Explorative Comparison of Children Songs

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Music is the universal language of mankind
(Longfellow, 1865, p. 202)

Music takes as many forms as culture
(Cross, 2008, p. 2)

Introduction

- Which features make up a child song?
  - universal genre of communication between children?
  - language specific features?
  - influence of social context (lullaby vs play song)

universality in musical genres?

- McDermott & Hauser 2005*
  - every known scale system is based on the octave
  - scale systems often include unequal interval relations – as in western major / minor
  - scales consist of 5 to 7 tones within 1 octave
  - small intervals occur most often (2 semitones)

- are these principles reflected in the most basic musical genres, i.e. childsongs and lullabies?

influence of lang on music

Patel & Daniele 2003, Huron & Ollon 2003; Hannon 2009

- collected musical themes from France and England
- found differences within variability of tone lengths (nPVI)

$$\mathrm{nPVI} = \frac{100}{m-1} \times \sum_{k=1}^{m-1} \left| \frac{d_k - d_{k+1}}{\frac{d_k + d_{k+1}}{2}} \right|,$$

Grabe&Low 2002

- higher for English (stress timed), smaller for French (syllable timed) themes
- conclusion: ling features are evident in music
- determined our choice of midi corpora

influence of social context lullabies vs playsongs

- lullabies are sung all over the world
- are recognizable regardless of musical culture (Trehub, Unyk, & Trainor, 1993)
- are rated as “simple”, compared to AD*-songs
- carry similar features like ID*-speech (Falk, 2011a+b)
- yet the musical features that make up an ID-song have not been thoroughly investigated yet

* AD: adult directed; ID: infant directed

Method

- 4 corpora of child songs
  - obtained from freely available midi collections (mamalisa.com) and songbooks
  - resemble rhythmic classes (Dauer 1983)

- stress timed German
- syllable timed Spanish
- mora timed Japanese
- unclassified Korean

- all composed in western tonal music

Analysis

- midi files have been segmented into melodic phrases by native speakers of the respective language (-Korean)
- melodic phrase determined upon text distribution (verse) or personal intuition
- analyzed in MATLAB with midi toolbox (Eerola&Toiviainen 2004)
- all files transposed to c-major to compare pitch distribution

Amount of Songs per Collection

		Song Class		
		Lullaby	Playsong	Total
	German	70	59	129
	Japanese	26	46	72
	Korean	2	40	42
	Spanish	6	67	73
Total		104	212	316

Results 1: Universal Features?

	German	Japanese	Korean	Spanish
songlength	45,06 (17,279)	49,63(29,3)	43,2 (19,90)	46,8 (24,310)
no of phrases/song	~6	~6	~6	~6
ambitus	11,78 (2,6)	10,99 (3,5)	10,57 (3,6)	10,6 (2,76)
notedensity_sec	2,07 (0,66)	2,35 (0,6)	2,3 (0.6)	2,6 (0,5)
nPVI	32,1 (15,6)	37,9 (25,7)	37,4 (18,7)	31, 1 (13,0)

