Foundations of Interactive Game Design (80K)

Exam review lecture
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Exam review
Exam will have questions on gender and education

Topics of next Tuesday's lectures
Some key concepts

... at a fast pace
Games are technology

- Physical hardware: consoles (Xbox, Wii, PS3), handhelds (DS, PSP), PCs, arcade cabinets, guitar controllers, etc
- Software engines: Unreal, Source, CryEngine, Flash’s renderer, etc
- Middleware and other components: AI, physics, world management, etc
- Authoring systems: Aurora, Flash, Excel, etc
Games are formal systems

- Game rules: just like card & board games, RPGs, war games, and playground games
- World rules: traditional hide–and–seek gets doors, lighting, gravity (etc) “for free” from the physical world — games have to (and get to) define their own world rules
- Game definitions are based on logical structure
Games are meaningful media

- Games have text, image, sound: metamedium
- Books, albums, and movies are fixed presentations — games are *media machines*
- Games can tell stories, make arguments, do other things media do — traditionally or procedurally
- Tools from other media useful, but need more
Games are social experiences

- We play with other physically present people (Wii, LAN parties, *Rock Band*)
- We play with other virtually present people (MMOs, *Second Life*, Xbox achievements)
- Our experiences of games are deeply shaped by our participation in online and offline game cultures
Spacewar!
graphics, movement, multi-player
You are standing at the end of a road before a small brick building. Around you is a forest. A small stream flows out of the building and down a gully.

> enter

You are inside a building, a well house for a large spring.

There are some keys on the ground here.
There is a shiny brass lamp nearby.
There is food here.
There is a bottle of water here.

> get lamp

Ok.

*Adventure*

text, narrative, single player
Spacewar!

- There were earlier computer/video games. But they simulated non-computer games: Checkers (1952), Tic-Tac-Toe (1952), Ping Pong (1958)

- In *Spacewar!* we see a vocabulary of computer games first emerge: navigation, projectiles, simulated gravity

- Huge influence on future games (e.g., Atari founder Bushnell’s *Computer Space*, 1971)
Spacewar!

• *Spacewar!* was also a feat of technology (tech demo for PDP-1) and open source

• *Spacewar!* also shows games as media — science fiction (don’t forget Sputnik) not traditional game simulation

• *Spacewar!* also is an important social game — called first multiplayer, spread in lab culture led to “*Spacewar! Olympics*” via *Rolling Stone*
Adventure

• Will Crowther (c. 1975) and Don Woods (1976, Stanford U.)

• There were earlier textual games, but very primitive: *Hunt the Wumpus*

• Another set of hugely influential formal structures: navigating simulated world (based on real caves), gathering items, solving puzzles, story/score progression
Adventure

• Technologically, another advance from universities, & inspired MIT/Infocom group

• As media, another form of fiction (fantasy, not science fiction) and a role for language

• Socially, the player as “hacker”

• Together with Spacewar!, we see many of the elements of modern gaming in their first form
Focus of text & project
Player centric design

- You are creating an experience for the player – all design considerations must flow from the questions:
  - What does the player do?
  - What experience does this create for the player (why would they do it)?
- You are not your own typical player
- The player is not your opponent
Iterative design

• Rapid iteration, with something working all along the way, is a widespread design idea

• Fullerton calls the designer “an advocate for the player” — but it’s easy to lose sight of new player’s perspective

• Her approach: rapid iteration, with input from playtesters at every possible step
Playcentric design

• Start with player experience goals — need to trust and distrust (strategic), always almost out of control movement (feel), etc

• Generate ideas, formalize ideas, test ideas, evaluate results

• Eject, repeat cycle, or accept current ideas

• Brainstorming, prototyping, design, production, testing
Why prototyping?

