

Video Game Design

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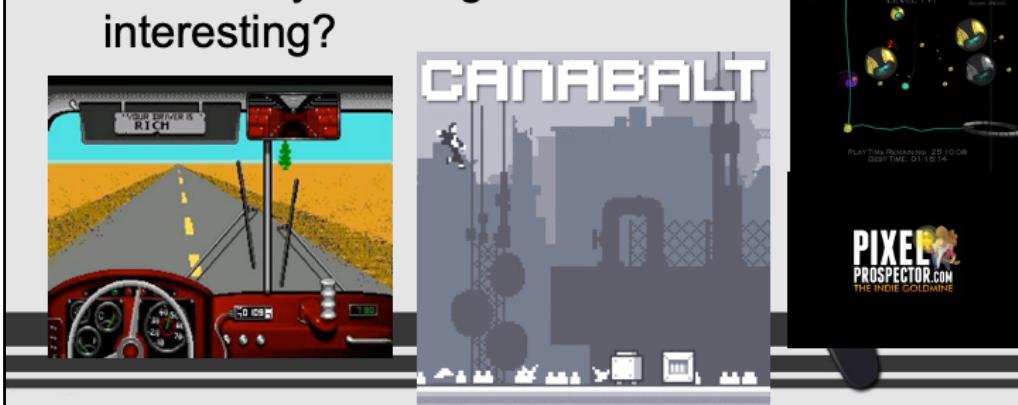
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Interesting Choices



Improving Player Choices

- What makes choice interesting versus uninteresting?
- How can you design choices that are interesting?



Desert Bus

<https://www.youtube.com/watch?v=2LtiHla1dNg>

Canabalt

https://www.youtube.com/watch?v=lMBg75_TiLw

Strange Attractors

https://www.youtube.com/watch?v=onH_bIgt0fk

Consequences



Choices should have consequences.
Or, each choice must alter the course of the game.
Upside and Downside to each choice

Lack of Consequence



Common flaw in existing games: Choices that have no bearing on outcome

Examples of poor choices: too many weapons that are too similar, side quests/minigames with no real impact

(e.g. Daikatana has 25 weapons)

Good examples: Weapons in Legend of Zelda,

Emotional Impact of Choice



Dramatic Decision
Fire Emblem (no anonymous grunts)

Short Term versus Long Term



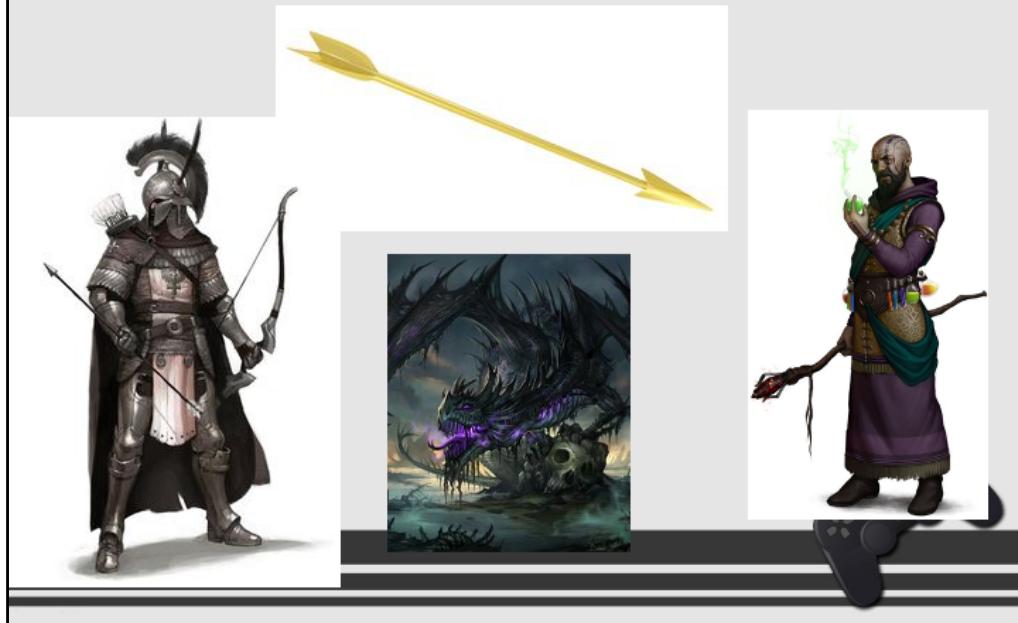
Bio Shock – little sister

Types of Decisions

- Hollow Decision: no real consequences
- Obvious Decision: no real decision
- Uninformed Decision: an arbitrary choice
- Informed Decision: where the player has ample information
- Dramatic Decision: taps into a player's emotional state
- Weighted Decision: a balanced decision with consequences on both sides
- Immediate Decision: has an immediate impact
- Long-Term Decision: whose impact will be felt down the road



Example: Golden Arrow



Powerful weapon

Use it to slay dragon, or save for the evil mage later in the game?