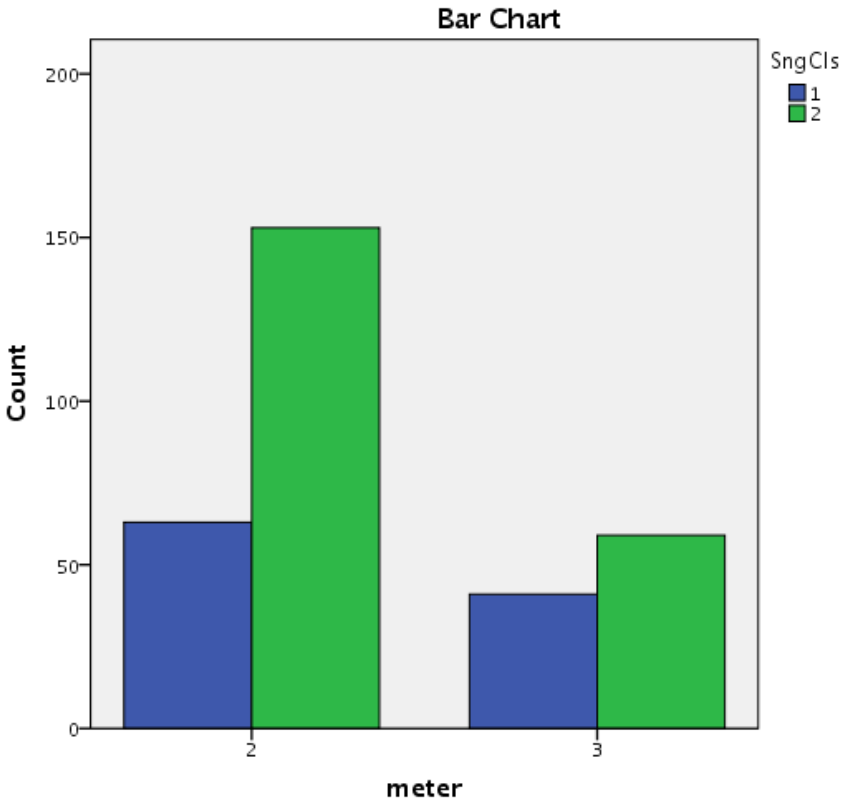
mean (SD)

- strong overlapp in gross structure, melodic and rhythmic features
- also apparent from pitch class and intervall distribution, not shown here

Results 2: Influence of ling features?

- not apparent from classical component (nPVI)
- future research?

