Rules

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GAM 224
Fall 2007
Outline

- Administrativa
- Rules
- Example
- Types of Rules
- Emergence
Admin

- Analysis project
  - Selected game due today
- Due Monday
  - Homework #1
Where are we?

- Monday was the beginning
  - Unit I: Rules
- Up to Chapter 14 in the book
  - important background
  - defining games
  - defining rules
- Now we will start to skip around a bit
Systems

- System
  - a group of interacting, interrelated elements forming a complex whole

- Components
  - Objects
  - Attributes
  - Relationships
  - Environment
Asteroids
Important

- No one feature of a game can be meaningful by itself
  - Example
    - only 4 bullets at a time

- When we analyze a game
  - we have to think about the whole system at work
Systems at Different Levels

- **Formal systems**
  - defined by symbols / objects
  - the rules for their manipulation

- **Experiential systems**
  - the players
  - their experience of the game

- **Cultural systems**
  - the game itself
  - its role in society
Properties of rules

- Limit player action
- Explicit and unambiguous
- Shared by all players
- Fixed
- Binding
- Repeatable
Rules

- Rules are central
  - a game is a **system** in which **players** engage in an **artificial conflict** defined by **rules** that results in a **quantifiable outcome**

- Notice
  - the more significant the game, the more focus is on the rules and their administration
    - significant = results with real-world consequences, lots of spectators, etc.
Why is this?

- Rules define the mechanisms of play and not play.
- Rules specify what the game is about and not about.
Example 1

- **Basketball**
  - "A player is entitled to any spot on the court he desires, provided he legally gets to that spot first and without contact with an opponent"
  - "A player shall not hold, push, charge into, or impede the progress of an opponent"

- **Message**
  - this game is about maneuvering around opponents not colliding with them
  - this is not a game about territory:
    - you can't physically stop your opponent from moving
Example 2

- Dots and Boxes
  - Each player can add one line per turn
  - A player enclosing a square marks it as his and can take another turn

- Message
  - This game is about territory
  - It is accumulative
    - territory won cannot be lost later
  - Players have time to deliberate
Example 3

- Asteroids
  - The ship can shoot and maneuver
    - but can only rotate in 15° increments
  - Only 4 bullets can be on the screen at a time

- Message
  - Player cannot shoot indiscriminately
  - Player must move as well as shoot
Thunderstorm

- four dice
- object
  - to be the last player whose house is not struck by lightning
- rules
  - player rolls all available dice
  - if no ones are rolled
    - player adds to "house" drawing
    - if house is already complete, it is struck by lightning and player is out
  - if at least one 1 is rolled
    - all of the dice with ones are removed from play
    - play passes the next player
    - if all dice are ones
      - all four dice are back in play
- house
  - seven elements
Eight and out

- deck of cards
  - 6, 5, 4, 3, 2, A
  - in four piles by suit
- object
  - to be the last player with the most points
- rules
  - each player draws one card from each pile
  - if an Ace is drawn
    - that deck is removed from play
    - all other decks are reshuffled
    - if all drawn cards are Aces,
      - all four decks are back in play
  - if no Aces are drawn
    - a player gets one point
  - if a player gets 8 points
    - he is out
Is this the same game?

- No
  - there's no drawing of houses
  - there's no rolling of dice

- Yes
  - there is the same internal logic
  - there is the same distribution of probabilities
To clarify

- Each dice
  - 6 random outcomes
  - 1/6 chance of a 1
- Each deck
  - 6 random outcomes
  - 1/6 chance of an A
- Scoring
  - seven strokes plus lightning
  - tallying 8 points
Rule types

- Operational rules
  - here is what the players do

- Constituative rules
  - the internal structure of the game

- Which is the game?
  - depends on the questions you want to ask
Operational Rules

- What players do in order to play
  - Choices
  - Moves
  - Resources

- Operationally
  - "Thunderstorm" different from "Eight and Out"
Constituative Rules

- Logical and mathematical structure of the game
  - Players may be ignorant and still play
- Logically
  - The two games are the same
  - Isomorphic
    - 1 to 1 mapping
  - A game played under one set of rules
    - could be described under the other rules
    - the outcomes would not change
    - the probabilities of those outcomes would not change
Consequences

- Operational rules
  - Affect the experience of play
    - how easy is it to tell if you're ahead?
    - what is the sense of drama?

- Constitutive rules
  - Affect the way the player will think about choices
    - what strategies are best?
    - what the differential values of particular options?
Implicit rules

- Rules that make the game playable
  - Player decorum
  - Turn length
- The more significant the game
  - the more implicit rules become operational
Penguin Shuffle
Computer games

- Perfect for creating large, complex sets of constitutive rules
  - logical and mathematical structure are there
  - players don't have to keep track

- Operational rules
  - limited by what the interface can provide
  - many more possibilities provided by real-world objects
Example

- Compare Paper & Pencil role-playing
  - D & D
- Computer RPG
  - Elder Scrolls: Oblivion
- D&D
  - Substantial burden on players to compute probabilities, remember effects of actions, etc.
    - Players do the constitutive work
  - But you have enormous freedom of action
    - The DM can come up with a response regardless of your choice of action
- Oblivion
  - You can play without knowing anything about the underlying probabilities
  - Can only do those actions that the game accepts
Quick ways to get a rewrite

- "Here are the operational and implicit rules of my game"
- “There are no rules”
- “The game is just like real life”
Simulation vs Rules