• You want to experiment with ways to turn your game concept into a system
• You want to involve your full team — and make sure you’re on the same page
• You want rapid iteration
• You want to make sure the game works before you start writing code, making art...
Physical prototypes

- What are the strengths and weaknesses of this kind of prototype?
  - Create much faster than on computer
  - Change much faster than on computer—even during playtest
  - Everyone can participate

- Allows rapid iteration
  - Can’t explore certain areas of game feel
  - Can’t figure out if game technology will work
  - Can’t execute complex processes—but can couple with computational support
Computational prototypes

- How will a core spatial/control mechanic feel? (Interface-in prototyping)
- Will the emergent NPC/enemy behavior be what we expect? (AI prototyping)
- Are the permutations balanced relative cost? (Unit customization testing)
- Good flow of narrative and space?
- Do the systems interact as expected? (Combos of resources, combat, other rules)
- Will the visual aesthetic be achievable and appropriate? (Design/tech border question)
What is a game?
Defining “game”

A “closed, formal system that engages players in structured conflict and resolves its uncertainty in an unequal outcome”
— Tracy Fullerton
Defining “game”

A “system in which players engage in an artificial conflict, defined by rules, that results in a quantifiable outcome”

— Katie Salen and Eric Zimmerman
Defining “game”

A “rule-based formal system with a variable and quantifiable outcome, where different outcomes are assigned different values, the player exerts effort in order to influence the outcome, the player feels attached to the outcome, and the consequences of the activity are optional and negotiable.”

— Jesper Juul
Rules

• Well-defined rules — unambiguous
• Affinity between games and computers
• Game rules and world rules
• Rules as software that require hardware
Variable, Quantifiable Outcome

- Not only in theory, but at this level of player skill
- Beyond discussion — a win, a score
- Making something a game — turning the creativity and grace of dance into a score for competitions
Valorization of Outcome

• Some outcomes are *better*

• Unwinnable games — but high score is *better*

• Positive outcomes are harder to reach — challenge
Player Effort

• People work — intellectually, physically
• Doesn’t work in pure chance, but people act like it does
• Reinforces attachment to outcome
Player Attached to Outcome

• Wanting to win, and not wanting to lose
• Violating this is playing wrong — spoilsport — usually
• If play among unequals (e.g., against small child) different story — but still a game for all players?
Negotiable Consequences

- There can be consequences, but not built into the game
- Poker can be for things of value, or not
- Not: stock market, traffic, russian roulette
- But their systems could be used for a game, w/o non-negotiable consequences
Game definitions

- Are often presented as “consensus” definitions based on surveys of previous game scholarship
- Can be interesting to think about, intellectually
- But: consistently marginalize things that should be central. For example...
This is not a game
The Sims is not a game

- “The #1 best selling game of all time.”
  — Electronic Arts, 2004

- But The Sims doesn’t meet formal definitions. Such games “have emergent quantifiable goals but usually no single overriding outcome.”
  — Katie Salen and Eric Zimmerman

- “Open-ended simulation games such as The Sims change the classic game model by removing the goals, or more specifically, by not describing some possible outcomes as better than others.”
  — Jesper Juul
Understand the vocabulary used in Fullerton’s book
Roles of players and interaction patterns

- Equal (*Monopoly*), hard differentiated (*Mastermind*), and soft differentiated (RPGs)
- Single player vs game (*KotOR*)
- Coop vs game (*LoTR* board game)
- Player vs player (chess)
- Multiple individuals vs game (bingo)
- Unilateral competition (*Fury of Dracula*)
- Multilateral competition — three or more (*Monopoly*)
- Team competition (charades)
Fullerton on systems

- Objects
- Properties
- Behaviors
- Relationships
- Dynamics
- Emergence
Fullerton on objects

- Game pieces
- Board/map/terrain spaces
- Game characters
- Even players!
Fullerton on properties

- Checker’s color, location, and whether “kinged”
- RPG character’s stats and equipment
- Tic-tac-toe space is null, X, or O
Chess pieces can make their types of moves, unless blocked.

RPG characters can do many things — can even gain and lose abilities.

Tic-tac-toe spaces have one behavior — getting a property they can’t lose.
Fullerton on relationships

- Types of objects (suits/colors in a deck of cards, fulfilling needs in *The Sims*)
- Arrangement of spaces (tic-tac-toe, *Counterstrike* map choke points)
- Unit differentiation (RTS units,) with outcomes made unpredictable through randomness
System dynamics

- Changes in objects, properties, behaviors, and relationships can have large or small gameplay effects

- The experience of one element depends on the larger system dynamics (Clue and Mastermind puzzles)

- LeBlanc’s mechanics, dynamics, aesthetics

- S&Z’s constitutive rules
Fullerton on emergence

- Relates to Conway’s Game of Life
- Simple systems can have complex, unpredictable results
- Game designers like to create unpredictable, sometimes believable, experiences (from *The Sims* to *Grand Theft Auto*)
Rules on three levels: Salen and Zimmerman

• Operational: The “rules of play” of a game. Surface visible rules

• Constitutive: Underlying formal structures “below the surface” of the rules presented to players. Logical and mathematical

• Implicit Rules: Unwritten, implied, rules for a game. Etiquette, good sportsmanship, access to play space, etc.
What is play?

