Norway grants

Comprehensive Insights into Psychological Image Quality: Addressing Ecological Validity and Emotional Content

Mikołaj Leszczuk, Kamil Koniuch, Lucjan Janowski, AGH University of Krakow

AGH

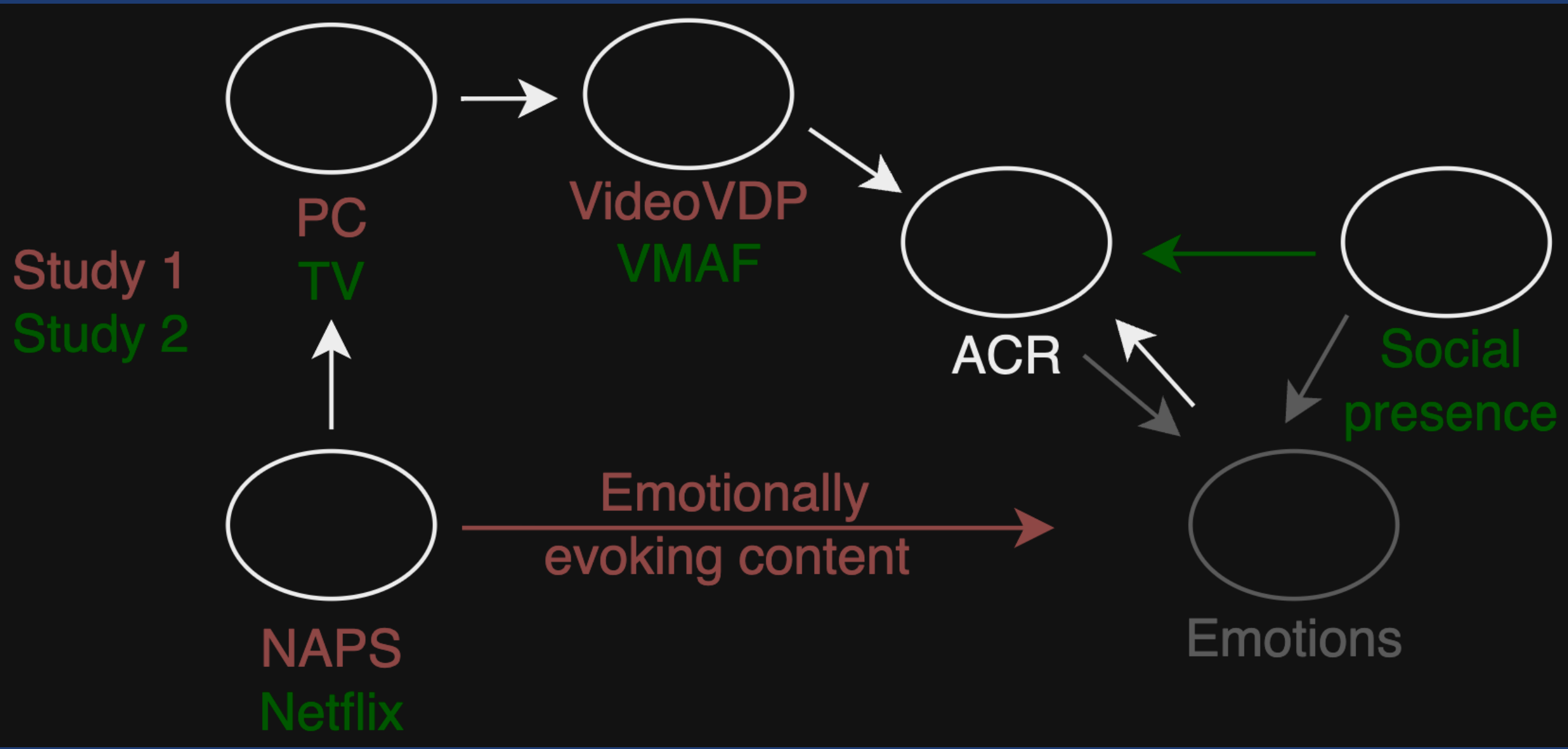
Introduction

QoE measure of the **delight or annoyance** of a customer's experiences with a service.

Introduction

QoE measure of the delight or annoyance of a customer's experiences with a service.

Objective of this studies was to use psychological factors as **independent** variable.


