IMGD 1001:
Gameplay

Outline
- Gameplay
- Game Balance
- Level Design

Gameplay
- Player experiences during the interaction with game systems
- Collective strategies to reach end points (score, goal)
- Specific to game activities
- "What the player does"
- Includes
  - Utility - A measure of desire associated with an outcome
  - Payoffs - The utility value for a given outcome
  - Preference - The bias of players towards utility

Gameplay Example (1 of 2)
- Adventure game: Knight and Priest
- During combat
  - Knight in front with sword
  - Priest in back casts spells (all spells cost the same)
- E-bolts: (do damage equal to sword)
- Band-aids: (heal equal to sword)
- Fight a single opponent with sword
  - Which spell should Priest cast?
    - Against 1 big opponent with 6 arms?
      - e-bolts
    - Against 30 small opponents with weak attacks?
      - band-aids
  - Can always decide which is better (not interesting!)

Gameplay Example (2 of 2)
- Now, suppose...
  - Band-aids still affect single target but e-bolts have an area affect
  - E-bolts do less damage, but armor doesn't make a difference
- Now, which spell should Priest cast?
  - Answer isn't as easy. Interesting choices. Good gameplay.

Group Exercise
- Break into project groups
- Adventure game: Knight and Priest
- Add gameplay elements that make combat more interesting than in previous choice

Discuss
- What are the categories?
Implementing Gameplay (1 of 2)

- Choices must be non-trivial, with upside and downside
  - If only upside, AI should take care of it
  - If only downside, no-one will ever use it
- Note: this is only regarding Game Theory
  - Ex: Could have ray gun that plays music. “Cool”, but soon “gimmie the BFG”
  - Ex: Nintendo’s Smash Bro’s has “Taunt”
- Other examples from popular games?
- Game value when upside and downside and payoff depends upon other factors
  - Ex: Rohan horsemen, but what if other player recruits pikenmen?
  - Ex: Bazooka, but what if other player gets out of tank?

Implementing Gameplay (2 of 2)

- Should be series of interesting choices
  - Use of health potion now may depend upon whether have net for capturing more fairies
  - Having net may depend upon whether needed space for more arrows for bow
  - Needing arrows may depend upon whether killed all flying zombie bats yet
  - Hence, well designed game should require strategy
- Other examples from popular games?

The Dominant Strategy Problem

- Articles with “10 killer tactics” or “ultimate weapon”
  - What are these doing?
  - Taking advantage of flaws in the game design!
- Should never have an option that is so good, it is never worth doing anything else
  - Dominant strategy
- Should never have an option not worth using
  - Dominated strategy

Near Dominance

- Worth looking for near dominance, too
  - Near-dominated – useful in only very narrow circumstance
  - Near-dominant – used most of the time
- Ex: stun gun only useful against raptors, so only useful on raptor level (near dominated)
  - Do I want it used more often?
  - How much effort on this feature?
  - Should I put in lots of special effects?
- Ex: flurry of blows most useful attack (near dominant) by Monk in D&D
  - Should we spend extra time for effects?

Avoid Trivial Choices

- Cavalry ➔ Archers ➔ Lancers
  - Transitive, not so interesting
- Better (see right)
  - Cavalry fast, get to archers quickly with lances
  - Lancers’ spears hurt cavalry bad
  - Lancers slow, so archers wail on them from afar
- What game does this look like?
  - rock-paper-scissors
  - Intransitive, more interesting

Toolbox of Interesting Choices

- Strategic versus Tactical
- Supporting Investments
- Compensating Factors
  - Impermanence
- Shadow Costs
- Synergies
Strategic versus Tactical (1 of 2)

- Strategic choices affect course of game over medium or long term
  - Tactical choices apply right now
  - Ex: build archers or swordsmen (strategic)
  - Ex: send archers or swordsmen to defend against invading force (tactical)
- Strategic choices have effect on tactical choices later
  - Ex: if don't build archers, can't use tactically later

Supporting Investments

- Often game has primary goal (ex: beat enemy) but also secondary goals (ex: build farms for resources)
- Some expenditures directly impact primary goal (ex: hire soldier), while others indirect (ex: build farm) called supporting investments
- Supporting primary goals are "one-removed"
  - Ex: improve weapons, build extra barracks
- Supporting secondary goals are "two-removed"
  - Ex: build smithy that improve weapons
  - Ex: research construction lets you build smithy and build barracks (two and three removed)
- Payoff will depend upon what opponents do

