WILL WRIGHT

TEACHES GAME DESIGN AND THEORY
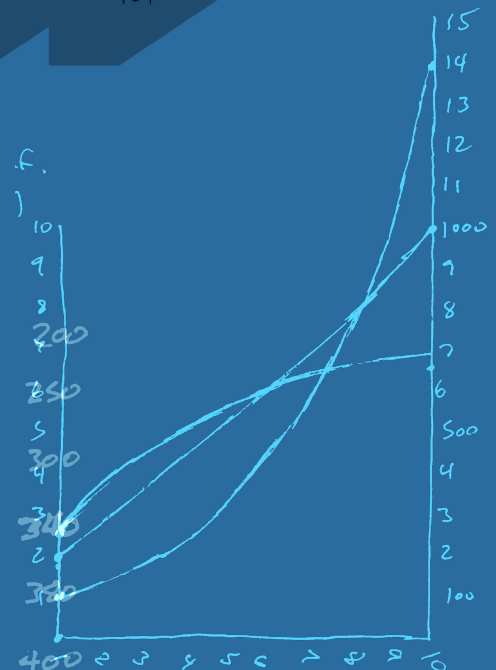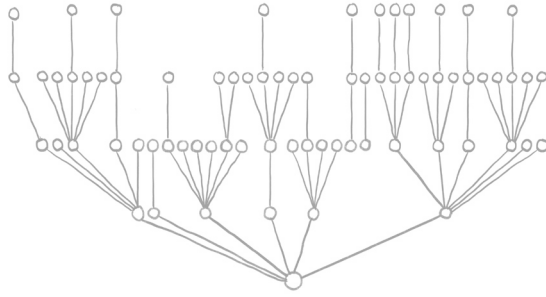
The Fundamentals of Game Design

TERMS

play (v.) To engage in recreational activities like exploration, discovery, and experimentation, often in a symbolic representation of the real world.

prototype (n.) A rough but playable version of a game created early in the design process.

win state (n.) The objective conditions that must be achieved for a player to win a game.

lose state (n.) The objective conditions that must be achieved for a player to lose a game.

goal state (n.) A condition in which a player is seeking to accomplish a task or objective.

zero-sum game (n.) A game with clear winners and losers. Gains by one player are balanced exactly through losses suffered by another.

HOW TO USE THIS WORKBOOK:

Throughout this course, you will develop three bodies of work.

Concept Book: A simple notebook in which you will record high-level game concepts. You'll also use this notebook to write responses to thought experiments posed to you throughout the class.

Prototype Library: A collection of all your playable prototypes. Throughout the class you'll be asked to build dozens of small interactive experiences to test various game mechanics and concepts. We've designed assignments to be engine agnostic, so don't worry about finding the "right" medium. For many, prototypes will be small tabletop experiences using paper, cards, chips, dice, etc. For those with more programming experience, prototypes may be wireframes in Unity, Unreal, Game Maker Studio, Twine, etc. Regardless of which vehicle you choose, the goal of prototyping is to build something interactive as quickly as possible, learn a core lesson from it, and move on.

We've provided a cover sheet template for your prototype library. Download it here and use it to track progress whenever you create a new prototype or playtest an older one.

Game Design Document (GDD): A deep dive into a single game concept we call your "Capstone Game." Your GDD should answer any questions a potential audience might have about the game, from high-level concept down to the minutiae of aesthetic choices in visual and audio design. After the course, you might bring your GDD to potential team members, publishers, or investors interested in your game.

We've provided a GDD template with headings and subheadings. Download it here and convert to a Google doc, so that you can collaborate on it with your team. By the end of the course, your GDD will run somewhere around 30 pages. Afterwards, you may choose to edit it into relevant sections based on your audience.

READING LIST

A Pattern Language, Christopher Alexander et al. Oxford University Press, 1977.

Flow: The Psychology of Optimal Experience, Mihaly Csikszentmihalyi. Harper Collins, 2009.

Urban Dynamics, Jay W. Forrester. Pegasus Communications, 1969.

Maps of the Mind: Charts and Concepts of the Mind and its Labyrinths, Charles Hampden-Turner. Collier/Macmillan, 1982.

The Ants, Bert Hölldobler and Edward O. Wilson. Belknap Press, 1990.

Gaia: A New Look at Life on Earth, James Lovelock. Oxford University Press, 1979.

The Ages of Gaia, James Lovelock. Oxford University Press, 1988.

Reality Is Broken: Why Games Make Us Better and How They Can Change the World, Jane McGonigal. Penguin, 2011.

The Medium Is the Massage: An Inventory of Effects, Marshall McLuhan. Gingko Press, 2001.

Thinking in Systems: A Primer, Donella H. Meadows. Chelsea Green Publishing, 2008.

*The Society of Mind*, Marvin Minsky. Simon & Schuster, 1988.

Blood, Sweat, and Pixels, Jason Schreier. HarperCollins, 2017.

Game design is a multidisciplinary creative process that directs the natural human inclination to play. For Will, the foundations of becoming a good game designer are:

• **Become familiar with design thinking outside of games**. If you're making a chair, there are many qualities you can choose to give your chair: comfort, portability, affordability. Similarly, there are many qualities you can give your game. Make deliberate decisions about which to explore and which to leave behind.

• **Aim for a state of continuous learning.** Will seeks design lessons from biology, cognitive science, even Japanese gardening. Draw inspiration from a variety of creative fields and academic disciplines, as well as playtesters, other games, conversations with your team, and your own mistakes. Strive to be a good listener, and remain open to the possibility of learning new things.

• **Begin making games as soon as possible.** Come up with an idea and play it immediately, no matter how unprepared you feel. It's no use cultivating some grand idea in your head which you eventually discover is too complex to execute. Instead, start creating simple games in your day-to-day life, test them with your friends, and begin to modify the gameplay based on your findings. This iterative process is used at the highest levels of the industry.

"Games have the possibility to go way beyond (a) zero-sum approach."
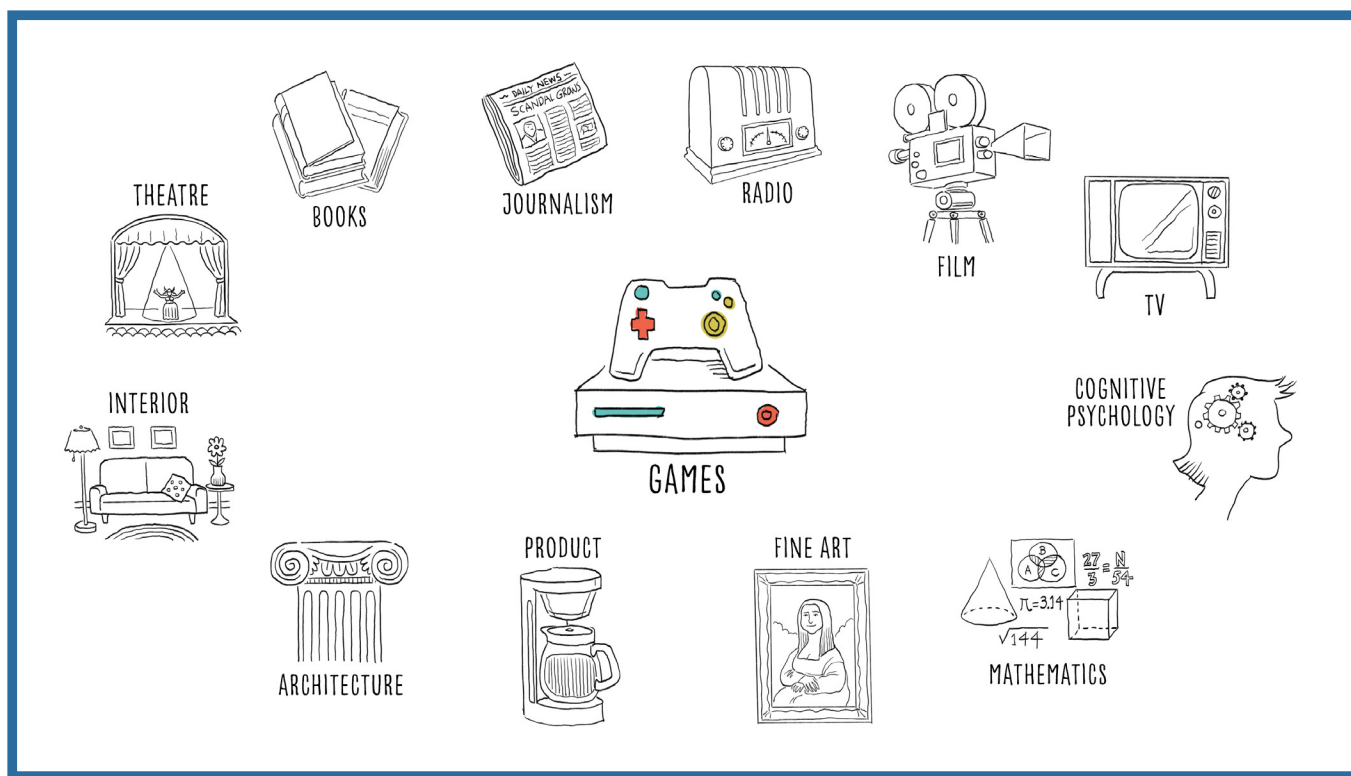
Will's work is unique because he rarely makes zero-sum games. Instead, *SimCity*, *Spore*, and *The Sims* empower the player to develop their own goals, and then pursue them as they see fit. Unlike many games, which tend to direct player behavior, his games encourage and amplify player creativity. Don't be afraid to push the boundaries of your game designs as you progress through the course.

