# CE810 - Game Design 2

## Evaluating Performance

Joseph Walton-Rivers & Piers Williams

Tuesday, 15 May 2018

University of Essex

# What is Player Experience?

**Player experience**

Collection of events that **occur** to the player **during** the game

# What is Player Experience?

## Scenario

Jeffrey is playing an online RTS game, and he is playing with a friend online against two other people.

## Question

Which of these are a part of the player experience and which are not?

| | |
|---|---|
| Losing a Unit | Yes |
| Laundry Finishing | No |
| Collecting resource | Yes |
| New message in chat window | Yes |
| Unit Moving | Yes |

# Metrics

Collect data on how players/bots work

**Activity**

What kinds of features can we collect?

# Data from humans

- High-level human experience
  - Final game scores?
  - **How** long did they play for?
- Biosignals
  - **Where** did they look?
  - Galvanic skin response
  - BCI
- Surveys and interviews
  - Likert Scales
  - **Why** did you feel that way?

# Data from bots

- Internal State
  - Will depend on bot **architecture**
  - Measure state visits in FSM
  - Did the game make **full** use of the AI?
- How many times does a bot face a **difficult** choice?
  - What is a difficult choice?

# Data from either

- Final Score distribution
- Game Duration
- Score “Drama”
- Statistical distribution of states
- Degree of challenge

# Data from populations

- Variability of scores
- Skill-depth

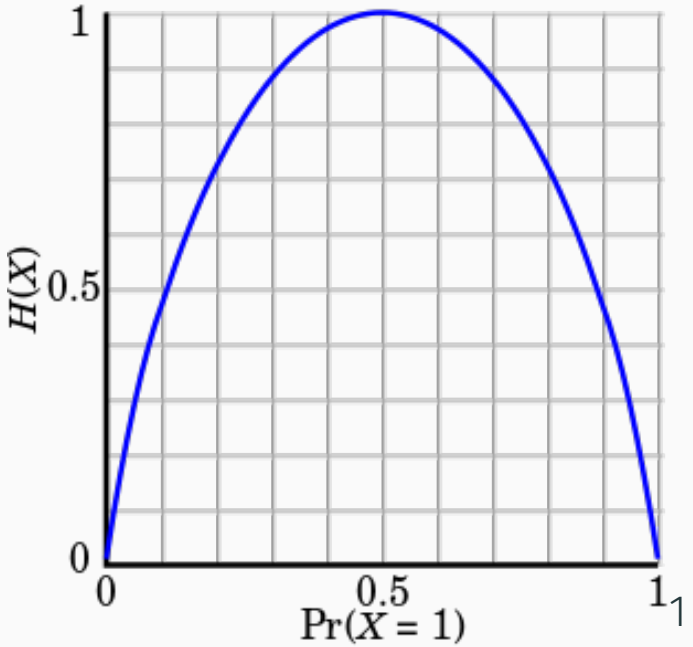
# Action Sequences

# Data from either

- Actions taken
- Record the sequence of button-pushes

# Entropy

- Sometimes used to **interpret** aspects of player experience
  - $H(X) = \sum_{i=1}^{n} P(x_i) I(x_i) = -\sum_{i=1}^{n} P(x_i) \log_2 P(x_i)$
  - Take a fair coin - how much entropy?
  - $H(fairCoint) = \sum_{i=1}^{2} (\frac{1}{2}) \log_2 (\frac{1}{2}) = -\sum_{i=1}^{2} (\frac{1}{2}) \times (-1) = 1$
  - How about an unfair coin? What is the entropy for a coin of probability 0.9?




