



the
gamedesigninitiative
at cornell university

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

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- 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

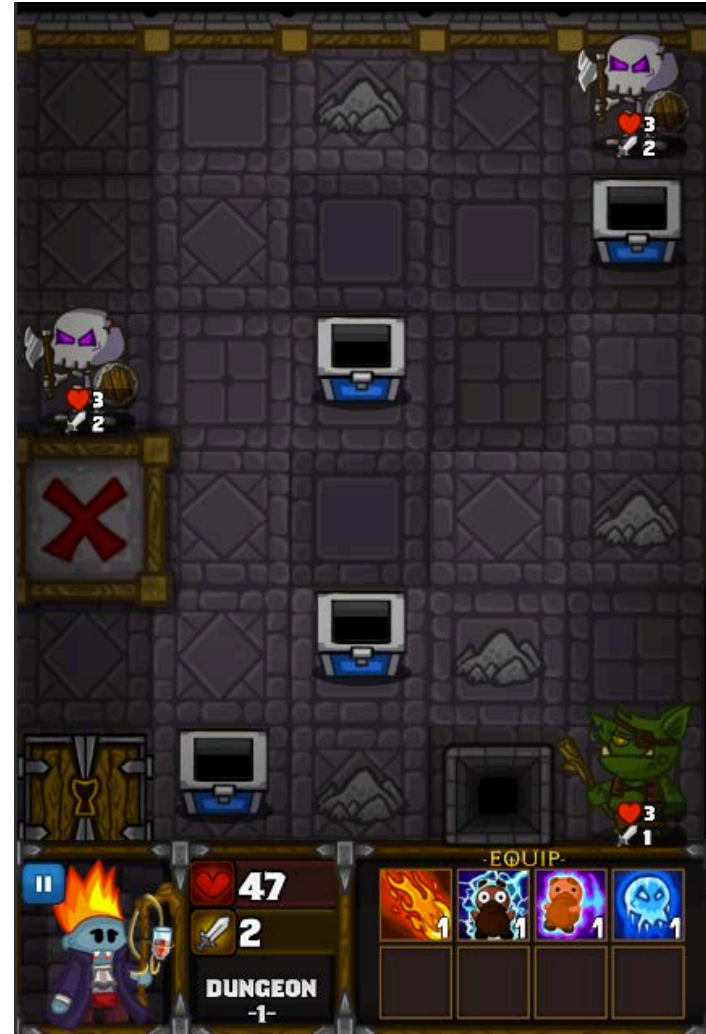
Resources and Strategy

- 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: Dungenlot

- 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

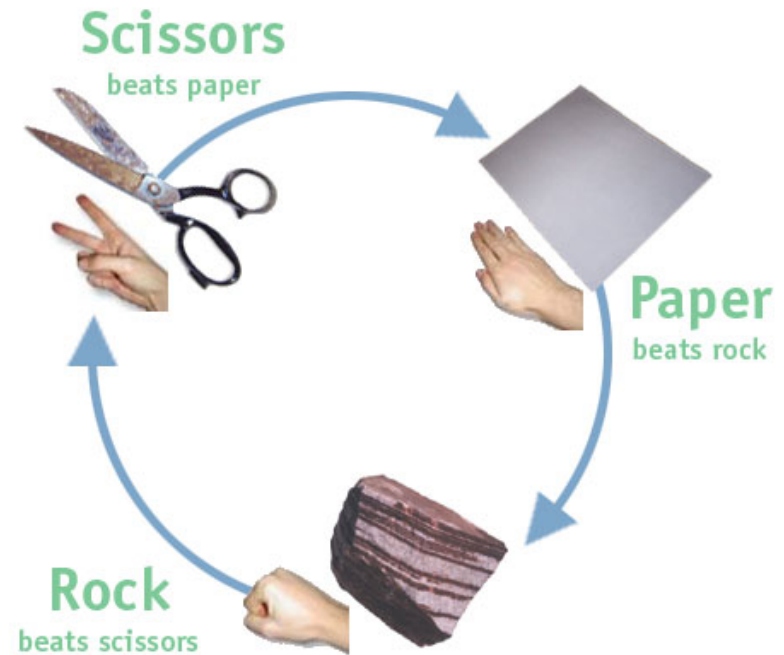
Bad Design: Deadlocks

- 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**



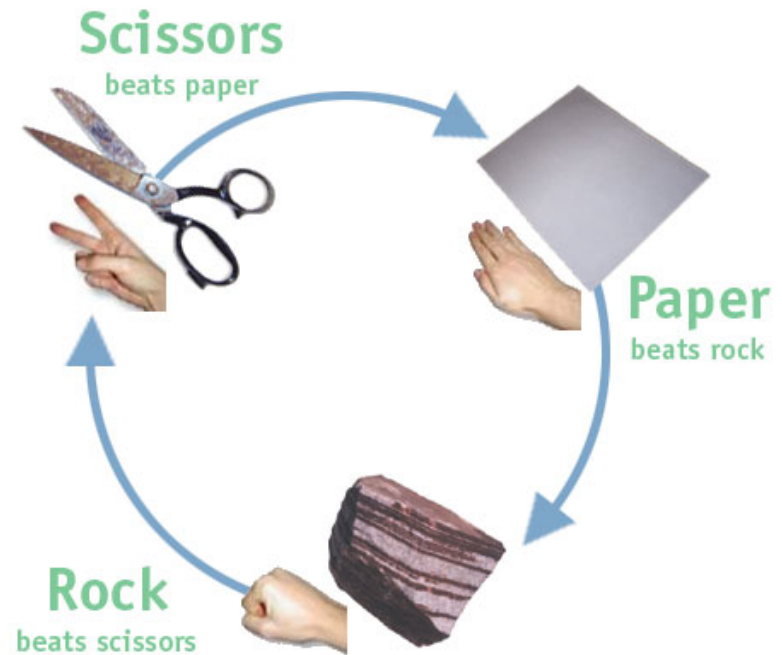
PvE: No Dominant Strategy

- “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