PC
TV
VideoVDP
VMAF
Study 1
Study 2
ACR
Social
presence
Emotionally
evoking content
NAPS
Netflix
Emotions

Study 1: Psychological Image Quality

Source Reference Circuits (SRCs)

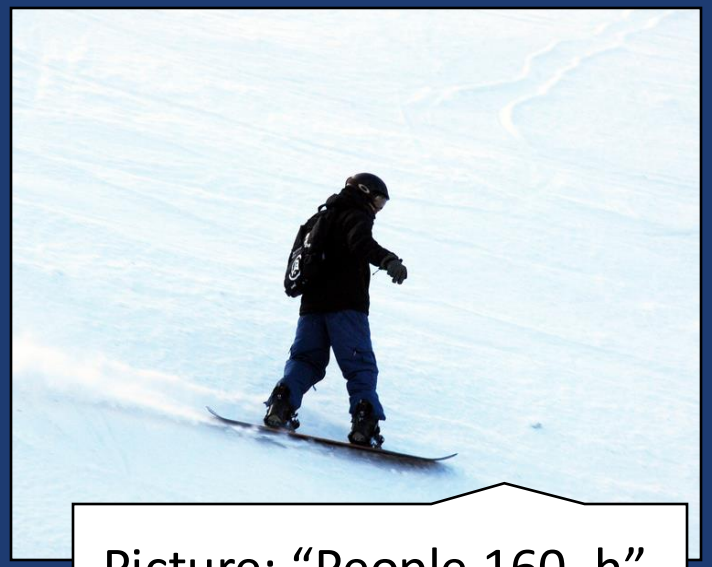
- Nencki Affective Picture System (NAPS) picture database used
- 1,356 high-quality realistic pictures, categorised as: “people”, “faces”, “animals”, “objects” and “landscapes”
- Database providing per-picture ratings covering entire range of 3 psychological variables: valence, arousal & approach/avoidance
- Using a subset of the NAPS database in the “people” category (250 pictures), being one of the most popular categories used in research
- Not removing pictures with potentially graphic, sexual or upsetting content

Hypothetical Reference Circuits (HRCs)

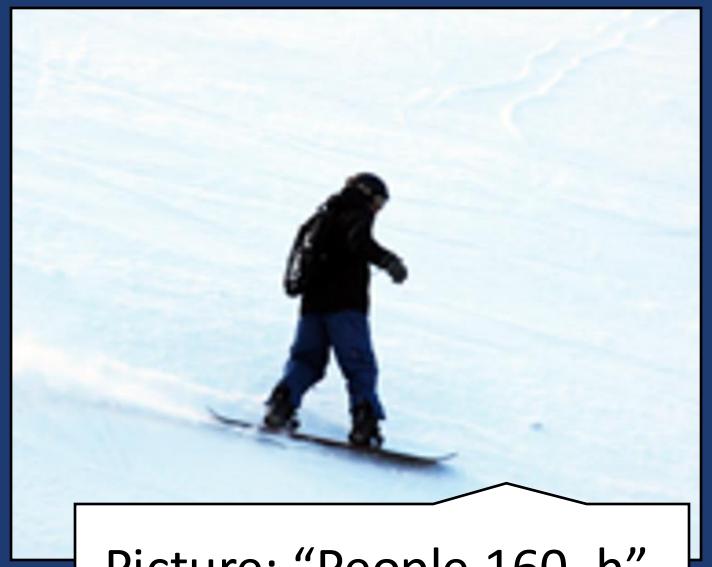
- 7 quality levels with fixed quality metric levels, as shown in Table
- Max quality metric level achieved for SRC image: 10
- The values of the other levels empirically selected
- Aiming at achieving distribution of quality levels being:
  - Widest possible
  - Most uniform

Quality	FovVideoVDP Quality Setting
A	10.000
B	9.825
C	9.600
D	9.350
E	9.050
F	8.600
G	7.750