Results 3: Influence of social context - lullabies vs playsongs

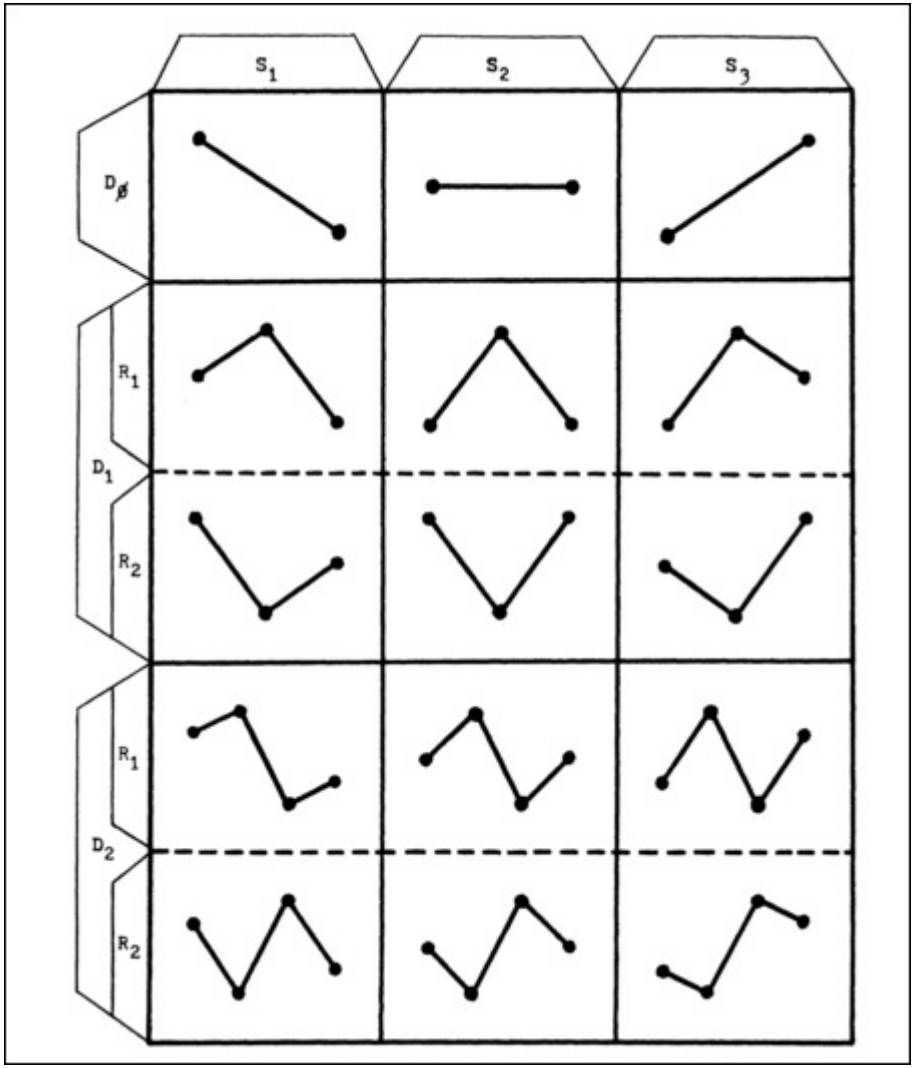


- ambitus
  lullabies (12,18 semitones) > playsongs (10,66 semitones)

- nPVI
- lullabies (37,16) > playsongs (32,29)

