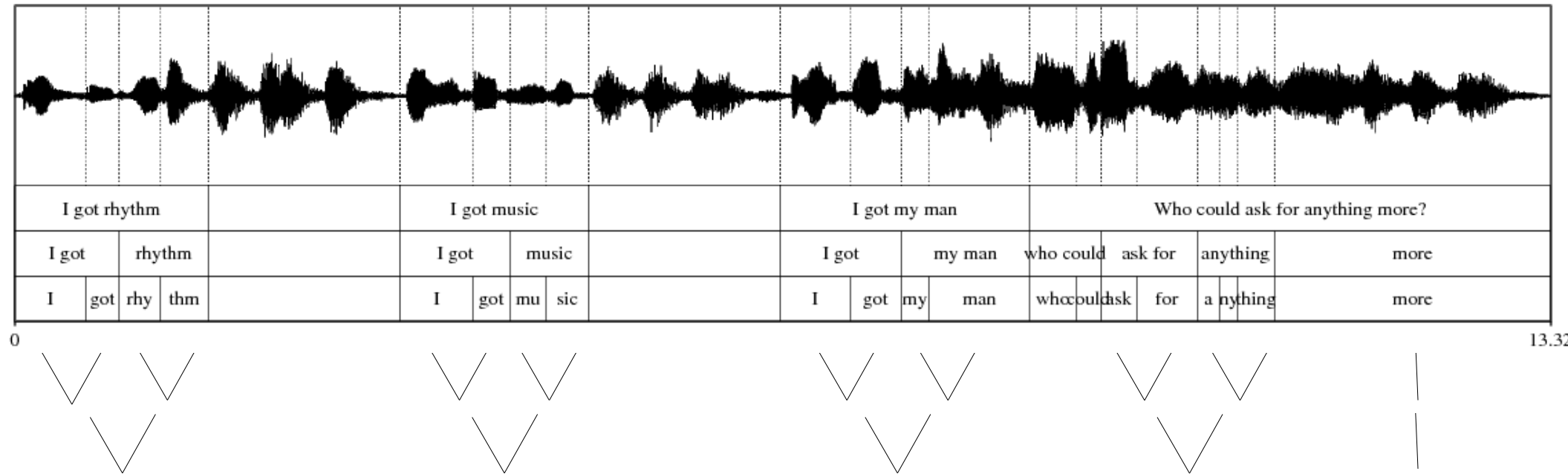
Ella Fitzgerald, "I got rhythm"

Musical Rhythm and English Grammar



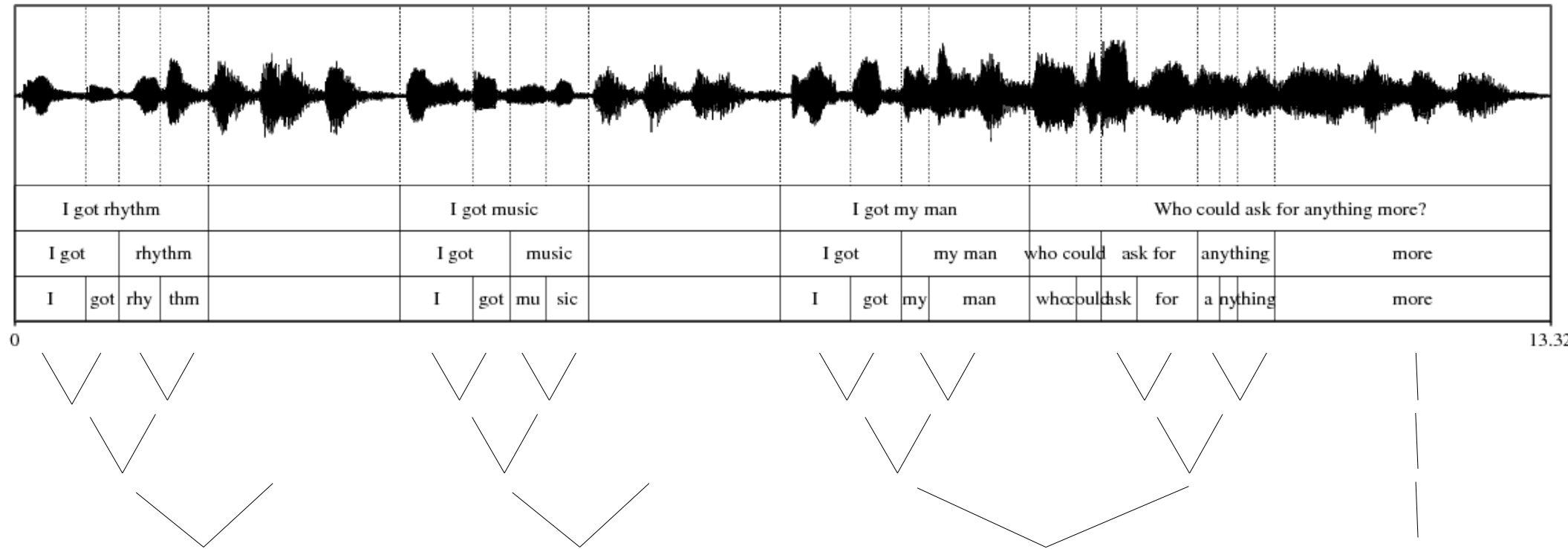
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Musical Rhythm and English Grammar



