About Me

- Blekinge Institute of Technology
  - PhD Candidate
    - Digital Game Development Degree
- EU FUGA ("Fun of Gaming") project
- Fun & player experience research
- Biometrics consulting
Numbers vs. Interviews?
Quantitative vs. Qualitative?
Quantitative AND Qualitative!
Outline

1. Traditional playtesting

2. Next-gen playtesting
   a. Now with more biometrics!

3. Takeaway
Iterative feedback loop

Game Design → Playtesting

Playtesting ← Game Design
Traditional Playtesting
Traditional Playtesting

- Quality assurance
  - Technical quality
  - Design quality
- Bug reports
- Balancing
- Qualitative approaches
  - Classic playtest
  - Focus groups
  - Think-aloud
Technical quality checks

- Make sure game functions correctly
- Bug reports depend on skill of tester
- Sometimes automatic testing

- Balancing gameplay parameters
  - Really more a design check
  - Trial and error
  - Time-consuming
Classic Playtest

- Watch someone play the game
- Check against design intentions
  - Are game rules obeyed?
  - Are game goals reached in proper way?
  - Do testers report this as being “fun”?
- Followed by questioning (Q&A)
- Iterate design based on feedback
Focus groups

- Modification of classic playtests
- Target audience clusters
- Group sessions
- In-depth interviews after session
Think-aloud protocol

- Add-on for classic playtests
- Player comments playing aloud
  - Recorded with microphones
- Spontaneous and unfiltered
  - Insights into player reasoning
Benefits of traditional playtesting

- Get a good idea of how players like your game
- Answer design questions
- Watch what triggers behavior
- Collect many subjective details
- Uncover hidden gameplay problems
- Interviews allow to investigate fine distinctions of gameplay
Limitations of traditional playtesting

- Hard to generalize
- Lots of bias
  - Observation/Memory
  - Testers
  - Questions
- Subjective interpretation of behavior
- Problems with accuracy
Why QA uses traditional playtesting...

- Works great for finding major issues
  - Interaction
  - Gameplay
  - Content
  - Interface
- Uncover nuances in interviews
- Insights into players’ minds
  - Answers to “WHY?” & “HOW?”
- Direct game design feedback
Why QA should think about adding next-gen testing...

- Much bias in qualitative techniques
  - Rooted in
    - Analysis
    - Recording
- Scientifically questionable
  - Objectivity
  - Reliability
  - Replicability
- Empirical power
Next-Gen Playtesting
Next-gen playtesting

- Gameplay metrics
  - Event-related/triggered
  - Continuous logging
  - Spatial

- Psychometric surveys

- Physiological player measurement
  - BIOMETRICS!
Gameplay metrics

- Provide empirical insights into player behavior
- Usually event-based
  - Player deaths for example
- Spatial data allow level design analysis
  - Heatmaps
- Construction of Personas
Example of Game Metrics

Example of game metrics data (see also Tychsen & Canossa 2008)
Gameplay metrics

PRO
- Objective data
- Quantifiable
- Identify trends
- Measure play behavior
- Events allow correlation with biometrics

CON
- Implementation for specific engine
- Missing fine granularity
- Need statistics experts
- Painstaking analysis
Psychometric surveys

- Standard psychological profiles
- What motivates your players?
- Standard tools from psychology
  - Psychotypes
  - Meyers-Briggs Type Indicator
  - EPQ-R Psychoticism
  - BIS/BAS Behavior
  - etc.
- Categorize your players
Psychometric surveys

**PRO**
- Categorize players
- Correlate with personas
- Validated method
- Quantifiable
- Reliable

**CON**
- Scoring can be tricky
- Need statistical knowledge
- Only fully valuable in conjunction with other measures
Measurement tools

- Facial Electromyography (EMG)
  - Emotion, Blinking
- Galvanic Skin Response (GSR)
  - Excitement, Arousal, Engagement
- Electroencephalogram (EEG)
  - Brainwaves, Cognition, Emotion, Attention
- Eye Tracking
  - Visual attention, Blinking, Cognition
- Accelerometers
- Position and pressure sensors, etc.
EMG

- Measuring facial muscle activation
  - Correlates to emotions

- Russel’s circumplex model of emotion
  - Valence = Positive or Negative
  - Arousal = High or Low

- Brow muscle = bad mood
- Smile and Eye muscle = good mood
Objective results: Valence responses

Cumulative tests for different game level types (see also Nacke, Lindley, 2008).
Correlation of Physiological Data to Events

Physiological data is recorded together with real-time game events, allowing for automatic data clustering and analysis.
GSR

- Electrodermal activity
- Eccrine sweat gland production
- Two electrodes (conductance)
- Correlates to arousal
- Easy deployment and measurement
- Signal can be noisy
- Allows emotion mapping together with EMG in circumplex model
Objective results: Arousual responses

More excitement peaks for one level (see also Nacke, Lindley, 2008).
Russel’s circumplex model of emotion

The two dimensions of this model can also be mapped to EMG and GSR measurement (see also Lang 1995).
EEG

- Electrodes placed on scalp (from 20 to 256)
- Measures electric potentials
- Brainwaves are described in frequency bands
  - Delta (trance, sleep)
  - Theta (emotions, sensations)
  - Alpha (calm, mental work)
  - Low beta (focus, relaxed)
  - Mid beta (thinking, alert)
  - High beta (alert, agitated)
  - Gamma, seldom (information processing)
Game experiment Setup

EEG and EMG electrodes are being attached. The Biosemi electrode cap consists of 32 electrodes in the areas: frontal (F), parietal (P), temporal (T), occipital (O), central (C).
EEG Frequencies and Spectrum

EEG Analysis is difficult. After artifact scoring, values have to be transformed for spectral analysis.
Eye Tracking

- Measures what eyes look at
  - Saccades (fast movement)
    - Gaze path
  - Fixations (dwell times)
    - Attention focus
  - Pupil dilation/blink rate
- Attention precedes gaze (200ms)
- Used mainly to improve interface
  - Lack of 3D analysis tools
Experimental playing session

Experimental gaming session with all logging equipment in place.
Example of 3D Eye Tracking Visualization

Viewed game world objects can be displayed together with their gazepaths in 3D (see also Stellmach, 2009)
Physiological measures

**PRO**
- Objective
- Covert & continuous recording
- Quantifiable
- Reliable
- Replicable
- Empirical power
- Automatization

**CON**
- Expensive
- Intrusive
- Difficult to analyze
- Time-consuming
Key biometric advantages

- Data is objective
  - Not dependent on memory/language

- Continuous measurement
  - During event processing

- Information on player responses
  - Emotional
  - Attentional/Cognitive
Biofeedback applications

- Use fuzzy models
- IEEE SIG: game.itu.dk/PSM
  - Player satisfaction modeling
  - Cognitive models
  - Affective models
- Optimal challenge
- Trigger game events with biofeedback (e.g. Emotiv)
- Popular approaches
  - GSR, heart-rate and respiration
The Takeaway
Takeaway

1. **Metrical testing is emerging**
   - Now is the best time to jump on!

2. **Your company needs user research**
   - Ultimately your players know best!

3. **Biometrics enhance classic testing**
   - Qualitative supports quantitative data

4. **Understand existing and emerging testing methods**
   - Keep in touch with experts
References


Icons from smashingmagazine.com
More at Future Play!

Tomorrow, 1pm, Room 206

PANEL: Game Metrics and Biometrics: The Future of Player Experience Research

Featuring Mike Ambinder, Regan Mandryk, Alessandro Canossa, Tad Stach, and me
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