

# The Contribution of Immanent and Performed Accents to Emotional Expression in Short Tone Sequences

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## Agenda

- ◆ Introduction
- ◆ Related Work and Backgrounds
- ◆ Experiment 1
- ◆ Experiment 2
- ◆ General Discussion

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## Introduction

- ◆ Music factors such as harmony, pitch level, and rhythm patterns affect the expression and perception of emotional expression in music (Gabrielsson & Lindstrom 2004)
- ◆ How do these factors interact with each other?

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## Related Work & Backgrounds

- ◆ Accents by pitch, intensity, and duration are in a similar way used in speech prosody to direct attention to focal words (Patel & Peretz 1997)
  - "Meet me IN FRONT OF the bank, I said"
  - "Meet me in front of the BANK, I said"
- ◆ The music performer highlights notes for music expression in a similar way

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## Related Work & Backgrounds (Cont.)

- ◆ Characteristics of tonality in music need to be activated dynamically (Jansen & Povel, 1999)
- ◆ The ordering of notes have implications for implied harmony (Bharucha 1984)
- ◆ The melodic context has impact on listeners' harmonic inferences

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## Related Work & Backgrounds (Cont.)

- ◆ Povel & Egmond 1993
  - The tonic, the major third and the dominant are the most stable
  - Less stable tones tend to resolve to more stable tones
- ◆ Sloboba 1991
  - Dissonant notes on emphasized beats occurred significantly more often might evoke sadness in listeners

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## Related Work & Backgrounds (Cont.)

- ◆ What can we conclude from the work above?
  - The relative emphasis on certain notes in a melody could affect music perception
- ◆ The paper is to investigate the effect different kind of accents in melodic structure

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## Immanent and Performed Accents

- ◆ Immanent accent is apparent in the notated score
  - Metric accent
  - Melodic accent
- ◆ Performed accent is under the control of the performer
  - Increasing loudness
  - Lengthening the tone

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## Hypotheses in the experiments

- ◆ Certain tones are more important than others
- ◆ Implicit harmonic function of certain tones maybe important for perceived emotional expression
- ◆ Tense or unstable notes are apt for expression of negative emotion
- ◆ Relaxed or stable notes are apt for positive motion expression

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## Hypotheses in the experiments (Cont.)

- ◆ Happiness is better represented by a note important in major mode
- ◆ Sadness by notes important in minor mode
- ◆ Notes marked for consciousness by either immanent or performed accents will increase listeners' perception of expression

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## Experiment 1

- ◆ Focused on immanent accents (melodic, metric and rhythmic accents)
- ◆ Subjects
  - 11 non-musicians, 7 females & 4 males
  - 4 of them have had formal musical training for avg. 9.2 years

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## Experiment 1 (Cont.)

- ◆ Musical Materials
  - 4 progressions, 2 in major mode, 2 in minor mode 🎵 🎵 🎵 🎵
  - The melody notes were chosen in a way that the last high-pitched tone is of special interest and called the *target-note*

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## Experiment 1 (Cont.)

- ◆ Variation of melodic contours (Target-note is always the highest pitch level)
  - 🎵 🎵 🎵 🎵 🎵 🎵
- ◆ Variation of rhythm
  - 🎵 🎵 🎵

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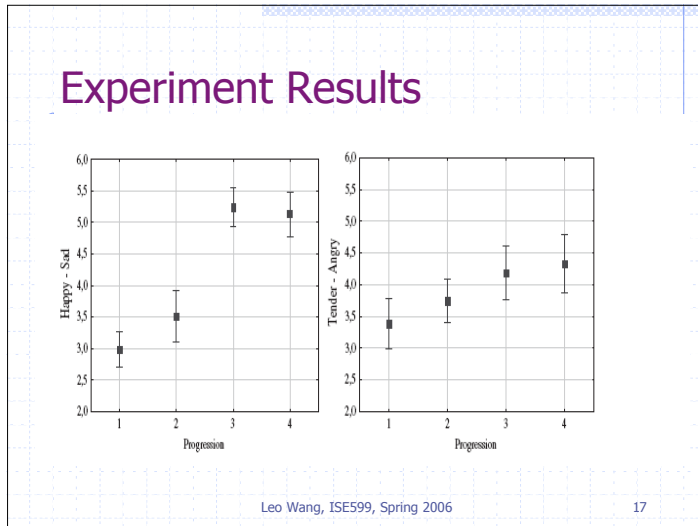
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## Experiment Procedure