LEARN MORE

Read Don Norman's book *The Design of Everyday Things* (Basic Books, 1988). There you'll find an influential design philosophy called "user-centered design" which you can apply to games. Consider the game as an object whose sole purpose is to communicate possible interactions to the player. What interactions does a particular game "afford" the player? How does the game encourage certain behaviors, while discouraging others?
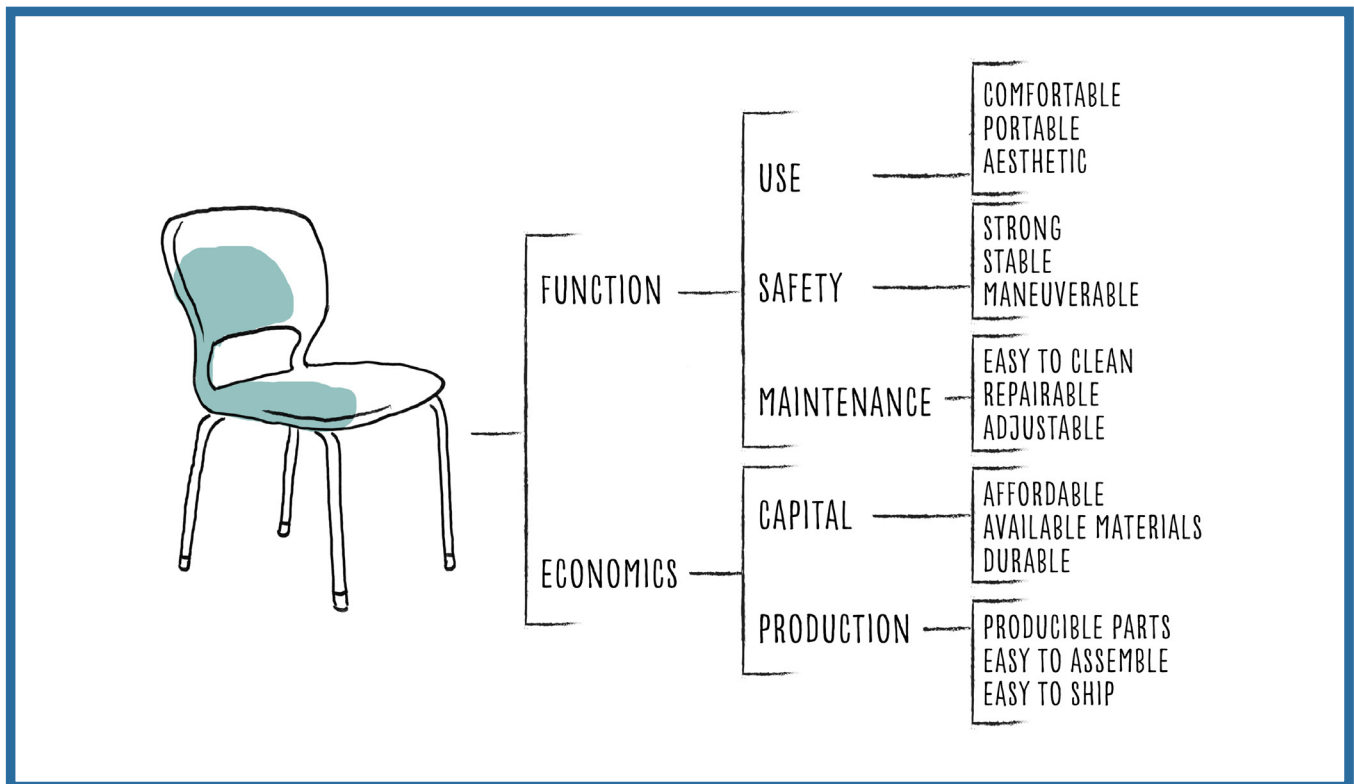
Read the book *Reality Is Broken* by Jane McGonigal (Penguin Books, 2011). Focus on the introductory chapters, where McGonigal writes about the vital role that games played in ancient civilizations and cultures. Consider how you can channel that vitality in your own designs.
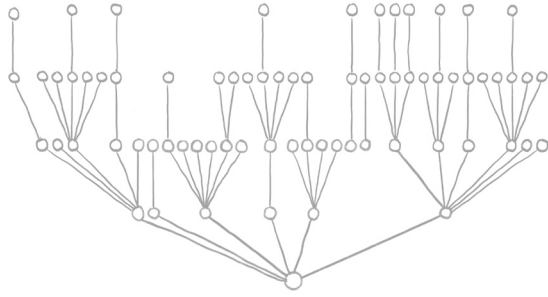
ASSIGNMENTS

Play one of Will's games (e.g. *The Sims*, *SimCity*, *Spore*) and focus on the goals you develop for yourself while doing so. Are you trying to create a city with the lowest crime in *SimCity*? Do you find yourself trying to have the best-decorated house on the block in *The Sims*? Are you interested in creating the largest spacecraft possible in *Spore*? When you find a goal that interests you, write a concept for a board or card game in your Concept Book that explores that goal in greater depth. Specify several possible win and lose states for your new game.

As a thought exercise, examine chairs by three different designers (e.g. Eames, Breuer, and Verner Panton). Write down which properties are given highest priority in each design. Comfort? Portability? Visual aesthetic? Durability? Then, write down which properties are given low priority. Rank these properties in order from least to most vital to the design.

FUNCTION
USE — COMFORTABLE / PORTABLE / AESTHETIC
SAFETY — STRONG / STABLE / MANEUVERABLE
MAINTENANCE — EASY TO CLEAN / REPAIRABLE / ADJUSTABLE

ECONOMICS
CAPITAL — AFFORDABLE / AVAILABLE MATERIALS / DURABLE
PRODUCTION — PRODUCIBLE PARTS / EASY TO ASSEMBLE / EASY TO SHIP
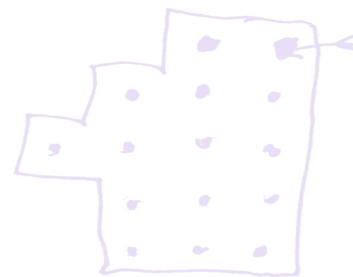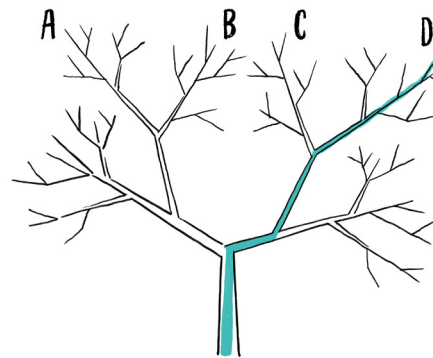
Generating Game Concepts

TERMS

emergence (n.) A design phenomenon in which features of play manifest independently when the player interacts with the game mechanics and sets the system in motion. In its adjective form, emergent can describe narratives, strategy, and even gameplay.

Designers find new game concepts by being inspired by all objects and settings, no matter how mundane they first appear. The natural and social worlds are a richer source of concepts than other games: Look for points of conflict or dynamic interaction everywhere you go. But the most important thing about inspiration is knowing what to do when you find it. Here are a few tips:

1. **Find new subjects through wide-ranging research.** Don't limit yourself to subjects that have already been explored in games. Seek out areas that are new to you and try to learn more about them, no matter how technical they might seem at first.

2. **Once you have a general subject for a game, analyze it from every possible perspective.** If you're interested in air travel, for example, you might wonder how a pilot lives and works. But what about the flight attendant or the air traffic controller? What about the plane itself, or the birds avoiding it during takeoff and landing? What about the clouds the plane cuts through during flight, or the weather gods who determine when a plane is grounded and when it can fly? Each of these perspectives can produce any number of game designs. All should be considered in equal detail.

3. **When you face difficult design decisions, trust your gut.** Sometimes you'll have to make choices without clear data. Will had no idea *SimCity* would have the wide appeal it gained, but he knew it was interesting to him, and that was enough. Be confident in your instincts about what is fun.

"You can take almost anything, and looking at it the right way, make it a fascinating interactive experience."

LEARN MORE

Watch a documentary about an obscure subject and jot down a few game concepts that come to mind as you do. While watching, pay attention to whether the subject becomes more or less interesting the more you learn about it. Try *Helvetica* (2007) by Gary Hustwit, which is about the world of typography, or *Jiro Dreams of Sushi* (2012) by David Gelb, which is about an 85-year-old sushi master in Tokyo.

ASSIGNMENTS

Generate a new game concept in your Concept Book and describe it to a friend. Have that friend describe the idea back to you. Note which parts of the design your friend emphasized that you didn't expect. Note which parts of the design they left out or forgot.

Go to Wikipedia. Click the "random article" button on the sidebar until something grabs your attention. Read the article, focusing on the actors and agents within it. Then, generate a game concept about the subject of the article from five different perspectives. Record the concept in your Concept Book.
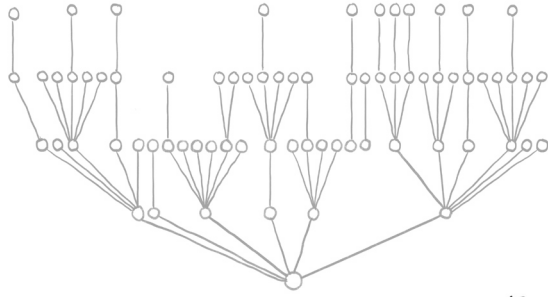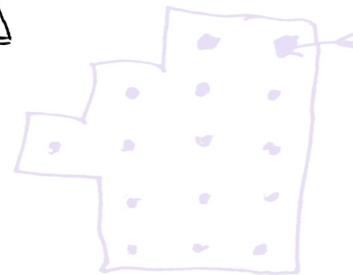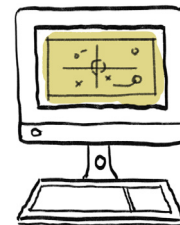
Early Prototyping

TERMS

prototype (n.) The simplest possible execution of a design concept.

paper prototyping (v.) To use simple analog materials to create an interactive experience which answers a design question by testing a game concept or feature.

iterative design (n.) A repeating design process in which a prototype is tested, results are analyzed, and the prototype is rebuilt based on the findings.

R apid prototyping is the central discipline of the game design process. You should build your prototypes as quickly and cheaply as possible, with a specific question or goal in mind. Don't spend any time agonizing over what form the prototype should take. The important thing is to build something interactive as quickly and cheaply as possible, learn a lesson from it, and move on to other branches of your design.

While prototyping, be open to discovering which moments of the play experience are fun, no matter how trivial or incidental they might seem at the time. Then take note of those moments for use in a future prototype and begin reworking the concept from a different angle. Prototypes can take any form, but there are two major categories.

"A prototype is a navigation instrument... it's a compass."