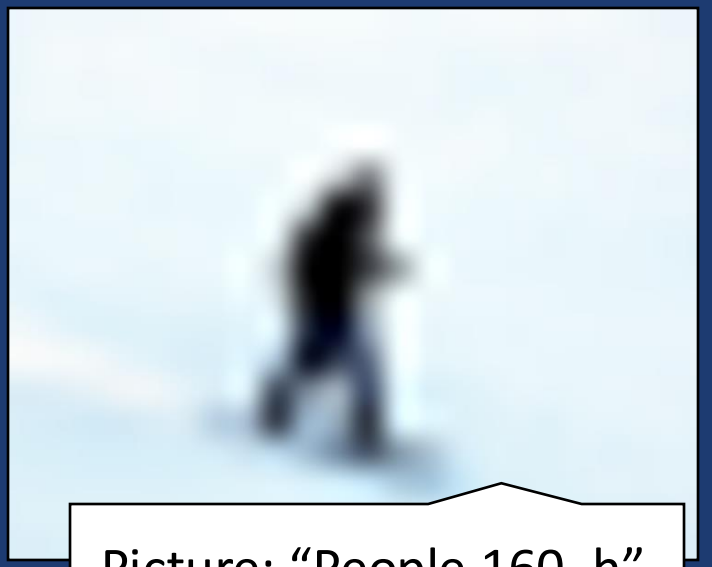
Example Processed Video Sequence (PVS) (Or Actually Processed Picture)



Picture: “People 160_h”, Compression: “A”

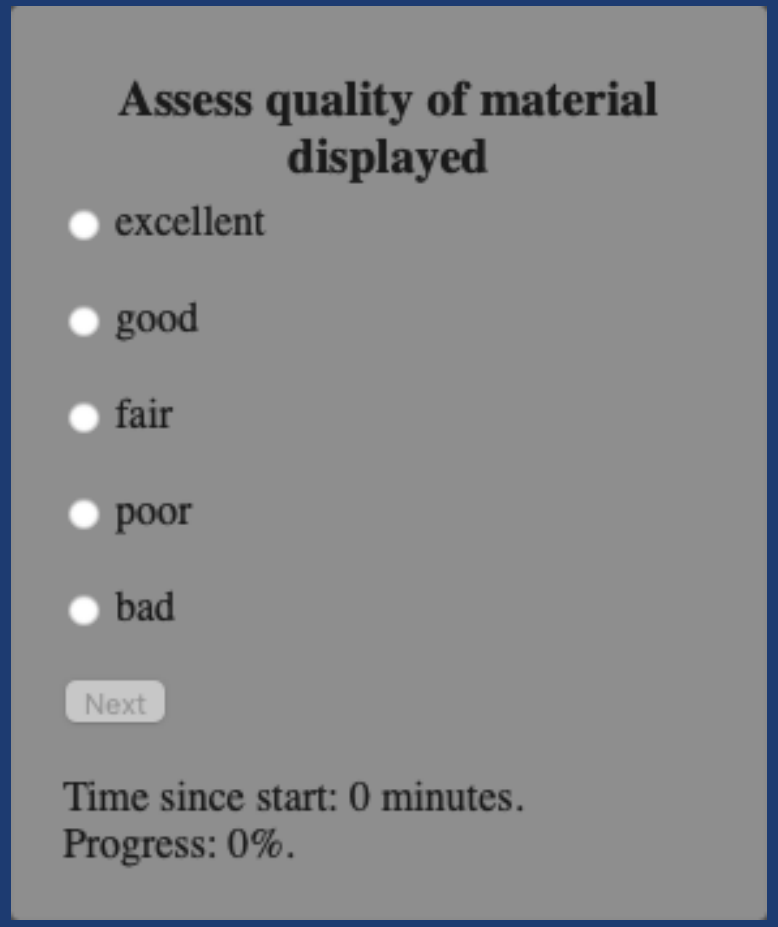


Picture: “People 160_h”, Compression: “D”



Picture: “People 160_h”, Compression: “G”