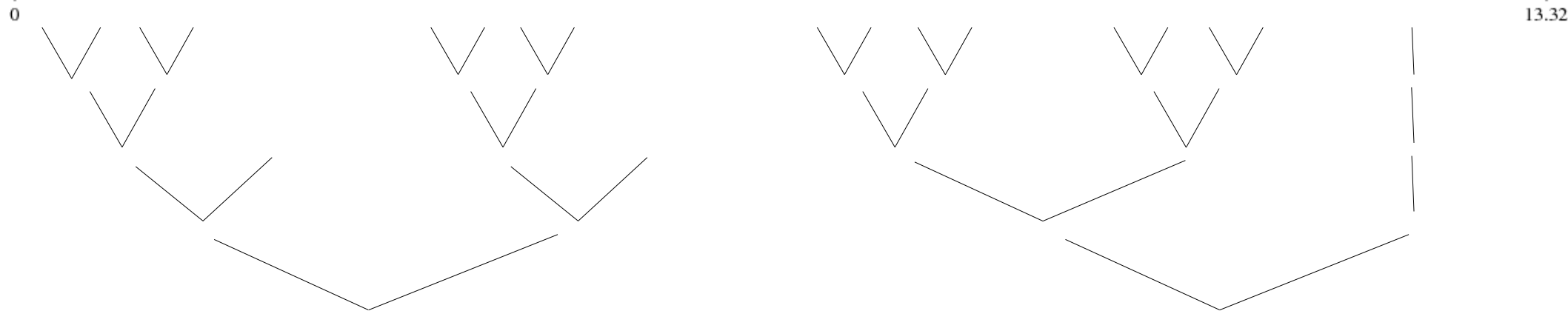
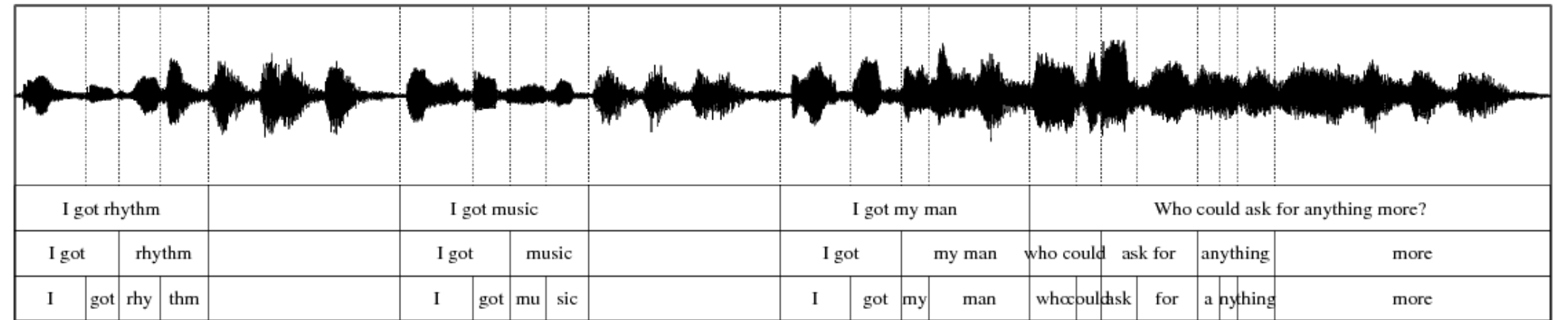
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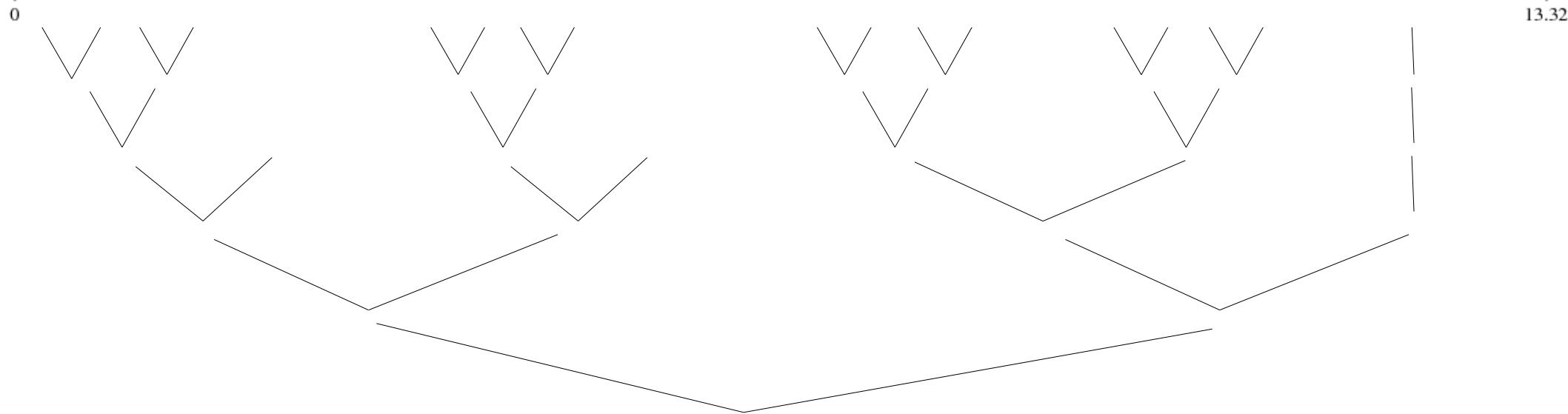
