

7<sup>th</sup> International Congress on  
Musical Signification - Imatra



Language and Music in  
Optimality Theory, part 2:  
**Phrasing in Language and  
Music**

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Outline

- Phrasing
  - Structure
  - Grouping
  - Contrast and boundaries

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- Phrasing
- Contrast
  - Contrast in language
  - Contrast in music

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- Phrasing
- Contrast
- Boundaries
  - Boundaries in language
  - Boundaries in music

Outline

- Phrasing
- Contrast
- Boundaries
- Intonation
  - Function
  - Intonation contours

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- Phrasing
- Contrast
- Boundaries
- Intonation
- Pitch structure in music
  - Melody

## Outline

- Phrasing
- Contrast
- Boundaries
- Intonation
- Pitch structure in music
- Phrasing in language and music
  - Understandable language
  - 'Musical'
  - Conclusion

## Outline

- Phrasing
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- Boundaries
- Intonation
- Pitch structure in music
- Phrasing in language and music

## Phrasing

### Structure

People tend to structure the physical sound signal

Both in production and in perception

This makes the sound meaningful and interpretable

## Phrasing

### Grouping

General tendency:

grouping of elements that belong together

perceptively even when it is not present in the physical signal

Example: the ticking of a clock

## Phrasing

### Grouping

The groups form a larger, hierarchical unit

## Phrasing

### Contrast and boundaries

Groups are marked in the signal by

- **contrast**: an important element (mostly the first element)
  - by means of stress, pitch, lengthening
- **boundaries**: a boundary marker (mostly the last element)
  - by means of pauses, lengthening, 'boundary tones'

**Contrast in language**

**Alternating rhythm**

**Eurhythmy rules:**

**Quadrisyllabic Rule (QR)**  
at the level of scansion the most important accents ideally are **four** syllables apart

**Disyllabic Rule (DR)**  
one level underneath the level of scansion the most important accents ideally are **two** syllables apart

**Phrasal Rule (PR)**  
at the second highest level the most important accents are as **far** apart as possible

**Contrast in language**

**Alternating rhythm**

**Contrast:**

*vijf en twin tig ou der wet se pla ten spe lers*  
'twenty-five old-fashioned gramophones'

**English:**  
*twen ty se ven Mis sis sip pi le gis la tors*

**Contrast in language**

**Alternating rhythm**

**Contrast:**

x x x x x x x x x x x x x x  
*vijf en twin tig ou der wet se pla ten spe lers*  
'twenty-five old-fashioned gramophones'

**English:**  
*twen ty se ven Mis sis sip pi le gis la tors*

**Contrast in language**

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**Contrast in language**

**Alternating rhythm**

**Contrast:** accentuation of the first syllable

x  
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*twen ty se ven Mis sis sip pi le gis la tors*

**Contrast in language**

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**English:**  
*twen ty se ven Mis sis sip pi le gis la tors*



## Contrast in music

### Alternating rhythm

Mozart: Sonata K. 331, I



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## Boundaries in language

### Phrases in language

Phrase:

- phonological phrase, intonation phrase, utterance
- words that form a structural unity together
- breath between phrases

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## Boundaries in language

### Temporal

Temporal phenomena at phrase ends:

- final lengthening
- pauses
- deceleration / acceleration

more lengthening, longer pauses and greater tempo changes at stronger boundaries (larger phrases)

## Boundaries in language

### Final lengthening

At the end of a phrase:

lengthening of the last syllable

(a) *Dag berättar* 'Dag tells'

(b) *En finurlig Dag* 'an ingenious Dag'

Swedish: /a/ in final position (b) about 55 msec longer than in initial position (a)

(Lindblom, 1978)

## Boundaries in music

### Phrases in music

Phrase:

- within one breath
- constant movement to the cadence
- a phrase can exist of subphrases: hierarchical

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## Boundaries in music


### Temporal

As in language: temporal phenomena at phrase ends


- final lengthening
- pauses
- deceleration / acceleration

## Boundaries in music

### Final lengthening



Old Mc Do-nald had a **farm**, ee - i ee - i **oh**.



On this farm he had a **cow**, ee - i ee - i **oh**.

## Intonation

### Function

Spoken language: intonation  
 Written language: punctuation

Function: grouping of words that form a unity in meaning and structure

Domain for intonation: **phrases**

## Intonation

### Intonation contours

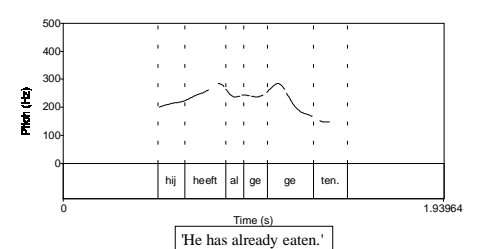
Intonation phrase: melody contour with

- high and low tones (accent)
- boundary tones

## Intonation

### Intonation contours

'Full stop intonation': falling low tone



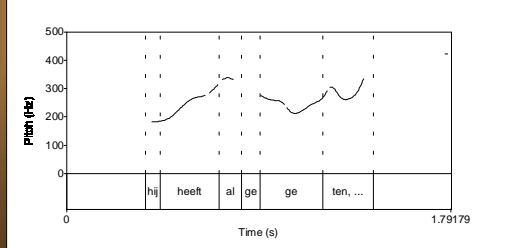
Time (s) 1.93964

'He has already eaten.'

## Intonation

### Intonation contours

'Comma-intonation': half high rising tone



Time (s) 1.73179

'He has already eaten, (but he still wants another biscuit)'

## Intonation

### Cerebral hemisphere specialisation

Intonation is *literally* the music of language:  
 right hemisphere

## Pitch structure in music

### Melody

**Tension**

- dissonant notes or chords are tensing
- phrase moves to total relaxation

**Relaxation**

- consonant notes or chords are the relaxing resolutions of a phrase
- total relaxation: cadence V - I

## Pitch structure in music

### Melody


**Tension differences between cadences:**

- **Tension**  
question / 'comma': half cadence V - IV
- **Relaxation**  
answer / 'full stop': full cadence V - I

## Pitch structure in music

### Melody

**Question - answer**  
Mozart K. 550, G Minor



question                      answer

Temporal

## Phrasing in language and music

### Understandable language

Structure = understandable  
= interpretation  
= hierarchical unit of smaller units

## Phrasing in language and music

### 'Musical'

Structure = 'musical interpretation'  
= understandable  
= telling a story

To illustrate: Bruch, Kol Nidrei (adagio, op. 47)

## Phrasing in language and music

### Conclusion

General tendency in language and music of structuring (hierarchically)

- by marking beginnings of groups
- by marking boundaries

**Hypothesis:**  
all temporally ordered behaviour is structured in a similar way