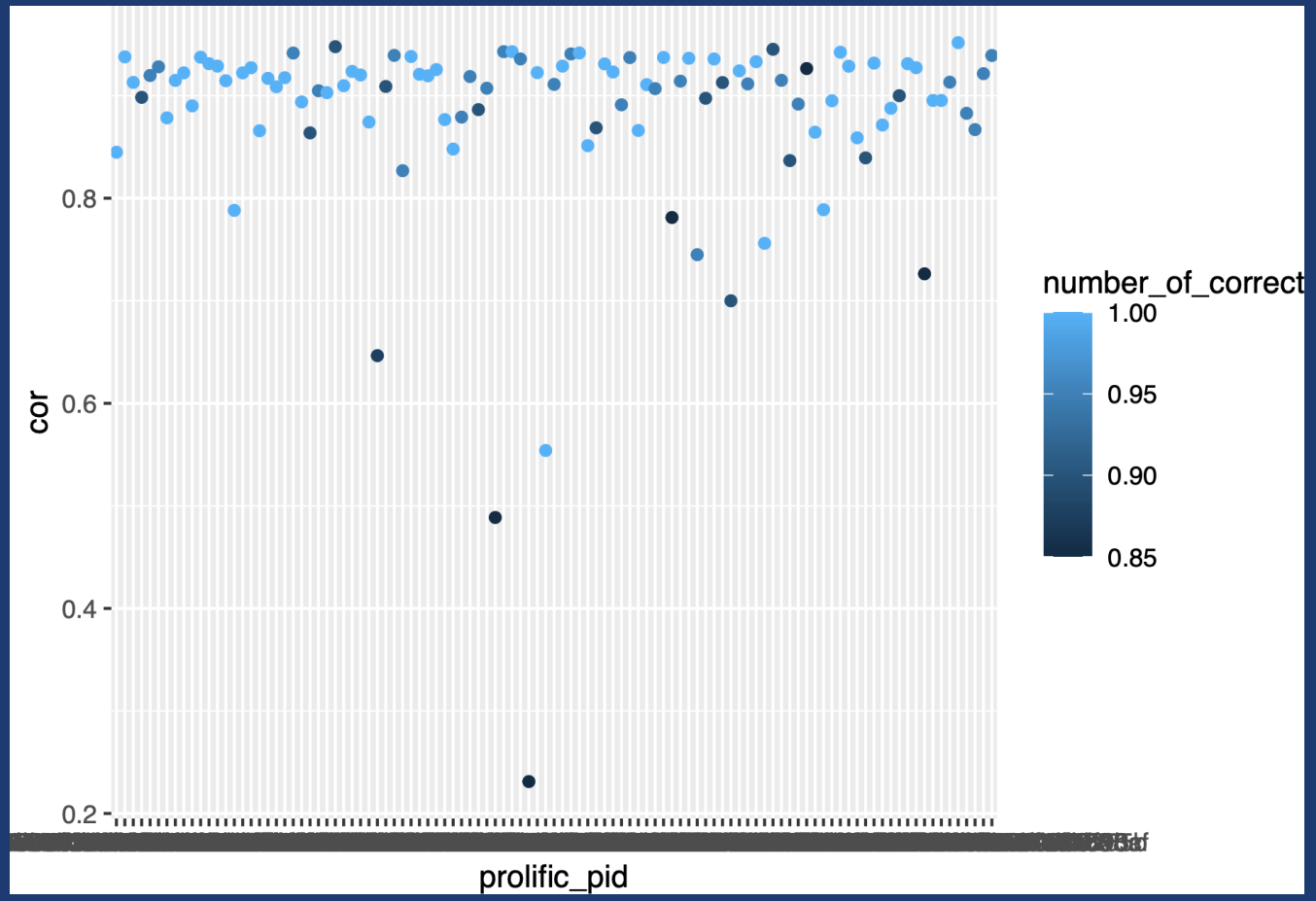
Picture Quality (ACR) as Measured Variable



Psychophysical Experiment – Crowd-Sourcing Platform

- Lack of specialized requirements
- Experiment to be tailored for crowdsourcing
- Participants recruited and compensated through Prolific
- Test group of 115 users participating in experiment
- Experiment carried out remotely
- Participants compensated (£9=$11/hour) for their time

The Vast Majority of Participants Being Not Outliers (ITU-T 0.75 Pearson Correlation Criterion)