THE ITERATIVE PROCESS

RESEARCH

SIMULATION PROTOTYPES

GAMEPLAY PROTOTYPES
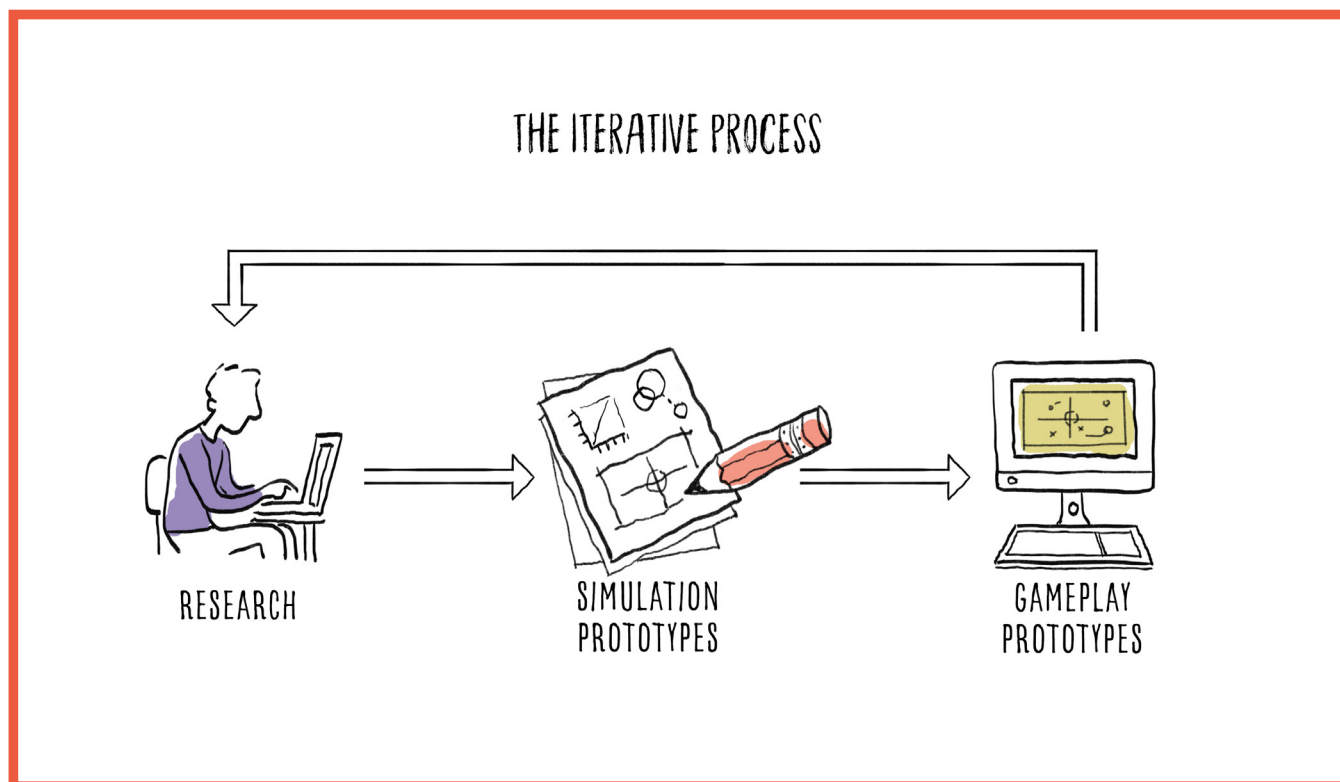
Paper prototyping: These are prototypes that aren't built on a computer. Tangible models help you understand how to give your game nouns authenticity and weight, and what it should feel like to interact with your game in a digital space. (Learn about game nouns in Chapter 7: Develop a Game Language.) Use pencil, paper, scissors, and glue to build an interactive experience that tests a specific concept or system.

Code prototyping: The benefit of prototyping with code is that you can easily tweak variables to explore different behaviors. The downside is that it usually takes more time and effort than paper prototyping. Use the simplest platform at your disposal and only do so if you can produce something quickly.

LEARN MORE

- Read Brian Crecente's *Polygon* article on the development of Ojiro "Moppin" Fumoto's *Downwell*. How did keeping an open mind during the rapid prototyping process help Fumoto find the core mechanic for his game?

- Read the "Eight Tips of Productive Prototyping" from chapter seven of Jesse Schell's book *The Art of Game Design: A Book of Lenses* (CRC Press, 2008). Think about his advice on digital versus paper prototyping. If you primarily prototype digitally, consider trying out paper prototyping, and vice versa.

ASSIGNMENTS

- Quickly build a paper prototype of one of the game concepts you developed in Chapter 2: Generating Game Concepts. Find a clean workspace and gather these materials: blank paper, colored construction paper, pens and pencils in several colors, scissors, glue, as many dice as you can find, a handful of chits or coins to use as resources, and any small objects you'd like to use as player pawns. First, think about your game concept from several different perspectives, and decide which one would be the most fun to inhabit as a player. Then design a set of actions players can take that will allow them to operate from that perspective. Build a responsive environment in which players will execute those actions. Take note of interesting conflicts or dynamics within your new game. Add the prototype to your library, and write a cover sheet for it.

- Find a digital game development environment you're unfamiliar with and watch a tutorial about how it works on YouTube. Write down which scripting language that environment uses, and find a code sample. Read the sample and see how legible it is to you. Try to edit one or two lines of code and see how the script runs afterwards. Here are some free and inexpensive engines for you to explore: Unity, Unreal, Gamemaker Studio, Twine, PuzzleScript, Godot, and HTML5.
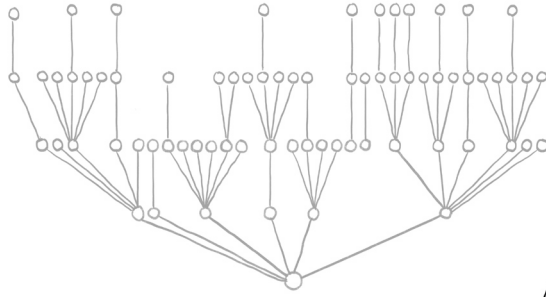
The Relationship Between Story and Games

TERMS

emotional palette (n.) The range of potential feelings a given medium can produce within its audience.

agency (n.) The power to control your own actions accompanied by the knowledge that you are able to do so.

linear storytelling (n.) A traditional narrative structure in which the audience follows a story in the order of beginning, middle, and end.

nonlinear storytelling (n.) A less traditional narrative structure in which the beats of the story are presented out of order, or discovered by the audience in the order of their choice.

machinima (n.) A medium of communal art in which fans use computer graphics engines from proprietary softwares to create original cinematic narratives.

Many designers begin making games to become storytellers. But stories and games are very different mediums, each with distinct challenges in design. Knowing what games can and can't do with a story is the first step to integrating a compelling narrative into your design.

As a storytelling medium, games are capable of producing emotions that other media cannot. Because the player is responsible for the actions within the game, they can experience feelings like guilt, accomplishment, pride, and self-expression. When developing a story for your game, focus on the sense of agency and responsibility you can create in your player and the stories that emerge from those emotions.

Enable your players to tell their own stories within your games. Offer them expressive tools. Think of the player as a collaborator in the production of your narrative and rely on them to complete the story.
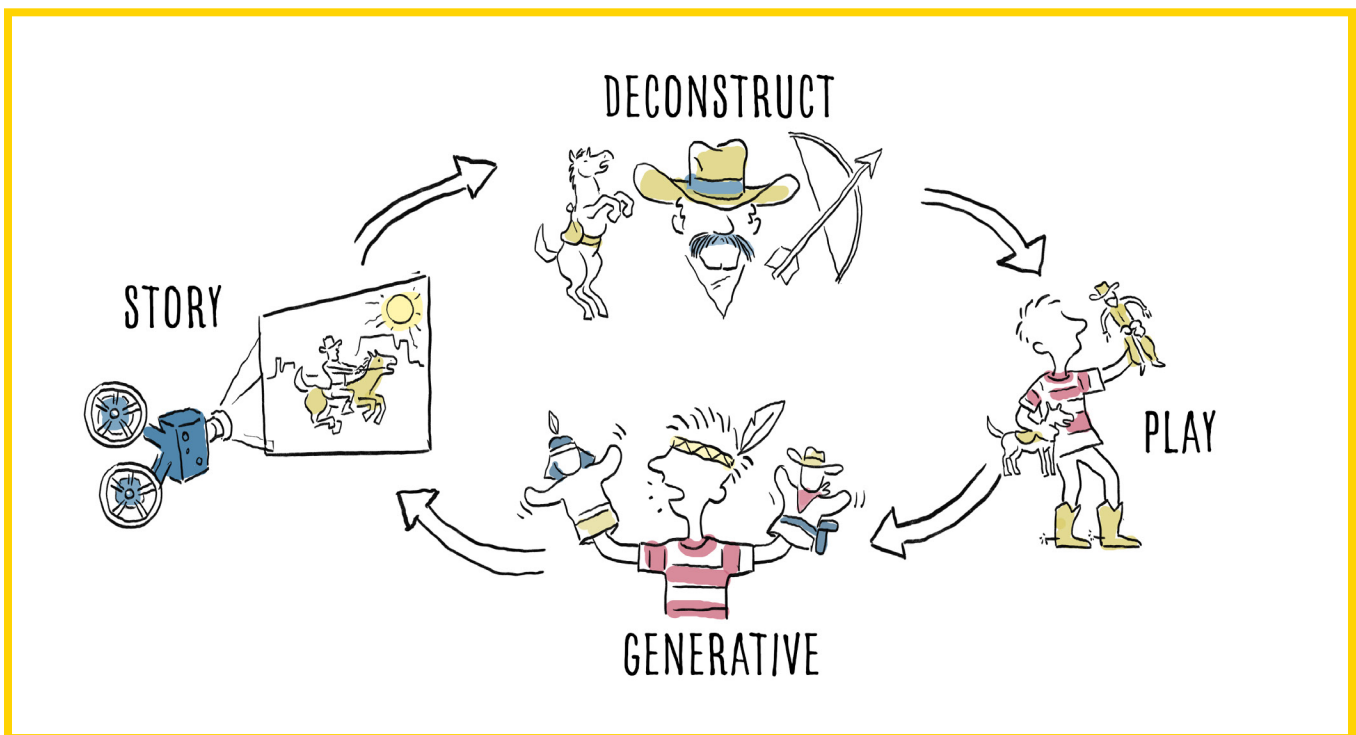
LEARN MORE

Play *Papers, Please* by Lucas Pope at 3909 or *The Banner Saga* by Stoic Studio. Focus on how the game mechanics interact with the story to produce a sort of participatory narrative. Notice moments where you feel guilt, pride, or a sense of accomplishment. How did the game designer provoke these feelings? Record your observations in your Concept Book.