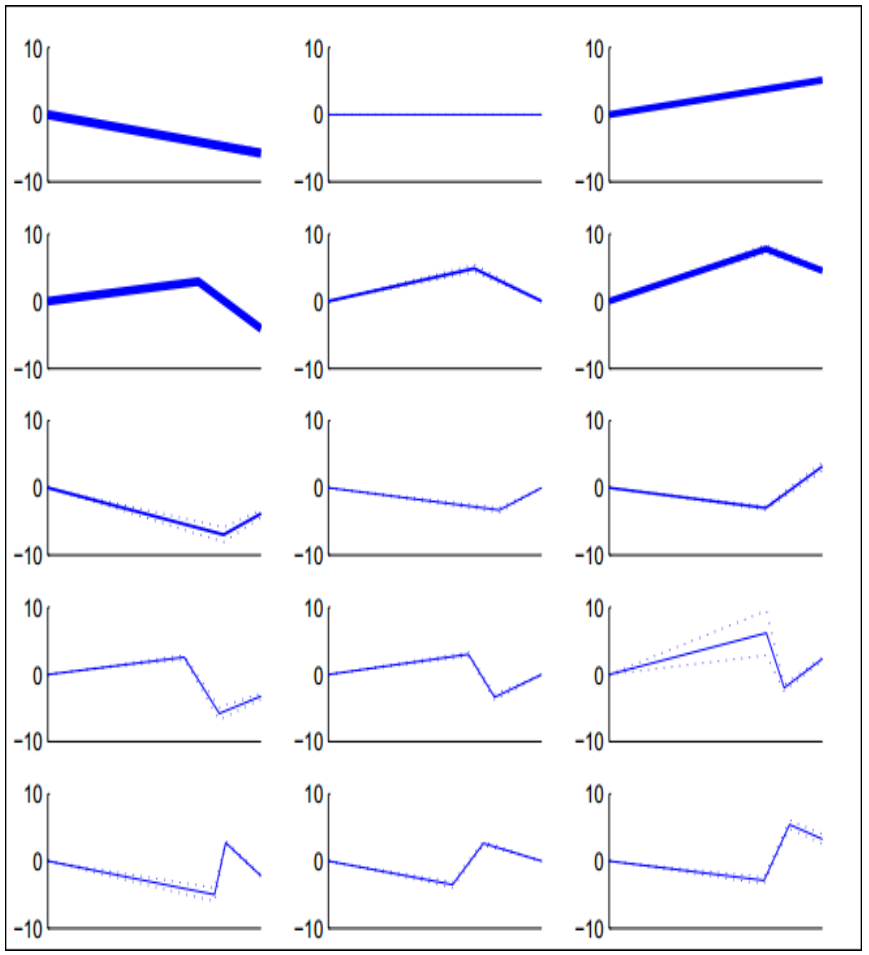
- no significant differences

Contour Types

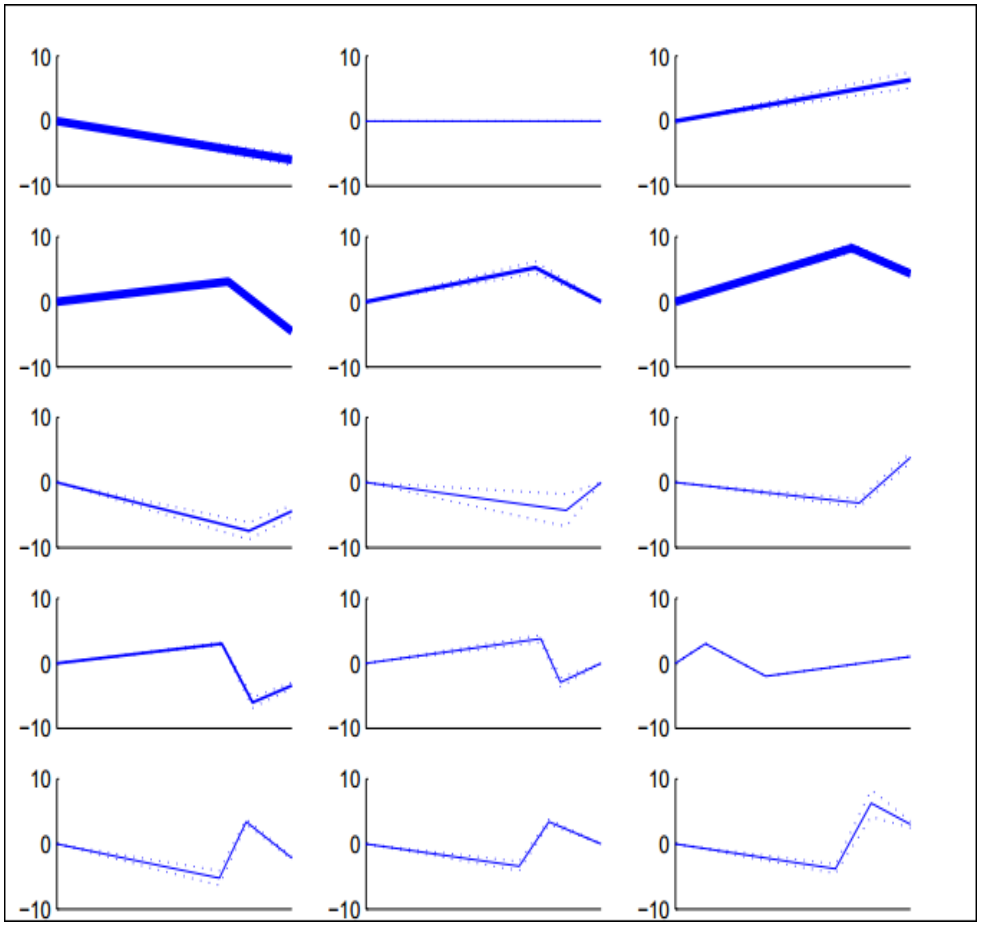


- 15 contour types – derived from Adams 1976
- decreasing, increasing, steady slope, 0 to 2 turning points

