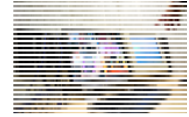


Emotions during gaming

Can you see, smell, or hear them?

Game Experience Lab is:

- Multiple physical lab-spaces:



- A multidisciplinary team @ HTI
 - Psychology (social, environmental, cognitive, experimental), marketing & communication sciences, human-technology interaction, artificial intelligence, USI
- A website: <http://www.gamexplab.nl>

Game play

- Emotions / experience
- Game experience, we all know it... have felt them... but can we reliably measure it?
- Emotions can spill through various channels, and measured inconspicuously as well as consciously
 - Verbal reactions (both 'real-time' and 'after the fact')
 - Postural responses
 - Behavioural patterns
 - Facial expressions

Game XP dimensions

- Game experience is a multi-headed beast consisting of several dimensions including (from GEQ):
 - Flow
 - Challenge
 - Competence
 - Tension / Frustration
 - Negative affect / Boredom
 - Positive affect
 - Immersion (imaginative and sensory immersion)
- But think also of Dominance and Excitement



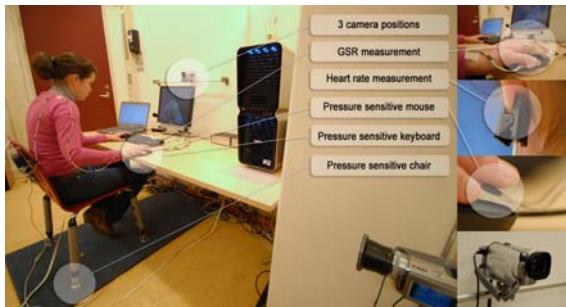
Theoretical basis

- Most used research tool is verbal expression after game experience:
 - self-report measures
 - recently developed Game Experience Questionnaire (GEQ)
- Less used, automatic measurements:
 - force measurement,
 - psycho-physiological measurements (heart rate, GSR, Facial EMG)
- Even less used, behavioural responses
 - 1) difficulty
 - 2) level of 'noise' -> i.e. individual differences
 - 3) time intensive (e.g. behavioural coding)

Behavioural responses

- Different challenges:
 - Observational coding
 - Validating behavioural responses
 - Reliability of indicator
- And then...
 - Individual differences
 - Automatic capturing

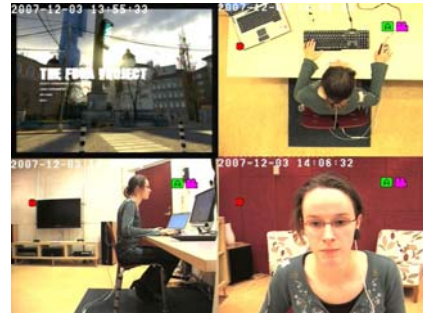
Experimental setup



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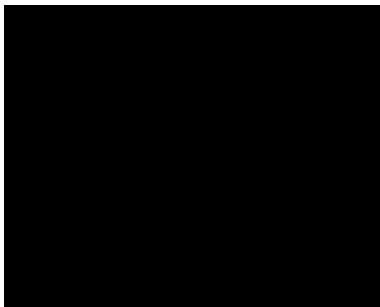
Observational coding



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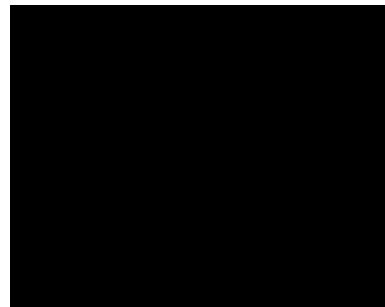
Individual differences



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Individual differences



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Game XP through behaviour

- Input from literature on:
 - Social interaction
 - HCI
 - Display of emotions
 - Game related research
- Distilled several body postures and behaviours that are promising for distinguishing between several game related experiences (dimensions from GEQ)

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Promising indicators per dimension

