Game Optimization through Large-Scale Experimentation

Erik Andersen
Ph.D. student
Center for Game Science
University of Washington Computer Science Dept.
Music

Art

Sound effects

Gameplay
engagement retention revenue
A/B Testing
A/B Testing
Metrics

- Levels completed
- Time played
- Return rate
Aesthetics  Secondary Objectives  Tutorials
Refraction  Hello Worlds  Foldit
Refraction
Rating: 3.8 / 5

400,000 plays
Hello Worlds!
Rating: 4.2 / 5
1,385,000 plays
Foldit
240,000 players
Player Tracking

- Flash cache / login name
- New players only
Statistical significance

95% confidence level (p<0.05)
Experiment #1: Audio

Music

Sound Effects
Result:

Music and sound effects did not matter
Experiment #2: Animations
Result:

Animations improved engagement
Refraction

Time Played (s)

No Animations
Animations

Time Played (s)

No Animations
Animations
Hello Worlds

Time Played (s)

- No Animations
- Animations
Hello Worlds

Return Rate (%)

- No Animations
- Animations
Experiment #3: Secondary Objectives

(Super Mario Bros., Nintendo 1985)
Hypothesis

% of players

Levels

With Coins
What about time played?

% of players vs Time
Hypothesis

With Coins

% of players

Time
Hypothesis

% of players

Time
Reality: Many Players Quit Sooner

% of players

Time

With Coins
Distribution of Time Played in Refraction

- **X-axis:** Time Played (minutes)
- **Y-axis:** Percentage of Players

- **Graph Legend:**
  - Green line: No Coins
  - Red line: Coins
Result:

secondary objectives *harmed* engagement
(Assassin’s Creed, Ubisoft 2007)
Maybe easier is better?

(Super Mario Bros., Nintendo 1985)
% of players vs Time

Off-path Coins
% of players

Time

On-path Coins

On - path Coins
secondary objectives were good if they supported the primary objectives
Experiment #4: Tutorials
Refraction and Hello Worlds:

no effect
Result:

text tutorials helped only in the most complex game
Number of concepts

11

13

24
Context-sensitivity

Context-sensitive

Context-insensitive
Result:

context-sensitive help was better
(if tutorials helped at all)
Foldit

Time Played (s)

- Context-insensitive
- Context-sensitive
Let’s gather more data

- Let us A/B test your games!
Coauthors

Yun-En Liu
Richard Snider
Roy Szeto
Seth Cooper
Eleanor O’Rourke
Jeff Lowdermilk
David Truong
Zoran Popović
Acknowledgements

**Kongregate**: August Brown and Anthony Pecorella

**Logging**: Kefan Xu

**Refraction Team**: Erik Andersen, Yun-En Liu, Marianne Lee, Eric Butler, Brian Britigan, Stephen Sievers, Roy Szeto, Mai Dang, Christian Lee, Ethan Apter, Emma Lynch, Happy Dông, Zorah Lea Fung, Justin Irwen, Seth Cooper, François Boucher-Genesse, Zoran Popović

**Hello Worlds Team**: Rich Snider, Michael Eng, Marianne Lee, Blake Thompson, Jeff Flatten

**Foldit Team**: Seth Cooper, Adrien Treuille, Firas Khatib, Janos Barbaros, Joshua Snyder, Alex Cho Snyder, Jeff Flatten, Jeff Lowdermilk, Dun-Yu Hsiao, Jeehyung Lee, David Salesin, David Baker, Zoran Popović
eland@cs.washington.edu