Meaningful Choice?

- 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



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

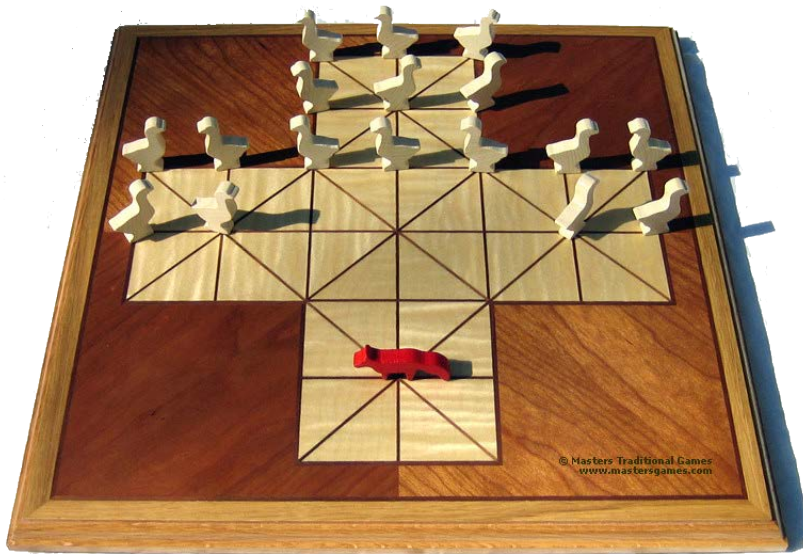
- **Player-versus-Environment**

- **Appropriately challenging**: neither too hard nor too easy
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PvP: Fairness

- **Symmetric**: have same start position & rules
 - Easiest way to achieve fairness
 - **Examples**: Chess, monopoly, *Warcraft II*
- **Assymmetric**: start & play with different rules
 - Fairness harder, but more interesting
 - **Examples**: Fox & Geese, *Starcraft*
- Requires user testing

