



Interactive Media and Game Development

Game Design



Outline

- Selecting Features (next)
- Level Design
- Core Design





Selecting Features

- Note! First ...
 - Work on core mechanics (movement, shooting, etc.)
 - Get bugs worked out, animations and movement smooth
- Then, have
 - prototype with solid core mechanics
 - tweaked some gameplay so can try out levels
- Need
 - 25 levels
 - Rest of features
- Problem ... too many ideas!
 - If don't have enough, show it to some friends and they'll give you some



Types of Features

- Player can use
 - Abilities (attack moves, swimming, flying)
 - Equipment (weapons, armor, vehicles)
 - Characters (engineer, wizard, medic)
 - Buildings (garage, barracks, armory)
- Player must overcome
 - Opponents (with new abilities)
 - Obstacles (traps, puzzles, terrain)
 - Environments (battlefields, tracks, climate)
- Categorizing may help decide identity
 - Ex: Game may want many kinds of obstacles, or many characters. What is *core*?



Tips on Vetting

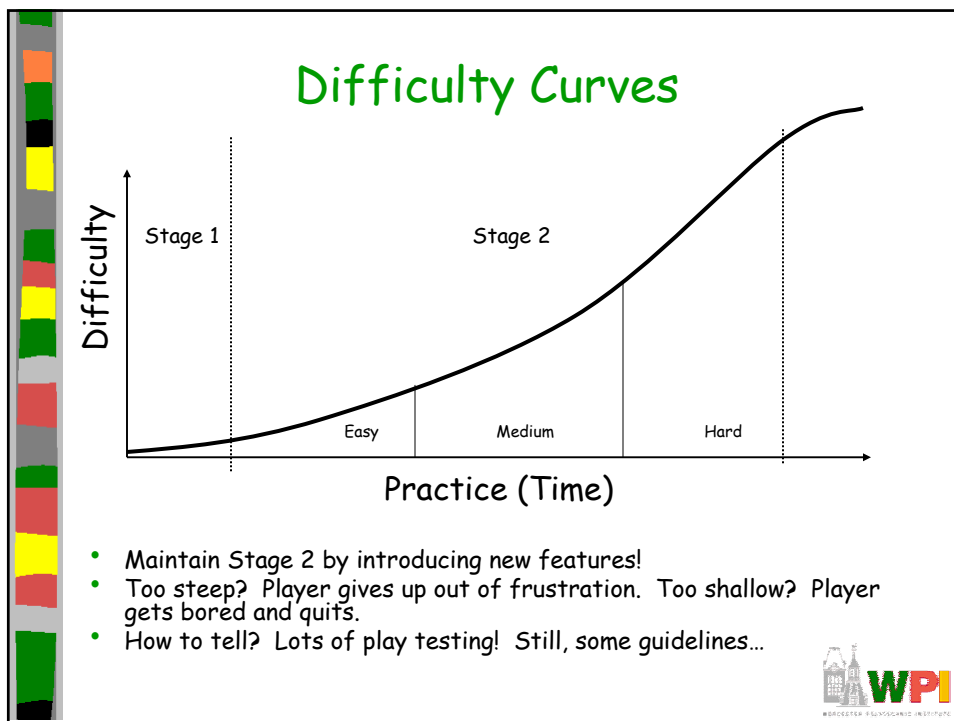
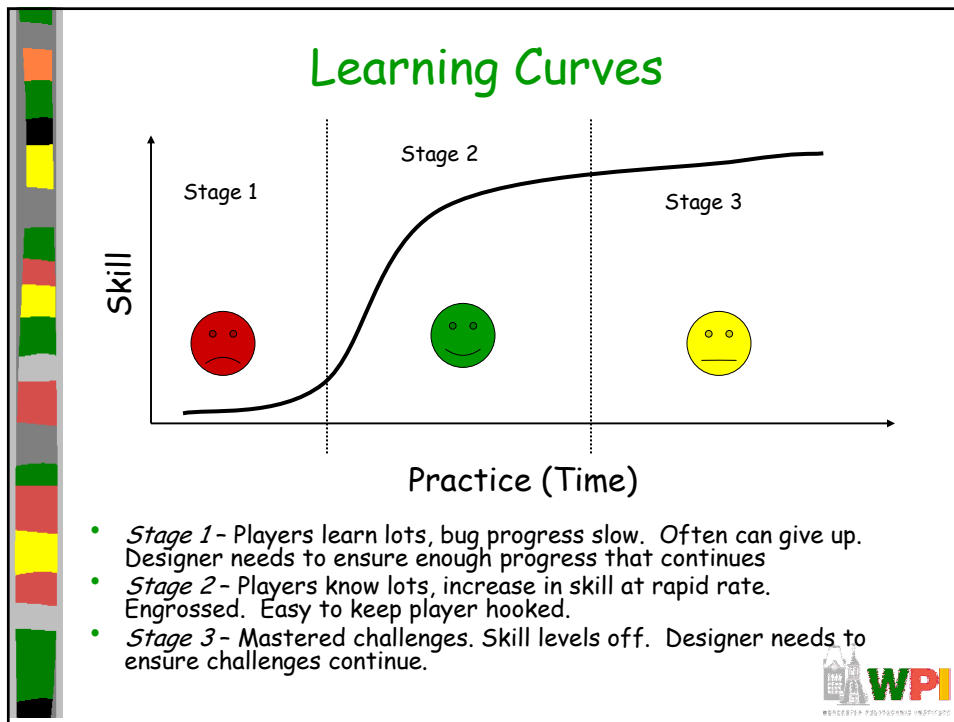
- Pie in the Sky
 - “The Koala picks up the jetpack and everything turns 3d and you fly through this customizable maze at 1000 m.p.h...”
 - Beware of features that are too much work
 - Don't always choose the easiest, but look (and think) before you leap
 - And don't always discard the craziest features ... you may find they work out after all
- Starting an Arms Race
 - “Once the Koala's get their nuclear tank, nothing can hurt them. Sweet! No, wait ...”
 - If you give player new ability (say tank) they'll like it fine at first
 - But subsequently, earlier challenges are too easy
 - You can't easily take it away next level
 - Need to worry about balance of subsequent levels
- One-Trick Ponies
 - “On this one level, the Koala gets swallowed by a giant and has to go through the intestines fighting bile and stuff...”
 - Beware of work on a feature, even if cool, that is only used once



