The Effects of Personal Song Meaning, Singer Gender and Musical Training on Spontaneous Facial and Head Movement

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Abstract

Singing is typically regarded in terms of acoustics and aesthetics; however, bodily movement often accompanies it. The present study explored the facial motor concomitants of singing as a function of personal meaning of song, level of musical training and gender of the singer. An 18-item facial movement scale was developed for the study; 4 judges rated performance by 12 singers of both a favourite and an assigned song (*Brother John/Frère Jacques*). Ratings on the majority of the items were influenced by one or more of the three variables, recommending the viability of this approach for future studies of singing and gesture.

Introduction

Purpose

To examine the complex relationship between facial expression, body movement and singing.

Variables Investigated

Meaningfulness of song, gender of singer, level of music training

Research Questions

1. Will singing a requested song (*Brother John*) as opposed to a self-selected (Favourite) song produce more facial expression and body movement?

2. Will gender of singer influence the amount of facial expression and body movement?

3. Will music training influence the amount of facial expression and body movement?

Past research

Thompson & Russo (2007):
Demonstrated that facial and head movement can communicate melodic information: In the absence of auditory sound, participants were able to differentiate the size of sung intervals solely based on changes in the facial expressions and head movements of singers.

Thompson, Russo & Livingstone (2010):
Both facial expressions and head movements played an important role in the perception of sung intervals and pitch, even when audio stimulus is present, indicating that audio and visual information work together to influence the perception of melodic information.

Russo, Sanstrom & Maksimowski (2011):
While observing vocalists performing sung intervals, as sound quality decreased, participants' gaze averted to the vocalist's mouth. However, as song quality improved, participants' gaze moved to the vocalist's eyes.

Juslin, Liljeström, Laukka, Västfjäll, & Lundqvist (2011):
The majority of people experience an emotional response to music and music that is linked to a personal memory is more likely to induce an emotional response.

Ekman, Friesen, & Ancoli (2001):
Facial expressions provide information regarding emotional experience, thus the two are related.

Research Hypotheses

1. Self-selected song → increased movement

2. Females → increased movement

3. Musicians → increased movement

Methods and Materials

Participants (N = 12)

- 3 music and 3 non-music females
- 3 music and 3 non-music males
- Mean age = 20.75 years (SD = 1.71)

Group	Vocal Training (Years)
Female Musicians	4.33
Male Musicians	1.25
Female Non-musicians	0
Male Non-musicians	0

Table 1. Musicians versus non-musicians years of vocal training

Apparatus

AIRS Test Battery of Singing Skills (Cohen et al., 2009; Pan & Cohen, 2012)

Airs Test Battery of Singing Skills										
#1 Opening Conversation	#2 Brother John	#3 Repeat Sentence	#4 Minor third song	#5 Voice range	#6 Favorite song	#7 Music elements	#8 Continue a song	#9 Composition to a picture	#10 Unfamiliar song	#11 Tell a story to a picture

Figure 1. AIRS Test Battery of Singing Skills

A custom Movement Scale of 18 Items (derived from: Ekman, 2002; see examples below in Figure 2)

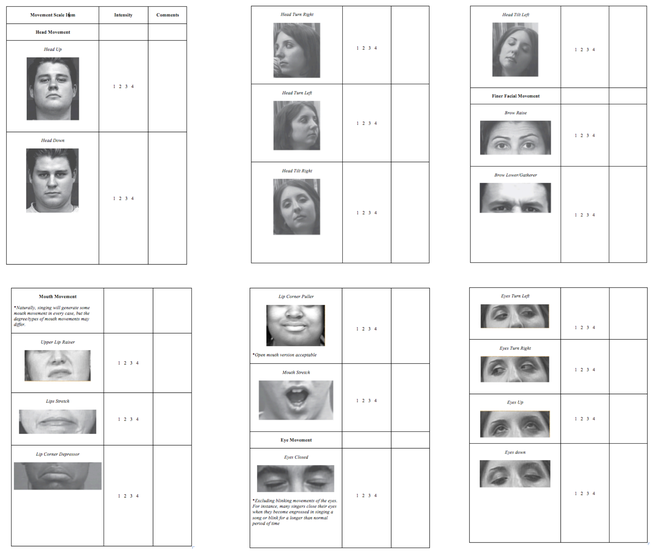

Figure 2. Movement Scale Item

Procedure

- 12 Participants completed (a) the automated AIRS Test Battery, which was audio and video recorded (~30 min duration), including singing *Brother John* before and after singing a familiar song (b) a Singing, Music and Language Background Survey (~5 min)
- 4 judges (university students) using the Movement Scale Items, analyzed the video data of 3 song conditions: singing of Brother John, singing the familiar song, and singing Brother John (again)

Results

Analysis of Coder Reliability

- Inter-rater reliabilities between the 4 judges for the 18 movement scales for each of the 3 song conditions were calculated. Those with a Cronbach's Alpha > .70 were considered reliable. This led to the inclusion of 15 scales for further analysis.