Assymmetric 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 Kart*

Feedback: *Raiden*



Feedback: *Mario Kart*



These Terms are Not Normative

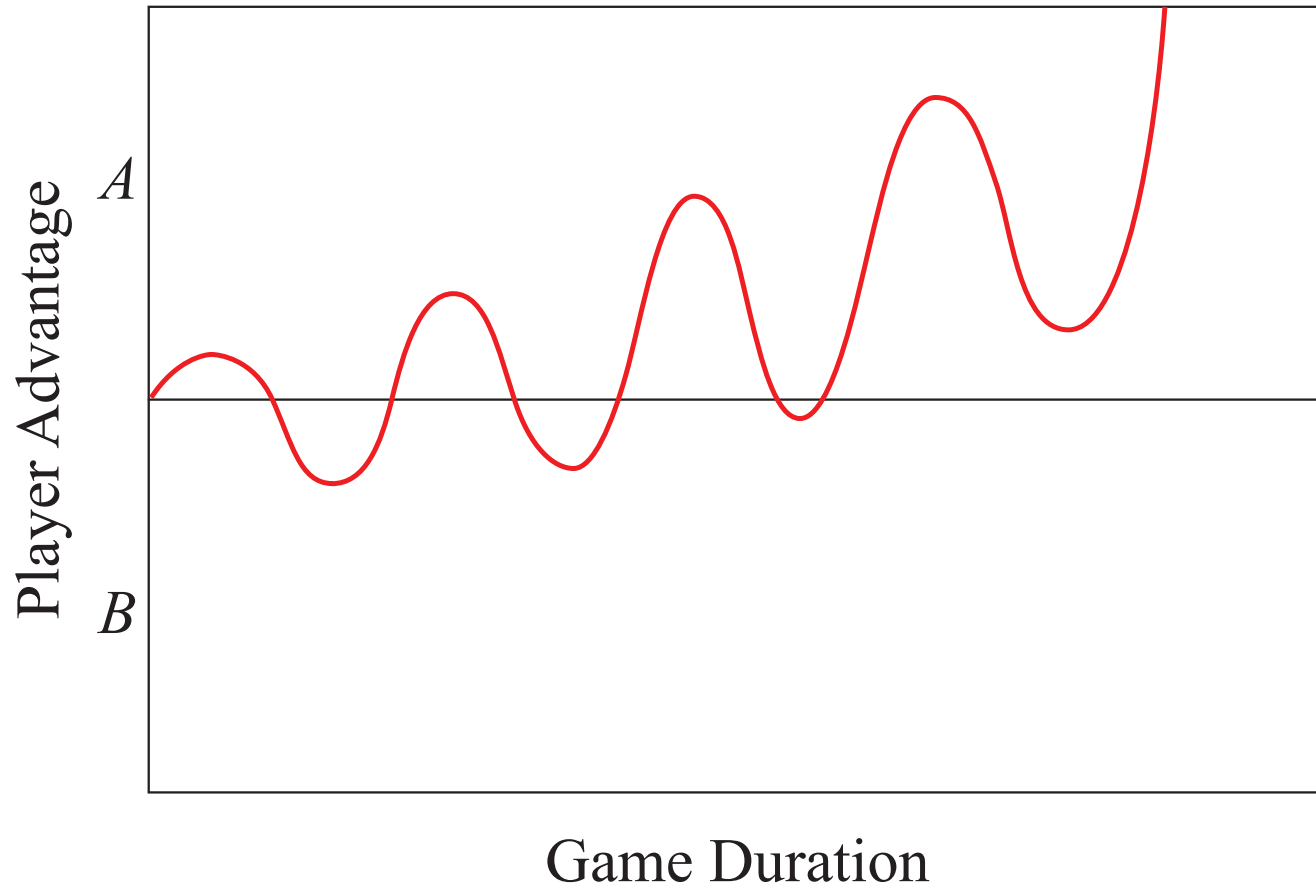
Positive Feedback

- Can be *constructive*
 - **Ex:** Increase attack
- Can be *destructive*
 - **Ex:** Drain opponent
- **Key Features**
 - Magnifies early successes
 - Increases player disparity
 - Make game end quickly