ASSIGNMENTS

• Generate a game concept in your Concept Book based on one of these four emotions: 1) **guilt**, 2) **pride**, 3) **a sense of accomplishment**, or 4) **the feeling of being part of a team**. Next, build a prototype with mechanics that produce your chosen emotion within the players. Add the prototype to your library.
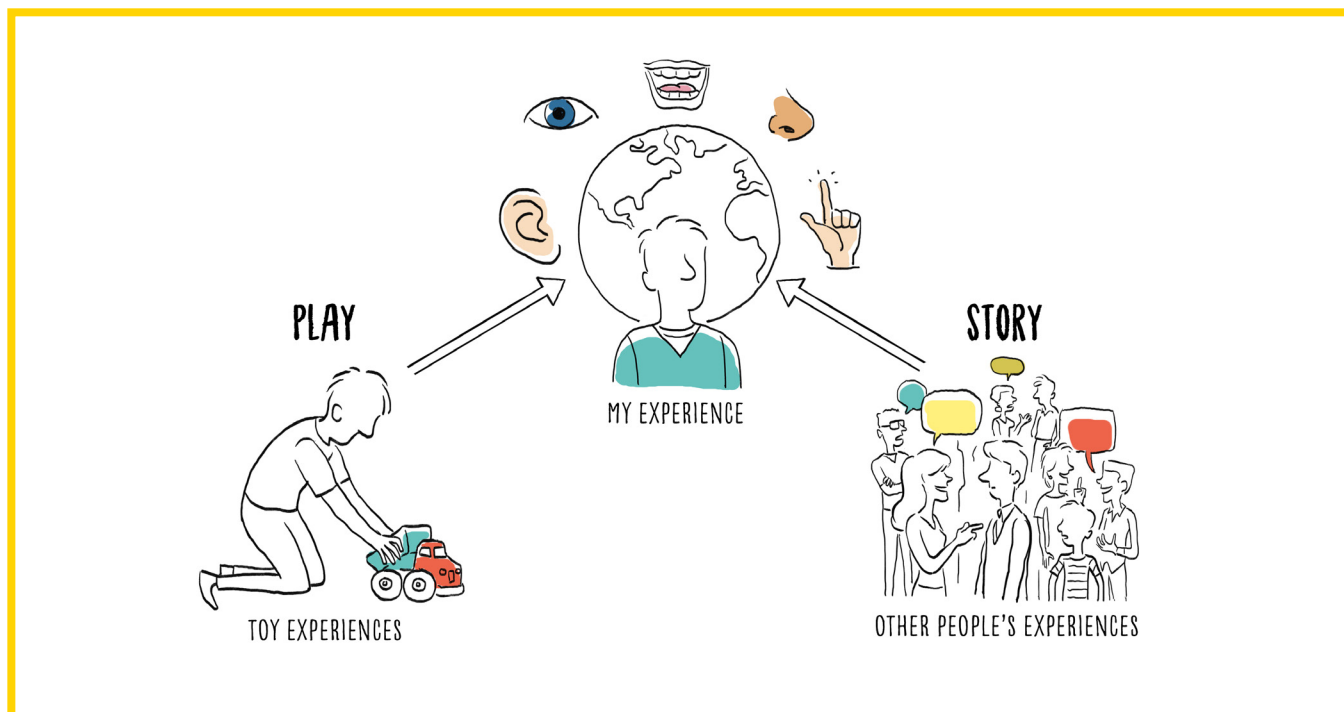
- Prototype an interactive experience that is a tool of self-expression for your players, such as a character creator (like *Spore*), a drawing system (like *Pictionary*), or even a directed writing environment (like magnetic poetry). Strive to create something structured, with rules and limitations, but not a game. Avoid win and lose conditions and instead focus on creating goal states and positive feedback for your players. Add it to your Prototype Library.

- Choose one of your favorite game concepts from your Concept Book, and take a few notes about possible stories it could tell. Then, go to twinery.org and use the tool there to create a narrative for the game with branching paths that the player can choose from. Create a story with at least three possible endings. Write a cover sheet for your interactive narrative and add it to your Prototype Library.
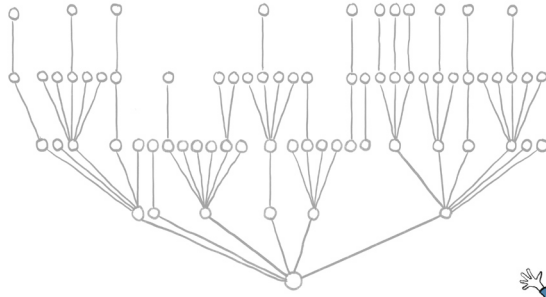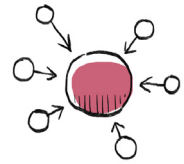
Exploring Player Psychology

TERMS

agency (n.) The power to control your own actions, accompanied by the knowledge that you are able to do so.

schema (n.) A mental framework of expectations used to perceive and respond to a given experience.

**feedback (n.)** - Outputs of a system, returned as inputs into that same system.

game loop (n.) A closed feedback loop in which a player is introduced to a challenge, attempts to overcome that challenge, and adjusts their future behavior based on success or failure.

mental model (n.) The interior structure of motivation your game builds in the mind of the player.
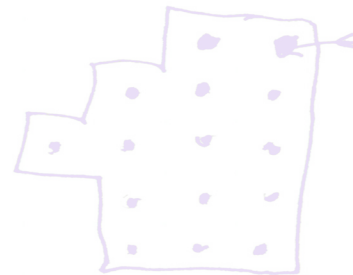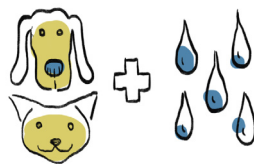
A

robust game experience creates an entire system of limitations and freedoms, goals and rewards, challenges and joys in the player's mind. For the duration of game-play, this new psychology replaces the player's typical real-world motivation. Game development is as much about programming the player's brain as it is about programming the game itself.

"Games, for a lot of people, become... a very integral part of their identity."

TECHNOLOGY

PSYCHOLOGY
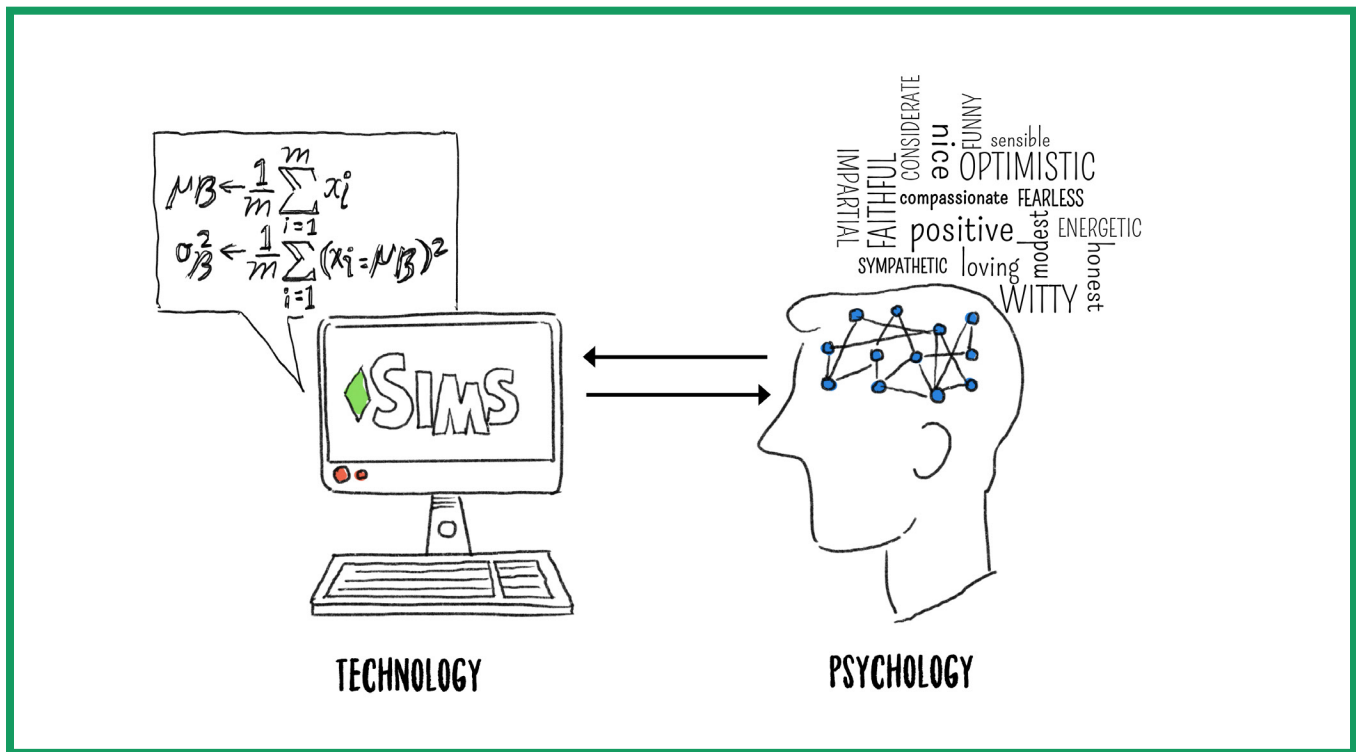
If your game design is compelling enough, your player will find themselves pursuing behaviors they would never pursue in their regular life. Will calls this interior system the "mental model." The system of motivation in *The Sims'* is based on Maslow's Hierarchy of Needs pyramid, which Will used to structure objectives for the player.

