Lecture 2

Mechanics Revisited
Purpose of Today’s Lecture

- Give a review of formal design elements
  - Not everyone here has had the Intro Games course
  - And for the rest of you, it has been over a year

- Develop a deeper understanding of mechanics
  - Understand the importance of interactions
  - Understand the analysis challenges

- Set us up for the later lectures on mechanics
  - Mobile game design and monetization
Reminder: Aspects of a Game

• **Players**: How do humans affect the game?

• **Goals**: What is the player trying to do?

• **Rules**: How can the player achieve the goal?

• **Challenges**: What obstacles block the goal?
Formal Design Elements

- **Players**: Player Mode Sketches
- **Goals**: Objectives
- **Rules**: Actions and Interactions
- **Challenges**: Obstacles and Opponents
Formal Design Elements

• **Players**: Player Mode Sketches

• **Goals**: Objectives

• **Rules**: Actions and Interactions

• **Challenges**: Obstacles and Opponents

Will assume you are familiar with first two
**Actions**

- **Verbs** that describe what the player can do
  - Walk (left or right)
  - Run (walk, but faster!)
  - Jump (up; jump/run for left or right)
  - Shoot (left or right)

- Does not need to be attached to an avatar
  - Build (RTS or simulation)
  - Swap (Bejeweled clones)
  - Rotate (Stacking games)
Evaluating Your Actions

- How important are they?
  - Do they help achieve goal
  - If not, why are they there?

- **Example:** Platformers
  - **Goal:** reach exit location
  - Killing enemies is *optional*
  - Other actions are *secondary*

- **Goal:** Minimize verbs
  - More verbs lead to *bloat*
  - Leverage *interactions*
Interactions

- Not a *direct* action of player
  - Outcome of the *game state*
  - Can happen without controller

- **Example:** collisions
  - Accidental or player forced
  - May be bad *(take damage)*
  - May be good *(gain power-up)*

- **Other Examples:**
  - Spatial proximity
  - Line-of-sight
  - Resource acquisition
Game Mechanics

- **Game mechanic**
  - Relationship between verbs and interactions
  - Often call this relationship the “rules”
  - **Gameplay** is manifestation of these rules

- **Example**: Joust
  - **Verbs**: Flap; go left or right
  - **Interaction**: Collision with opponent
  - **Rule**: If hit opponent, lower player dies
Gameplay Example: *Joust*
Early Mobile Games: Just One Verb

- Can we limit to **one** verb?
  - Mechanics are all interactions
  - Common in mobile, tablet
  - Due to lack of input modes

- **Example**: Sneak Beat Bandit
  - Has only one verb: *move*
  - Rhythm game; move to beat
  - All movement on rails
  - If obstacle in way, turn
  - Line-of-sight mechanics
Beat Sneak Bandit
Avoid Verb Proxies

- **Proxy**: verb that activates another verb
  - “Use an item” (what does the item do?)
  - “Shoot” (what does the weapon do?)

- Make the **outcome** of your verbs clear
  - Fire standard projectile (effects have “travel time”)
  - Fire continuous beam (effects are instantaneous)

- Important questions to ask
  - How does help reach the goal?
  - How is it outcome challenged?
Avoid Verb Proxies

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Challenges

• **Obstacles**
  • Prevent progress towards goal
  • Have to be “overcome”

• **Opponents**
  • Players or bots with their own goals
  • May or may not need to be overcome

• **Dilemmas**
  • Can only perform one of several actions
  • “Correct” choice not immediately clear
Challenges

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Generally necessary for “deep” gameplay
“Deep Gameplay”

- Want many ways to overcome challenges
  - **Example**: kill enemy or sneak past
  - If just one way, gameplay is “shallow”
- Shallow challenges hurt replayability
  - “Twitch” challenges become boring fast
  - Cerebral challenges solved by the walkthrough
- All games should have a **strategic** element
Strategy

- **Definition**: an elaborate sequence of steps
  - Action is the culmination of all the steps
  - Changing steps or order changes action

- Still allows for puzzle gameplay
  - Allow some *flexibility* in these solution steps
  - **Example**: Multiple solutions to Rubik’s Cube
  - **Example**: Time-rewind in *Braid*