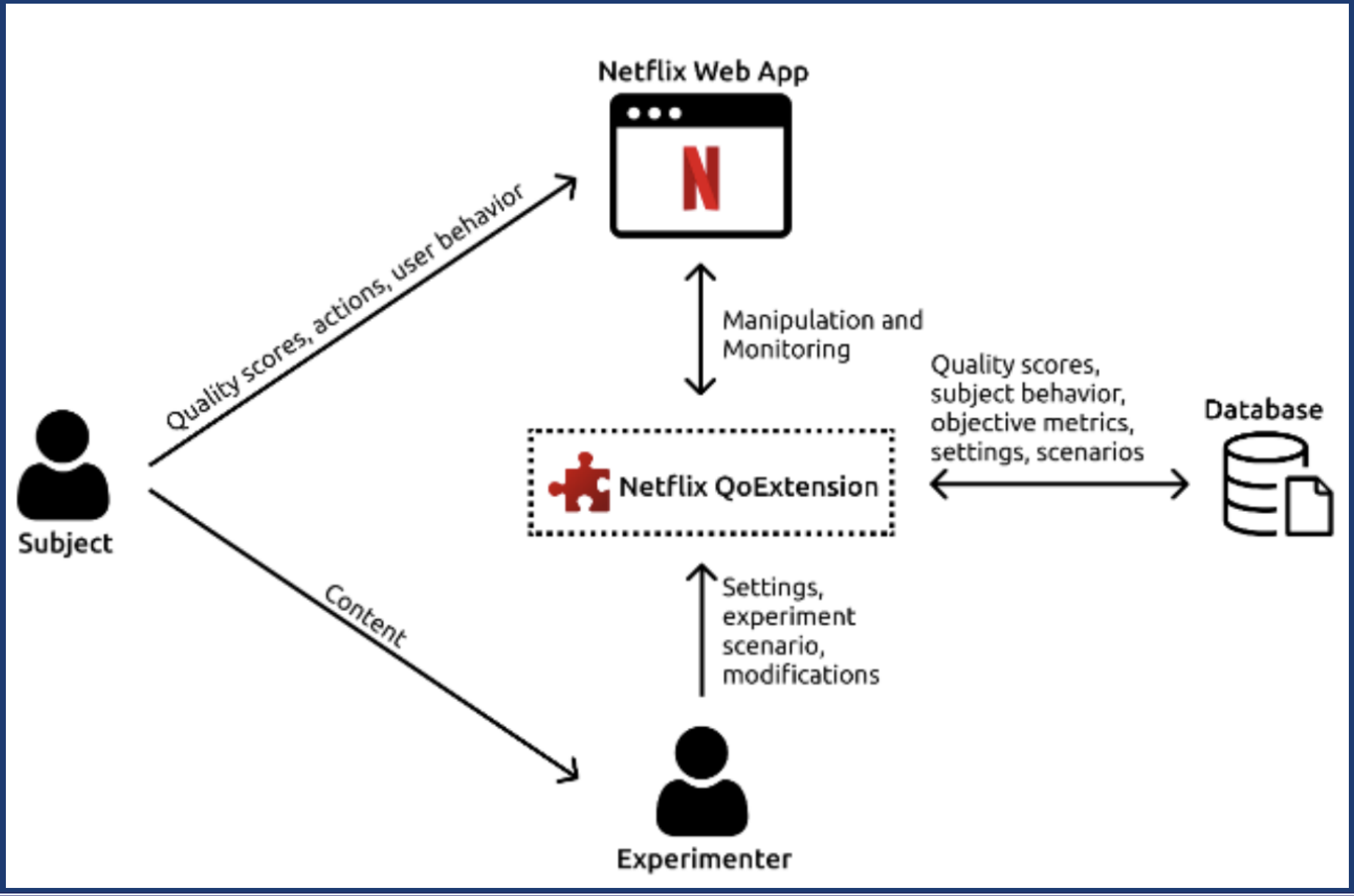
Trapping Questions

- 20 trapping questions asked to filter out inattentive participants
- Examples given on the right
- Up to 3 errors were allowed (agreed a priori)
- Remember that low image quality may make it difficult to answer
- All participants positively verified (no more than 3 errors)!

- “Did the photo show a market?” (Answer: True)
- “Did the photo show a street?” (Answer: True)
- “Did the photo show an artist?” (Answer: True)
- “Did the photo show a garlic?” (Answer: False)
- “Did the photo show pollution?” (Answer: False)