- Are the rules of NBA Live the same as the rules of NBA basketball?
  - The game wants you to think so
- All the details are right
  - time-outs
  - quarters
  - passing
  - shooting
  - etc.
Simulation vs Rules

- But of course they aren't
  - the players dribble automatically
  - you control different players at different times
  - you don't have to aim your passes or shots
  - players don't hear broadcast commentary while playing
  - sometimes you’re the coach, sometimes the player
- You have to get past the rules of the simulated game
  - to think about the actual rules of the video game
Real rules

Examples
- player stats and their impact on player interactions
- power-ups and “special” moves
- player AI
  - team and opponent
- playbook

Don’t let the game deceive you
- think about what the player’s choices are
- what computations turn those choices into outcomes
The rules of go can be explained in 10 minutes
  - but it takes years to master
  - games have great strategic intensity

How does intensely meaningful play arise from simple rules?
Emergence

- product of coupled, context-dependent interactions
- resulting system is non-linear
- behavior cannot be reduced to the sum of its parts
Coupling

- From systems theory
- Objects are coupled
  - if a change to one causes or requires a change in another
- Example
  - The position of one piece on the go board impacts the strategic importance of others
    - players should consider the whole network of relationships when making a move
Coupling 2

- In engineering
  - we try to avoid coupling between objects in systems
  - tight coupling makes a system hard to change and fix
  - makes its behavior hard to predict

- In game design
  - coupling can produce great gameplay
    - it makes the user's decisions more meaningful
    - a decision here affects the whole outcome
      - if you don't feel this way, what is the point?
Asteroids
Example

- Coupling between thrust, firing direction and orientation in Asteroids
  - Forces the player to manage attitude, position and aiming simultaneously

- Add in precise collision detection
  - Changes in orientation can affect asteroid collisions, too

- Choice of ship orientation becomes a meaningful one
Context-dependent Interactions

- An interaction is context-dependent
  - if its outcome is not solely determined by the properties of the interactors
  - but also the environment of interaction

- Examples
  - Asteroid vs ship
    - outcome is always the same
    - not context-dependent
  - An incomplete pass in football
    - stops the clock
      - may be important late in the game
Context-dependency

- Requires the player to understand the context before making choices.
- The context becomes a feature that can be manipulated as well as the player's choices.

Example

- stealth mechanic
  - turns ordinary movement into a context-dependent activity
- Asteroids
  - presence or absence of alien ship changes strategy for attacking asteroids
Emergence through Combination

- When pieces can be combined in a complex system
  - their behavior may have emergent properties
  - a type of context-dependency

- Example
  - Chess
    - two rooks
  - Advance Wars
    - recon / rockets
    - submarine / battleship
  - RPGs
    - healer / fighter in party
Non-linearity

- Technically, the property that a linear change in the input to the system produces a change in output that is not linear
  - A non-linear system is one in which the behavior "breaks" at certain points
  - Non-linear systems theory
    - also called complexity theory and chaos theory
- Examples
  - a window and a baseball
    - small velocities $\rightarrow$ bouncing
    - large velocities $\rightarrow$ shattering
    - larger velocities $\rightarrow$ puncturing
  - almost any macro physical system
Non-linearity 2

- Most games are inherently non-linear
  - Two outcomes – win / lose
  - Often a single game decision (input) can make the difference between winning and losing (output)
- Otherwise
  - the game becomes predictable
    - once behind, one can never catch up
- Example
  - Asteroids
    - a tiny navigation or prediction error can mean loss of ship
Meaningful Play

- Emergence helps make the play meaningful
  - it means the choices matter
    - things are highly coupled
  - it can generate more choices
    - combining parts for complex wholes
  - it makes that the game seems more "real"
    - the real world is non-linear
  - it gives the player something to learn
Example: Metroid

- Player has an infinite supply of bombs
  - bombs explode after a short time interval
  - bombs do not fall with gravity
- In the "ball" state
  - the player can survive a bomb explosion and be tossed in the air
- Result
  - the player can drop a bomb, drop another in the air, which throws them higher, etc.
  - access to vertical space is limited only by player's mastery of this technique
- If it wasn't for this emergent characteristic
  - the designer would have to build in some kind of super jump, or
  - would have to make levels that use the vertical dimension less
Bad emergence

- Emergence may mean that an unanticipated strategy succeeds when it shouldn't.

- Example
  - Deus Ex
  - Mines can be attached to walls
  - In some levels
    - the player can build a ladder from mines
    - get to the next level without completing the current one
Designing Emergence

- By nature not totally predictable
- Game must have complexity
  - coupling
  - context-dependency
- Objects must have
  - multiple relevant dimensions
  - on which they vary
- Iterate
  - find (and eliminate) bad emergence
  - find (and enhance) good emergence
Systems

- Emergence is a system phenomenon
  - two coupled objects ≠ emergence
    - weapon and ammo
  - many coupled objects
    - weapon and ammo and mission and enemy and location and carrying capacity and weapon upgrades and cost and ...
    - now we start to see emergent complexity

- But too much complexity
  - can burden the player's decision making
  - good games introduce couplings one at a time to build up the player's abilities
  - good games build on player's real-world experience and expectations so there is less to learn
Summary

- Every game has rules
  - Not always obvious
- Don’t confuse constitutive and operational rules
  - Constitutive = internal logic structure
  - Operational = what you do to play
Monday

- Reading
  - Ch. 17
  - Information