• *Play* is clearly fundamental to games — so what is it?

• Fullerton: has many faces: learning, socializing, problem solving, seeing anew...

• For Salen and Zimmerman: “Play is free movement within a more rigid structure.” From the “play” of a steering wheel to the “play” of language to the “play” of a game
Caillois’s “fundamental categories” of play

- Agôn: Competitive play (most game play)
- Alea: Chance-based play (gambling)
- Mimicry: Role-playing and make believe (from theatre games to tabletop RPGs)
- Ilinx: Vertigo and physical sensation play (from “ring around the rosie” to skiing)
- Padia & Ludus: Improvisation and joy vs. gratuitous difficulty
Caillois’s play matrix

<table>
<thead>
<tr>
<th></th>
<th>Paida</th>
<th>Ludus</th>
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</thead>
<tbody>
<tr>
<td><strong>Agôn</strong></td>
<td>Unregulated athletics</td>
<td>Boxing, <em>Chess, Starcraft</em></td>
</tr>
<tr>
<td>(competition)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Alea</strong></td>
<td>Counting-out rhymes</td>
<td>Betting, lotteries</td>
</tr>
<tr>
<td>(chance)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mimicry</strong></td>
<td>Masks, disguises</td>
<td>Theatre, ritual</td>
</tr>
<tr>
<td>(simulation)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Ilinx</strong></td>
<td>Horseback, waltzing</td>
<td>Skiing, tightrope walking</td>
</tr>
<tr>
<td>(vertigo)</td>
<td></td>
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How do we play games?
Salen & Zimmerman’s model

- Designing an interactive experience is designing for a larger system:
  
  Player makes internal decision
  
  Game creates output
  
  Player takes action

But play is also improvisational...
How do we play games?

- Early cognitive science, and AI, focused on *planning*. Model the world in the head, etc.

- This couldn’t deal with quickly-evolving situations, like battlefields or games.

- A new AI approach arose, focused on being in the world, using it as a resource, responding to it: e.g., Chapman and Agre’s *Pengi*, the “insects” of Brooks.
Pilgrim in the Microworld

• A detailed account of learning to play, and learning about, a particular game.

• Learning in the mind, learning in the body, learning as an embodied thinker and player.

• Planning is a reality, but certainly not the only thing happening.

• It tells a story...
At first it felt like my eyes told my fingers where to go. But in time I knew the smooth rotating hand motions were assisting the look in turn, eyes and fingers in a two-way partnership. Walking a rainy street, you identify the dimensions of a puddle in relation to the size and rate of your gait, so the stride itself patters the style of your looking ... what you see...

— page 40-41
Games and pleasure

• Gameplay is *autotelic* (its own reward)

• Gameplay is intrinsically motivating (that’s why people try to harness it...)

• But this is only when it’s well designed — need to establish in the first few minutes

• We might think of Caillois’s categories of play as a matrix of play’s pleasures
Flow

Mihaly Csikszentmihalyi’s description of the pleasure (and problems) in challenges
Flow

These exceptional moments are what I have called "flow" experiences. The metaphor of flow is one that many people have used to describe the sense of effortless action they feel in moments that stand out as the best in their lives. Athletes refer to it as "being in the zone," religious mystics as being in "ecstasy," artists and musicians as "aesthetic rapture."

— Mihaly Csikszentmihalyi
Flow’s characteristics

First, the experience usually occurs when we confront tasks we have a chance of completing.

Second, we must be able to concentrate on what we are doing.

Third and fourth, the concentration is usually possible because the task undertaken has clear goals and provides immediate feedback.

Fifth, one acts with a deep but effortless involvement...

Sixth, enjoyable experiences allow people to exercise a sense of control over their actions.

Seventh, concern for the self disappears, yet... the sense of self emerges stronger...

