the gamedesigninitiative at cornell university

Lecture 7

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

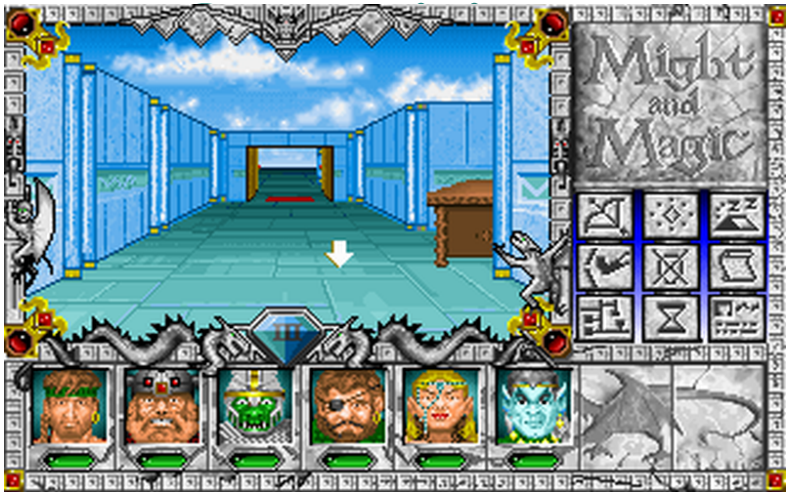
PvE: Balanced Resources

- 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
- Examples:
  - Buff spells in most RPGs
  - *Dragon Age* cold spells



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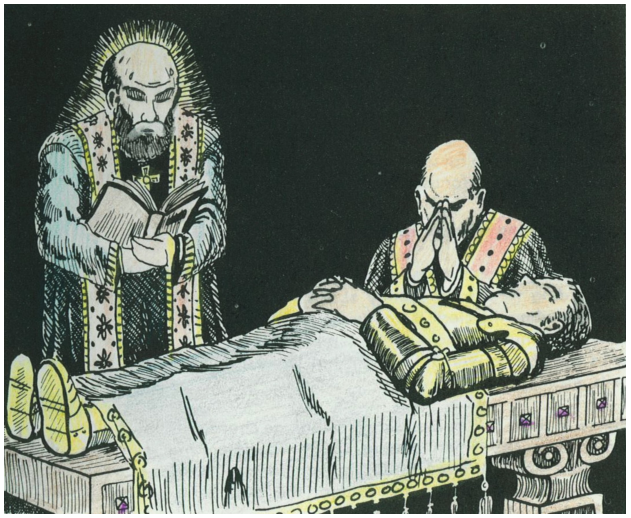

Overpricing

- Expensive, weak actions
  - Usage is "penalized"
  - Waste of designers' time
- Examples:
  - Shredder ammo in ME2
  - *Raise Dead* in early D&D

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- 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