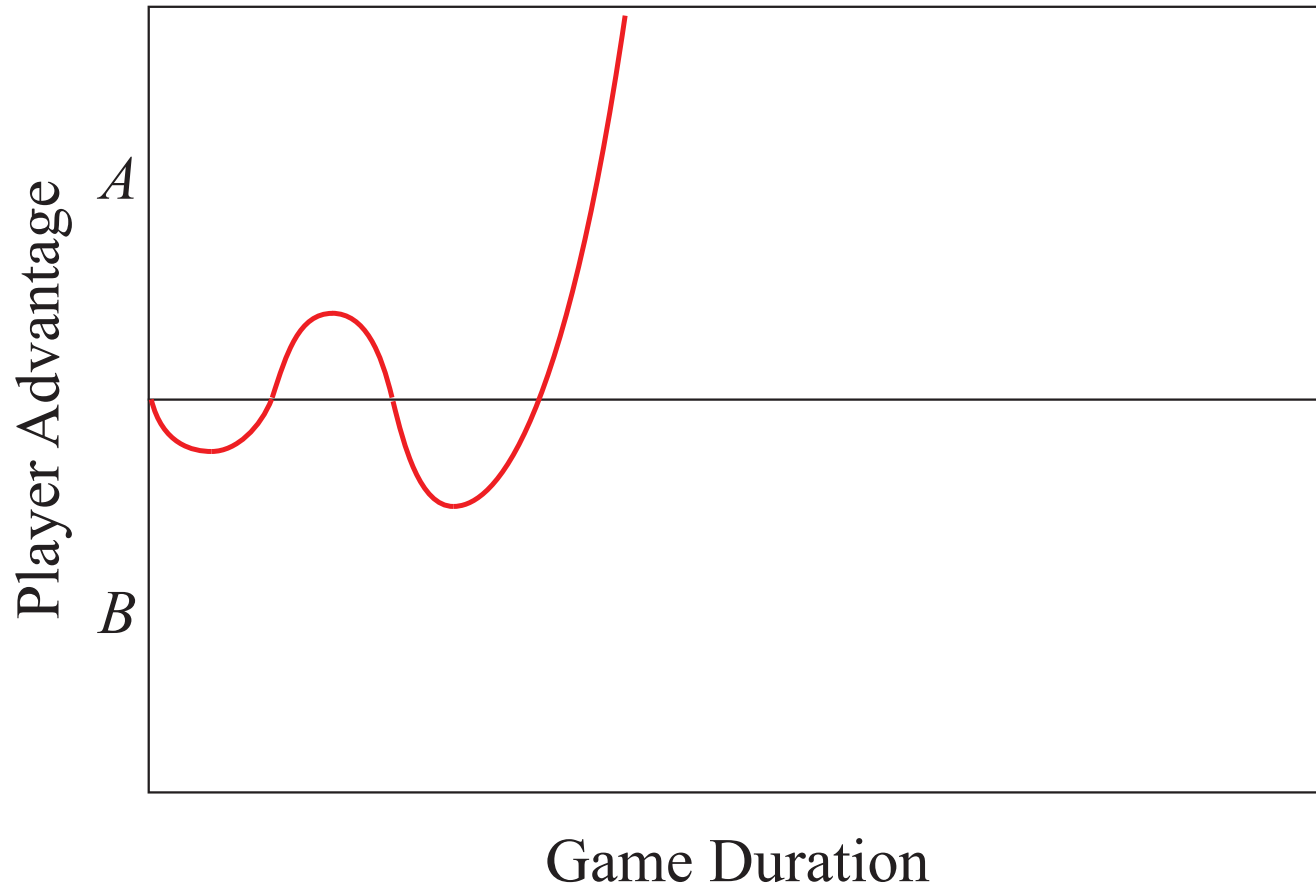
Negative Feedback

- Can be *constructive*
 - **Ex:** Boost opponent
- Can be *destructive*
 - **Ex:** Drain player
- **Key Features**
 - Magnifies later actions
 - Equalizes player status
 - Make game end slower