SCHEMA

1. ENTER RESTAURANT   2. BE SEATED   3. GET MENU   4. PLACE DRINK ORDER   5. RECEIVE DRINK

6. PLACE FOOD ORDER   7. EAT FOOD   8. RECEIVE CHECK   9. PAY CHECK   10. LEAVE
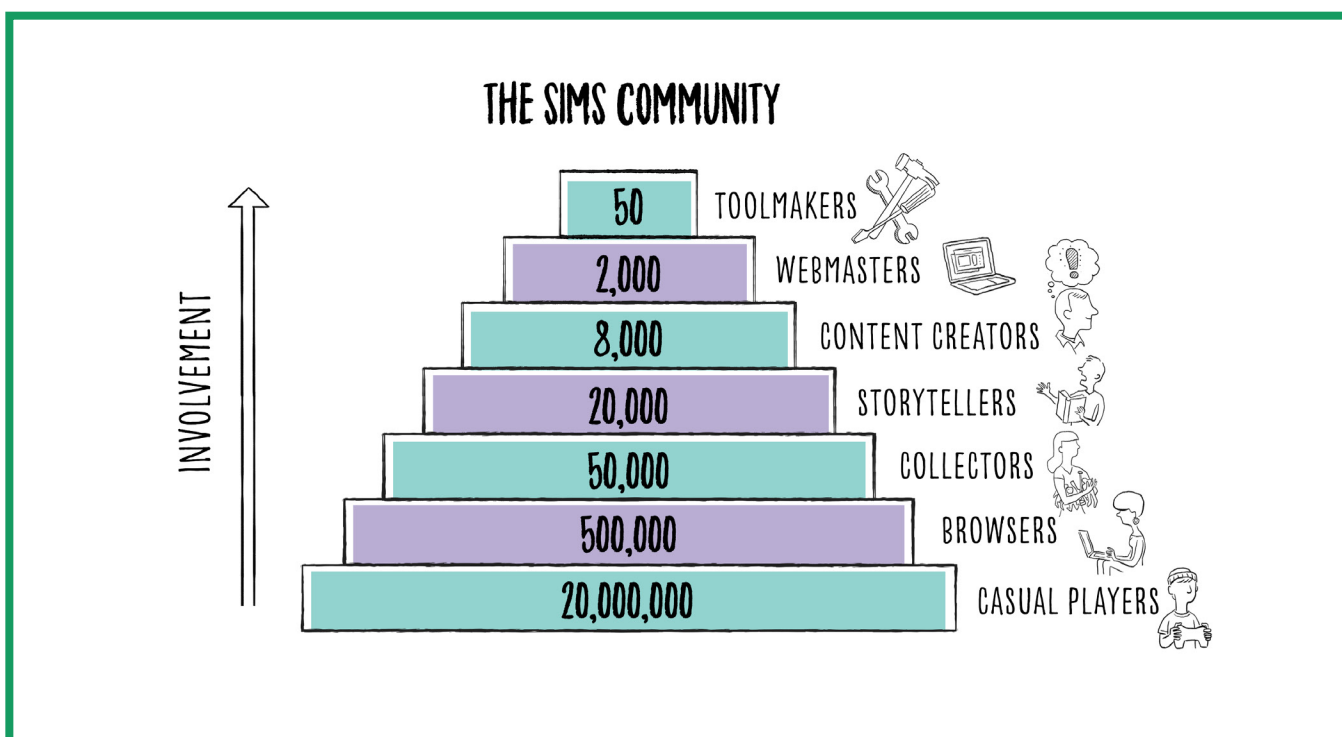
SCHEMA WITHIN GAMES

CLASSIFICATION

CAUSALITY

EMPATHY

AGENCY

Keep in mind the following when thinking about the mental model for your game:

1. **Players will have expectations of how your game model works,** and you should be aware of them as a designer. These expectations are based mainly on what they have seen and experienced in other games. If you have a strong sense of the mental model your game creates for the player, you will be able to better direct their behavior toward the most fun aspects of the experience.

2. **Don't limit your model to what's possible in the real world.** Only pure simulators have to strive for accuracy. Create systems that are responsive, whimsical, and humorous.

3. **Take note of the roles that form in your game's community,** and design toward them. If you notice a network of players who like to collect certain items, for example, add a rarity structure into your game to encourage that behavior. Support players as they organically create roles for themselves, because they can become evangelists for your game.

THE SIMS COMMUNITY

INVOLVEMENT

50	TOOLMAKERS
2,000	WEBMASTERS
8,000	CONTENT CREATORS
20,000	STORYTELLERS
50,000	COLLECTORS
500,000	BROWSERS
20,000,000	CASUAL PLAYERS

LEARN MORE

Learn to interpret player psychology by playing your games with a tester. Return to one of the prototypes you built in Chapter 4: The Relationship Between Story and Games, and play it with a friend. While playing, discover a moment of fun you didn't intend to create as a designer. Pay particular attention to moments where your friend is electing to spend more time than you expected, or pushing the boundaries of a certain mechanic to see how far it can go. Take note of those moments in your Concept Book, and consider them for possible core mechanics in a future prototype.

ASSIGNMENTS

Select one of the illustrations from *Maps of the Mind* by Charles Hampden-Turner, shown in the introduction to this chapter and reproduced on the right and the following page. Use it to develop a game concept. Record that game concept in your Concept Book.

Illustrations by Charles Hampden-Turner

Psyche and Polycentrism:
The View of James Hillman
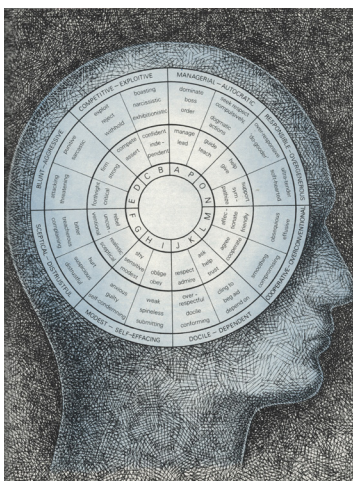

The Broken Image: Floyd Matson's view of Descartes, Newton, and Darwin
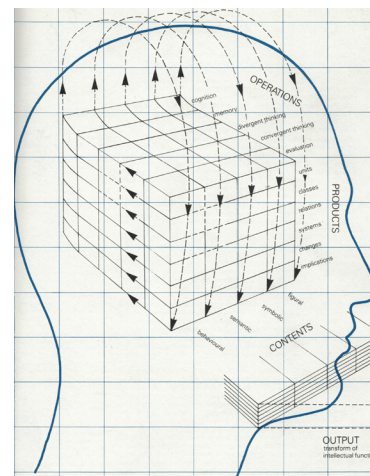
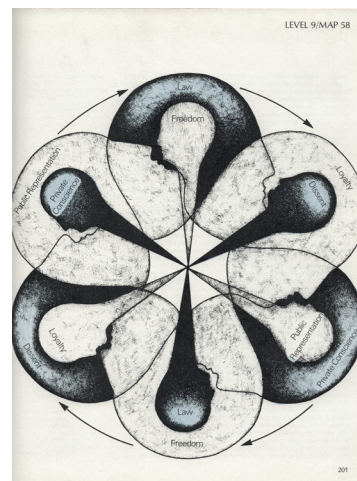The Structure of Intellect:
J.P. Guilford's Cubic Factors
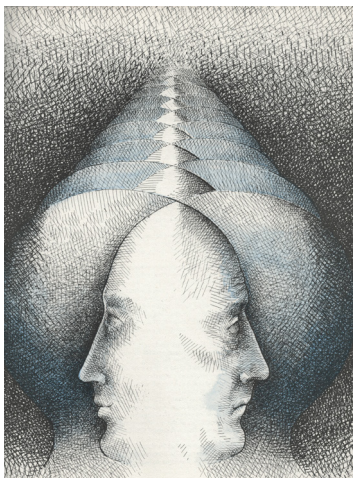
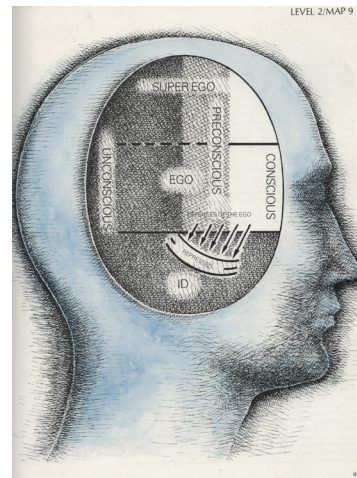The Etchings of Interpersonal Anxiety: The Dynamisms of Henry Stack Sullivan

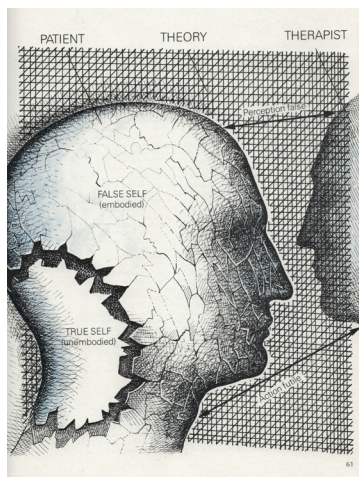The Oresteia and the Myth of Democracy of Aeschylus
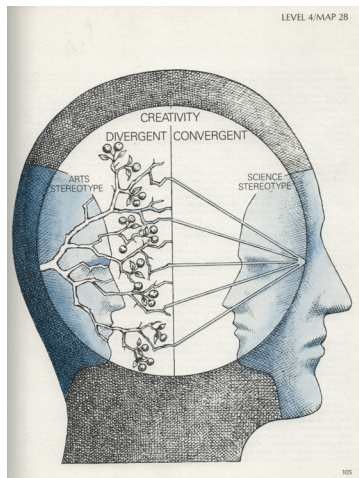
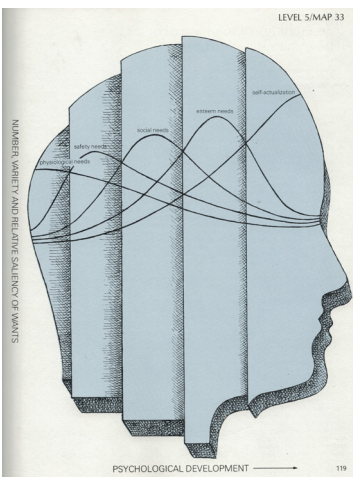The Two Cultures Controversy: Getzels, Jackson, and Hudson