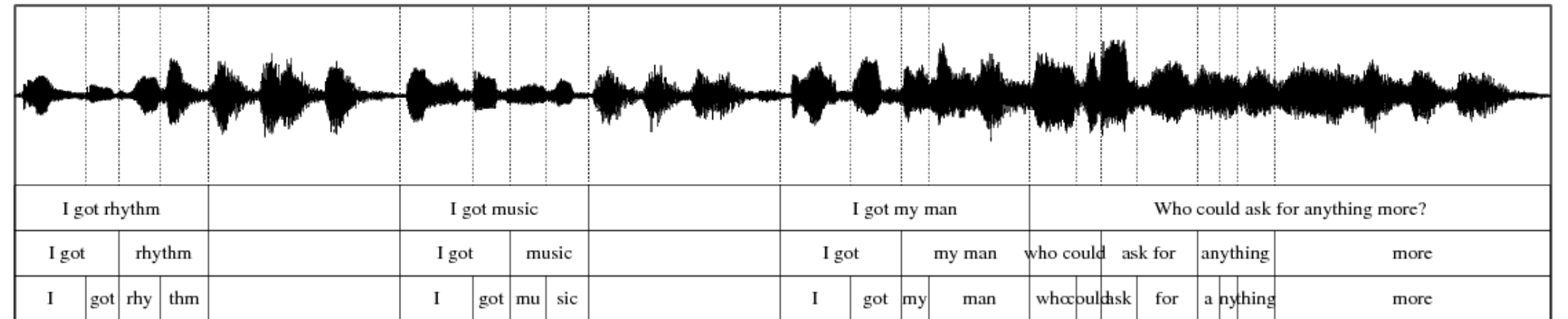
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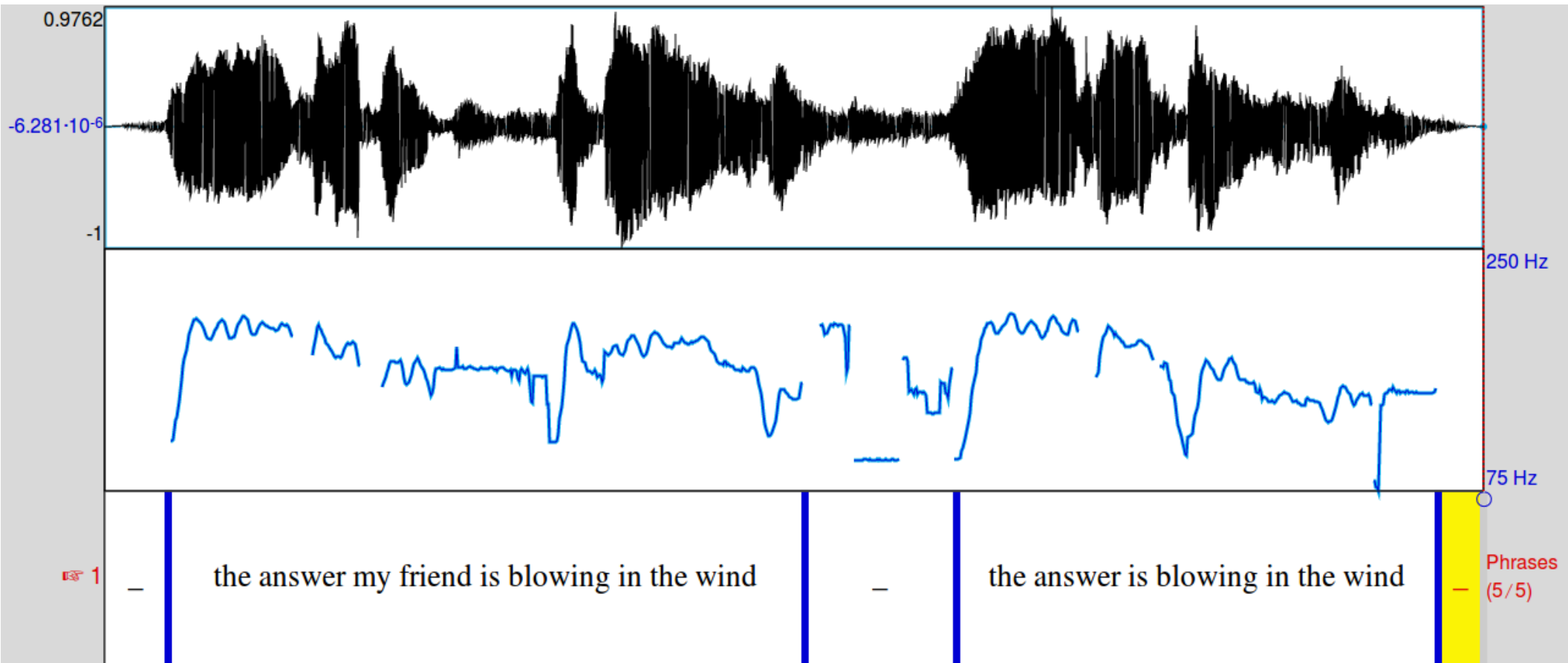
Musical Rhythm and English Grammar



