Economies & Balance
What is Game Balance?

- What does it mean to be unbalanced?
- Examples of unbalanced games?
- Examples of well-balanced games?
- What types of games can be unbalanced?
Types of Game Balance

• Player-versus-Player
  • **Fairness**: equal players have equal chance of winning
  • **Pacing**: players have “reasonable” chance of catch-up
  • **Politics**: skill should be more important than alliances

• Player-versus-Environment
  • **Appropriately challenging**: neither too hard nor too easy
  • **Balanced resources**: actions are not too “expensive”
  • **No dominant strategy**: requires multiple play styles
PvE: Appropriately Challenging

- Play should ramp up from easy to harder
  - Early levels are tutorial levels
  - Feeling of accomplishment over time

- **Easy mode** crucial for story-focused games
  - Casual players just want to experience story
  - Should have “press button to win” mode

- **Harder modes** should be hard, not boring
PvE: Balanced Resources

• **Sources**: How a resource can increase
  - **Examples** (player): ammunition clips, health packs
  - **Example** (external): spawn points

• **Drains**: How a resource can decrease
  - **Examples** (player): firing weapon, player damage
  - **Examples** (external): monster death

• Adjust sources and sinks to “balance” economy
  - Together, determine “price” of resource
  - Price of resource should reflect its “power”
Design Problem: Pricing Resources

Underpricing

- Cheap, powerful actions
  - Players favor these verbs
  - Limits play variety
- Buffs in *Might & Magic*
  - Same mana as attacks
  - Lasted all *day* long
- *Dragon Age* cold spells
  - Shattered enemy on critical
  - Rogues had auto criticals
Design Problem: Pricing Resources

Overpricing

- Expensive, weak actions
- Usage is “penalized”
- Waste of designers’ time
- Shredder ammo in ME2
  - Same damage as inferno
  - But inferno lights on fire
- Raise Dead in early D&D
  - Loss of stats (e.g. Con)
  - No easy way to regain
Design Problem: Pricing Resources

### Underpricing
- Cheap, powerful actions
  - Players favor these verbs
  - Limits play variety
- Examples:
  - Buff spells in most RPGs
  - *Dragon Age* cold spells

### Overpricing
- Expensive, weak actions
  - Usage is “penalized”
  - Waste of designers’ time
- Examples:
  - Shredder ammo in *ME2*
  - *Raise Dead* in early *D&D*

- Resource usage determines difficulty
  - *Resident Evil*: Availability of ammunition
  - *D&D 3.x*: 20% resource per encounter
Resources and Strategy

• What is more “dangerous”?
  • Damage-dealer
  • Healer
  • Controller (lock-down skills)
  • Summoner (chain or simple)

• How does this affect strategy?

• Is the answer always the same?
  • How do you analyze this?
  • What resources do each of the archetypes above involve?
Resource Analysis: Dungelot

- Simple combat mechanic
  - Each round, swap damage
  - Enemy dies when health is 0
- Player goes until health is 0
  - There is healing in game
  - …but too sparse to go forever
- Two primary characters
  - **Paladin**: can lessen damage
  - **Vampire**: drains blood to heal
  - Which is better?
Bad Design: “Engines”

• Actions combine to make resources free
  • Spend one resource to get another
  • Use new resource to get old one back

• Example: *Dragon Age*
  • Resources: Health, Mana
    • Small health loss; regain much mana
    • Small mana loss; heal much damage
  
• Solution? Cool-down time
Bad Design: Deadlocks

- Cyclical interaction between sinks & sources
  - Prevents any further action
  - Example: *Settlers 3*
    - Need stone for stonecutter’s hut
    - Stonecutter’s hut is source for stone

- Treat deadlock as a loss condition
  - **Example**: No more builders in *Starcraft*
  - But detection of deadlock is **hard**
PvE: No Dominant Strategy

- “Rock-Paper-Scissors” model
  - No strategy always wins
  - Optimal depends on context
  - Challenge is finding context

- Play is **highly variable**
  - Monotonous play is punished
  - Must master different styles

- Play becomes **psychological**
  - What is opponent thinking?
  - True even if opponent an AI
Isn’t this a bad design?
  - Game “feels” random