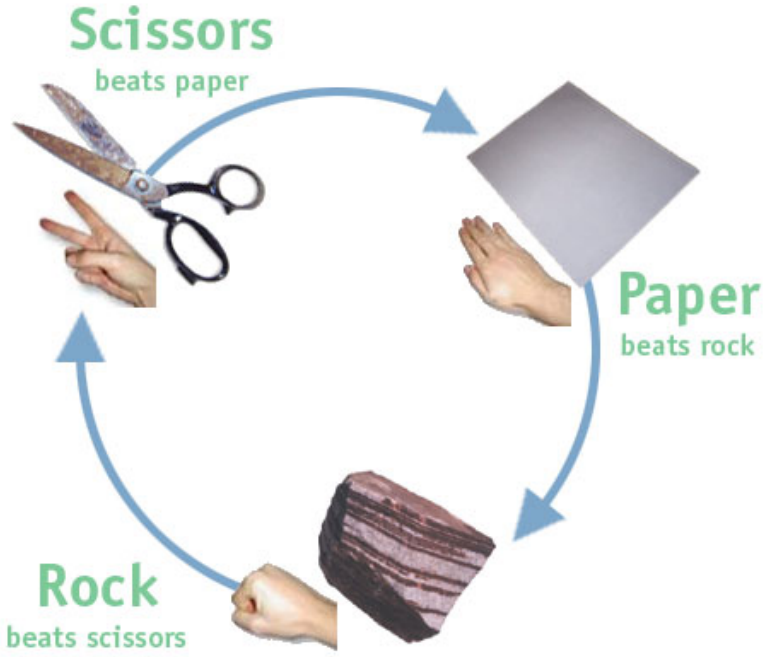
Bad Design: Deadlocks

- 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**

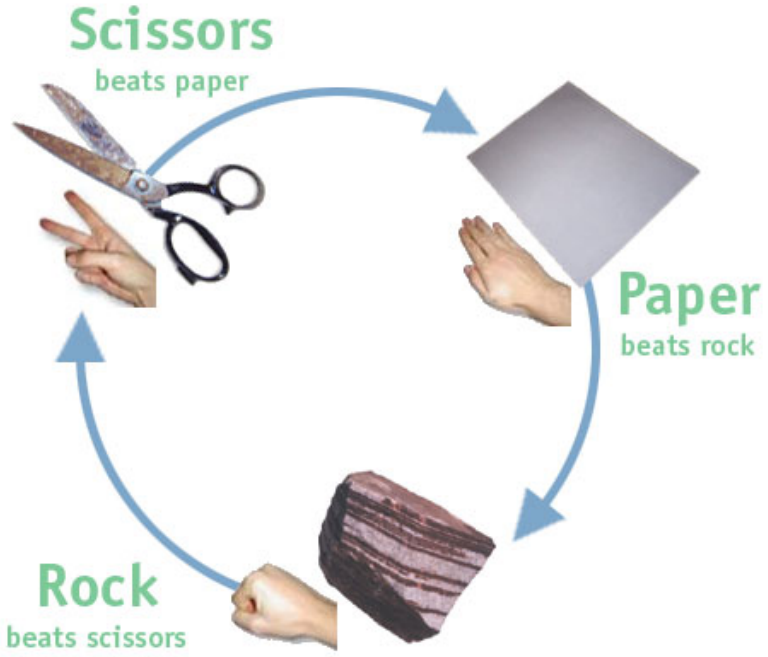
PvE: No Dominant Strategy

- "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



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



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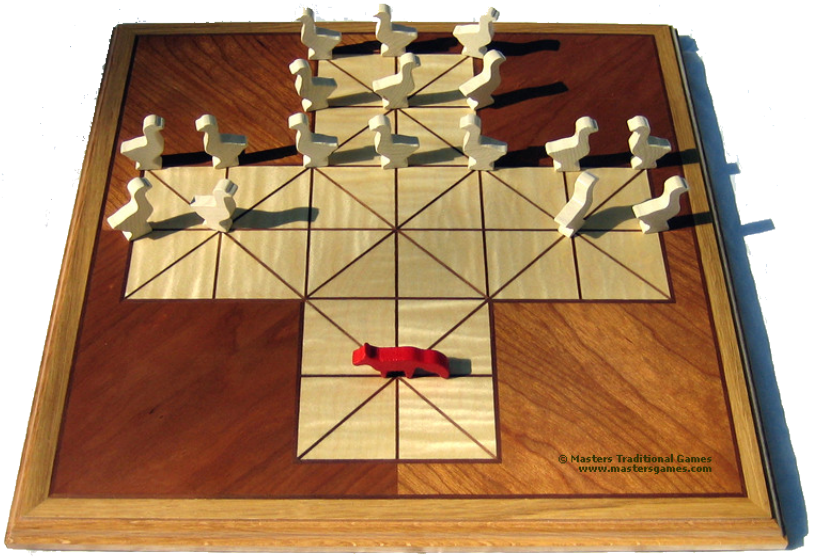
PvP: Fairness

