Dataset documentation: Listening study

Manuscript: A closed loop, music-based brain-computer interface for emotion mediation

Author: Stefan Ehrlich <stefan.ehrlich@tum.de>

Last revised: 18.09.2018

Citation: Ehrlich, S. K., Agres, K. R., Guan, C., & Cheng, G. (2019). A closed-loop, music-based brain-computer interface for emotion mediation. *PloS one*, *14*(3), e0213516.

URL/DOI: http://dx.doi.org/10.1371/journal.pone.0213516

Introduction

The purpose of this study was to investigate whether participants' affective responses to the generated musical patterns were in accordance with the corresponding valence and arousal settings of the composing algorithm. That is, the listening study was meant to evaluate and validate the functionality of the composing algorithm.

Study protocol

Number of participants: 11

Number of sessions: 1

Protocol of a single session conducted in the following chronological order:

Stage	**Participant task**	**Measurement**	**Duration**
1. Listening	Passive listening to one of 13 excerpts generated with the composing algorithm	n.a.	30 sec
2. SAM-rating	Rating emotional valence and arousal of the previously heard excerpt	Self-assessment manikin scheme (SAM)	~10 sec
Repetition of 1 and 2 for all 13 excerpts presented to the participant in a pseudo randomized order			
3. General assessment	General rating of the presented music stimuli based on several pre-defined questions	Questionnaire	~2 min

1. Stimuli

parameter valence	**parameter arousal**	**corresponding emotional expression**
0	0	sadness
0	0.5	
0	1	anger
0.25	0.25	
0.25	0.75	
0.5	0	
0.5	0.5	neutral
0.5	1	
0.75	0.25	
0.75	0.75	
1	0	pleasantness

1	0.5	
1	1	happiness

2. Self-assessment manikin scheme

After each excerpt, participants were asked to rate his/her experience emotional valence and emotional arousal using two separate 9-point SAM schemes (see Fig 1) with "1" corresponding to negative valence and low arousal, respectively; "9" corresponding to positive valence and high arousal, respectively.

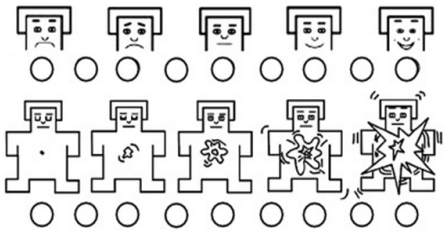

Figure 1: emotional valence (top row), emotional arousal (bottom row)

3. General assessment

Participants were asked to make and overall assessment of the musical excerpts using a 7-point scale (e.g. the music sounded "…artificial vs. natural", in this case a rating of "1" corresponded to "artificial" and a rating of "7" to "natural").

Dataset organization

The data is stored in MATLAB® format (.mat) with a single struct file containing the data of all 11 participants

- *ratings_VAL:* a dataset table with target valence and arousal (columns 1 and 2), followed by each participant's corresponding valence ratings on a 9-point scale for each excerpt (columns 3-13).
- *ratings_ARO:* a dataset table with target valence and arousal (columns 1 and 2), followed by each participant's corresponding arousal ratings on a 9-point scale for each excerpt (columns 3-13).
- *ratings_general:* a dataset table with 6 individual 7-point scale ratings capturing tendency towards either of two opposing extremes of overall assessment of the music stimuli, e.g. "artificial_vs_natural".