Study 2: Watching with Friends

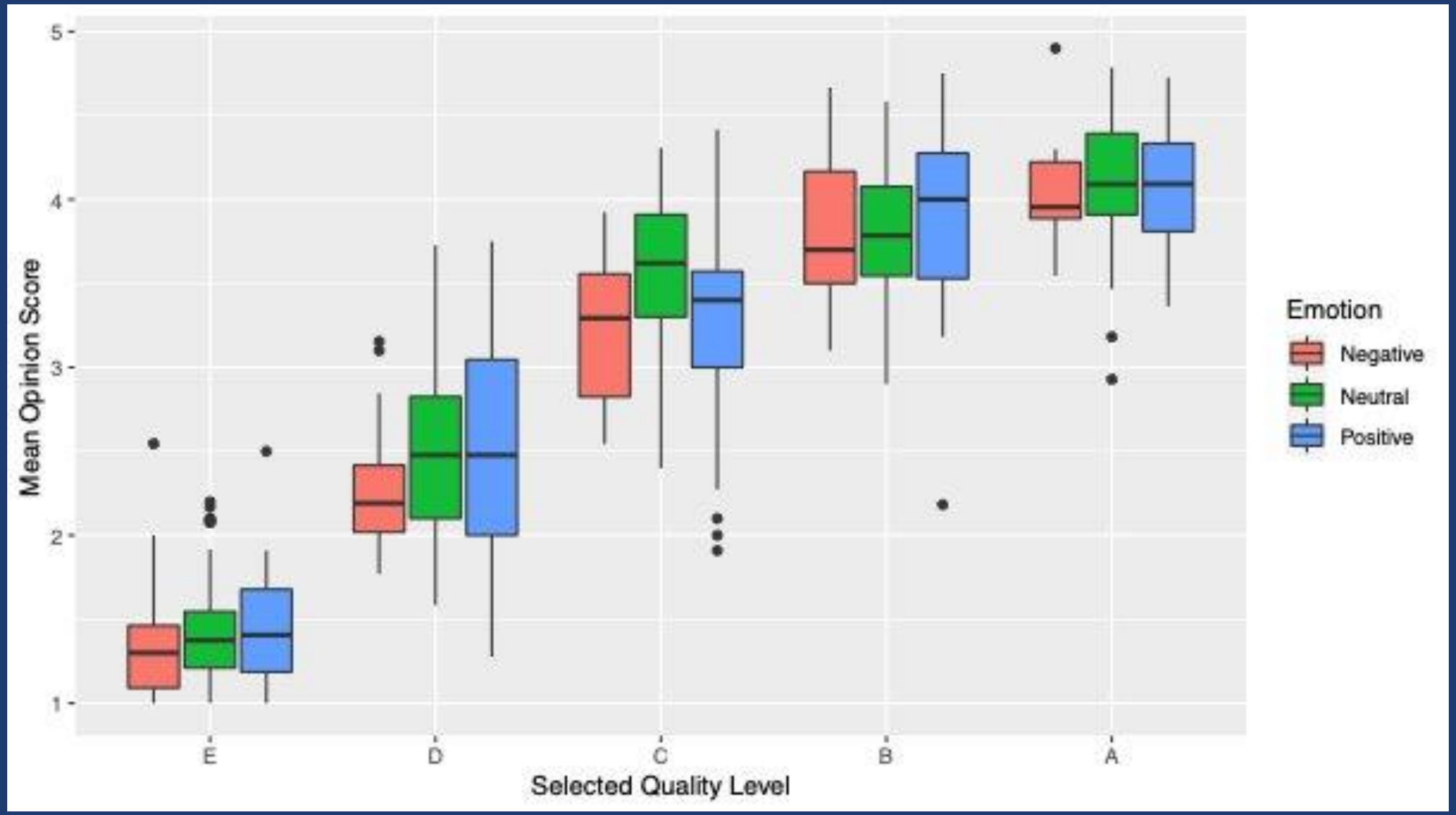
Study 2: Watching with Friends



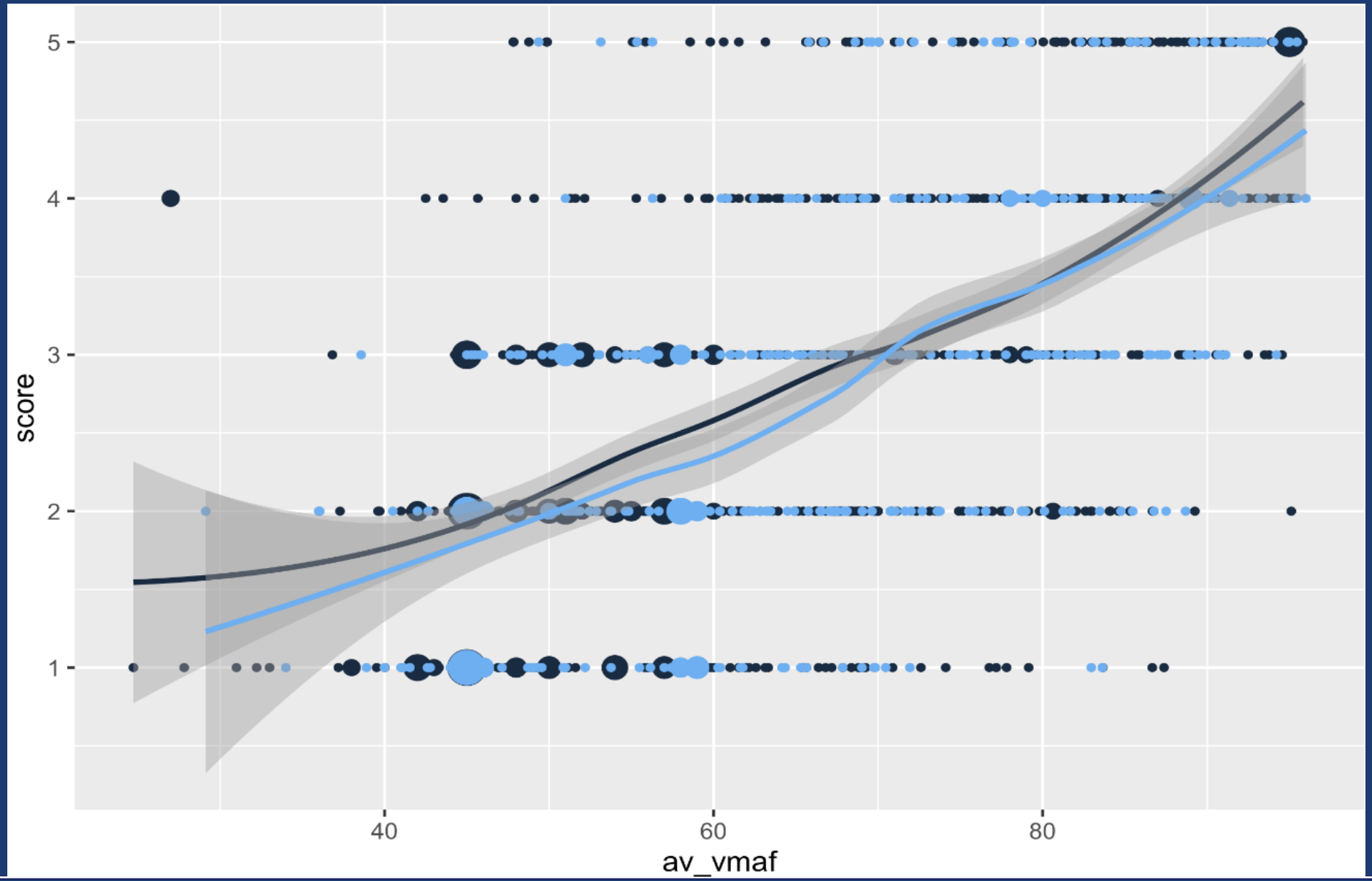
Study Design

- 23 pairs of participants
- 2 series: alone and together
- Scores were obtained every 2.5 minutes
- Content chosen by participants

Study 1 results



Study 2 results



Conclusions

- **Observation on Effects:**
  - Effects are lower than initially expected.
  - Measuring QoE with ACR scale neglect influence of emotional factors.
- **Insights on Metric:**
  - Metrics performance is better than anticipated.
  - This can allow for QoE studies focused on emotions and behaviour.

Recommendations

- **For ACR:**
  - Use this scale only for perceptual studies.
  - For studies measuring other aspects of QoE use metrics as approximation.
- **QoE future studies:**
  - Use behavioural or emotional measures.

Norway grants

Thank you

„Towards Better Understanding of Factors Influencing the QoE by More Ecologically-Valid Evaluation Standards”; acronym TUFIQoE registration number 2019/34/H/ST6/00599 obtained funding as part of the GRIEG Polish-Norwegian competition research projects financed from the Norwegian Financial Mechanism for 2014-2021

Mikołaj Leszczuk, AGH, mikolaj.leszczuk@agh.edu.pl
Kamil Koniuch, AGH, kamil.koniuch@agh.edu.pl
Lucjan Janowski, AGH, lucjan.janowski@agh.edu.pl

NTNU

AGH