
Digital online gaming, emotions, and well-being: A longitudinal study of players 'in the wild'

A Data Management Plan created using DMPTuuli

Creator: Jussi Palomäki

Affiliation: University of Helsinki

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Project abstract:

Regular environmental and social interactions have an impact on psychological and cognitive functions, especially so throughout development and adolescence. These days such interactions for young people have increasingly become digitized and gamified. The long-term effects of involvement in digital environments is under-researched, and it is unknown whether gaming can negatively (or indeed positively) impact emotional well-being and mental health. I propose to use digital online games as model systems to explore how emotions influence well-being in the digital age. I will conduct novel longitudinal 'in the wild' experiments to shed light on what makes digital online gaming rewarding with positive well-being effects, or, conversely, when does gaming lead to negative emotions and reduced well-being. Specifically, I will examine how emotional events (particularly tilting – losing control due to negative emotions) in online poker and Starcraft 2 are manifested via facial emotion expressions, heart rate variability, self-reported experienced emotions, and actual playing behavior; these measures are then linked to self-reported well-being throughout the experiment. Data are collected longitudinally and mostly unobtrusively – but without sacrificing experimental rigor – from players as they play normally in their own homes, using state of the art computer vision techniques and experience sampling methodology. My research will provide much needed ecologically valid evidence on how emotions during digital gaming affect well-being outside of gaming. Ultimately, I aim to develop a concrete tool to help active players to improve their emotion regulation and well-being. This tool uses a webcam to detect players' tilt-like gaming moments and, if needed, advises them to quit; and it has significant potential future applications and societal impact.

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1. General description of data

1.1 What kinds of data is your research based on? What data will be collected, produced or reused? What file formats will the data be in? Also give a rough estimate of the size of the data produced/collected?

The data will be 1) webcam video frames collected from online poker and Starcraft 2 players as they play their preferred game at their home; 2) Likert-scale self-report data on well-being, emotions, stress and "tilting" based on validated self-report scales or those prepared for the current study; and 3) numerical game data on Starcraft 2 and online poker (in-game actions, play time, etc.). See below for details on data collection.

The final data produced and reused will be anonymized primarily in a format that can be opened and re-analyzed by all standard data analysis software (e.g., R, STATA, SPSS, EXCEL, WORD or LibreOffice). At the early analysis stage, the video frames will be in a standard video format to enable manually labeling them by visual inspection; numerical variables will be then constructed based on these labelings.

The final size of the dataset is difficult to estimate, but it will probably be several hundred gigabytes (numerical self-report- and game data, as well as webcam video frames from 50 players playing for 3 month).

Data collection details:

For a period of three months, participants will be instructed to play as they would normally, only with the additional requirement of having their webcams on recording their face. For the poker players this means playing the game either with real or "play" money, depending on what type of game they want to play. The participants will be provided a memory card equipped **webcam** with a frame rate of at least 25 fps. Participants will keep a **playing diary**, in which they report and time-stamp their experiences of tilting, that is, losing control due to negative emotions. These self-reports should include at least 1) perceived cause (i.e. appraisal of the eliciting situation), 2) perceived severity, 3) brief descriptions of the emotions felt (including arousal and valence), and 4) time and duration of the tilt. Players might have different conceptions of when they feel they have "lost control". Thus, players will be encouraged to write diary entries even if they only briefly lost control, or even if they had only a mildly negative emotional experience ("borderline tilt"). The diary will also include brief *pre*- and *post*-session descriptions of the players' overall state of mind and feeling of reward (e.g., "How are you feeling right now on a scale from 1 to 10"; 1 = Not good at all, 10 = Extremely good; and "How rewarding was your playing session?"; 1 = Not at all, 10 = Extremely).

The poker players will record their poker hand histories using poker tracking and analysis software such as Poker Tracker, which imports poker hand histories from online poker sites and builds a local database. Poker Tracker allows for monitoring players' session-by-session profit or loss, the number of hands played, and the amount of time played. Having detailed quantitative tracking records of the poker hands played will help participants to accurately reflect on their playing sessions and to time-lock tilt experiences with specific game events. The Starcraft 2 players will similarly record all of their games using the game's built-in function, which allows for a detailed breakdown of each participant's games played and helps them to retrospectively link their experiences of tilting to specific game events. The data collection process will be fully *encapsulated*: all software and the webcam will be simultaneously switched on (and off) as the participants begin (and stop) playing.

