



IMGD 1001: Gameplay

by

Mark Claypool (claypool@cs.wpi.edu)

Robert W. Lindeman (gogo@wpi.edu)



Outline

- Gameplay (next)
- 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!)
- How can we fix this?

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?

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.

"A game is a series of interesting choices."
- Sid Meier (*Pirates, Civilization...*)

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 "gimme the BFG"
 - Ex: Nintendo's *Smash Bro's* has "Taunt"
 - What for?
 - Other examples from popular games?
- Gameplay value when upside and downside *and* payoff depends upon other factors
 - Ex: Rohan horsemen, but what if other player recruits pikemen?
 - 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*
 - Note, even *Tetris* and *PacMan* have strategy!
- Game must display *complexity*
 - But doesn't mean it must be complex!
 - Don't make too many rules ("less is more")
 - How many rules does chess have?
 - *Emergence* from interaction of rules
 - Ex: In *Populous*, Priests convert, but not if already in combat. By design? Maybe, but non-intuitive result.

The Dominant Strategy Problem

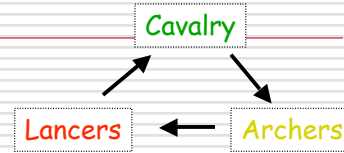
- Articles with “10 killer tactics” or “ultimate weapon”
 - What are these doing?
→ Taking advantage of flaws in the game design!
- Should never have an option that is so good, it is never worth doing anything else
 - *Dominant* strategy
- Should never have an option not worth using
 - *Dominated* strategy

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 wait 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

Strategic versus Tactical (2 of 2)

- Ex: *StarCraft*
 - Strategic choice: 1) upgrade range of marines, 2) upgrade damage, or 3) research faster fire
 - Which to choose?
 - If armored foes, Protoss Zealot, more damage
 - If fast foes, Zerglings, maybe faster fire
 - Other factors: number of marines, terrain, on offense or defense

Supporting Investments

- ❑ Often game has primary goal (ex: beat enemy) but 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*
- ❑ Primary goals are “one-removed”
 - Ex: improve weapons, build extra barracks
- ❑ Supporting goals are “two-removed”
 - Ex: build smithy can then improve weapons
 - Ex: research construction lets you build smithy and build barracks (two and three removed)
 - ❑ Most interesting since strategic
- ❑ Payoff will depend upon what opponents do

Versatility (1 of 2)

- ❑ For balance, a 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
- ❑ With versatility, a 4th choice:
 - 4) This is neither best nor worst, but most versatile
- ❑ Versatile good for
 - beginners
 - flexibility (against unpredictable or expert opponent)

Versatility (2 of 2)

- Ex: beam can mine asteroids and shoot enemies
 - Versatility makes it good choice
- Speed is common way for versatility
 - Don't make fast units best at something else
- If a versatile unit is also cheapest and most powerful → no interesting choice
 - (See "Compensating Factors", next)

Compensating Factors

- Consider strategy game where all units are impeded by some terrain
 - Ships can't go on land, tanks can't cross water, camel riders only in desert
- Flying unit that can go anywhere
 - How can we balance this?
 - 1) Make slow
 - 2) Make weak, easily destroyed
 - 3) Make low surveillance range (unrealistic)
 - 4) Make expensiveCommon but uninteresting since doesn't change tactical use!
- Versatility, neither best nor worst
 - good for beginners
 - Flexible, so often more powerful
 - Speed makes units versatile

Impermanence (1 of 2)

- Some things are permanent
 - Ex: you get a health pack
- Others are not
 - Ex: I got the "one ring" but you can grab it off me
- Really, 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 (mostly from *Magic the Gathering - Battlegrounds*)
 - Can be destroyed (enchancements, 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 armory 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
 - 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
- Use variability to add subtlety to game
- Vary environment and vary shadow costs
- Ex: more trees to vary cost of wood
 - 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 2.2)

□ 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 – (ex: 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 get as 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
 - Player enters college during first year
 - Goal is to graduate from college
- 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!