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 important of interactions
  • Understand the **analysis** challenges

• Set us up for the **later lectures** on mechanics
  • Monetization and mobile game design
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)

Mechanics Revisited
Primary Actions

- How do verbs, goals relate?
  - Imagine there no challenges
  - What verbs *must* you have?

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

- **Goal**: Focus on primary
  - Secondary verbs lead to bloat
  - Add features with interactions1
Secondary Actions are Acceptable

- Often in **puzzle platformers**
  - Platformer verbs + something
  - “Innovation on the cheap”

- Verb that alters “geography”
  - Access hard-to-reach areas
  - Directly overcome *challenges*
  - Not directly needed for goal

- But do this sparingly!
  - Indies have one new verb!
  - Other features are *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*
Design Goal: Verb Minimalism

- 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 your verbs** *outcome oriented*
  • Fire standard projectile (like shoot, but says what it shoots)
  • Fire freezing beam (what is does and how it is applied)

• **Important questions to ask**
  • Does it help me reach a goal?
  • Does it overcome a challenge?
Avoid Verb Proxies

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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…
Actions Affecting Spatial State

• Typically we what we would call *movement*

• But there are many ways to implement
  • **Direct** movement of avatar (e.g. WASD)
  • **Indirect** movement of avatar (e.g. pathfinding)
  • Alter the **environment** (e.g. removing platforms)

• Area of much potential *innovation*
  • Particularly given the limitations of mobile
Alterning the Environment

- Found in “physics” games
  - No direct control of avatar
  - Can only remove/add/move obstacles in environment
  - Movement is “natural”

- **Example**: *Screw the Nut*

- Physics is a rule system
  - Interaction, not action
  - Takes one state to another
  - Also one that is complex to understand/model
Innovating Avatar Movement

- 2D games move on 2-axes
  - Classic: left-right/up-down
  - Unless top-down game, one of these axes is restricted

- Is jump the only option?
  - Launcher/trajectory verbs
  - (Limited) teleportation

- **Example:** *Knightmare Tower*
  - Launcher-style game
  - Vertical movement is boosts gained from killing enemies
Environment AND Avatar

- Possible to split the verbs
  - Some for avatar movement
  - Others for environment

- Found in “drawing” games
  - Draw missing platforms
  - Avatar walks on platforms
  - **Ex**: Max & Magic Marker

- Innovate by limiting avatar
  - Move on single axis
  - Combine with environment
  - **Example**: Swindler
Combining Actions

- Verbs can combine in interesting ways
  - Run and jump in a platformer
  - Strafing fire in a shooter

- Typically result of the interactions
  - Each verb interacts with environment in different way
  - Combination of two give extra feature for “free”
  - This is an example of emergent behavior

- Not all combinations are emergent
  - Example: Double jump is not a feature of interactions
  - This type of verb combination is a distinct action
## Combining Actions

<table>
<thead>
<tr>
<th>Running Jump</th>
<th>Strafing Fire</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Can move while in midair</td>
<td>• Based on “real life” property</td>
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<td>• Just horizontal movement</td>
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Mechanics Revisited
Combining Actions

**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
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- But some features are gamy
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  - Creates interesting effects

Mechanics Revisited
Combining Actions

Is this an example? Why or why not?
## Common Spatial Interactions

<table>
<thead>
<tr>
<th>Collisions</th>
<th>Detection</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Can effect <em>resources</em></td>
<td></td>
</tr>
<tr>
<td>• Player takes damage</td>
<td></td>
</tr>
<tr>
<td>• Player gains power-up</td>
<td></td>
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<tr>
<td>• Player-NPC transfer gold</td>
<td></td>
</tr>
<tr>
<td>• Can effect <em>spatial values</em></td>
<td></td>
</tr>
<tr>
<td>• Bounce off collision point</td>
<td></td>
</tr>
<tr>
<td>• Swing from attached rope</td>
<td></td>
</tr>
<tr>
<td>• Attraction to magnet/charge</td>
<td></td>
</tr>
<tr>
<td>• Examples:</td>
<td></td>
</tr>
<tr>
<td>• Line-of-sight (w/ obstacles)</td>
<td></td>
</tr>
<tr>
<td>• Spatial proximity</td>
<td></td>
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<tr>
<td>• Can have <em>direct</em> effects</td>
<td></td>
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<tr>
<td>• Alarms in a stealth game</td>
<td></td>
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<tr>
<td>• Can have <em>indirect</em> effects</td>
<td></td>
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<tr>
<td>• Tower defense targeting</td>
<td></td>
</tr>
<tr>
<td>• Adjust NPC reactions</td>
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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*
Actions and 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)
  - **Example**: double jump is different from jump

- Primary use of resources in game design
  - Presence of resource allows action; may consume
Balancing 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
Design Problem: Pricing Resources

Overpricing

- Expensive, weak actions
- Usage is “penalized”
- Waste of designers’ time

Examples:
- Shredder ammo in ME2
- *Raise Dead* in early D&D
Design Problem: Pricing Resources

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**Overpricing**

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- Examples:
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- Resource usage determines difficulty
  - *Resident Evil*: Availability of ammunition
  - D&D 3.x: 20% resource per encounter
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: Origins*
  - Resources: Health, Mana
  - Small health loss; regain much mana
  - Small mana loss; heal much damage

- **Solution?** Cool-down time
Summary

- **Mechanics** combine **actions** and **interactions**
  - Actions are a direct result of player controls
  - Interactions triggered by a particular game state
  - Input limitations make interactions very important

- Interactions depend on the **game state**
  - Spatial state associated with physics, detection
  - Resources associated with limitations, unlocking