

Game Design

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Game System Dynamics

A Tale of Epidemics

- It all started from an infected pet brought into a large population center
- The disease was terrible
 - It could kill in seconds
 - Others were infected but asymptomatic, thus spreading the disease

A Tale of Epidemics

- People started to run away from large cities, and spread the illness to more remote areas
 - Quarantines were set up, but not heeded
 - Some people tried to help
 - They ended up becoming infected as well
 - Some others spread the infection intentionally
- The dead started to pile up

A Tale of Epidemics

- And finally...
- Blizzard hard reset the servers and it was all good

13th September 2005

- World of Warcraft
 - Zul Gurub, a high level dungeon



Corrupted Blood

- The final boss, Hakkar the Soulflayer, cast a debuff
 - Transferred by a dismissed pet to Stormwind

Corrupted Blood

Deals 200 damage every 2 sec.

10 seconds remaining

Corrupted Blood Incident

- In addition to inflicting severe damage on the target character, the disease “infected” close contacts who could spread the disease to others in close proximity. [1]
 - Presumed the short period of infectivity (several seconds), as well as its highly lethal effect, would render the disease self-limiting.

Corrupted Blood Incident

- Uncontrolled dissemination of the disease[1]
 - lack of residual immunity
 - infectivity to the virtual animals
 - characters could teleport
 - nonplayer characters of the city also spread the disease.
- Numerous scholarly articles analyzed the event

What Are Games Made Of?

- Formal Elements – define the structure of a game
 - Players, Objectives, Procedures, Rules, Resources, Conflict, Boundaries, Outcome
- Dramatic Elements
 - Challenge, Play, Premise, Character, Story, World Building, The Dramatic Arc
- System Dynamics
 - Games as Systems, System Dynamics, Interacting with Systems, Tuning Game Systems

System Dynamics

- A system[2]
 - “A set of interacting elements that form an integrated whole with a common goal or purpose”
- Purpose of system dynamics in games[2]
 - system principles for the quality of interactions and growth and change over time.

Games Are Systems

- A game is a set of formal elements which create a dynamic experience for players
 - The interaction between formal and dramatic elements shapes the player experience

System Elements[2]

- Objects
- Properties
- Behaviors
- Relationships

Objects

- Basic bricks of your system
 - Game pieces
 - Items
 - Players
 - In-game concepts
 - Etc.
- Defined by behaviors and properties

Properties

- Values that define aspects of objects
 - Lvl. 12 Human Female Mage
 - Values for attributes
- Properties are important for determining interactions and relationships
 - The more complex the properties, the less predictable the relationships

Behaviors

- Possible things an object might do in a given state
 - As with properties, the more complex the behavior, the less predictable the interaction

Relationships

- Define the manner in which objects interact
 - Can be expressed in different ways
 - Linear
 - Hierarchical
 - Fixed
 - Variable
 - Etc.

Relationships

- Gladia
 - Lvl. 2 Paladin with 18 strength (+4 bonus)
 - Attacks a goblin with 13 AC
 - To hit, she needs to roll a D20, add proficiency (2) and STR bonus (4) and get at least 13
 - Hits 70% of the time

System Dynamics

- Elements are not isolated from each other
 - All elements are needed for a system to work
 - Elements need to be arranged in a specific way, too
 - Changes any of the above will have an effect on your game

System Dynamics

- Systems are greater than the sum of their parts
 - Examining the pieces in isolation will NOT be the same as studying the complete system
- Because of this
 - Games can only be understood when played
 - We cannot determine player experience, only a potential set of outcomes

Economies in Games

- When does a game have an economy:
 - Items to exchange
 - Agents to exchange them
 - Currency (optional)
 - Pricing (fixed or variable)
 - Market limits

Economies in Games

- Creating an in-game economy [2]
 - Does the size of the economy grow?
 - How is the supply of currency controlled?
 - How are prices set?
 - Is there any restriction on trade?