- **Resources** are a common way to implement
Understanding Game State

• Many game state values are **spatial**
  • Represent location of a game **entity**
  • Also physical values like velocity, acceleration

• Entities act as containers for non-spatial values
  • Values that never change: **attributes**
  • Values that can change: **resources**

• Attributes, resources can be global as well
  • Though most mechanics are at entity level…
Resources and Gameplay

• Resources are crucial to “combat” mechanics
  • Entities have resource values (e.g. health, ammo)
  • Expend resources to affect others (e.g. attack)
  • May change resources of that entity (e.g. damage)

• Three basic categories of resource combat
  • Tug-Of-War: entities take from each other
  • Dot Eating: entities race to gather limited resource
  • Flower Picking: race to gather unlimited resource
Resources and the Game Economy

- **Sources**: How a resource can increase
  - **Examples**: ammunition clips, health packs

- **Drains**: How a resource can decrease
  - **Examples**: firing weapon, player damage

- **Converters**: Changes one resource to another
  - **Example**: vendors, *Starcraft* barracks

- **Traders**: Exchange resources between entities
  - Mainly (but not always) in multiplayer games
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Economic Challenges

- You can use resources to
  - Control player progression (hinder or advance)
  - Modify player abilities (limit or enhance)
  - Create a large possibility space (for replay value)
  - Create strategic gameplay

- Do not need a lot of resources
  - Not every game is a strategy game
  - But almost all games have some economy
Resources as Dilemma

- Players perform cost-benefit analyses
  - **Cost**: resource change not beneficial to player
  - **Benefit**: resource change beneficial to player

- **Example**: Survival Horror
  - Use ammo to shoot zombie (Cost: ammo)
  - Use knife to stab zombie (Cost: health)
  - Benefit the same in each case

- Players act with least cost for benefit
Emergent Behavior

- **Coupled Interactions**
  - Two mechanics that can happen at once
  - **Verbs**: jump AND run in a platformer
  - **Resources**: warrior AND archer in an RTS

- **Context-dependent Interactions**
  - Mechanics combine to give new behavior
  - **Verbs**: jump and run is new form of movement
  - **Resources**: warriors form wall to cover archers
Emergent Behavior

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Examples of Emergent Actions

### Running Jump
- Can move while in midair
  - Just horizontal movement
  - Not realistic; it is a game
  - Many platformer challenges assume this type of control
- Different than a *long jump*
  - Less height than reg. jump
  - No control once in the air
  - Would be a *distinct action*

### Strafing Fire
- Based on “real life” property
  - Bullets travel in straight line
  - Movement changes origin
  - Walking side-side makes a spray (used in covering fire)
- But some features are gamy
  - Bullets slower than life
  - Character faster than life
  - Creates interesting effects
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# Combining Actions

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## Common Spatial Interactions

### Collisions
- Can effect *resources*
  - Player takes damage
  - Player gains power-up
  - Player-NPC transfer gold
- Can effect *spatial values*
  - Bounce off collision point
  - Swing from attached rope
  - Attraction to magnet/charge

### Detection
- Examples:
  - Line-of-sight (w/ obstacles)
  - Spatial proximity
  - Can have *direct* effects
    - Alarms in a stealth game
  - Can have *indirect* effects
    - Tower defense targeting
    - Adjust NPC reactions
Resource-Spatial Interactions

Resource Affects Spatial

- Resources can unlock areas
  - Keys are a trivial resource
  - Also use resource thresholds
  - **Ex:** Collect all tokens to pass

- Resources affect difficulty
  - Adjust input device sensitivity
  - **Ex:** Deadeye meter in *RDR*
  - **Ex:** Jet packs to increase jump

Spatial Affects Resources

- Resources made by entities
  - Have a spatial location
  - **Ex:** Time to transfer resources
  - **Ex:** Sources be captured

- Resource values are entities
  - Take up physical volume
  - Need space to acquire
  - **Ex:** Inventory in *Deux Ex*
Challenges: Limitations

- **You cannot** always perform an action
  - Shooting may require ammo
  - Cannot (always) jump in mid air

- **Limitation**: requirement to perform action
  - Boolean test (like an `if–then`)
  - Checked at time of user input

- **Only one** limitation per verb
  - If more than one, split into more verbs
  - Reason double-jump is distinct
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Next Time: Mobile Gaming