Ella Fitzgerald, "I got rhythm"

Musical Melody and English Grammar

Musical Melody and English Grammar



Listen to and describe the way the phrases are expressed and separated:

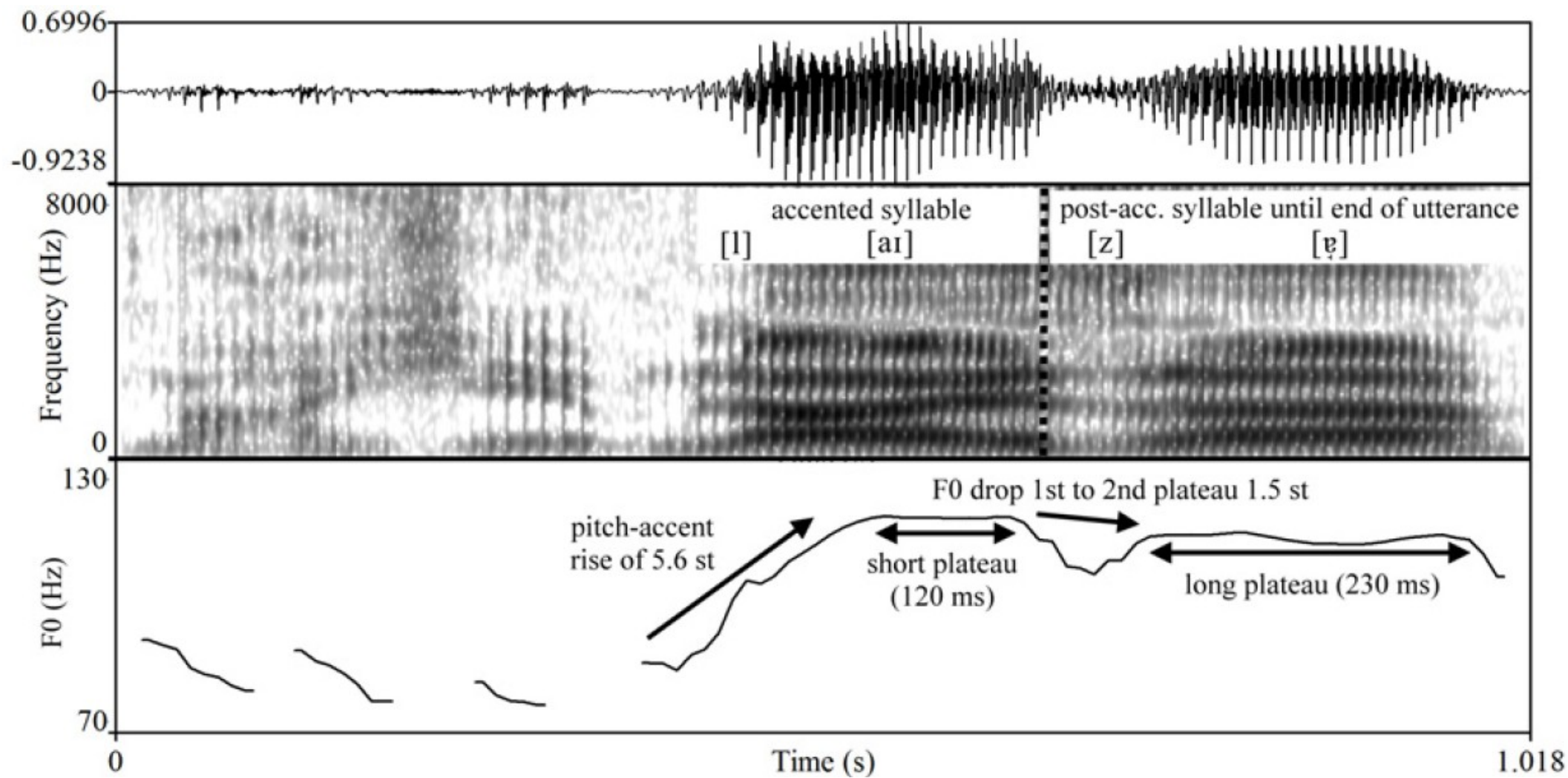
the answer, my friend, is blowing in the wind