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

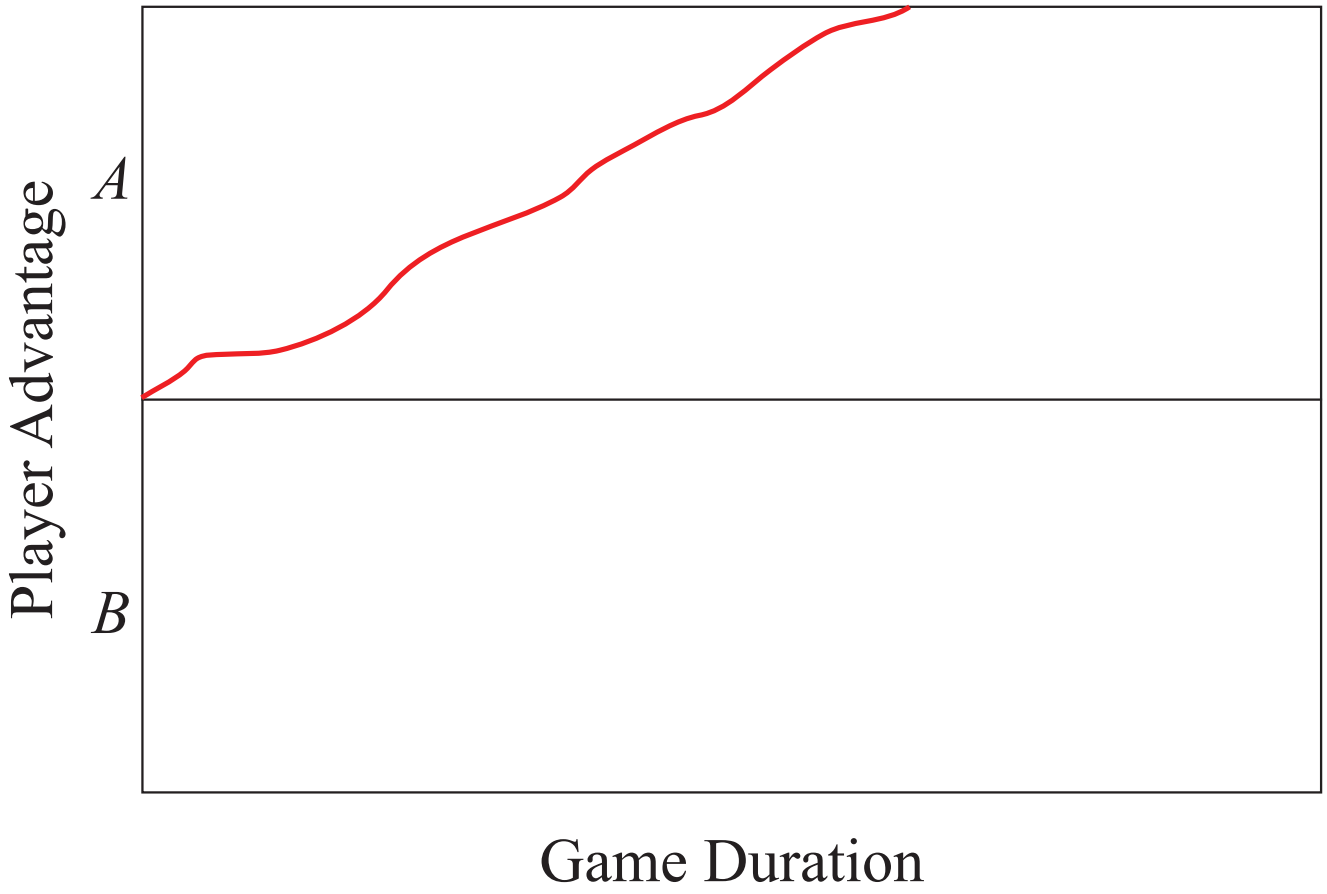
