Speech and Song Classification

Themes Across Childhood and Adulthood

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What do we know about speech and song classification?

- **Classification of auditory stimuli can be varied by manipulating auditory features:** *Pitch height, range, contour, timbre, register, tension and faucal distance differences impact classification of auditory stimuli as "speech" or "song" (Merrill & Larrouy-Maestri, 2017)*
- **Speech and song are characteristically different in various domains:** *There are innate functional, structural and affective and acoustic differences between speech and song as auditory stimuli (Jackendoff, 2008)*
- **There is an established acoustic continuum between "speech" and "song":** *The speech-to-song illusion involves repetitions of a spoken phrase, and researchers have found that at some point, classification by participants changes to song, indicating stimuli ambiguity (Deutsch et al., 2011)*

What don't we know about speech and song classification?

- Beyond acoustic features, researchers have yet to understand what roles other characteristic differences between speech and song might play in guiding participant knowledge and classification

Objective

- Perform an exploratory analysis of the potential factors involved in speech and song classification in both children and adults
- Results can be used to guide future studies on specific

Participants

- A total of 243 participants (82 adults, age 18-64; 51 children, age 4-17) completed the online survey, approved by the Ethics Review Board of Western University and indicated consent
- Data from 70 child and 40 adult participants was excluded due to a failure to complete the survey
- 51 children (*M* = 9.39; 27 females, 23 males, 1 undisclosed) and 74 adults (mean not available as age ranges only were collected; 31 females, 41 males, 2 undisclosed) were included in the final analysis

Procedure and Task

- Survey data previously collected via Qualtrics was used
- Survey consisted of 133 questions, including demographics and questionnaire, perception and music preference subsections. Both short answer and multiple choice questions were included.

References

Deutsch, D., Henthorn, T., & Lapidis, R. (2011). Illusory transformation from speech to song. The Journal of the Acoustical Society of America, 129(4), 2245–2252. https://doi.org/10.1121/1.3562174

Jackendoff, R. (2009). Parallels and NONPARALLELS between language and music. Music Perception, 26(3), 195-204.https://doi.org/10.1525/mp.2009.26.3.195

Merrill, J., & Larrouy-Maestri, P. (2017). Vocal features of song and Speech: Insights From Schoenberg's Pierrot Lunaire. Frontiers in Psychology, 8. https://doi.org/10.3389/fpsyg.2017.01108

Thematic Analysis

- Responses from two questions were used for a thematic analysis
  Q3) "What is the difference between music and language?"
  Q4) "What are the sound features, or the physical properties of sound, that differ between speech and song?"
- Responses were first freely coding (i.e. taking notes on potential codes within each response)
- This process was repeated to refine the granularity of codes, and seek commonalities between adult and child datasets
- Eight higher level themes were identified based on these codes

Aesthetics: Qualities associated with one's appreciation and/or admiration of music, language, speech and/or song (for example, **"music is beautiful"**, or **"I like music"**)
Acoustic differences: Acoustic properties have been found to differ between speech and song. Acoustic differences were reported in several acoustic parameters such as **loudness**, **pitch frequency** & **rhythm**.
Composition/structure: Speech and song have differences in their physical make-up and structure (for example, **"music has notes"**, **"language has words"**)
Functional role: Speech and song have different intended utility that vary based on an individual's circumstances (for example, **"language for communication"**)
Realization: Differences in the contextual factors associated with usage of either music, language, speech or song (for example, **"music involves instruments"** or "**singing**")
Cognitive (abstract) aesthetics: Conceptual factors and abstract ideation related to music, language, speech or song (for example, **"music is universal"**)
Concrete: Typically used by younger children and representing an early developmental state, concrete codes are those in which direct correlations are made between the various auditory concepts discussed (i.e. **"music is singing"** or **"language is talking"**) and the properties they hold, such that they are viewed as one in the same.
Other: Codes that did not fit into one of the aforementioned higher level themes.

Results

- **Adult responses to Q3 highlighted the Function, Cognitive and Realization themes (Table 1) as important to participants' understanding, whereas child responses highlighted the Concrete, Function, Realization and Acoustics themes (Table 2)**
- **Adult responses to Q4 highlighted the Acoustics, Realization, Structure and Function (Table 3) as important to participants' understanding, whereas child responses highlighted the Acoustics, Cognitive and Concrete higher- level themes (Table 4)**

	Aesth-etics	Acoustics	Structure	**Function**	**Realization**	**Cognitive**	Concrete	Other
Proportion of comments per theme	0.07	0.28	0.16	**0.68**	**0.30**	**0.36**	0.16	0.11
Proportion of codes per theme	0.02	0.13	0.06	**0.39**	**0.15**	**0.15**	0.06	0.03

Table 1. Thematic analysis of adult participant (n = 74) differentiation of music and language

	Aesth-etics	**Acoustics**	Structure	**Function**	**Realization**	Cognitive	**Concrete**	Other
Proportion of comments per theme	0.10	**0.24**	0.12	**0.43**	**0.24**	0.16	**0.51**	0.18
Proportion of codes per theme	0.04	**0.10**	0.04	**0.24**	**0.13**	0.06	**0.33**	0.06

Table 2. Thematic analysis of child participant (n = 51) differentiation of music and language

	Aesth-etics	**Acoustics**	**Structure**	**Function**	**Realization**	Cognitive	Concrete	Other
Proportion of comments per theme	0.04	**0.84**	**0.25**	**0.25**	**0.33**	0.18	0.00	0.10
Proportion of codes per theme	0.01	**0.54**	**0.10**	**0.10**	**0.15**	0.06	0.00	0.04

Table 3. Thematic analysis of adult participant (n = 74) understanding of sound feature differentiation between speech and song.

	Aesth-etics	**Acoustics**	Structure	Function	Realization	**Cognitive**	**Concrete**	Other
Proportion of comments per theme	0.14	**0.47**	0.18	0.18	0.08	**0.35**	**0.22**	0.08
Proportion of codes per theme	0.06	**0.36**	0.09	0.12	0.04	**0.20**	**0.10**	0.04

Table 4. Thematic analysis of child participant (n = 51) understanding of sound feature differentiation between speech and song..

Discussion

- **These findings provide insight into the potential thematic concepts recruited by individuals of varying ages during speech and song classification**
- **Future studies can work to manipulate the presence or degree of these themes to assess influence on classification**

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