Encounter on the Narrow Ridge: Martin Buber Interpreted by Maurice Friedman

The Limited Energy Model of Sigmund Freud

The Divided Self: Jean-Paul Sartre to R.D. Laing

Abraham Maslow's Hierarchy of Needs
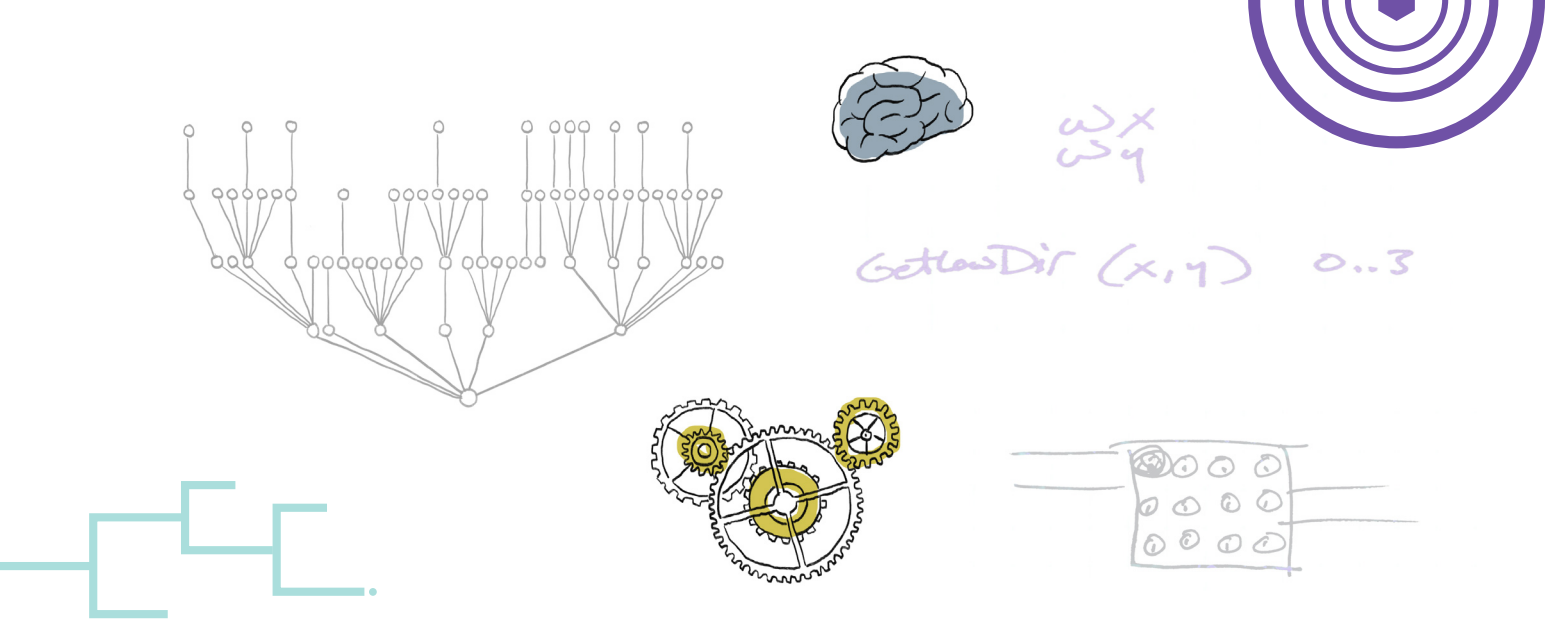
Design Player-Centered Experiences

TERMS

flow state (n.) A state of complete absorption in a task, characterized by a loss of time.

Dynamic Difficulty Adjustment (DDA) (n.) A game feature in which the system automatically raises or lowers the difficulty of the game to match the player's skill level moment by moment.

nested game loops (n.) A structure of game loops in which smaller challenges represent constituent parts of larger, more complex challenges.

failure state (n.) The condition in which a player doesn't accomplish a stated challenge or objective.

Usually found at the end of a game loop and accompanied by negative feedback.

incentives (n.) Elements of your game system which motivate player behavior and foster engagement in your game world.

core game loop (n.) The repeating challenge or interaction progressing the player through objectives to eventually achieve the win condition.

orthogonal game loop (n.) A repeating challenge or interaction that does not advance the player toward the win condition.

As a designer, your primary focus should be the player's experience. Your game rules and system only exist to enable that experience. Will uses this set of strategies to increase the probability that players remain focused on his games throughout their experience.

1. **Put your players in a flow state.** To create it, balance the difficulty of your game against the maximum ability of your player. If your game has fail states, they have to be quick, understandable, and immediately factored into the next game loop. Build small, repeatable game loops within larger, complicated loops. For instance, offer resources to your player after they succeed or fail at a small task. This creates a nested structure of challenge, so the player can always engage with a new task.

RAMP THE MODEL
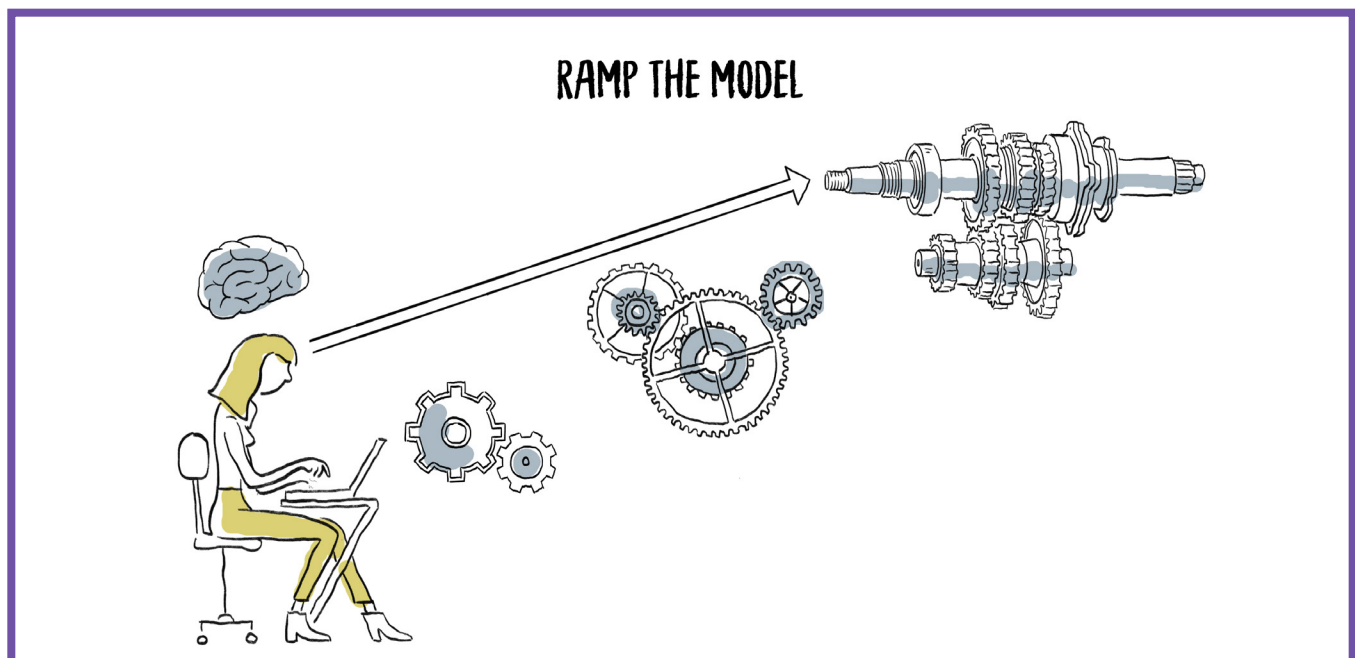
2. **Gradually ramp up difficulty and complexity.** Give your player the agency to decide which task to face next, and slowly ramp up the difficulty of that task over time. Build a similar ramp in the complexity of your game. Start with a few options, then start adding more. Don't just drop players into a complete game world.

3. **Design fun, interesting, and humorous fail states.** In the real world, people try to avoid failure at all costs. But in a video game, players are always falling down chasms, driving into walls, and accidently blowing up planets. Strive to make your fail states as enjoyable as possible. Use fast or humorous animations, and don't punish the player too harshly if they don't succeed. If you do this, players will begin to embrace failure as a way to learn about the rules and regulations of the game world.

4. **Use psychological incentives to motivate your player,** rather than relying on material rewards like coins or points. Discovery is a powerful incentive: Offer your player a glimpse of a larger world they can access later in the game. Self-expression is an equally underutilized reward. Let your players pick their own teams and decide their own avenues of attack. Designing a strategy and watching it succeed or fail can also be a strong incentive.

> "The really interesting player rewards are the things that they came up with themselves."

LEARN MORE

- Learn more about flow by thinking about when you encounter it in your own life. Take out your Concept Book and write about a recent time you were in a flow state. Think about times you've been so absorbed in a challenging task that time seemed to disappear. How was that flow state achieved? How did it feel? How long did it last? Was it a sustainable state? What could be adjusted to make the experience more sustainable?

- Play a complex strategy game, such as Sid Meier's *Civilization* or *World of Tanks* from Wargaming. Keep an eye out for when you achieve the flow state, and try to discover what factors of the game experience brought you there.

- Read Rami Ismail's essay "Game a Week: Getting Experienced at Failure" on *Gamasutra*. Consider his advice on the value of rapid prototyping, and how it intersects with Will's thinking on the value of failure for both players and designers.

• Play *Hotline Miami* from Dennaton Games. Observe how short the game loops are. Consider how often you are encountering failure on a mission, then factoring the lessons learned in failure into your next attempt at that same mission.

• Play *Celeste* from Matt Makes Games. Consider how the "death" animation, or the fail state on level screens, differs from more punishing games.

ASSIGNMENTS

• Isolate the primary fail state in one of the prototypes from your library. Then, make the game more fun by adding rewarding feedback to that state.

— If you have a video game of your own in development, test out new, more rewarding feedback for fail states. Add humor to the animations for when your player character takes damage or dies. Make respawn animations immediate, and make the setbacks for player failure as minor as possible.

• Create a simple Dynamic Difficulty Adjustment (DDA) system. Take your favorite prototype from your library and introduce a way to scale the difficulty of a task to match the player's skill. Build in a simple system that evaluates the player's success and reduces the challenges they face when they are behind. They should also face greater difficulty when they are ahead. Add the new prototype to your library.

Develop a Game Language

TERMS

game language (n.) A shared system of signs and symbols the designer uses to communicate with their player.

game nouns (n.) The interactable objects and persons that populate your game world.

game verbs (n.) The actions available to a player in the game world.

game adjectives (n.) The subjective character of the game nouns that color the experience of interacting with them.

Games use a system of signs and symbols to communicate meaning to the player. Understanding the grammar of game languages can help you better communicate with your player, and is a vital part of educating them about the rules of your game world.

NOUNS	VILLAIN ⟹ ME
VERBS	ATTACK ⟹ FIGHT
ADJECTIVES	SCARY ⟹ STRONG

1. **Use your game language to influence your player's behavior and direct their agency.** Foreground your game nouns through color saturation, and use animations to show what kind of interactions (verbs) are available. Game adjectives are helpful for directing player behavior and understanding what you want players to feel while interacting with the objects in your game world. A player will probably run away from an angry dog, for example, but might approach a cute one.

2. **Don't be afraid to traffic in common metaphors and reference traditional games.** There are basic archetypes of story and play that have been around for centuries, and by referencing them you can bring up a useful set of assumptions. If a dragon swoops

"Metaphors are very, very useful as a tool for designers."

into your town and makes off with the mayor, for example, you can be pretty sure your player is going to hunt down that dragon and try to kill it.

LEARN MORE

Play *Grim Fandango* by Tim Schafer or *The Binding of Isaac* by Edmund McMillen. Interpret the game language as you play. What are the nouns of the game? What are the verbs and adjectives? Record these in your Concept Book.