Outline

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Guidelines

- Decide how many levels (virtual or real)
- Divide into equal groups of EASY, MEDIUM, HARD (in order)
- Design each level and decide which group
 - All players complete EASY. Design these for those who have never played before
 - Most can complete MEDIUM. Casual game-players of this genre
 - Good players complete HARD. These are designed for yourself and friends who play these games.
- If not enough in each group, redesign to make harder or easier so about equal number
- Play all and arrange in order, easiest to hardest
- Test on different players (friends and family, but enough in each category)
- Tweak according to outcomes of test



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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" ... ask: what for?
 - Ask: 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 3)

- Should be *series* of interesting choices
 - Ex: 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*
- Game must display *complexity*
 - But doesn't mean it must be complex!
 - Don't make too many rules. Less if more.
 - Real world example: termites place one piece of mud. Results in hive, with cooling vents, etc.





Avoid Trivial Choices

- Horsemen → Archers → Pikemen
 - *Transitive*, not so interesting
- Horsemen → Archers → Pikemen → Horsemen (picture)
 - Ask: what game does this look like? (rock-paper-scissors)
 - *Intransitive*, more interesting
 - Ex: from LOTR Battle for Middle Earth
 - Horsemen fast, get to archers quickly with lances
 - Pikemen spears hurt horsemen bad
 - Pikemen slow, so archers wait on them from afar
- Don't want to hardwire. Sometimes A way better than B, sometimes a bit better, sometimes worse
 - The answer should depend upon the game situation, weather, terrain, time ... also what opponent is doing



Ensuring Interesting Choices

- Interesting choices require good judgment on the part of the player
 - Correct choice must vary with circumstances
- Aim as designer, ensure circumstances don't stagnate and have only one right way to win
- No method for finding "best" choices
 - That's where creativity comes in (art)
- Still, some tips ...





Toolbox of Interesting Choices

- Strategic versus Tactical
- Supporting Investments
- Versatility
- Compensating Factors
- Impermanence
- Shadow Costs
- Synergies



Strategic versus Tactical (1 of 3)

- 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 3)

- 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



Strategic versus Tactical (3 of 3)

- Ex: *Warzone 2100* (ask: who played?)
 - Build factories to spawn war machines
 - If build in level, then spawn quickly but factory only used for that level
 - If build at base, spawn slowly (have to ship to front lines) but factory can be used in subsequent levels
- Lesson: Good gameplay should have different choices leading to different *kinds* of payoff
 - Reduces the risk of trivial choices
 - Increase scope for good judgment





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)

- Rule of thumb 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
 - 4) This neither best nor worst, but most versatile
- Most should be best in some way
- 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
- 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 impeded by some terrain
 - Ships can't go on land, tanks can't cross water, camel riders only in desert
- Assume flying unit that can go anywhere (Ask: how to balance?)
 - 1) Make slow
 - 2) Make weak, easily destroyed
 - 3) Make low surveillance range (unrealistic)
 - 4) Make expensive
- Note, last choice common but uninteresting since doesn't change tactical use
- Choice should be clear to player. Don't make a gamble before they know.
 - Ex: pick troops (cold weather) then find in jungle





Impermanence (1 of 2)

- Some permanent (ex: you get to treasure first), others not (ex: I got storage near mine, but you can grab it off me)
- Really, another kind of compensating factor
 - I.e. - impermanence can compensate for something being really good
- Can be used for interesting choices
 - Ex: choice of medium armor for rest of game or invulnerable for 30 seconds?
- Advantage (or disadvantages) can be impermanent in number of ways:



Impermanence (2 of 2)

- (Examples mostly from *Magic the Gathering - Battlegrounds*)
 - 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*)
- Common in games, but deserves special attention





Shadow Costs (1 of 2)

- In a game, continually presented with costs and trade-offs. But not all direct.
 - Ex: soldiers for gold, but need armory first for weapons and barracks for soldiers
 - Called *shadow costs* for supporting investments
 - Can make flow chart mapping shadow costs



Shadow Costs (2 of 2)

- Ex: Age of Mythology has wood and food. Food is inexhaustible, wood is finite
 - Charioteer
 - Costs 60 wood, 40 food and 40 seconds to spawn
 - Shadow costs vary over game
 - Early on, food and wood expensive, spawn doesn't matter
 - 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 as get far from base, supply long grows, game lasts a long time
 - Ex: *Super NES NBA Jam* - catch up setting as an equalizer
- Be aware of each





Review: Use Tools from Toolbox of Interesting Choices

- Strategic versus Tactical
- Supporting Investments
- Versatility
- Compensating Factors
- Impermanence
- Shadow Costs
- Synergies
- Groupwork:
 - Use 1-2 in a game about graduating from high school. Discuss.

