

Effects of Acoustic Parameters on the Perception of Ambient Music guiding its Use in Everyday Activities



Gigliotti, M. F.¹, Ben Mustapha, S.¹, Ouadada, K.¹, Lauret, D.¹, & Delevoye-Turrell, Y.²

¹Filboost, Strasbourg, France

²SCALab, Cognitive and Affective Sciences Laboratory, UMR CNRS 9193, University of Lille, France

INTRODUCTION

- **Ambient music** (also **background music**) is a type of musical composition created to immerse the listener in a specific psycho-physiological state.
- Unlike music, ambient music does not involve lyrics, which makes it suitable for use during cognitive tasks^{1,2,3}.
- Despite the numerous playlists available on platforms for mental tasks (i.e., reading, learning), the matter has attracted scant scientific interest.
- Moreover, the **heterogeneity of paradigms and stimuli**, along with **scant description of the acoustic and artistic features** of musical excerpts makes the knowledge on the matter fragmented.

AIMS

Create and validate a bank of ambient music excerpts by :

- 1) Validating the convergence between the composers' intention and individuals' perception
- 2) Understand what emotional and acoustic⁶ features make an ambient music excerpt suited for a specific mental activity

METHOD

Online survey conducted on LabJS and Pavlovia

Participants : 30 (15 males + 15 females), French speaking, mean age: 27.6 years. 77% having no or never had neurological, psychological or neurodevelopmental troubles. 63% had basic or no musical experience (OMSI – item 10^{4,5}).

Stimuli : **10 ambient music excerpts** composed by Filboost® (30 secs extracted from the original 10 mins-compositions. Presented in a random order). The full bank of ambient music stimuli include 100 excerpts, still under evaluation.

Tasks :

1. Rating the degree of **pleasantness**, **arousal** and **valence** of each musical excerpt (on a 1-100 Visual Analog scale)
2. Indicating to what extent the musical excerpt evoked **tension**, **calmness**, **joy** and **sadness** (on a 1-100 Visual Analog scale)
3. Indicating for what activity participants would listen to that specific excerpt : **get motivation**, **get inspiration**, **calm down** and **focus** (Forced-choice question)
4. Answering the Big Five Inventory (BFI - Short version) and the Short Test of Musical Preferences (STOMP - Revised version) (Analysis not reported here)