Universals of Melody

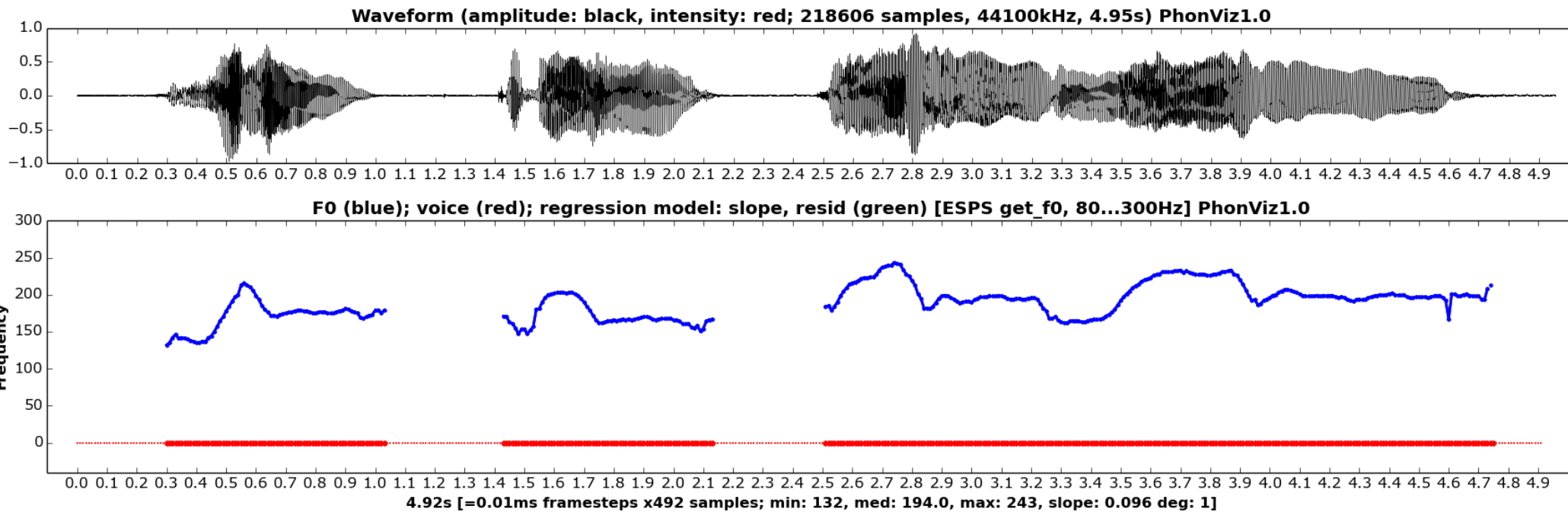
Between Speech and Song

- ‘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'



Universals of Melody: 'Call Contours'



Universals of Melody: 'Call Contours'