Finally, the sense of the duration of time is altered...
Flow reconsidered

• An attractive theory — the best parts of gameplay clearly seem to be flow

• But this theory of “exceptional moments” probably overused/extended in discussing everyday gameplay

• Think of your own play experiences — some flow, but not first and always
Flow reconsidered

• “Here's all the motivation you'll ever want: get that action again, those last few bricks left and that eery lobbing interim as the ball floats about so you never know when it'll hit and you don't dare try placing a shot because you're more than happy just to hold on with your eyes glued to the ball.”

— David Sudnow

• A valuable, partial concept
Raph Koster

What's fun is exercising your brain

Games are puzzles

they are about cognition,

and learning to analyze patterns
When you’re playing a game, you’ll only play it.

Until you master the pattern.

Basically, all games are edutainment.
Henry Lowood

- Talked about the creativity of players—they’re artists too
- Can do beautiful strategic things (need understanding of game to appreciate) and expressive things (dancing, protesting)...
- but maybe not the pure beauty of physical athleticism (or only via bodies, like DDR)
Platforms
Combat

Missile: high rez

Sprite: high rez

Playfield: low rez

Entire game on one screen

Only other element is Pong-style ball
Pitfall!

Tree detail: high rez

Vine: high rez

How is this possible?

Harry: high rez

Logs

Scorpions

255 screens!

Logo

Activision
Atari VCS

- No frame buffer
- Key component: the Television Interface Adapter (“Stella”)
- Drawing line-by-line, calculating in horizontal/vertical blanks
- How to create *Pitfall!*?
Pitfall!

- A founder of the “platformer” genre, 1982
- VCS required drawing each line — so moved high-resolution sprites during every frame (two sprites are tree details and Harry, etc)
- Also moved ball graphic during drawing to create vines that are on same line
- Technical and game design tour de force, created by one person: David Crane
River Raid

- Carol Shaw, Activision, also 1982
- Also pushed platform boundaries
- Also defined genre conventions
- Let’s take a look...
Game platforms

First generation games tend to show off what the platform can do by default, then...
PS2

Unreal Tournament (launch title, 2000)

God of War II (late title, 2007)
Changing platforms

- RJ Mical talked about connection between platforms and genre innovation
- John Davison and Robert Mitchell talked about online games as the norm, growing processing power, handheld platforms, new controllers/interfaces, etc
- Platforms—and their spaces of innovation—are going to keep moving
Game fictions
Game fictions

• A great variety of fictions.
• But only two major approaches to how the fictional elements are implemented.
• Two examples for which we have script excerpts: *Prince of Persia: The Sands of Time* and *Fable*.
Prince of Persia
The Sands of Time

Linear story, with side trips
(playing a cinematic story)
Fable

Putting it together

Linear story, good and evil choices
NPC logics same for animation and language
1997 — Hamlet on the Holodeck

How do we combine what games have . . .

Janet Murray asks . . .

with fiction?
1997 — Hamlet on the Holodeck

- Good games don’t just have *activity*
- Good games don’t just have *participation*
- Good games have “the satisfying power to take meaningful action and see the results of our decisions and choices” — *agency*
1999 — Formal Abstract
Design Tools
What makes Mario 64 so good?

Doug Church asks . . .

And how can understanding that help us formalize concepts for discussing game design?
1999 — Formal Abstract

Design Tools

- *Mario* 64 has simple and consistent controls offered for movement, & predictable physics, enabling *intention*

- "A clear reaction from the game world to the action of the player" — *perceived consequence*

- Also relates to story...

*This process of accumulating goals, understanding the world, making a plan and then acting on it, is a powerful means to get the player invested and involved*
Agency and Intention

- Murray’s *agency* is “the satisfying power to take meaningful action and see the results of our decisions and choices” with actions that are chosen and related to the players’ intentions

- Church’s *intention* and *perceived consequence* encourage a “process of accumulating goals, understanding the world, making a plan and then acting on it” with “a clear reaction from the game world to the action of the player”

- Let’s talk about them together...
Agency and Drama

- Mateas integrates Murray’s agency into Laurel’s neo-Aristotelian drama

- Agency is not “freedom to do anything,” but rather having the *material affordances* to take actions suggested by the *formal affordances* of the dramatic situation

Games like *Quake* balance formal and material affordances (e.g., kill everything that moves) and *Façade* attempts to balance them for gameplay inspired by kitchen sink drama
How to think about digital media’s “inside”?