Positive Feedback

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

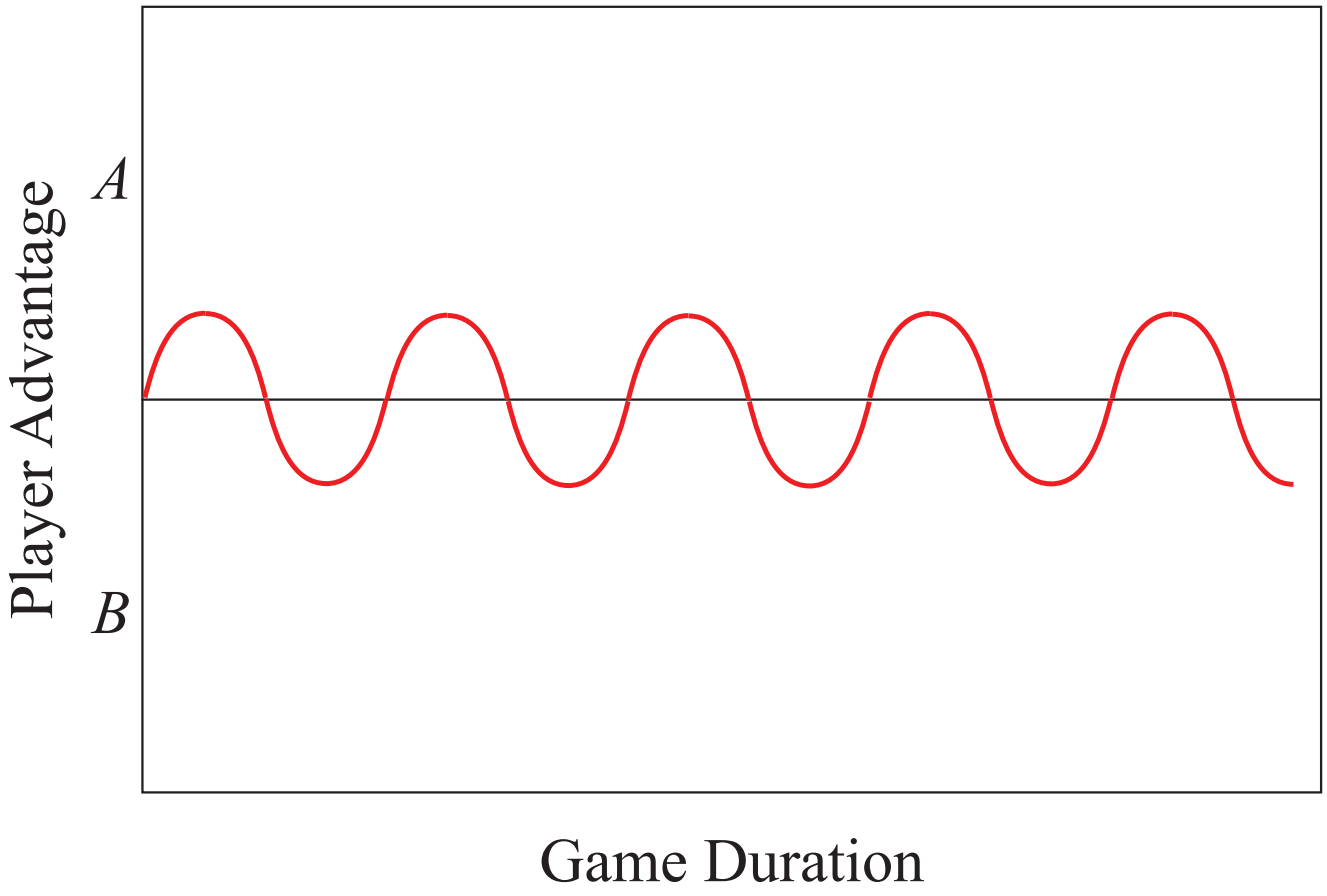