Informed decision: player knows capabilities of weapon and monsters

Dramatic decision because of emotional attachment to inventory item

Weighted decision: consequences balanced on both sides

Immediate decision – pending battle with dragon

Long-term decision – future battle with mage

Decision Types

- Not all decisions have to be as complex as “golden arrow” example
- Avoid **hollow**, **obvious**, and **uniformed** decisions
- Remove all nondecisions



Dilemmas

- Situations where player must weigh the consequences of their choices carefully
- In many cases, there is no optimal answer
- Often initially seem paradoxical or recursive (maybe puzzle elements)
- Von Neumann studied dilemmas, diagrammed showing potential outcomes



Cake-Cutting Dilemma



- Divide a piece of cake between two children
- Each wants the largest piece
- Mother assigns one to be “cutter” the other as “chooser”
- Cutter slices the cake, chooser picks their slice





Cutter's
Strategies

Cut as Evenly as
Possible

Cut One Piece
Bigger

Chooser's
Strategies

Choose Bigger Piece

Choose Smaller
Piece

**Chooser gets
a slightly
bigger piece.**

**Chooser gets
a slightly
smaller piece.**

**Chooser gets
a bigger piece.**

**Chooser gets
a smaller
piece.**



Zero-Sum Game



- Total amount won at the end of the game is exactly equal to the amount lost.
- Cake-Cutting Dilemma is an example
- Interests of players are diametrically opposed.
- What one player loses is gained by the other.



Minimax Theory

- Von Neumann discovered that there is an optimal strategy for each player in zero-sum games
- Optimal strategy is “maximize their minimum potential result”



Problem with Zero-Sum Games

- Once players are aware of the optimal strategy, they will always use that strategy
- **Obvious Decision**
- How can we create more complex dilemmas?



The Prisoner's Dilemma

- Created by two RAND scientists in the 1950's
- Showed how non zero-sum games can create situations where the optimal strategy for each player can result in sub-optimal strategies for both



The Prisoner's Dilemma

- Two criminals commit crime together
- Caught by police
- Held in separate cells with no means of communication
- DA offers each a deal, says that both are getting the same deal:
 - Rat on partner, he denies it, you go free and partner get 5 years in jail (and vice versa)
 - Both rat: each gets 3 years
 - Neither rat: each gets 1 year





Thief A's Strategies

		Rat on B	Don't Rat
		A: 3 years B: 3 years	A: 5 years B: 0 years
		A: 0 years B: 5 years	A: 1 year B: 1 year
Thief B's Strategies	Rat on A		
	Don't Rat		



Hierarchy of Payoffs in the Prisoner's Dilemma

- Temptation for defection (0 years)
- Reward for mutual cooperation (1 year each)
- Punishment for mutual defection (3 years each)
- Sucker's Payoff for unreciprocated cooperation (5 years)
- Temptation > Reward > Punishment > Sucker
- If this hierarchy exists, the optimal strategy for each player will always result in a payoff that is less than if they had acted cooperatively.

Hypothetical Game Using Prisoner's Dilemma

- Steve Bocska/Radical Entertainment presented at GDC
- Building/Customizing Spacecraft game



[http://www.gamasutra.com/view/feature/3025/temptation_and_consequence_.php
?print=1](http://www.gamasutra.com/view/feature/3025/temptation_and_consequence_.php?print=1)

Spacecraft Game

- Requires bartering and trading of raw materials with budget of \$10000, but high transaction cost of \$8000 “shipping and handling”
- Technology can be purchased (\$5000) that allows materials to be transported free of tax but...
- ...both players must purchase



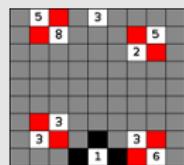


Player A's Strategies

	Buy Transporter	Keep the Status Quo
Buy Transporter	A: \$5k B: \$5k	A: \$0 B: \$13k (B goes bankrupt)
Keep the Status Quo	A: \$13k B: \$0 (A goes bankrupt)	A: \$8k B: \$8k

Player B's Strategies





Puzzles



- Contextualize choices that player makes: moving towards or away from solution?
- Key element in creating conflict in almost all single-player games
- Innate tension in solving puzzles
- Tie to system of rewards for success and punishment for failure => transforms into a dramatic element
- Multiplayer games don't need puzzles, but can certainly be used (especially co-op)
- As a game dev, consider yourself a puzzle designer
- Make sure puzzle is integrated seamlessly into game
 - Advance storyline
 - Enable progress