Contour Types in Playsongs vs Lullabies

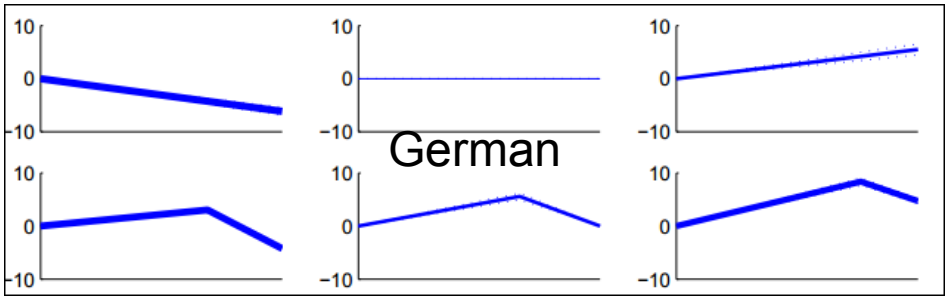


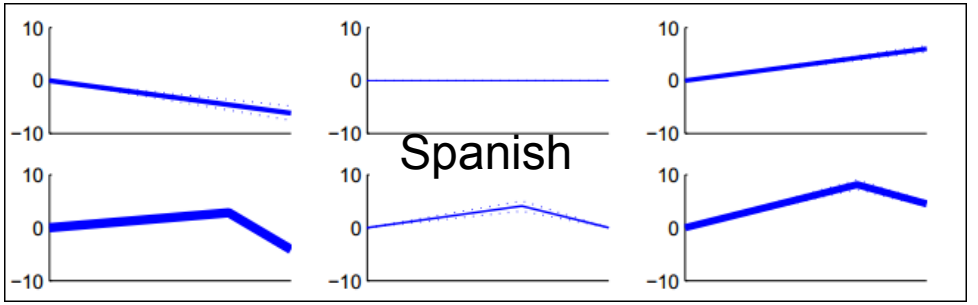
Contour Distribution Playsongs

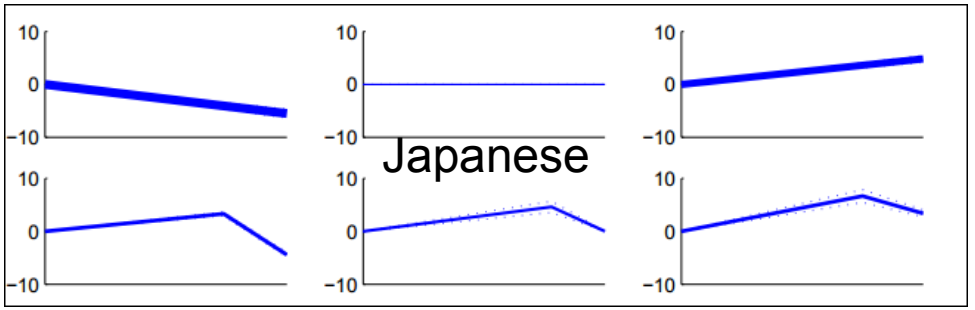


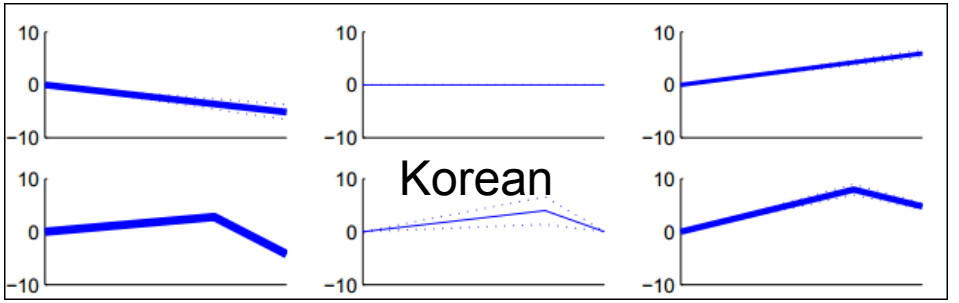
Contour Distribution Lullabies

Contour Types per Language

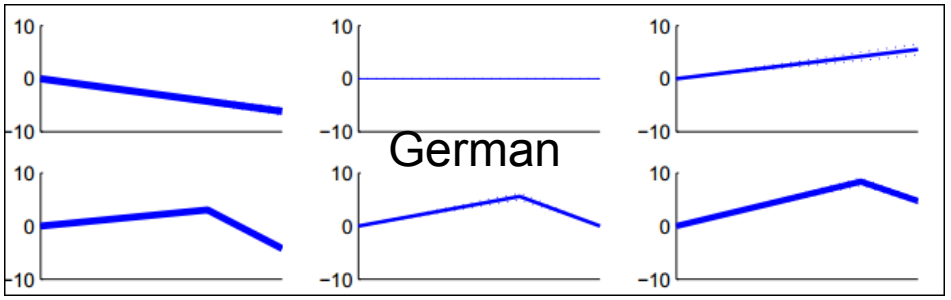


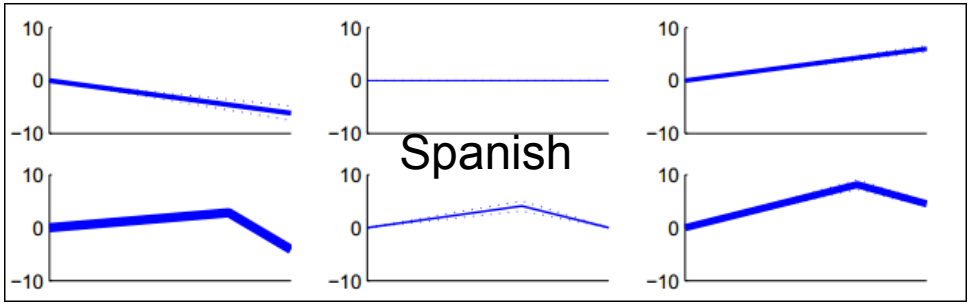


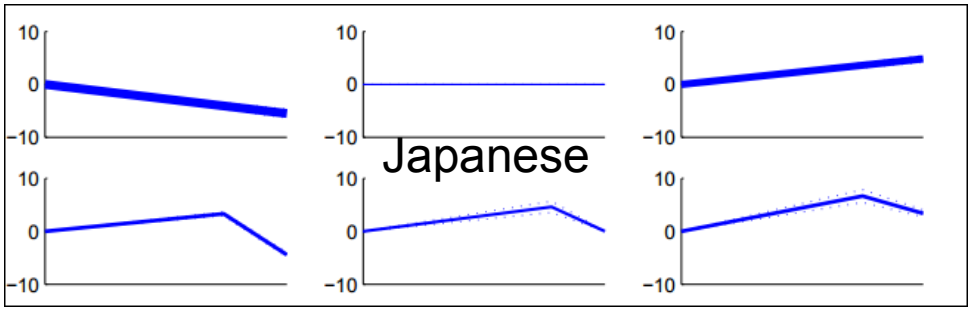


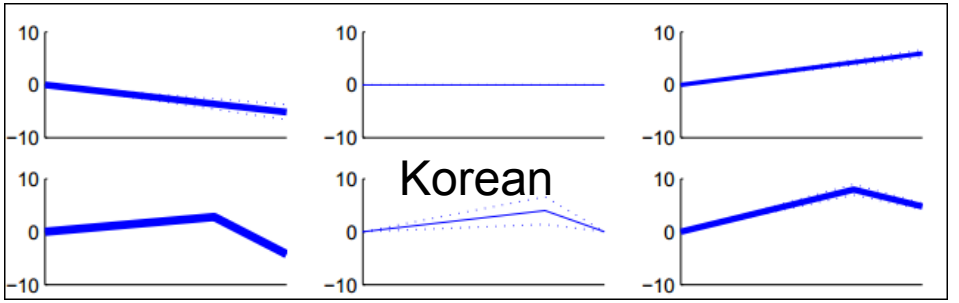


Contour Types per Language









General Discussion

- more similarities than differences between songs
- neither language nor social context cause musical features to vary
- influence of western tonal music
- more in depth analysis

Discussion & Future Research

- do lullabies support language acquisition?
  - acquisition of prosodic contours, other suprasegmental features of L1; Schön, D. et al., 2008, Cognition
  - future research with speech samples

- is there overlap in contour type distribution between music and language?
  - Simone Falk studies (Falk, 2011, a+b)

- maybe the difference between lullaby and playsong becomes only evident in performance of song – differences are in acoustics, not in musical structure (Trainor et al., 1997)

- music interesting to consider when investigating language :)

Thank you for your attention!

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