Negative Feedback

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

Sprint: No Feedback



Too Little Positive Feedback



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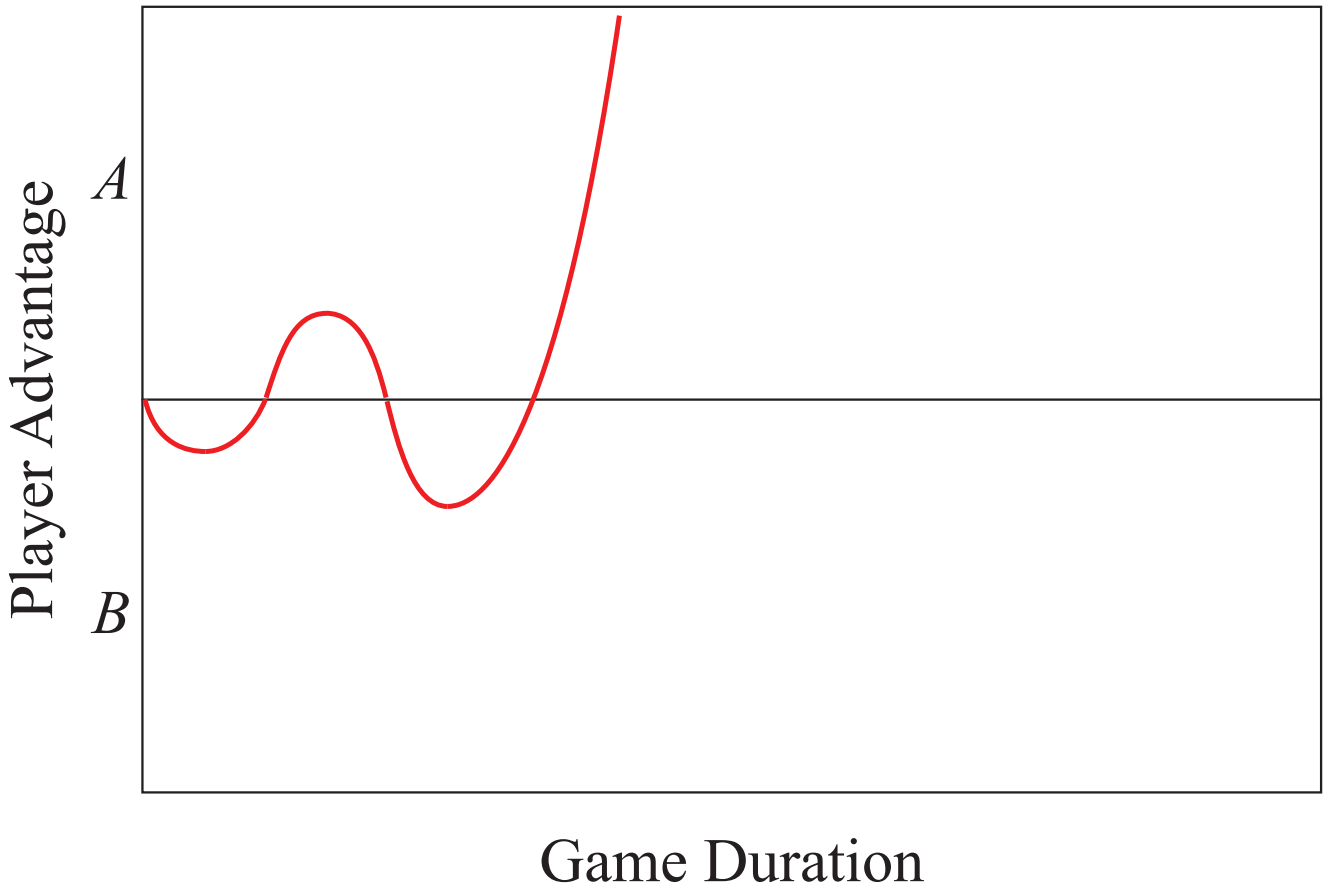