- ◆ 72 musical pieces (4 progressions, 3 levels of melodic contour, 2 levels of melodic direction, 3 rhythm patterns)
- ◆ Rate all pieces on two bipolar scales (happy – sad, and tender – angry)

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- ### Analysis of Results
- ◆ ANOVA (Analysis of Variance between Groups)
  - ◆ Progressions in minor mode in general representing sadness and anger
  - ◆ Progressions in major mode in general representing happiness and tenderness
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- ### Analysis of Results (Cont.)
- ◆ Short-short-long rhythm patterns were perceived as the most angry pattern
  - ◆ Descending direction was perceived as more sad than the opposite direction
  - ◆ Progression 1 for happiness, progression 3 for sadness, progression 4 for anger
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### Largest Contrast Effects in Happiness, Progression 1

◆ GH 2.45 (1.90-3.01)	d) LGH 3.82 (2.98-4.66)
b) GH 2.45 (1.90-3.01)	e) LGH 3.36 (2.91-3.82)
c) GH 2.55 (1.99-3.10)	f) LGH 3.27 (2.42-4.13)

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## Experiment 2

- ◆ Focused on performed accents (loudness, articulation, and timing)
- ◆ Subjects
  - 18 non-musicians, 14 females & 4 males
  - 6 of them have had formal musical training for avg. 8.1 years

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## Musical Pieces in Exp. 2

<b>Progression 1</b>			<b>Progression 3</b>			<b>Progression 4</b>		
a) Version 1 - high pitch	b) Version 1 - high pitch	c) Version 1 - high pitch	d) Version 2 - high pitch	e) Version 2 - high pitch	f) Version 2 - high pitch	g) Version 1 - low pitch	h) Version 1 - low pitch	i) Version 1 - low pitch
j) Version 2 - low pitch	k) Version 2 - low pitch	l) Version 2 - low pitch						

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## Experiment 2 (Cont.)

- ◆ Musical Materials
  - A selection of versions from Experiment 1
  - Two melody versions 123 and 132
  - Half note always places as the first note
  - Three progressions

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## Variation of performed accents

- ◆ Increased loudness
- ◆ Increased loudness and legato
- ◆ Increased loudness and staccato
- ◆ Increased loudness, legato and delayed onset
- ◆ Increased loudness, staccato and delayed onset

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## Experiment Procedure

- ◆ 60 musical pieces (3 progressions, 2 target-note positions, 5 types of accents, 2 levels of performed accents)
- ◆ Rate all pieces on a single scales
- ◆ Progression 1 on happiness
- ◆ Progression 3 on sadness
- ◆ Progression 4 on anger

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## Analysis of Results (Happiness)

- ◆  $\frac{1}{3}$  of variance can be accounted for a linear regression model
- ◆ The only significant factor is pitch
- ◆ Target-Note A and note F might have the same impact on happiness

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## Analysis of Results (Sadness)

- ◆  $\frac{1}{3}$  of variance can be accounted for a linear regression model
- ◆ The significant factor is pitch
- ◆ Target-Note on the 3<sup>rd</sup> beat is superior to target-note on the 4<sup>th</sup> beat
- ◆ Legato increases perception of sadness

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## Analysis of Results (Anger)

- ◆ 2/3 of variance can be accounted for a linear regression model
- ◆ Performed accent on target note increases the rating of emotional expression
- ◆ High pitch is favorable for expression of anger

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## General Discussion

- ◆ All notes are not of equal importance for emotional expression
- ◆ Assumed target-notes affected perceived emotional expression when they were stressed by immanent and performed accents
- ◆ The effects found in experiments were small,
- ◆ Provided evidence for interactions among music factors.

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