EXPLORATORY RESULTS

1) Convergence between artists' intention and individuals' perception

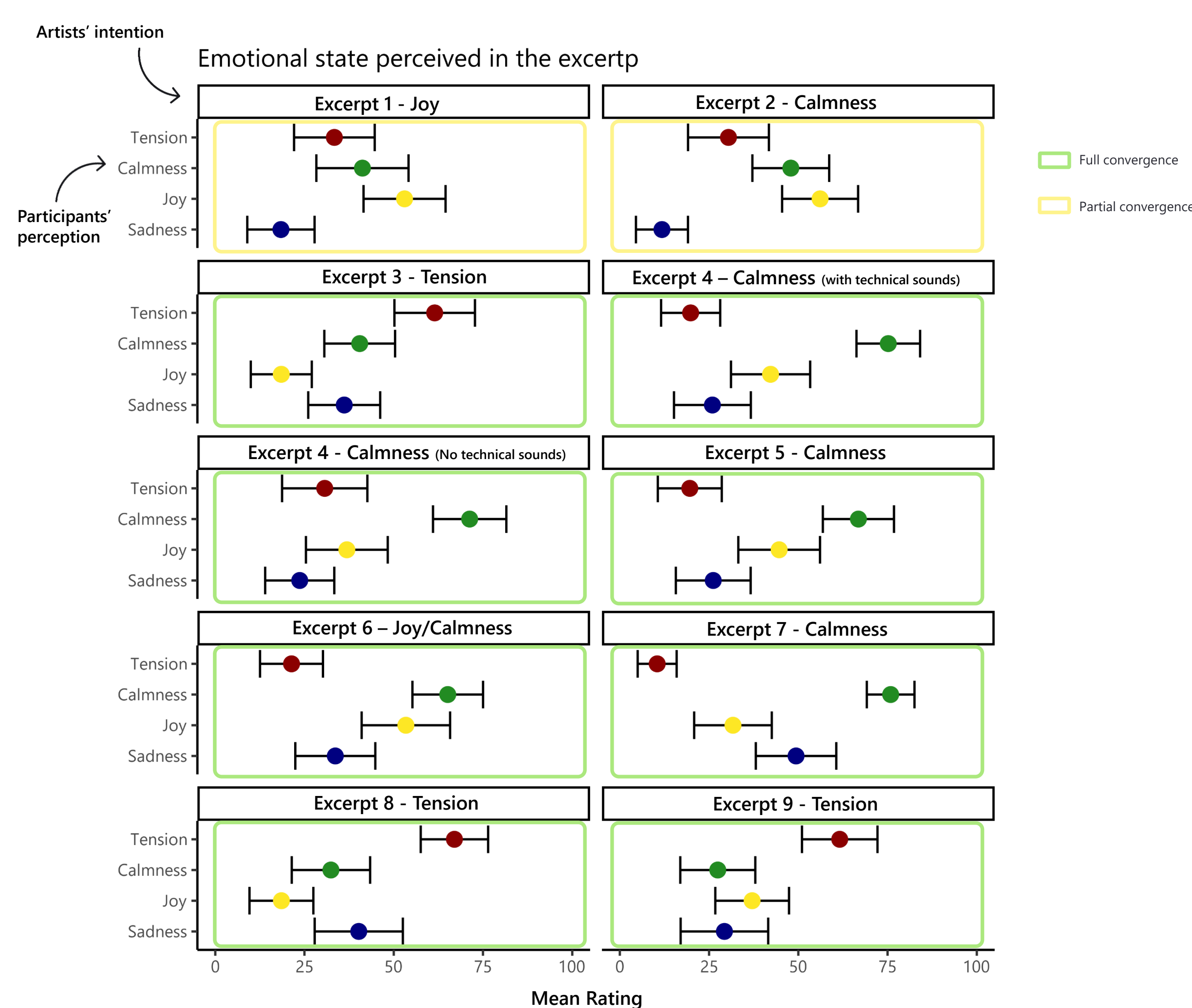


Figure 1. Mean ratings expressing the extent to which tension, calmness, joy and sadness were perceived in the musical excerpt, compared to the original intention of the artists (indicated in sub-plots titles). Points represent mean ratings and error bars 95% Confidence Intervals. Non-overlapping CIs indicate the perception of a single emotion. Overlapping CIs indicate the perception of multiple emotions. Two variants of Excerpt 4 were presented, namely with and without technical sounds (birds sound in the present excerpts selection).

2) Emotional and acoustic features orienting the choice of a musical excerpt for a given mental activity