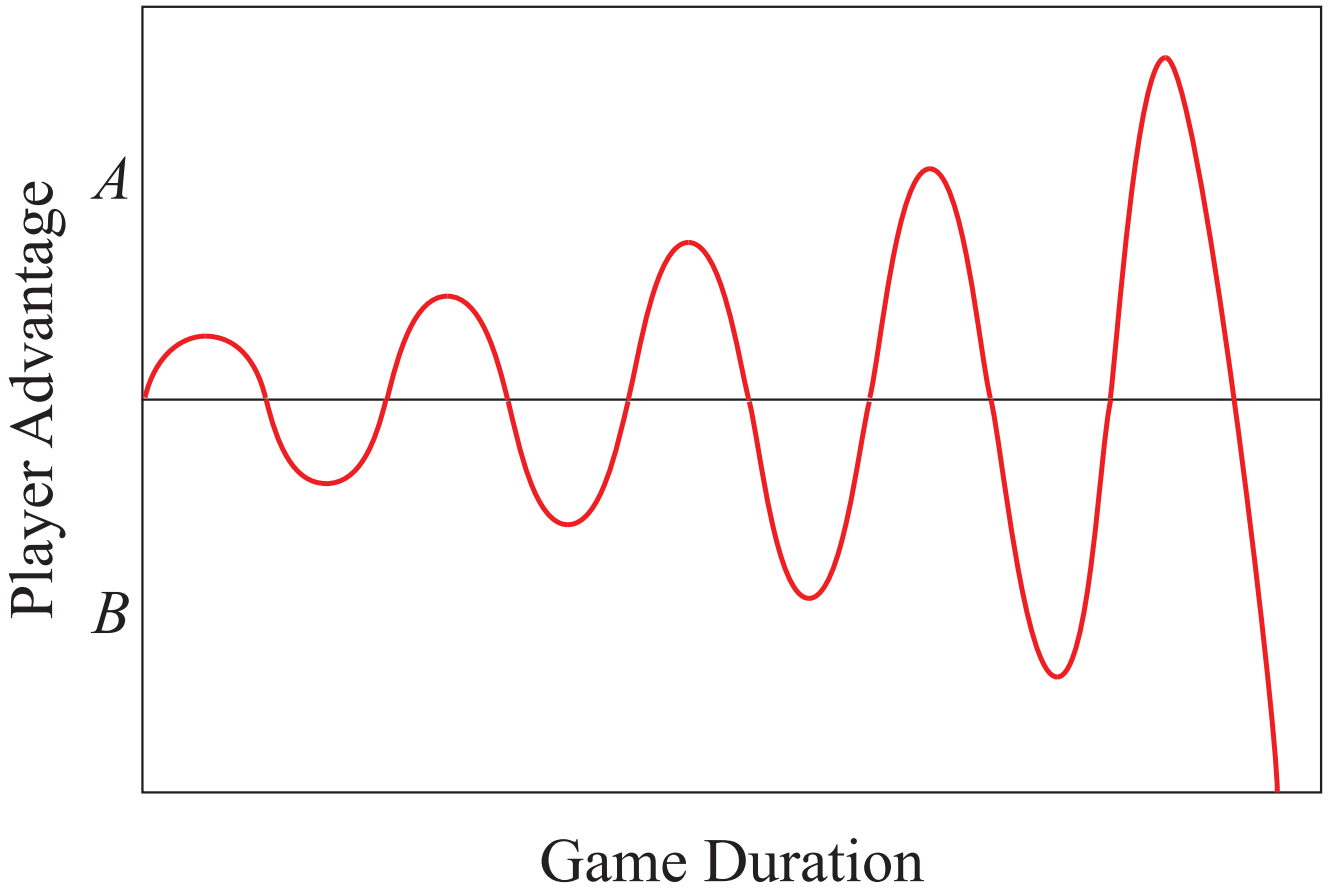
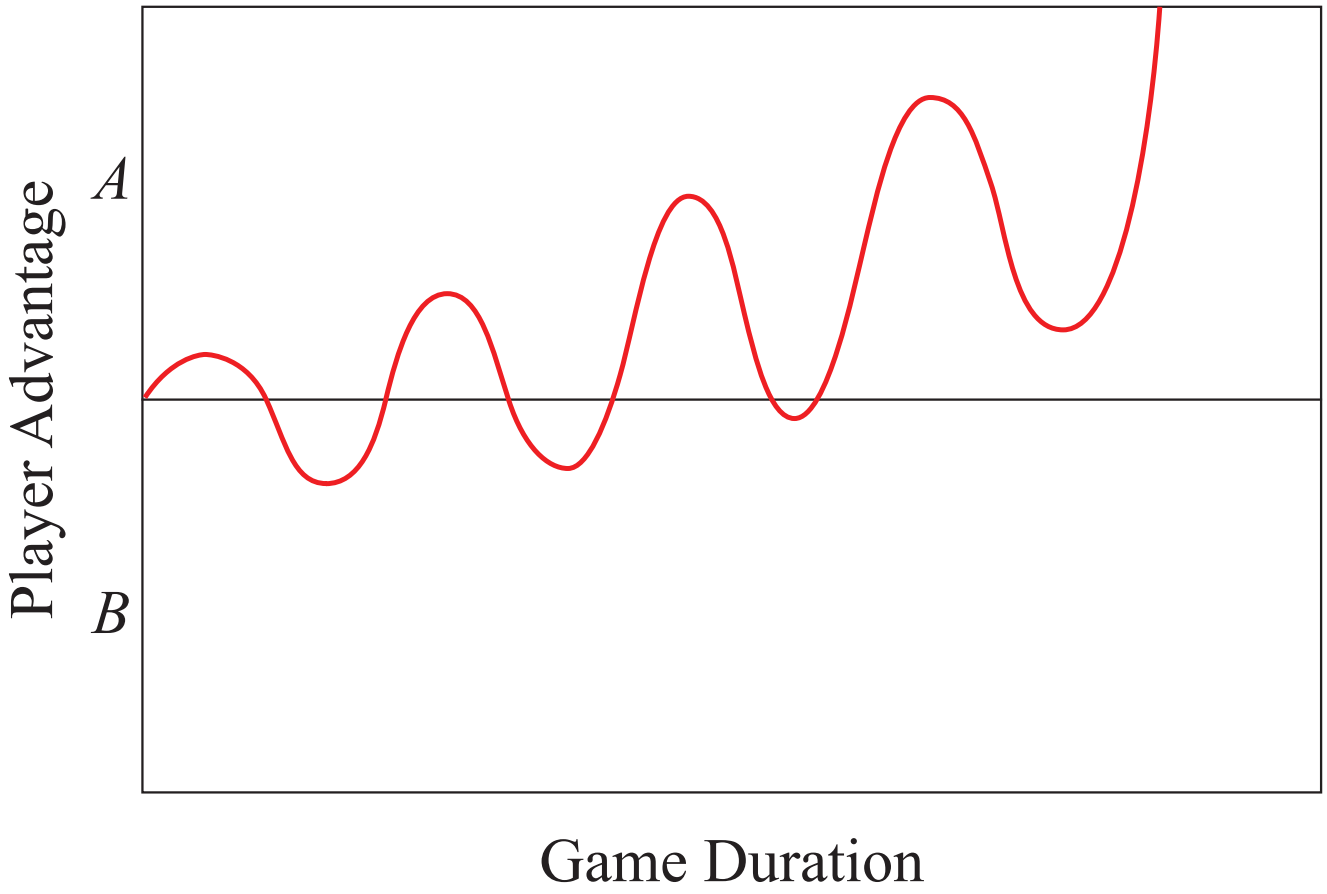