Rewards and Punishment

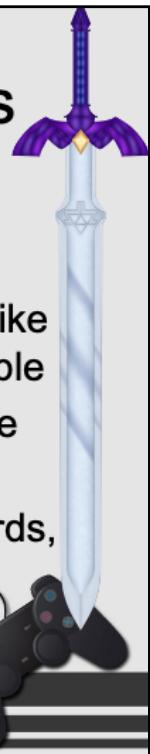


- Most direct consequences for player choices
- Emphasize rewards, while limiting punishments
- Threat of punishment, *not punishment itself*, carries dramatic tension
- Rewards should have utility or value



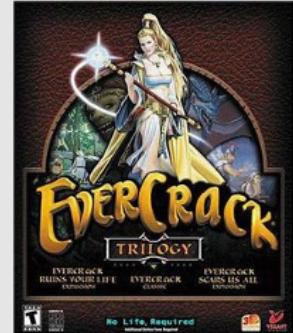
Reward System Guidelines

- Rewards that are useful in obtaining future victory carry greater weight
- Rewards that have a romantic association, like magic weapons or gold, appear more valuable
- Rewards that are tied into the storyline of the game have an added impact
- Pay attention to timing and quantity of rewards, otherwise they can become meaningless

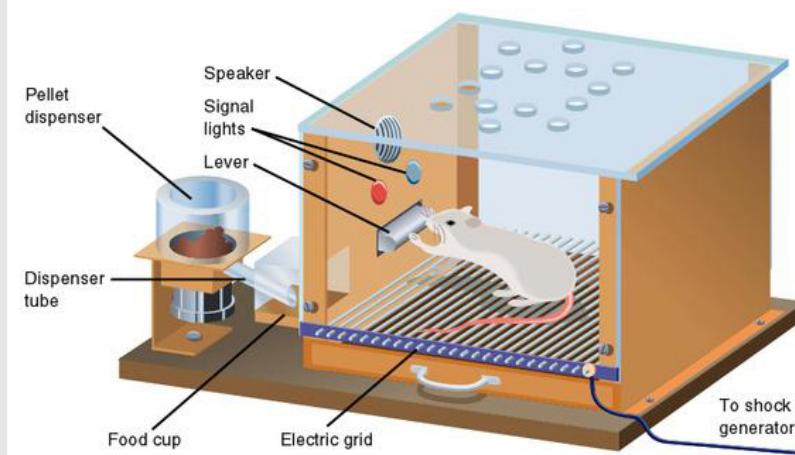


EverQuest: Addictive Game

- Psychologist Nick Yee studied reward/punishment structure in EQ
- Believes EQs addictive power lies in a behavior theory advanced by B.F. Skinner:
- Operant Conditioning –
- The frequency of performing a given behavior is directly linked to whether it is rewarded or punished



Skinner Box



Rat in box with lever and food dispenser

Fixed interval schedule: food comes out on fixed interval of time (level has no impact)

Fixed ratio schedule: food comes out every time rat presses lever fixed number of times

Random ratio schedule: must press lever a randomly determined number of times (different distributions possible, but probably uniform)

Everquest is Random Ratio Schedule

Gambling in Las Vegas?

Recognition

- Powerful type of reward
- Humans crave acknowledgement for achievements
- Examples: high scores, tournaments



Anticipation

- Useful for complex choices
(random ratio schedule good for simple, repetitive game play)
- Closed versus mixed information structures – is all information available to player?
- Chess versus Warcraft II with Fog of War



Surprise

- Feel random to players, but in a good way
- Example: foot soldier versus ogre
- Foot soldier: strikes for 1-5 HP, 10 HP
- Ogre: strikes for 1-20 HP, 20 HP
- Chance that foot soldier will win
- Trick is to find right balance of surprise versus meaningful decisions



Progress

- Advertise milestones to player
- Reward after each accomplishment
- Providing a path for player gives a sense of achievement
- Be creative in finding way to represent progress to player
- Plan “mini-arcs” of about one hour of progress after which player encounters “memorable moment”





The End



- Play completely resolves (not player death)
- Don't end with fluffy animation with player showered with praise and adulation
- Instead build reward ending into story



Fun Killers

- Micromanagement
- Stagnation
- Insurmountable Obstacles
- Arbitrary Events
- Predictable Paths



Micromanagement

- Tedium
- Boring
- Overwhelming
- Solutions for RTS
 - Command queuing
 - Formations
 - High-level strategies (defend, attack, patrol, etc.)



Stagnation

- Repetition
- balance of power (team up against player that is ahead)
- endless loop (caught in debt)
- no progress being made



Insurmountable Obstacles

- Perceived as being such by some percentage of gamers
- Adventure games
- Halo example



Arbitrary Events

- Frustrate user, especially if a negative event
- Zombie closets



Predictable Paths

- Don't force user down one path if possible
- Create illusion of freedom



HL2 City 17