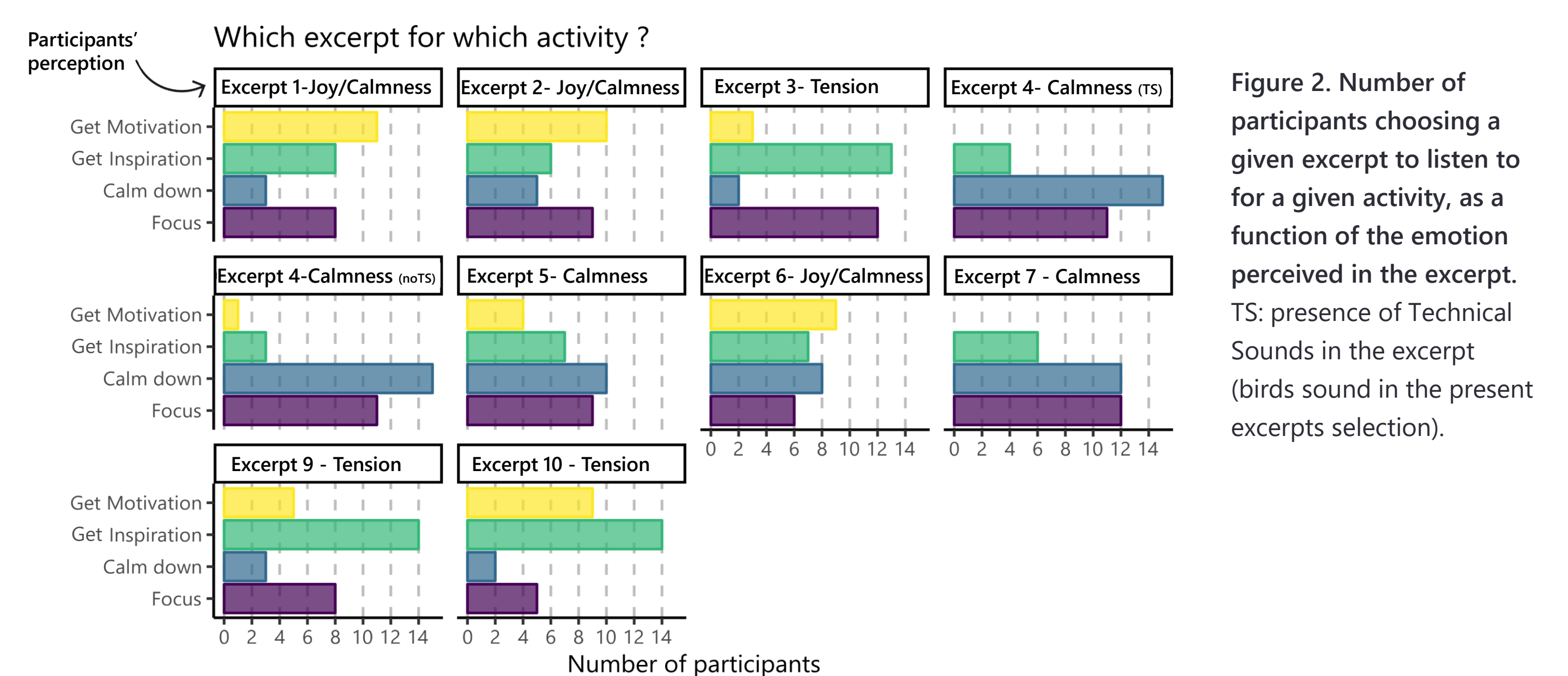


Figure 2. Number of participants choosing a given excerpt to listen to for a given activity, as a function of the emotion perceived in the excerpt. TS: presence of Technical Sounds in the excerpt (birds sound in the present excerpts selection).