Powerful Negative Feedback



Ideal Game Progression



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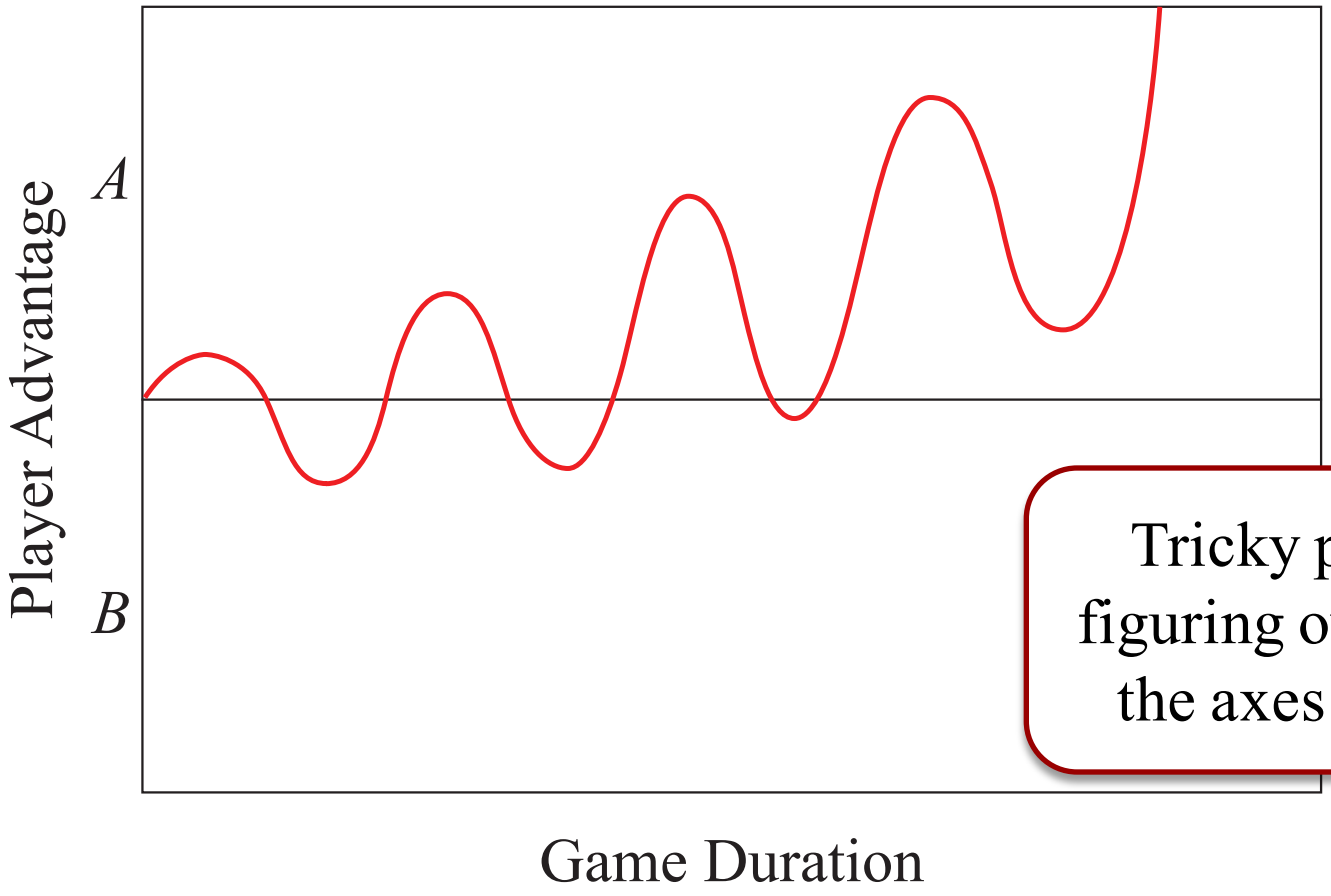


Tricky part is figuring out what the axes mean

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

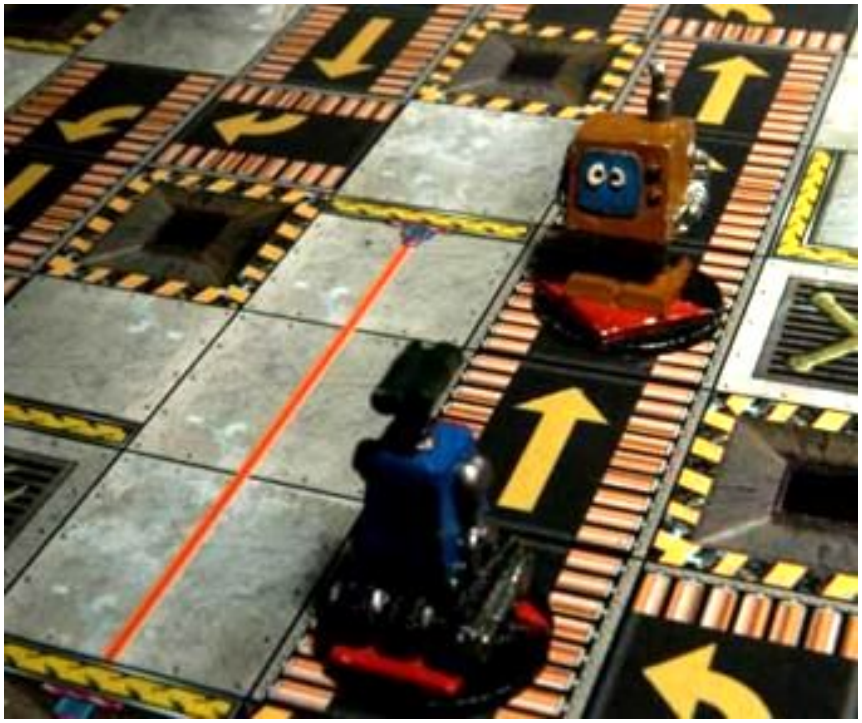
Are Politics a Bad Thing?

- 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