[1] Borrowed from wikipedia

# A Game Example

| loc | 0 | 1 | 2 |
|---|---|---|---|
| 0 | 10 | 20 | 15 |
| 1 | 12 | 35 | 13 |
| 2 | 15 | 20 | 10 |

| loc | visits | p(loc) | calc |
|---|---|---|---|
| 0,0 | 10 | 0.067 | $0.067 \log_2(0.067)$ |
| 0,1 | 12 | 0.08 | $0.080 \log_2(0.008)$ |
| 0,2 | 15 | 0.1 | $0.100 \log_2(0.100)$ |
| 1,0 | 20 | 0.134 | $0.134 \log_2(0.134)$ |
| 1,1 | 35 | 0.234 | $0.234 \log_2(0.234)$ |
| 1,2 | 20 | 0.134 | $0.134 \log_2(0.134)$ |
| 2,0 | 15 | 0.1 | $0.100 \log_2(0.100)$ |
| 2,1 | 13 | 0.0867 | $0.0867 \log_2(0.0867)$ |
| 2,2 | 10 | 0.067 | $0.067 \log_2(0.067)$ |
| | 150 | Total: | |

# A Game Example

**Exercise**

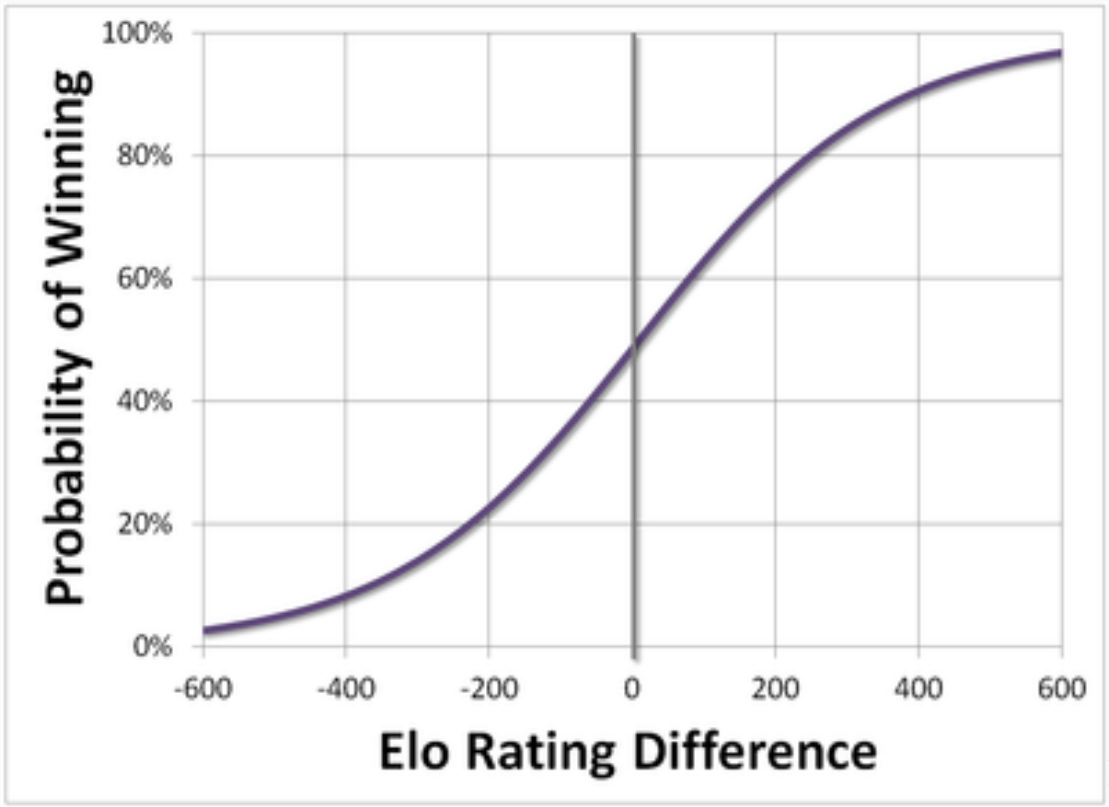
Now you try - in Java. Download the here and calculate the entropy

# Skill Ratings

- How **good** is a player?
- What is the **issue** with win rates?
- If A $>$ B and B $>$ C is A $>$C?

# Elo Ratings

- Elo is based on probability
- $Elo(A) - Elo(B) = P(A \text{ beats } B)$



[2]

[2] Borrowed from liquipedia