Pressure at Play: Measuring Player Approach and Avoidance through the Keyboard

Wouter van den Hoogen, Eelco Braad* & Wijnand IJsselsteijn
Hanze University of Applied sciences & Eindhoven University of Technology
DYNAMIC PLAYER EXPERIENCE

• The player experience is the result of the combination of physical activities, cognitions and emotions a player has during or shortly after play.

• It emerges from play, and changes during and after play.

• This temporal character makes it a complex construct to analyse and characterise.

• One approach is to adopt phasic analysis (event-based), relating in-game events to player experience measurements.
MEASURING PLAYER EXPERIENCE

• Players’ verbal accounts during play (e.g. think-aloud protocols) or after the fact (e.g. interviews, questionnaires).

• Psychophysiological measurements (e.g. EMG, skin conductance).

• Behavioural responses (e.g. movement synchrony, gamepad pressure).
• Behavioural indicators may include:
  – postural responses (static and dynamic)
  – exerted pressure (on controls and environment)
  – intensity of movement
  – synchronicity of movement

• Benefits of using behavioural indicators may be:
  – using naturally occurring responses
  – non-disruptive, continuous real-time during gameplay
  – increasing integration in game peripherals
  – possible future use as qualified game input
• Player behaviour related to game input can be interpreted as *functional*:

  The player intentionally presses a button to trigger one of the in-game actions.

• Using additional behavioural measures, such actions may be experientially *qualified*:

  The button force or speed of depressing may be indicative of the player’s determination.
FUNCTIONAL AND BEHAVIOURAL
• Keyboard pressure has been related to the experienced level of difficulty in a game: pressure increases.

  (Sykes and Brown, 2003; Tijs, Brokken, & IJsselsteijn, 2008)

• Keyboard pressure has been related to experiences of frustration and boredom, and correlated with subjective arousal.

  (Van den Hoogen, IJsselsteijn, & De Kort, 2008)

• Behavioural cues from touchpad pressure can be used as indicators of negative affect in relation to phasic critical incidents.

• In general, negative events and actions are experienced and expressed stronger than the positive ones.
  
  (Baumeister et al., 2001)

• Avoidance (of undesirable goals) is expressed stronger than approach (of desirable goals).

• Following psychology, we differentiate between:
  – in-control approach behaviour, pursuing desirable goals
  – out-of-control avoidance behaviour, avoiding undesirable goals
HYPOTHESIS AND METHOD

• **Hypothesis**: For fast-paced action games, such as first-person shooters and racing games, we predict that a player’s avoidance behaviour is expressed with higher keyboard pressure than approach behaviour.

• Tested with 19 participants (M=12, F=7; aged 18-42).

• Test with 4 different games.

• Measurements through:
  – retrospective self-report (SAM 9-point scales)
  – realtime keyboard pressure
• Four games: 2 first-person shooters and 2 racing games, played for 10 minutes each.
• Keyboard-based input (WSAD or arrows) using pressure sensors at the four corners.

• Mean pressure for each event type was calculated:
  – average pressure of the four corners
  – range correction (pressure w.r.t. max pressure per participant)
  – mean value of range-corrected pressure for approach and avoidance
SELF-REPORT SAM MEASURE

• Retrospective visual self-report:

  **Pleasure**

  ![Pleasure Scale](image)

  **Arousal**

  ![Arousal Scale](image)

  **Dominance**

  ![Dominance Scale](image)
RESULTS KEYBOARD PRESSURE

- Re-MANOVA: Game (one of the four games), and Direction (forward vs. backward movement) as within subject factors with interface force as dependent variable.

- Higher average force for the backward movement ($M=0.17$, $SE=0.04$) than forward movement ($M=0.15$, $SE=0.04$), ($F(1,16)=14.06$, $p=0.002$)
RESULTS SAM SCALES

• LMM analyses:
  – SAM arousal (fixed factor)
  – Difference score between approach and avoidance pressure (dependent variable).
  – Participants number (random factor)

• A significant main effect of SAM Arousal on the difference score of keyboard pressure ($F(1,66.18)=5.73, p=.02$)

• Increased levels of arousal related with greater difference between forward and backward oriented keyboard pressure.
CONCLUSIONS & DISCUSSION

• Approach actions expressed with more force than avoidance actions.

• Corresponds with self-reported arousal throughout the games.

• Combination of behavioural and functional measurements: qualitative indicator of player experience.
Currently focused on mean force per input type; additional research could add more detailed analysis. (e.g. dynamics, range, trends or onset & offset dynamics)

Expert players may use such behaviours in different, perhaps more advanced ways:
- As found by (Elliot 2006), behaviours may be adopted in the context of goal-orientation in an anticipating way.
- Not all players smile after dying virtually, indicating player dependent behavioural patterns (v.d. Hoogen et al., 2012)
THANK YOU // Q&A

Eelco Braad
Hanze University of Applied Sciences
Groningen, The Netherlands

M: e.p.braad@pl.hanze.nl
T: @illco