The effect of music on software developers' performance during small coding tasks

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Final Presentation

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Overview

- ➔ Motivation
- ➔ Experiment Setup
- ➔ Analysis
- ➔ Expectations and Results
- ➔ Discussion
- ➔ Limitations
- ➔ Summary

Motivation

Why?

63% - 88.2% of participants listen to music at work at least some of the time -> obscure background noises, regulate mood (Barton et al. 2019)

What?

Effect of music on developers performance in programming tasks

How? (Prev.)

Measuring programming task completion, time, and self-reported perception of participants (Barton et al. 2019, Lesiuk 2000 and 2005)

How? (Us)

Measuring EEG data with Muse 2 headband, along with self-perception. Investigating different music styles as well as own choice.

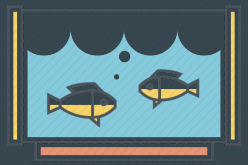
Experiment Setup

Distractive
Focus-Increasing
Own Music
Office Background Noises

4x

Training

Flow?



Interview +
Demographic Survey

Training: Level 1-4
Conditions: 6-7 levels each

9 Questions
7-point Likert scale

2 mins
Measure EEG Baseline

Analysis

Muse

$TEI = \beta / (\alpha + \theta)$
$TDI = \theta / (\alpha + \beta)$

➔ Blink Rate

➔ Task Difficulty (TDI)

➔ **Task Engagement (TEI)**

Interview

➔ Perceived task difficulty
➔ Preferred music condition
➔ Reasons for/against listening to music when coding

Flow
and
Demographics

Results (Participants)

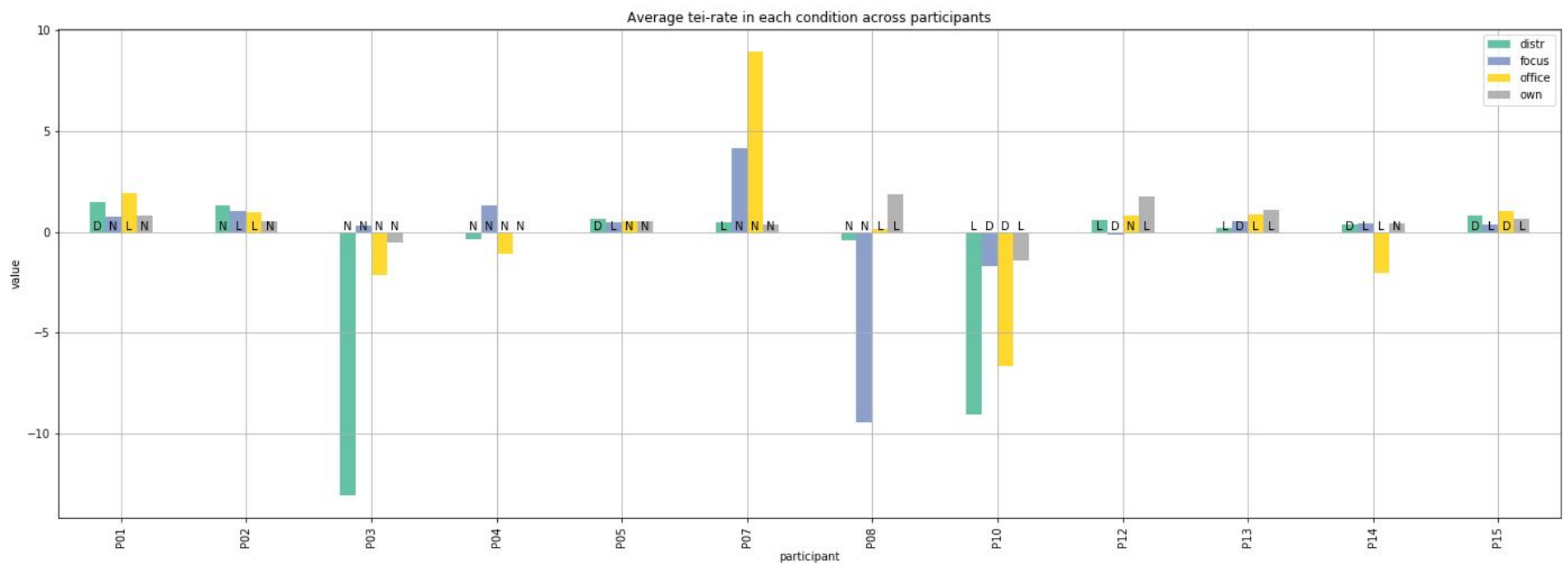
- ➔ 15 participants (12 after data cleaning)
- ➔ 9 frequently listen to music while coding

➔ Thanks for participating!

Expectation

- ➔ “Distracting” and “Office Background” low TEI and Flow score
- ➔ “Focus” and “Own Choice” high TEI and Flow score

Results (EEG)



Illustrative example: RM-ANOVA no significant differences between conditions

Results (Flow)

➔ Highest in “own music” condition

➔ Lowest for “distracting” and “office background”

➔ Higher for “liked” music

Discussion

- ➔ Statistically insignificant
- ➔ Self-perception does not correlate with EEG-results
- ➔ Results very different for each participant → Personality?

RQ 3: *Does the personal music taste of the participants has an influence on the performance?*

Limitations

- ➔ Not all data was analyzed in-depth (time restrictions)
- ➔ Internal Validity:
  - ◆ Programming Tasks:
    - Short, difficult to get into flow
    - Not 100% comparable
  - ◆ Music selection
    - No “extreme” music selected, but music that can be played on mainstream radio
    - No experts in music theory
- ➔ External Validity: Only students and no professionals

Summary

Within-Subjects user study

- ➔ 15 participants
- ➔ EEG measures
- ➔ Perceived flow
- ➔ Interview

- ➔ Results difficult to interpret
- ➔ High variance between participants
- ➔ Future work needed to get more in-depth knowledge