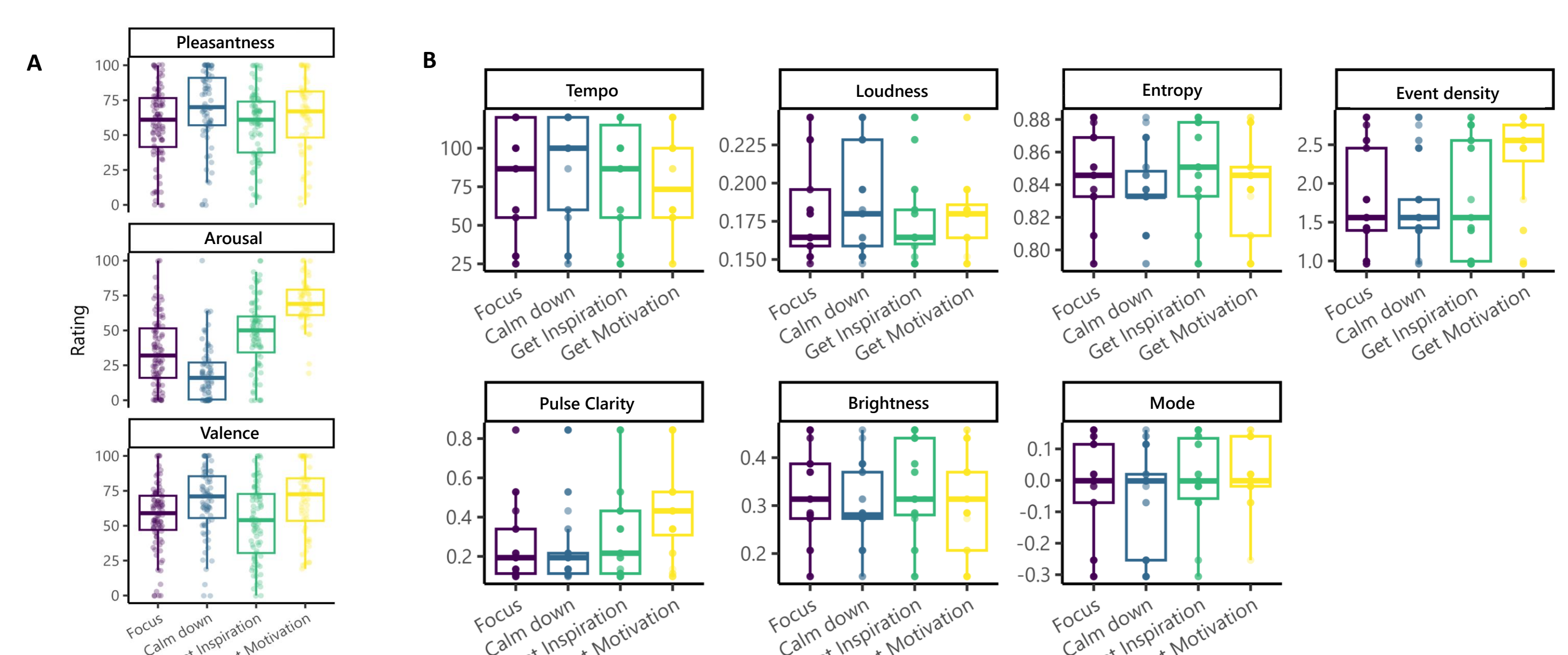


Figure 3. PANEL (A). Boxplots representing median, second and third quartile values for pleasantness, valence and arousal ratings. Dots represent individual ratings of each musical excerpt. PANEL (B). Boxplots representing the median, second and third quartile values for each acoustic parameter. Each dot represents a single musical excerpt. The acoustic parameters were extracted by means of the MIRtoolbox.

CONCLUSIONS

- The composition method adopted by Filboost matches the individuals' perception of ambient musical excerpts. The method takes into consideration both emotional and acoustic features.
- Results show that emotional features and acoustic parameters can be used to predict the choice to listen to a musical excerpt for a given mental activity.
- They encourage to pursuit the validation of Filboost's ambient music excerpts, that are ready to serve as a bank of sonic stimuli available for research testing.

REFERENCES: 1 - Kiss & Linnell (2023). *Psychology of Music*, 51(1), 89-106. 2- Yoo et al., (2022). *International journal of environmental research and public health*, 19(22), 15094. 3- Angel et al. (2010). *Perceptual and motor skills*, 110(3, suppl), 1059-1064. 4 - Ollen (2006). A criterion-related validity test of selected indicators of musical sophistication using expert ratings. In *New York: Oxford University Press*. 5 - Zhang & Schubert (2019). *Music Perception: An Interdisciplinary Journal*, 36(5), 457-467. 6 - Trost et al. (2015). *Social cognitive and affective neuroscience*, 10(12), 1705-1721.



Web App - Musical ambiances for cognitive tasks -
On-demand sonic stimuli composition
(david@filboost.com)

Team : musicians, sound designers, psycho-
acousticians, neuropsychologist, researcher

Poster contact : maria@filboost.com