THE MAGIC CIRCLE

PLAYGROUND
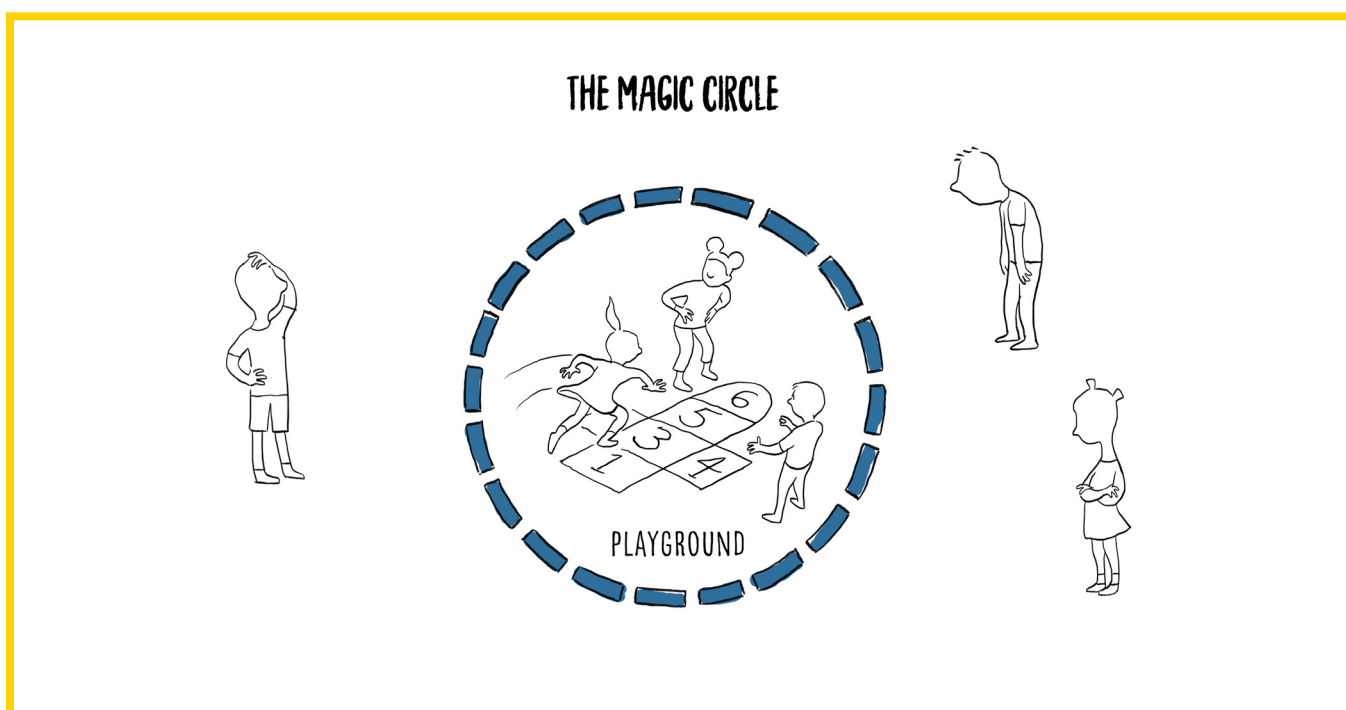
Discover more about the theory of the "magic circle" in the book *Homo Ludens* by Johan Huizinga (1938). Read through the text with a focus on how vital play is in both nature and culture. Consider how your game designs can appeal to states of play that are ancient or even pre-cultural.

ASSIGNMENTS

• Use the sheet on the following page to repurpose the core mechanics of a playground in a new video game concept.

• Decide on a game concept for your Capstone Game. Review Chapter 2: Generating Game Concepts for guidance on picking a subject. Review your previous prototypes during this process, and find mechanics from your backlog that may eventually make it into your final design. Record your notes on idea generation in your Concept Book.

USING MECHANICS FROM PLAYGROUND GAMES

STEP 1: Read the descriptions of the following playground games, and then repurpose them as the primary mechanics for a new video game concept.

Tag example: A multiplayer game called Vampire Lord is set in an eighteenth-century Gothic village. One player is designated as the powerful, flying vampire lord. All of the other players are slower, walking villagers. If the vampire bites a villager, the villager becomes the vampire lord. Players gain points as villagers for every second they stand in key locations on the map (church, graveyard, town square) but lose points for every second they play as the vampire lord.

STEP 2: Prototype one of the game concepts you developed above. Add it to your library.

TAG
Mechanics: All players have to avoid being touched by a single player, designated as "it." When a player is touched by "it," they become the new "it."

_____

_____

_____

_____

_____

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RED ROVER
Mechanics: Two teams of players make walls by lining up and holding hands. Each team then invites one player from the other team to run across the field and break through the wall. If the player is stopped by the wall, they join the team. If they break through, they select one person from the opposing team to join their side.

_____

_____

_____

_____

HOT POTATO
Mechanics: Players stand in a circle and toss an object back and forth. A song, which could stop at any time, plays in the background. When the song stops, the player who is holding the object is out of the game.

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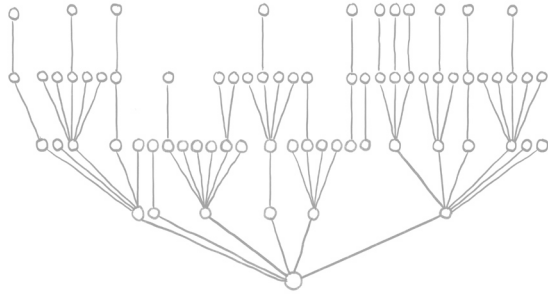
Designing a Visual Aesthetic

TERMS

pixel (n.) The illuminated, colored squares that produce images on a digital display.

pixel art (n.) A 2-D visual style that uses pixels to render and animate the characters and environments within a game. Pixel art styles often reference early video game aesthetics popularized by consoles such as Atari, Nintendo Entertainment System (NES), Super Nintendo Entertainment System (SNES), and Sega Genesis.

low-poly (n.) A 3-D visual style based on the simple, blocky shapes produced by meshes with a low polygon count. Low-poly styles are less graphically demanding and more stylized than their high-poly counterparts.

high-poly (n.) A 3-D visual style common in high-quality animation that uses high polygon meshes to produce realistic, complex shapes and structures. High-poly styles are graphically demanding and tend to achieve a sense of realism.
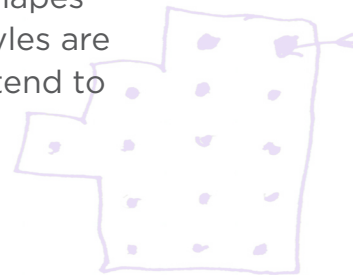
Today, even the average home PC is capable of rendering highly detailed, realistic 3-D models. But visual style is about more than realism or fidelity. Your visual aesthetic helps define your game language and should impact your design.

1. **Discover the visual aesthetic of your game during the research phase of the design process.** Don't just look at other games, but research art and material cultures throughout history. In his research for *Spore,* Will gathered hundreds of pulp sci-fi comic books from the 1960s for visual inspiration. Use a similarly broad, research-based approach to finding a visual aesthetic in your own game.

2. **Use bold color choices and shallow depths of field to highlight game nouns.** Consider how certain animation choices influence the feel of your game verbs. Don't underestimate the extent to which visual choices can influence the psychology and guide the behavior of your players. The look of your game should direct particular kinds of player behaviors while discouraging others.

> "Visual style reflects the language of your game."

3. **When looking for artistic collaborators, seek out people who understand your vision** as a designer, but who can also produce work you can't. If you have a very particular style in mind (pixel art, for example) find someone who specializes in that style. If not, you should find a generalist who can help you ideate and develop the visual style of the game as it progresses through various design stages.

LEARN MORE

- Play *Return of the Obra Dinn* by Lucas Pope at 3909. Analyze his mix of 2-D and 3-D assets. Think about how his visual aesthetic references, but also exceeds, the styling of puzzle games on early PCs.

- Play *Hylics* by Mason Lindroth. Consider how a visual aesthetic can be the central element of a game experience rather than just a supporting one.

- Play *Crawl* by Powerhoof. Notice how the chaotic, pixel-based visual style influences your gameplay during crucial moments.

- Study the book *Halo: The Great Journey...The Art of Building Worlds* (Titan Books, 2011) to get a sense of how concept art can influence visual design and worldbuilding on a large game project.

ASSIGNMENTS

- Create a mood board that displays the visual influences of your Capstone Game. For a digital mood board, use Pinterest or Evernote to collect images that fit your theme. Alternatively, create a physical mood board by printing out images and either attaching them to poster board or affixing them to pages in a notebook.

- Add a link to or a photo of your mood board to the Aesthetic References (3.b) section of your GDD. Write a few sentences describing the general aesthetic you are trying to achieve. Is it 2-D or 3-D? Will you use a low-poly or high-poly style? What feeling and emotions will the visual style evoke in the player? How will it influence their gameplay?

- Develop work for the Concept Art (3.c) section of your GDD. Draw these yourself, or work with your artist to produce sketches of characters, environments, and enemies that will eventually appear in your game. Study concept art from your favorite games to see how early visual designs eventually translate into game objects.
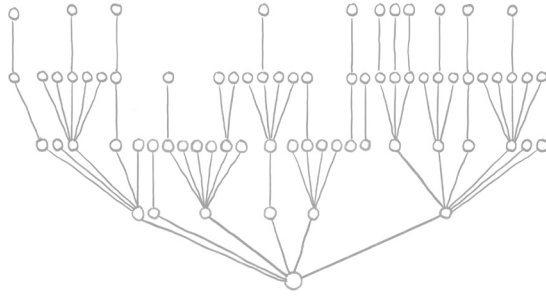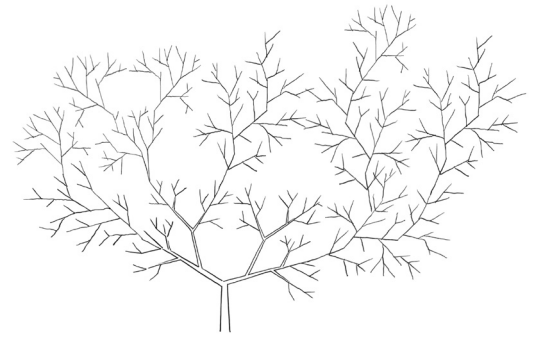
Game Mechanics

TERMS

affordance (adj.) The range of possible interactions visible and understandable to the player at a given time.

game mechanics (n.) The sub-systems and processes of interaction that constitute the underlying structure of the larger game system. They are objective—the "if" levers that produce predictable "then" outcomes within your system.

game dynamics (n.) Moments of play produced by the game system in motion with player inputs. When a player starts conversing with a game system through its game mechanics, the conversation produces the game dynamics, or the whole game system in motion.