Compensating Factors

- Consider strategy game, all units are impeded by terrain
  - Ships can't go on land, tanks can't cross water, camel riders only in dessert
- Flying unit that can go anywhere → How to balance?
  1) Make slow
  2) Make weak, easily destroyed
  3) Make low surveillance range (but could be unrealistic)
  4) Make expensive
  Common but uninteresting since doesn't change tactical use!
- Guideline is to ask what is best and worst about choices:
  1) This move does most damage, but slowest
  2) This move is fastest, but makes defenseless
  3) This move best defense, but little damage
- Most should be best in some way
- What if ok in every way? → Versatile (next)

Versatility

- With versatility, a 4th choice:
  1) This is neither best nor worst, but most versatile
  - Ex: beam can mine asteroids and shoot enemies
  - Versatility makes it good choice
- Versatility, neither best nor worst
  - Good for beginners
  - Flexible, so often more powerful
  - (against unpredictable or expert opponent)
  - Speed makes units versatile
  - Common
  - Don't make fast units best at something else
- Versatile unit cheapest and most powerful
  - not an interesting choice

Impermanence (1 of 2)

- Some things are permanent
  - Ex: you get a potion that raises max HP
- Others are not
  - Ex: I got the "one ring" but you can grab it off me
- Really, impermanence is another kind of compensating factor
  - I.e., impermanence can compensate for something being really good
  - a common and valuable technique
- Can be used for interesting choices
  - Ex: choice of "medium armor for rest of level" or "invulnerable for 30 seconds?"
- Advantage (or disadvantages) can be impermanent in number of ways.
  - How?
Impermanence (2 of 2)

- **Examples:**
  - Can be destroyed (enchantments, ex: gratuitous violence makes units tough, but can be destroyed)
  - Can be stolen or converted (ex: threaten steals or converts enemy for short time)
  - Can be applied to something you don’t always have (ex: goblin king gives bonus to goblins, but must have goblins)
  - Certain number of uses (ex: three grenades, but grenade spamming)
  - Last for some time (wears off, ex: Mario invulnerable star)

Shadow Costs (1 of 2)

- In a game, you are continually presented with cost/benefit trade-offs
- But not always directly
  - Ex: soldiers for gold, but need armor first for weapons and barracks for soldiers
  - Called shadow costs for supporting investments
  - And shadow costs can vary, adding subtlety

Shadow Costs (2 of 2)

- Ex: Age of Mythology has wood and food. Food is inexhaustible, wood is finite
- Direct cost for Charioteer: 60 wood, 40 food and 40 seconds
- Shadow costs vary over game
  - Early on, food and wood expensive, spawn doesn’t matter (since make few)
  - Mid-game, much food and wood, spawn makes it harder to pump out new units
  - End-game, no wood, spawn is priceless
- Vary environment and vary shadow costs
  - Ex: more/fewer trees to vary cost of wood
- Use variability to add subtlety to game
  - Challenge for level designer
  - Expert players will appreciate

Synergies (1 of 2)

- **Synergies are interaction between different elements of player’s strategies** (note, terms may be different than Ch 2.1)
- **Positive Feedback**
  - Economies of Scale – the more of one type, the better (ex: wizards draw strength from each other)
  - Economies of Scope – the more of a set, the better, or advantage of combined arms (ex: trident and net, infantry and tanks)
- **Negative Feedback**
  - Diseconomies of Scale – first is most useful, others have less benefit (ex: diminishing returns from more peasants entering a mine since get in each other’s way)
  - Diseconomies of Scope – mixed troops go only as fast as slowest

Synergies (2 of 2)

- Ideally, all go together at once, but can emphasize
  - Ex: Chess is a game of positive feedback
  - Small advantage early on, exploited to crushing advantage
- Game of negative feedback needs other ways to keep interesting
  - Ex: trench combat makes a “catch-up” factor, or as get far from base, supply grows long, game lasts a long time
  - Ex: *Super NES NBA Jam* – catch up setting as an equalizer
- Be aware of both negative and positive feedback

Group Exercise

- Break into groups
- Consider a new game
  - Race across América (NY to LA) (not by air)
  - First team to cross finish line wins
- Choose 1-2 tools from your toolbox below
  - Strategic versus Tactical
  - Supporting Investments
  - Compensating Factors
  - Impermanence
  - Shadow Costs
  - Synergies
- **First** choose tool, then consider gameplay to make interesting
- Discuss!