• Is binary arithmetic central?

• Is uncompiled source code the key?

• An alternative: “operational logics” — sometimes identified using source code, and sometimes higher-level descriptions.

• Operational logics are abstract processes, used by authors to communicate to audiences, that can be implemented many ways.
Implemented “in many ways”?

- When you play *Pong* on an Atari VCS, the 2D collision detection is implemented *in hardware*.
- When you build a game using XNA, the 3D collision detection is implemented *in software*.
- Obviously, implementations differ fundamentally, but the logic — that virtual objects can “touch” — is the same.
Graphical logics

- Graphical logics are the abstract operations associated with movement, collision detection, and physics.

- Movement – objects move in space.
- Collision – object overlap triggers events.
- Physics – movement governed by laws.
Fiction logics

- *Quest flag* logic for quests / missions (milestone-based progression).

- *Dialogue tree* logic for NPC interactions — discussion, provocation, quest acceptance/completion, etc (directed graph).

- The interfaces change, the underlying logics remain.
Resource management

• As Michael Mateas observes, resource management logics are the abstract operations associated with acquiring, using, and transforming resources (e.g. food, money).

• Allocation – selecting sources, sinks, and transformations to apply to a resource.

• Random events – events within the fictional world that modify quantities or rate constants.
Procedural rhetoric
Procedural Rhetoric

- “Procedurality refers to a way of creating, explaining, or understanding processes.”
- “Rhetoric refers to effective and persuasive expression.”
- “Procedural rhetoric, then, is a practice of using processes persuasively.... persuading through processes in general and computational processes in particular.”
September 12th

Not an animation, but an interaction...
September 12th

- Fictional world: Village of civilians and terrorists, bomb targeting
- Rules: People move continually, bombs take time to fall, dead civilians inspire mourning, mourning inspires terrorism
September 12th

• Gameplay:
  • Targetted bombing hits civilians, sprouts as many new terrorists as it kills
  • Indiscriminate bombing creates a wasteland w/ more terrorists than others
  • Procedural rhetoric: Bombing is a poor tool for addressing terrorism
Monopoly’s rhetoric

• Fictional world: Real-estate speculation and development, plus random events
• Rules: Land monopolies required for development, allows bankrupting rivals
• Gameplay: Buy land as fast as you can, trade aggressively, develop first, broken endgame
• Rhetoric: Strategies for capitalism? Parody?
The Sims

• Fictional world: Stylized suburban life, work elided, home decoration, moody “sims”

• Rules: No set goal, must manage moods, basic needs and relationships require work

• Gameplay: Queuing up tasks, compromise, fighting time constraints, paths to goals

• Rhetoric: Suburban life as constant struggle for the basics, w/ unclear goals, but...
Play Between Worlds
Boundaries

• Online and offline social groupings (servers at the con)
• Online and offline game structures (live quests and human NPCs)
• Online and offline economics (not just for gold farmers)
Taylor

• “My hope is to show that the very notion of being able to bound off what is game and not game is not a particularly fruitful way of understanding these spaces — either as games or via their status as a cultural space”

• “[T]his book tries to understand the ways not only the artifact of the game, but the production of play within it, are multiply constituted by a variety of actors located in particular social contexts”
Taylor’s intervention

• Online life is not a bounded-off zone of experimentation,
• nor simply a place to work out offline issues.
• The game “itself” is as social as it is a technological artifact or set of rules
Bartle’s world typology

• “The vast majority of virtual worlds, whether commercial or hobbyist, are game-like (Dorothy) worlds, the leading title at the moment being *World of Warcraft*...”
  Designer-fixed goals and player roles

• “However, there are also social (Wendy) worlds of some significance, the most important of which is *Second Life*...”
  Player-determined goals and player roles.
Bartle’s world typology

• “The players of those few balanced (Alice) worlds that remain usually consider them to be game-related, while nevertheless recognizing that they're somehow different than Dorothy worlds” (Ultima Online)

• “[T]he designer constructs a world with no storyline, but with a lush capacity for interaction. This results in a framework for the creation of story by the players”
Thanks everyone!