Don’t make actions equal
  - Just make nothing the best
  - But some actions are worse
  - **Challenge**: separate two

Make AI “predictable”
  - Best move if know opponent
  - Player learns how AI thinks
  - Challenge for AI design
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PvP: Fairness

- **Symmetric**: have same start position & rules
  - Easiest way to achieve fairness
  - **Examples**: Chess, monopoly, *Warcraft II*

- **Asymmetric**: start & play with different rules
  - Fairness harder, but more interesting
  - **Examples**: Fox & Geese, *Starcraft*

- Requires user testing
Assymetric Gameplay
PvP: Pacing

- Pacing is a function of feedback
  - **Positive feedback**: rewards player successes
  - **Negative feedback**: punishes player successes

- Positive feedback leads to **snowballing**
  - Once player gets ahead, hard to catch up
  - Opponent will quit early (redefine loss, victory)

- Negative feedback leads to **stalemate**
  - Game goes on forever without a winner
  - Even worse, winner may feel arbitrary
Feedback

- Common form of emergent behavior
  - Game mechanics produce certain outputs
  - Outputs then modify the game mechanics

- **Positive**: *reward* player for success
  - Extra-lives in any arcade game
  - Power-ups/abilities in Raiden clones

- **Negative**: *handicap* player for success
  - Blue shells in *Mario Cart*
Feedback: *Raiden*
Feedback: Mario Cart
These Terms are Not Normative

<table>
<thead>
<tr>
<th>Positive Feedback</th>
<th>Negative Feedback</th>
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<tbody>
<tr>
<td>Can be <em>constructive</em></td>
<td>Can be <em>constructive</em></td>
</tr>
<tr>
<td>Ex: Increase attack</td>
<td>Ex: Boost opponent</td>
</tr>
<tr>
<td>Can be <em>destructive</em></td>
<td>Can be <em>destructive</em></td>
</tr>
<tr>
<td>Ex: Drain opponent</td>
<td>Ex: Drain player</td>
</tr>
</tbody>
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**Key Features**
- Magnifies early successes
- Increases player disparity
- Make game end quickly

- Magnifies later actions
- Equalizes player status
- Make game end slower
Ideal Game Progression

Player Advantage

Game Duration

Game Balance
Too Much Positive Feedback

Game Duration

Player Advantage

Game Balance
Powerful Negative Feedback

Game Duration

Player Advantage

A

B

Game Balance
Parameter Tuning

- **Recall**: mechanics have parameters
  - How fast you can run
  - How far you can jump

- **Tuning**: adjust these parameters
  - Allows you to control feedback
  - How bad should blue shell effect be?

- Tuning requires a lot of playtesting
PvP: Politics

- Politics occur from **player alliances**
  - Players “gang up” against an opponent

- Problem with politics
  - Turns the game into a form of “voting”
  - Winner a matter of popularity, not skill

- What games are susceptible to politics?
  - Game must support **more than two players**
  - Game must allow **resource sharing**
Are Politics a Bad Thing?

- Not necessarily; some players like them
  - Make a strategy game more social
  - Example: *Settlers of Catan*
    - Trading resources is important
    - Consider player advantage in trade

- Impossible to eliminate in some games
  - Example: free-for-all games, wargames

- Just be aware in player testing
Kingmaking

- Player “chooses” winner
  - Extreme form of politics
  - Voting is not necessary

- Forms of kingmaking
  - Excessive aid to “king”
  - Sabotaging other players
  - Blocking player obstacles

- **Snowballing** encourages kingmaking
Controlling Politics

- Make the game more like a race
  - Players have little ability to influence each other
  - Examples: footrace, backgammon, high scores

- Make **sabotage** resource expensive
  - Loss of resources disadvantages saboteur later
  - Example: base defenses in a strategy game

- Limit opportunities for **alliances**
  - Make it difficult for players to share resources
  - Example: cannot trade cards in Risk
Summary

• Game balance does not need an opponent
  • Appropriately challenging: neither too hard nor too easy
  • Balanced resources: actions are not too “expensive”
  • No dominant strategy: requires multiple play styles

• Multiplayer games introduce other issues
  • Fairness: equal players have equal chance of winning
  • Pacing: players have “reasonable” chance of catch-up
  • Politics: skill should be more important than alliances