Lecture 22:

Balance
This is it!

Source: Lucasfilm
Updates

- Updated plan due *tonight* by 11:59pm
- Newgrounds release, Tuesday, Nov. 18th
- Newgrounds postmortem, Thursday, Nov. 20th
Years of Balancing
Halo 3
That’s Not How We Roll

Balance
Epic Balance Issues
StarCraft
WarCraft II (and most old RTSes)

Humans

Orcs

Both

Balance
StarCraft

Terran  Zerg  Protoss

Balance
“Zerg OP, Toss imba!! So can we nerf terran now?”

- rockman
“Zerg OP, Toss imba!! So can we nerf terran now?”

- rockman
Balance

OP

imba

buff

nerf

winrate

broken

rework

underpowered

qq
“Zerg **OP**, Toss **imba**!! So can we **nerf** terran now?”

**Zerg and Protoss are too powerful so can we reduce the relative power of Terran?**
An unbalanced game is...

- Unfair
- Frustrating
- Uninteresting
- Trivial
What is balance?

- Narrowest sense:
  - Fairness
Fairness in competitive games
Balance

> 50%

< 50%
Balance

< 50%  > 50%
Balance

52-56%
Fairness in noncompetitive games
Fairness in noncompetitive games

- When I fail, is it:
  - my fault?
  - the game’s fault?
Why is balance so hard?

- Complex interconnected systems

\[ A < B < C \]

- Hard to change these systems on the fly
- Hard to measure balance
- Player behavior changes
Game situations

Possible

Known to people

Balance
SlayerS`BoxeR` (Lim Yo-Hwan)
BoxeR’s innovations

- All-in attacks with workers
- Superhuman micromanagement
- Dropships everywhere
Tic-Tac-Toe

- Fun as a kid
- Not so much as an adult
Perfect Play

100%
Perfect Play

100%
Perfect Play

0% 0%
Perfect Play

draw
draw
first move
What is balance?

- Narrowest sense:
  - Fairness

- Expanded sense:
  - Depth
  - Variedness
  - Interestingness
  - Harmony
Key Questions

- How important is playing unpredictably?
- To what extent must players react to the current state of the game?
- How powerful is a given action or combination of actions?
- How much long-term strategy is necessary?
- Is the outcome known long before the game’s end?
- What is the effect of avoiding certain end states?
- Are the starting conditions of the game fair?
Balancing Techniques

- Tweaking
- Tweaking Interface
- Statistics
- Restricted Play
Balancing Techniques

- Tweaking
- Tweaking Interface
- Statistics
- Restricted Play
Halo’s Overpowered Pistol
Balance
Balancing Techniques

- Tweaking
- Tweaking Interfaces
- Statistics
- Restricted Play
Balance

Pistol: 2
Sniper Rifle: 4
Pistol: 3
Sniper Rifle: 4
Pistol: 30
Sniper Rifle: 4

Balance
Spike size: 2
Spike power: 4
Balancing Techniques

- Tweaking
- Tweaking Interface
- Statistics
- Restricted Play
Behavioral Statistics

People Play → Database
League of Legends

Highest Win Rate Champions (9/16/2012 - 9/23/2012)

Win Percentage  Popularity Percentage

Mouse over elements for details.
StarCraft II

Balance
StarCraft II
Balancing Techniques

- Tweaking
- Tweaking Interface
- Statistics
- Restricted Play
Behavioral Statistics

People Play

<table>
<thead>
<tr>
<th>Pawn Moves</th>
<th>28% of Moves</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knight Moves</td>
<td>22% of Moves</td>
</tr>
</tbody>
</table>

Database
How fair are the starting conditions?

Player must choose a starting condition $S$. 

Balance
How powerful is a particular action?

Player cannot play action $A$ more than $k$ times.
Player cannot look more than $k$ moves into the future.
Player cannot look more than $k$ moves into the future.
Epic Restrictions

Balance
Ideally…

Unbalanced Game

Balanced Game
### Cards

- **Analyze Game**
- **Include Reports**
- **1/1**
- **1/2**
- **1/6**

### Balance Measures

**Current Game:** R1/1,G1/2,B1/6.

- **Perfect** (50%)
- **Aggressive** (43% wins, 0.06% ties.)
- **Plays distribution over at most 2 actions.** (30.72%)
- **Greedy** (22.41%)
- **Button-Mashing** (22.41%)
- **Never plays R1/1.** (11.54%)
- **Never plays B1/6.** (11.54%)
- **Never plays G1/2.** (11.54%)
- **Plays distribution over at most 1 actions.** (0%)
- **Always plays R1/1 if possible.** (0%)
- **Always plays B1/6 if possible.** (0%)
- **Always plays G1/2 if possible.** (0%)

### Computed Games

- R1/1,G1/2,B1/6,*2/1.
- R2/5,G3/5,B4/5,+1/3.
- R2/5,G3/5,B4/5.
- R1/1,G1/2,B1/6.
<table>
<thead>
<tr>
<th>Power Cards</th>
<th>Noteworthy Balance Measures</th>
<th>Interpretation</th>
</tr>
</thead>
</table>
| **A**      | +1/2                        | Green is too weak.  
             | Omit Green: 13.54%, Omit Blue: 7.44%,  
             | (Green cannot beat Red, even by playing +1/2.) |
| **B**      | +2/3                        | Blue is too strong.  
             | Omit Blue: 6.76%, Omit Red: 11.62%,  
             | (Red cannot beat Blue, even by playing +2/3.) |
| **C**      | +2/1                        | All monsters are about as strong. The slight differences point to interesting variety in how they are played.  
             | Omit Blue: 10.77%, Omit Red: 10.83%,  
             | Omit Green: 10.78% |
| **D**      | *1/2                        | Random play is unreasonably effective.  
             | Random: 8.04% |
| **E**      | *2/3                        | Power card on self unhelpful; random play too good.  
             | Omit Self * 2/3: 47.41%, Random: 11.99% |
| **F**      | *4/1                        | Blue is too strong, but now random performs sufficiently poorly.  
             | Omit Blue: 6.76%, Omit Green: 12.38%,  
             | Omit Red: 11.62%, Random: 3.26% |
| **G**      | *2/3, *4/1                  | Too harsh to simple players, and one direction of * 4/1 is too self-destructive.  
             | Greedy: 3.41%,  
             | Prefer Self * 4/1: 3.83% |
| **H**      | *2/3, +2/3, +1/2            | Multiplier power card is now less self-destructive, but Blue is now too strong.  
             | Prefer Self * 2/3: 5.41%,  
             | Omit Blue: 4.31% |
| **I**      | *2/3, +1/2                  | All values appear reasonable, and there is nice variety among the actions. Ready for playtesting.  
             | Prefer Self * 2/3: 23.73%,  
             | Greedy: 7.95% |
What is balance?

- Narrowest sense:
  - Fairness

- Expanded sense:
  - Depth
  - Variedness
  - Interestingness
  - Harmony
Group Activity: Balance Scorecard!

- Is there a dominant strategy?
- Which mechanics are overpowered? Underpowered?
- How much long-term strategy is necessary?
- To what extent must players react to the current state of the game?
- When the player fails, whose fault is it?