Emergent Gameplay

- Systems which generate unexpected results
 - Game of Life (John Conway)
 - Played on a checkerboard
 - Birth: If an unpopulated cell is surrounded by exactly three populated cells, it becomes populated in the next generation.
 - Death by loneliness: If a populated cell is surrounded by fewer than two other populated cells, it becomes unpopulated in the next generation.
 - Death by overpopulation: If a populated cell is surrounded by at least four other populated cells, it becomes unpopulated in the next generation.

Emergent Gameplay

- Use emergent techniques to make games more believable
 - E.g. semi-realistic behavior for NPCs
 - GTA and RDR - Agents perceive elements of their environment and act upon them

Interacting with Systems

- We are building games, after all
 - Games require interaction
 - In order to interact, players also require information and feedback

Interacting with Systems

- When building interactions, consider the following [2]
 - The information available to the player regarding the state of the system
 - What parts of the system are under player control
 - What feedback the systems provides
 - How the above are aggregated into gameplay

Tuning a Game System

- Start from a complete system
- Test for fairness and balance
- Test for fun and challenge

Case Study



World of Warcraft - Naxxramas

- Raid location — Dragonblight
- Attunement requirements — None
- Available Difficulties — 10-player and 25-player
- Encounters — 15
 - Spread across five wings. Each of the first four wings can be progressed in any order, with the final wing unlocking when the previous 13 encounters are completed.

Raiding in WoW

- Group PvE requiring lots of coordination
- 3 major roles
 - Tank (Beatdown) – lots of armor and resistances, meant to survive against strong enemies
 - Healer (Support) – keeps other characters alive and healthy
 - Damage dealers (Artillery) - fragile but powerful

Raiding in WoW - WotLK

- 25 man raids
 - 3 - 4 tanks
 - 5 - 6 healers
 - ~15 DPS
- 10 man raids
 - 2 tanks
 - 2 – 3 healers
 - ~5 DPS

Naxxramas Military Quarter

- Numerous minor encounters and 3 boss encounters
 1. Instructor Razuvious
 2. Gothik the Harvester
 3. The Four Horsemen
- The encounters were initially designed for 40 man raids, then changed for 25 and 10 man raids in WotLK