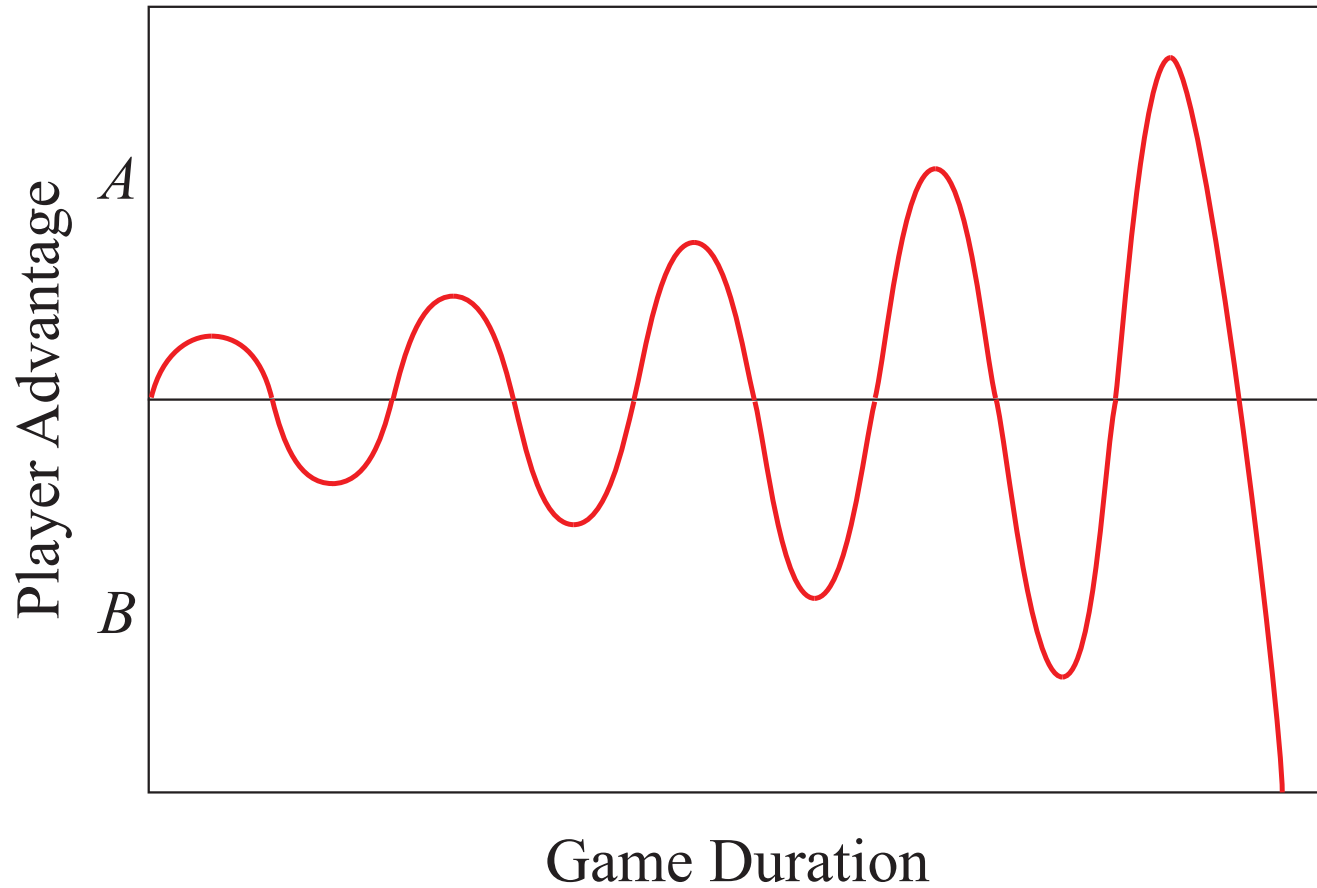
Ideal Game Progression



Too Much Positive Feedback



Powerful Negative Feedback



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
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