We will also employ an **experience sampling method**. Participants will download an application into their phones asking them once a day to fill in a short questionnaire on their affective state (the PANAS scale), level of happiness and stress, and the number of hours they have slept. Finally, at the *beginning* and *end* of the experiment (twice during the 3-month span), participants will fill out the World Health Organization Quality of Life Brief scale, which is a validated 26 item measure on the perceived quality of one's life. The scale taps four broad domains on life quality: physical and psychological health, social relationships and environment.

1.2 How will the consistency and quality of data be controlled?

The data will be collected in the participants' own homes as they play their preferred games for a period of 3 months. Thus, data consistency and quality cannot be controlled as well as in a laboratory environment. We use automatic facial expression and heart rate detection methods based on webcam video frames, which may be susceptible to changes in illumination and motion. However, to mitigate the potential issues in data quality, we will use state-of-the-art methods that are quite robust against illumination and motion based artefacts. We have also prepared alternative methods to collect heart rate such as easy-to-wear chest-mounted electrodes, should the webcam-based method prove insufficient. The data collection process will be fully *encapsulated*: all software and the webcam will be simultaneously switched on (and off) as the participants begin (and stop) playing. Finally, the questionnaires and self-report questions will be short, thus not taxing the participants too much on a daily basis, which will reduce drop out rates.

2. Ethical and Legal Compliance

2.1 What ethical issues are related to your data management, for example, in handling sensitive data, protecting the identity of participants, or gaining consent for data sharing?

All self-report- and game data will be fully anonymized and participants' identities cannot be linked to their data. The webcam video frames will, however, have to be visually inspected by the experimenters to label them. This will be done in a secure set up (i.e. disconnected from internet) wherein data cannot be unintentionally exposed.

After labelling the video frames, the analyses will be performed algorithmically. Variables and value names will be constructed logically. Participants will give written consent for using their data for the study, and for sharing them in anonymized format with the scientific community. Once ready and checked, a copy of the anonymized dataset in numerical format (including the constructed variables but *not* the actual video frames) will be uploaded to figshare.com (or similar) open data repository.

The above notions will be fully explained in the written consent participants have to sign before being eligible to participate. The study will be pre-registered (at aspredicted.org). At the beginning of the project, the members of the research team will agree on the tasks, responsibilities and rights relating to data collection, data management and data use.

2.2 How will data ownership, copyright and Intellectual Property Right (IPR) issues be managed? Are there any copyrights, licenses or other restrictions which prevent you from using or sharing the data?

The research team (PI: Jussi Palomäki) claims ownership of all data until they are made publicly available either upon or sometimes prior to the publication of an article. There are no restrictions preventing us from using or sharing the (anonymized) data we will collect during our proposed studies.

3. Documentation & metadata

3.1 How will you document your data in order to make it findable, accessible, interoperable and re-usable for you and others? What kind of metadata standards, README files or other documentation will you use to help others to understand and use your data?

We will upload our anonymized data on an open access online repository, such as figshare.com, and also provide a metadata file (in standard text-format) with clear instructions on how to repeat our analyses, including definitions and descriptions of our experimental variables.

4. Storage and backup during the research project

4.1 Where will your data be stored, and how will it be backed up?

As mentioned above, a single software platform will encapsulate all software provided for participants' home use. Thus, this platform will store all video-, self-report- and game data onto the webcams' memory cards. Thereafter, the platform will also protect the data against identification (using strong encryption and hashing anonymization), and perform regular backups to the servers of the University of Helsinki.

4.2 Who will be responsible for controlling access to your data, and how will secured access be controlled?

PI, Dr. Jussi Palomäki will be primarily responsible for controlling access to our data (via the University of Helsinki IT Services). In addition, the research group members will have access to the data collected.

5. Opening, publishing and archiving the data after the research project

5.1 What part of the data can be made openly available or published? Where and when will the data, or its metadata, be made available?

Upon, or sometimes prior to publication of our results, we will make all our data and metadata (instructions on how to operate our data, variable descriptions and definitions) publicly available on online repositories such as figshare.com. These data will be fully anonymized in a way that no individual can be identified.

5.2 Where will data with long-term value be archived, and for how long?

Data (including webcam video frames) will be maintained by the University of Helsinki IT Services during the research project. The anonymized data will also be archived on our personal hard drives, USB-memory sticks, as well as public online repositories such as figshare.com for an indeterminately long time.

6. Data management responsibilities and resources

6.1 Who will be responsible for specific tasks of data management during the life cycle of the research project? Also estimate the resources (e.g. funding, time, and effort) required for data management.

The research group (PI: Dr. Jussi Palomäki), with the help of the University of Helsinki IT Services, will be solely responsible and self-sufficient for collecting and managing the data. The research personnel (assistant and PhD student) will be financially compensated for their work, including data management.