Naxxramas Military Quarter



Instructor Razuvious



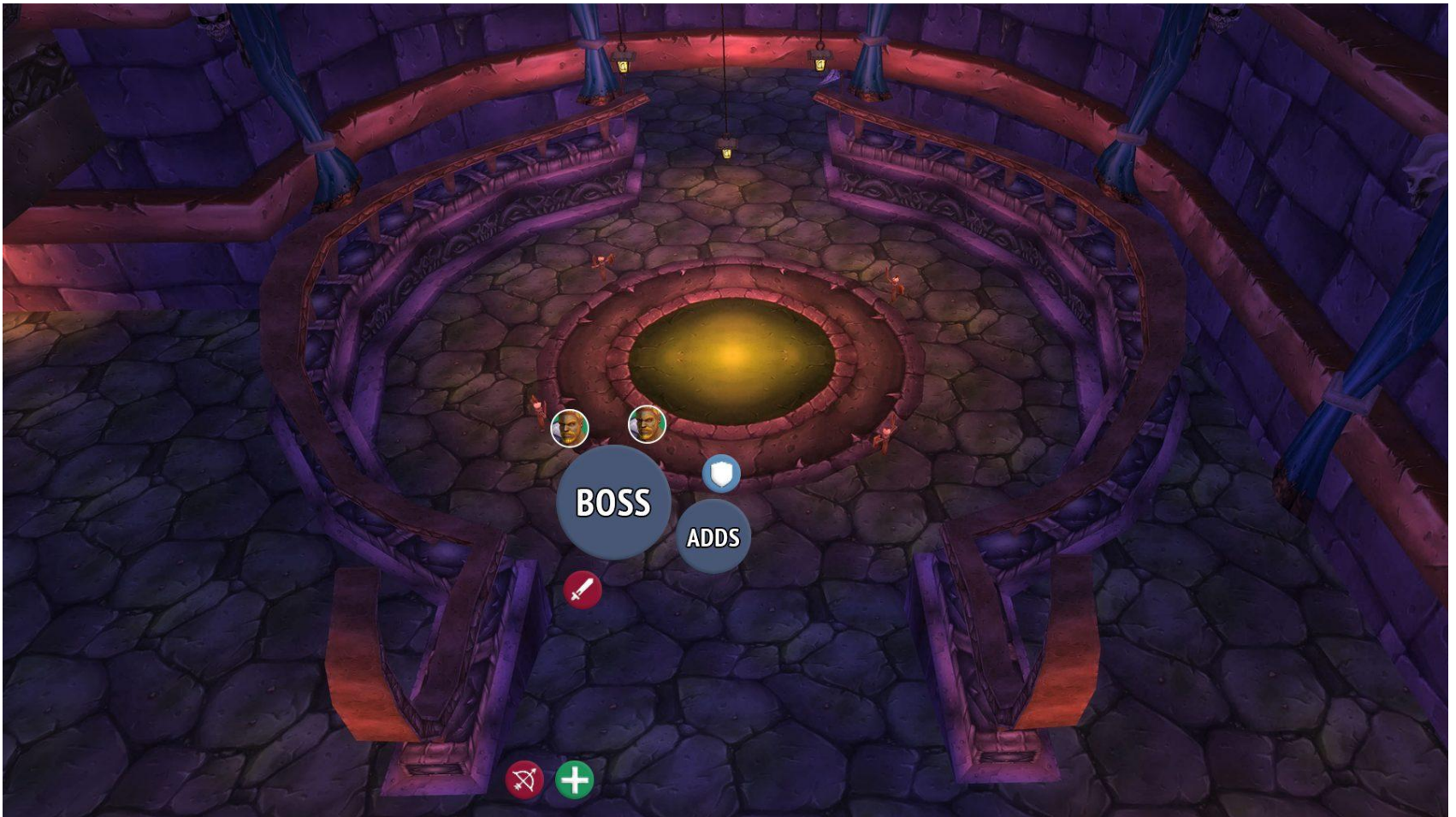
Instructor Razuvious

- “Pay attention. This is Instructor Razuvious, Kel’Thuzad’s appointed trainer of all death knights. It is said that his own technique is so potent, only a disciple of his could possibly withstand his might.”
 - Commander Eligor Dawnbringer

Instructor Razuvious (25)

- Cannot be tanked by players
 - Use Understudy adds (4 in total) to tank instead
 - These need to be mind controlled by one (and only one) specific class
 - 2 are mind controlled and 2 are kept away by tanks, then switched as needed -> at least 2 Priest class players using uncommon abilities
 - No special damage requirements
 - Healers are fewer and need to pay special attention to large damage over time effects

Instructor Razuvious



Instructor Razuvious (10)

- You might not have 2 Priests
- Only 2 Understudies
- Orbs of control – objects used to mind control the 2 Understudies (usually tanks use them)
- The other roles are the same

Gothik the Harvester



Gothik the Harvester

- “Gothik, the Harvester. A master of necromancy and conjuration, Gothik is said to be able to beckon forth legions of the undead at a moment’s notice. It is with his guidance that even the weakest of Death Knights can raise the dead.”
 - Commander Eligor Dawnbringer

Gothik the Harvester

- Phase 1
 1. Gothik does not fight personally, but summons adds
 2. The room is split in two, and a gate separates the 2 sides once combat starts; living NPC enemies are spawned in one side
 3. As enemies die on one side, they come back as undead on the other side
- Phase 2
 1. Gothik attacks the raid
 2. Stacks a damaging effect on the entire raid – this is a DPS check
 3. Teleports to the other half of the room every 10 seconds
 4. At 30% life, Gothik opens the gate and both sides are accessible