Analysis of Movement Scale Items

- Means were calculated for each movement scale, for all three song conditions, collapsing over gender and musical experience.
- ANOVA with 1 within-subjects factor (3 song conditions – *Brother John* initial, own song, *Brother John* reprise) and 2 between groups factors of gender and musical training (2 levels each) was conducted on each of the 15 movement scales.
- Sample results are shown in Figure 3a and b.

Movement Scale Items influenced by variables

- Head tilt left, lip corner puller, mouth stretch, eyes down, eyes up, eyes turn right, eyes turn left, and eyes closed.

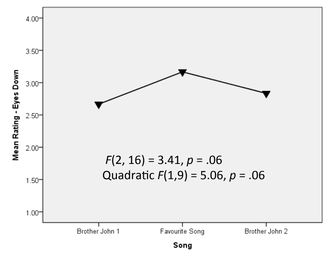

Figure 3a. Mean ratings for the *Eyes down* scale item as a function of song.

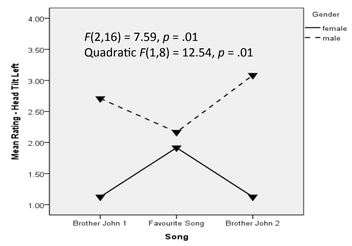

Figure 3b. Mean ratings for the *Eyes down* scale item as a function of song.

Discussion

Song (Brother John vs self-selected song)

- Self-selected → increased movement
- Expected: looking down more for self-selected song
- Unexpected: looking up, looking right, opening mouth, and smiling

Gender

- Females → greater movement
- Expected: looking down and left
- Unexpected: tilting head left

Musical Training

- Musicians → increased movement
- Expected: looking up, looking right and mouth opening

Conclusions

In response to the three questions posed:

1. The expected quadratic pattern was not significantly observed for the main effect of song, but this pattern emerged several times, yet only approached significance.

2. Females and males exhibited varying degrees of movement across song conditions.

3. Musicians and non-musicians differed in their rating patterns on certain movement scales; musicians showed significantly higher ratings on particular movement scales.

This is an exploratory study and provides a basis for future research on facial movement responses in singing.

Acknowledgment

Thanks to Bing-Yi Pan, Bradley Frankland, Ross Dwyer, & Marley MacInnis. The Social Sciences and Humanities Research Council and UPEI supported this research.

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References

Cohen, A. J., Armstrong, V., Lannan, M., & Coady, J. (2009). A protocol for crosscultural studies of singing. New York Academy of Sciences.
Ekman, P., Friesen, W. V., & Ancoli, S. (2001). Facial signs of emotional experience. In W. G. Parrott (Ed.), *Emotions in Social Psychology: Essential Readings* (pp. 255-264). New York, NY US: Psychology Press.
Ekman, P., Friesen, W.V., & Hager, J.C. (2002). Facial Action Coding System. Salt Lake City, UT: A Human Face.
Juslin, P. N., Liljeström, S., Laukka, P., Västfjäll, D., & Lundqvist, L. (2011). Emotional reactions to music in a nationally representative sample of Swedish adults: Prevalence and causal influences. *Musicae Scientiae*, *15*(2), 174-207.
Pan, B-Y, & Cohen, A.J. (2012). The AIRS Online Test Battery of Singing Skills. In A.J. Cohen & F.A. Russo (Chairs), New test instruments to study singing: Perception, production, and emotion. Symposium conducted at the Annual Meeting of the Society for Brain, Behaviour, & Cognitive Science, Kingston, ON.
Russo, F. A., Sanstrom, G. M., & Maksimowski, M. (2011). Mouth versus eyes: Gaze fixation during perception of sung interval size. *Psychomusicology: Music, Mind & Brain, 21*(, 98-107.
Thompson, W.F., & Russo, F. A. (2007). Facing the music. *Psychological Science, 18*(9), 756-757.
Thompson, W., Russo, F. A., & Livingstone, S. R. (2010). Facial expressions of singers influence perceived pitch relations. *Psychonomic Bulletin & Review*, *17*(3), 317-322.

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