- Challenge
 - Approach / forward leaning as indicator of interest with stretched upper body (De Meijer, 1989)
- Negative affect (e.g. boredom)
 - Indicated by collapsed upper body / bowed upper body (De Meijer, 1989; Walcott, 1998)
 - Also, many shifts in body position - related to low immersion - seems indicative of boredom (Bianchi-Berthouze, Cairns, Cox, Jennet & Kim, 2006)
- Competence:
 - Erectness of posture as indicator of dominance and success (Weisfeld & Beresford, 1982)

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Promising indicators per dimension

- Tension
 - Higher pressure on interface device (e.g. Park, Zhu, Jung, McLaughlin & Jin, 2005; Mentis & Gay, 2002)
- Immersion
 - Synchronous - e.g. swaying – vs asynchronous movement - e.g. shifts in sitting position (Bianchi-Berthouze, et al., 2006)
- Flow
 - Unclear, but potentially gaze direction & time on display
 - additionally total lack of outward directed behaviour.

Operationalisation

- Pressure exerted on interface device
 - indicator of high arousal -> *frustration & excitement* (Sykes & Brown, 2003; Park et al., 2005)
- Body position:
 - forwards / backwards motion and static position (*approach - avoidance / but also interest and attention*)
 - sideways seating position / swaying with game
 - synchronous movement vs asynchronous (*immersion / flow -> requires observation*)

Pressure sensitive devices

- Very little exists on the shelf, therefore designed own pressure sensitive devices
- Pressure sensitive glove (intended for PS2 experiment)
 - Benefit: Independent of interface devices
- Tested existing gloves (e.g., NoDNA X-IST touchglove 3D)
 - too large, loss of dexterity, not sensitive enough, unable to pick up small 'tapping' movements (e.g. on mouse)

Pressure sensitive glove



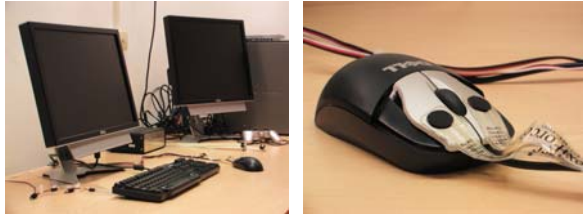
Pressure sensitive glove



Multiple pressure sensitive devices

- Testing showed that glove seems suitable for console based gaming
- However, not suitable for usage in pc-based gaming. Too much loss of *feeling* on mouse and keyboard
- Additionally we designed a pressure sensitive mouse & pressure sensitive keyboard

Pressure sensitive mouse+keyboard



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Automatic capturing of seating position

- Body position:
 - forwards / backwards motion and static position (approach - avoidance / but also interest and attention)
 - sideways seating position / swaying with game
 - synchronous movement vs asynchronous (immersion / flow)
- Additionally tilt of torso
 - forwards & backwards leaning
- Use of 3-axis accelerometer & designed pressure sensitive chair

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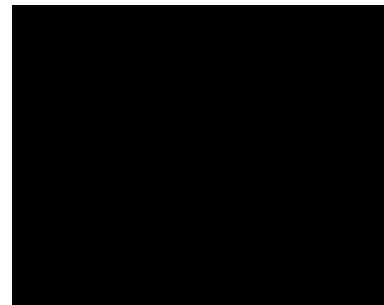
Pressure sensitive chair



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Movement measurement



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In our experiments

- Calibrating and validating measurements of GameXP: multi-method approach
 - Game Experience Questionnaire
 - video recording: coding of facial expression and posture
 - input device handling (e.g pressure) *mouse/keyboard*
 - body position *with 'pressure chair', and accelerometer*
 - GSR and heart rate

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Behavioural indicators of game XP

- Goal: connecting behavioural indicators to the dimension as found in the Game Experience Questionnaire
- Construct validation
- In-game and after-game experiences need not be the same (feedback from pilot studies: "*During the game it was actually rather nice, but afterwards I thought it was boring. There was no real ending.*")

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Behavioural indicators of game XP

- Probably, one indicator of any emotions is not enough or even feasible, multiple indicators needed
 - Overlap in indicators for different dimensions (e.g. competence and challenge)
 - Distinction of indicators for arousal and valence (*see also Mandryk & Atkins, 2007*)
 - Patterns rather than static postures may be required (*e.g. Mota & Picard, 2003*)

Unexpected behaviour...