Gothik the Harvester



Gothik the Harvester (25)

- Phase 1 – two common strategies
 1. Split the raid in 2 halves, or
 2. Go to the living side only
- If you choose 1
 - Prioritize dangerous enemies
 - Don't kill the enemies too fast, as the undead are more numerous
- If you choose 2
 - Once Gothik reaches 30% and the gate opens, all the undead will also attack you (which may overwhelm the raid)

The Four Horsemen



The Four Horsemen

- The most powerful death knights within Naxxramas are the four horsemen. They represent the pinnacle of Kel'Thuzad's guard. The first, Thane Korth'azz, holds the power of flame. The next, Lady Blaumeux, calls forth the power of shadows, drawing the souls of the living into the voracious embrace. Sir Zeliek, a paladin in life, so strong in his faith, that even in undeath, the power of the light still heeds his call, smiting his foes in battle. Sir Zeliek still tries to make players run so he does not have to kill another person. The final death knight, Lord Mograine, was the finest warrior that the death knights had ever seen. However, after the events of Azeroth, he vanished without a trace. Kel'Thuzad has appointed Baron Rivendare in his place.
 - Commander Eligor Dawnbringer

The Four Horsemen

- Each individual Horseman has their own set of abilities alongside an almost identical Mark
 - The mark stacks each 12 seconds
 - Each stack deals more damage
 - Applied to all PCs in range
 - If no PC is in range, the horseman deals very high damage to all the raid. The damage is impossible to keep up with, thus killing the raid; therefore, each boss needs to be tanked

The Four Horsemen

- Thane Korth'azz
 - Every 15-seconds a Meteor falls onto a random player currently fighting Thane Korth'azz, dealing extreme damage split between everyone within 8-yards
 - All PCs fighting him need to stay close together
- Baron Rivendare
 - Melee fighter
 - Unholy Shadow – very high damage to the primary target (both instant and the over time)

The Four Horsemen

- Sir Zelik
 - Instead of an autoattack, he casts Holy Bolt on the closest player
 - Every 15 seconds casts Holy Wrath on a nearby player
 - Bounces to another player within 10-yards, dealing 50% more damage with every bounce
 - Players need to spread out
- Lady Blaumex
 - Instead of an autoattack, she casts Shadow Bolt on the closest player
 - Shadow Zone – spawned every 15 seconds under a random player, which damages all players standing in it
 - Lasts 75 seconds

The Four Horsemen – Strategy A



The Four Horsemen – Strategy B



The Four Horsemen (10 and 25)

- Assign corners and initial tanks for each knight
 - All of the Horsemen need a tank, but Lady Blaumeux and Sir Zeliek don't attack based on threat, so you can easily use a high health caster or healer to tank these temporarily
 - Assign healers for each tank

The Four Horsemen (10 and 25)

- Once you reach 3 – 4 marks, start to switch
 - Draw the bosses closer, switch tanks and then move to the corners again
 - Special care for the ranged horsemen
- Take down the melee bosses first
 - The ranged bosses are really hard for melee characters
 - Void zones and Holy Wrath

The Four Horsemen (10 and 25)

- Things that can go wrong:
 - Ignore Mark stacks, dying to the growing damage.
 - Players don't stack for Thane Korth'azz's Meteor.
 - Tanks switch too slowly, stacking too many marks.
 - Players get too close to Sir Zelig or Lady Blaumeux, taking direct damage.
 - The tanks for Sir Zelig or Lady Blaumeux accidentally get too far away.
 - Players on Sir Zelig stack too tightly.

Bibliography

1. Balicer, Ran D., Modeling Infectious Diseases Dissemination Through Online Role-Playing Games, *Epidemiology*: March 2007 - Volume 18 - Issue 2 - p 260-261
2. Fullerton, T., *Game Design Workshop: A Playcentric Approach to Creating Innovative Games*, CRC Press, 2014