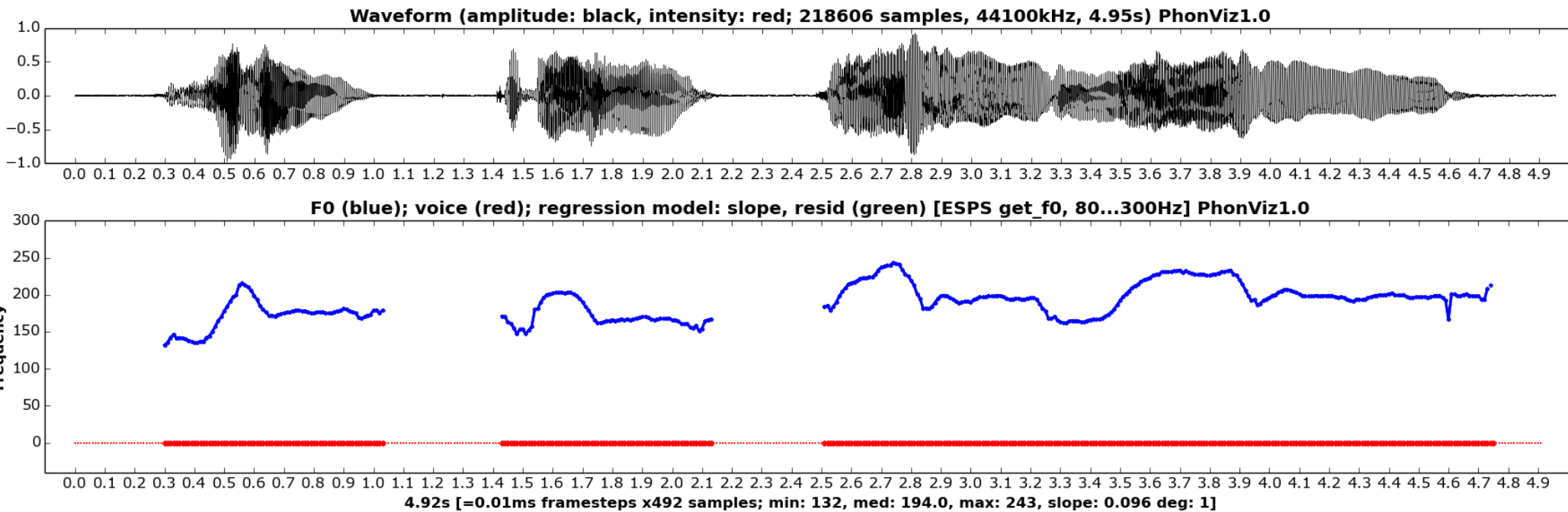


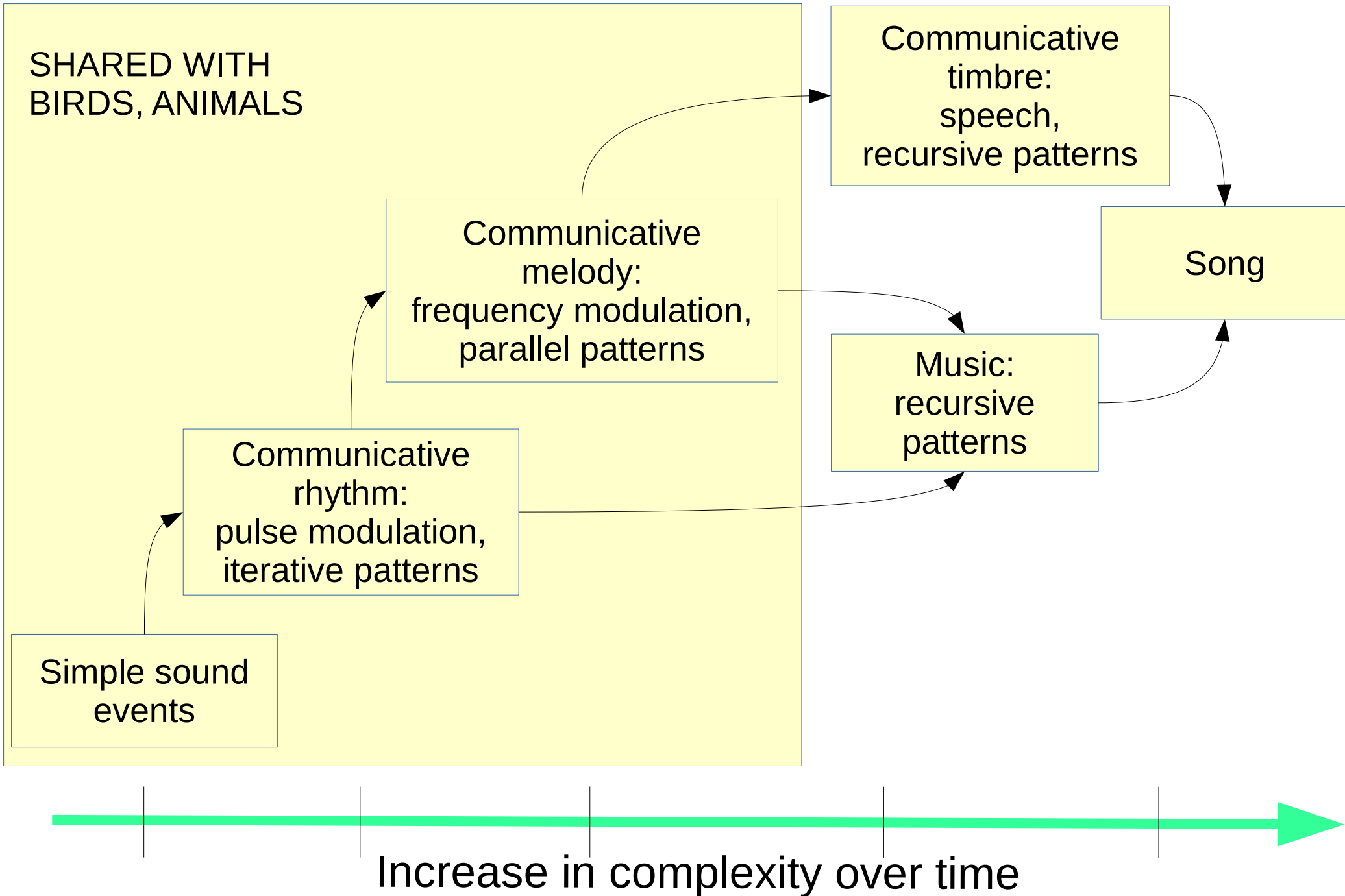
Table 1: Chant contour frequencies averaged over the accent-bearing syllable; chant contour ratios compared with just and tempered minor 3rd.

associated locution	1 st F0 level	2 nd F0 level	F0 ratio	minor 3 rd ratio	
				just	Tempered
<i>hello</i>	212	177	1.198	1.2	1.189
<i>goodbye</i>	201	168	1.196		
<i>Johnny</i>	240	196	1.224		
<i>where are you</i>	230	197	1.168		

Universals of Melody: the Pentatonic Scale

<https://www.youtube.com/watch?v=ne6tB2KiZuk>

Speculations on Rhythm, Melody and Evolution



Summary and Conclusion

- Language and music many features
 - structural patterns:
 - linear
 - hierarchical
 - parallel
 - Language and music share functions:
 - identity:
 - individual
 - community
 - emotion
- But there are differences
 - which affect the speech-music relation in song
 - which may be due to partly independent evolution