Many game mechanics will use some form of probability or randomness. A simple dice roll is an example. Use randomness when you want to create interesting variability in play, or add tension to a certain moment within your game.

Never apply positive feedback to an element that is essentially random, because that fools the player into thinking that they did something significant. Similarly, if you apply randomness to moments that are supposed to be precise and vital to success, such as firing a gun in a shooter game, the game begins to feel arbitrary. Instead, introduce small, mathematically simple elements of chance throughout your game. Those elements will play against one another and eventually present as game intelligence to the player.

Allow players to mitigate randomness in your game by giving them access to tools that influence probability. For example, if you're building a digital card game that relies on random draws, allow your player to build their own deck. If you're building a war game that detects hits and misses by using a probability table, let players add equipment that improves their probability. This way your player has control and agency over how randomness affects the game state, and their failures won't feel arbitrary.

When selecting game mechanics, think about the experience your game is creating. Then work backwards to find the mechanic that will improve that experience. Sometimes that means borrowing a common mechanic from another game, and sometimes it means creating your own. The best way to get good at using game mechanics is to start recognizing them in other games. Play games with an analytical mind. Break each system down into its component parts, and eventually you'll see how many mechanics are shared across games and systems. Strive to become a mechanics collector, gathering things from here and there that you'll eventually use in your own designs.

> "When players are imagining that your world is more detailed, more rich, and more complicated than it actually is, don't talk them out of it."

LEARN MORE

Read the influential [essay] "MDA: a Formal Approach to Game Design and Game Research" by Hunicke, LeBlanc, and Zubek. Consider whether, as a designer, you are more focused on Mechanics, Dynamics, or Aesthetics. Ask yourself how you can strengthen your design in other categories.

ASSIGNMENTS

• Prototype a mechanic for your Capstone Game based on one of these common mechanics and add it to your library:

— **Push Your Luck:** Players accumulate resources over time and are put in increasingly risky and rewarding situations. If they fail the challenge, they lose all their resources. They can quit and keep what they've earned at any time.

— **King of the Hill:** Players compete to occupy and protect a centralized region. Players gain points when they are the single occupying force in the region. Points freeze when there is more than one occupying force.

— **Worker Placement:** Players have three action points (workers) per turn and a list of nine available actions. Players take turns assigning their workers and taking the selected action. Only one worker from any player can be assigned to a given action. Workers return to the players after all workers have been placed.

• Use the sheet on the following page to do an MDA analysis of one of your favorite games. As you do so, focus on how you can leverage different kinds of fun to improve the aesthetic experience of your game.

MDA ANALYSIS

TASK: Revisit the influential paper "MDA: A Formal Approach to Game Design and Game Research" by Hunicke, LeBlanc, and Zubek. Then follow the steps below to do an MDA analysis of your favorite game in your Concept Book.

STEP 1: Recognizing Game Aesthetics.
Under the MDA framework, "Aesthetics" represent the various kinds of fun a game can produce. The essay isolates and describes eight types of fun.

Play your favorite game and describe what is fun about it in your Concept Book. Then, rank the eight kinds of fun below from "most" to "least" prevalent within the game experience.

Sensation: Game as sense-pleasure

Fantasy: Game as make-believe

Narrative: Game as drama

Challenge: Game as obstacle course

Fellowship: Game as social framework

Discovery: Game as uncharted territory

Expression: Game as self-discovery

Submission: Game as pastime

STEP 2: Observing Game Dynamics.
Game "Dynamics" are produced when players begin operating a game and set it in motion. In a practical sense, the dynamics are the repeating moments of fun within the game, such as jumping over a chasm in *Mario*.

Describe your favorite game's three primary dynamics in your Concept Book. Rank them in order from "most" to "least" important to the core experience of gameplay.

STEP 3: Finding Game Mechanics.
Game "Mechanics" are the rules of the game, the objective nuts-and-bolts algorithms. In the *Mario* games, a common mechanic is "if Mario falls in a chasm, then the player must restart the level."

Write out the objective rules that create the primary dynamics you described in Step 2. Be as objective as you can in your language. Use "if, then" statements if possible.
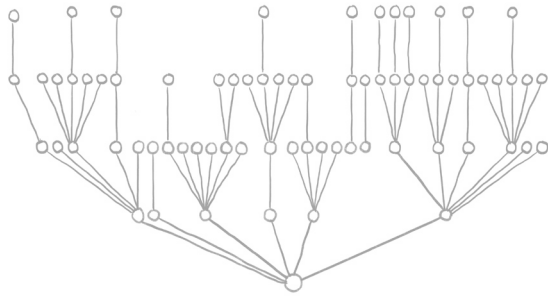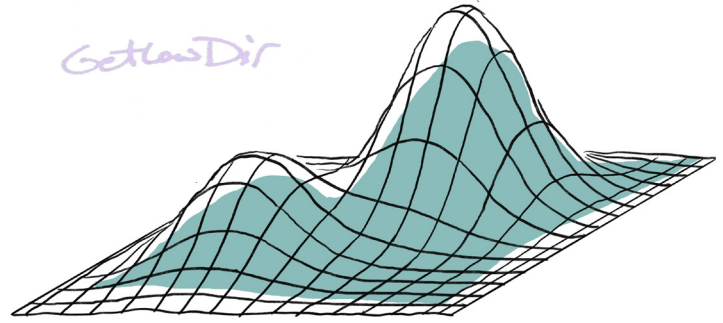
Iteration and Scoping

TERMS

scripting language (n.) A type of programming language in which you can run your code to test it without compiling it first.

local maximum (n.) The point at which prototyping or testing no longer improves your design.

engineer (n.) The person(s) on a game design team responsible for writing the underlying code. Also referred to as a developer, programmer, or coder.

designer (n.) The person or persons on a game design team who determine the player experience and develop game features to produce that experience.

scope (n.) The total number of features a design team can realistically implement, given the time and resources at their disposal.

open-world (adj.) A game environment with multiple active objectives and a large map through which the player travels with full freedom.
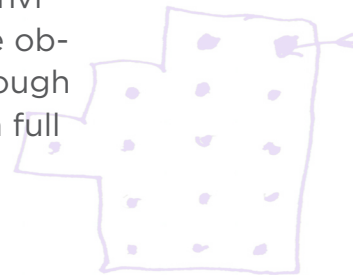
In the late stages, always prototype the riskiest features of your design. Successful prototypes that don't fit in your current game can always show up in future designs, just as the city building tool from Will's first game ended up becoming his foundation for *SimCity*. In the late stages of prototyping, there are a few things you should keep in mind.

1. **Recognize when you've reached the local maxima of your design**. To overcome the local maxima, you have to make some dramatic change in direction that takes you onto a new design hill. Often this means ripping out core features of your design, or rendering certain prototypes unplayable.

YOUR DESIGN

OPTIMIZED AT LOCAL MAXIMA

CURRENT

A BETTER DESIGN
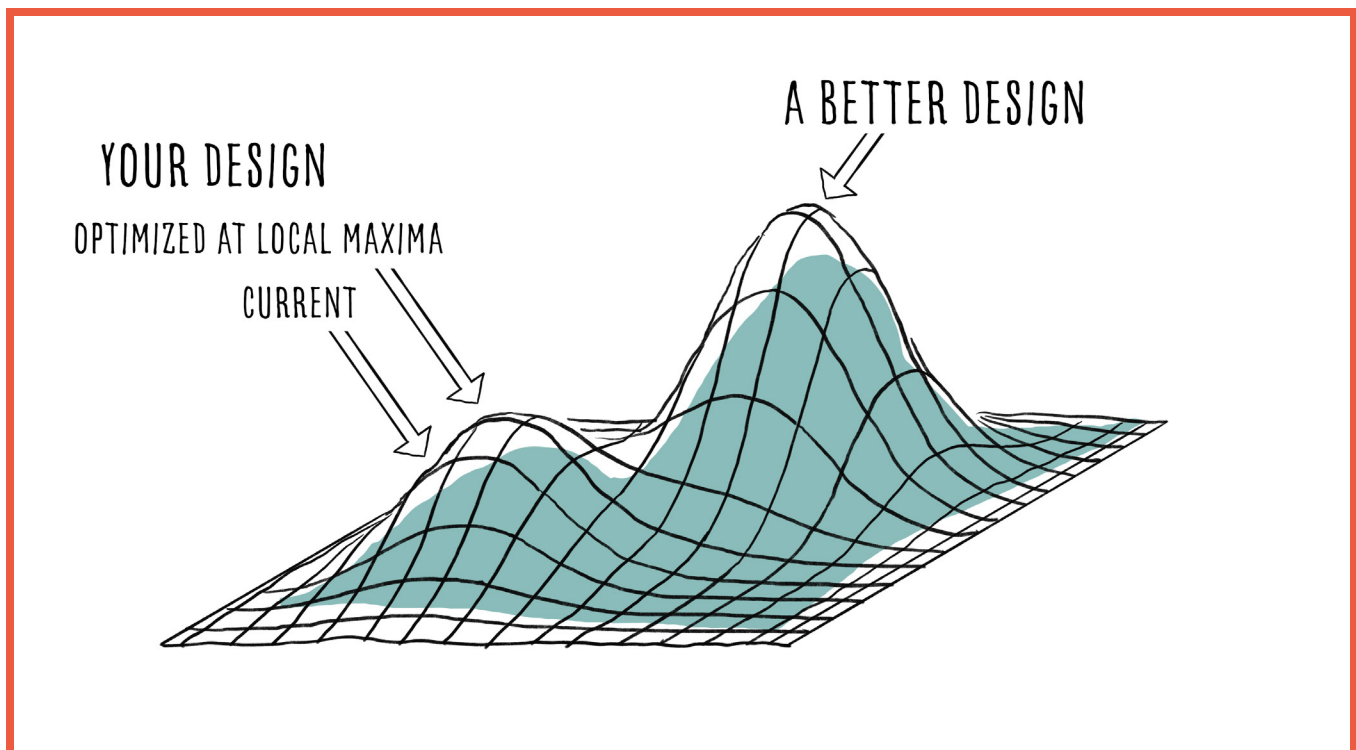
The best designs have to overcome local maxima two or even three times before they become as good as they can possibly be.

2. Use "feature triage" to find the scope. In feature triage, designers assign priority values to the features they'd like to see in the game. Then, engineers assign effort costs indicating the amount of time it will take to execute those features. This produces a prioritized list of features for the team to pursue in order to produce the game without wasting time or resources.

From the perspective of your players, the scope presents itself as the "size" of your game, or the totality of possible interactions available in the experience. Scoping your design is always a balancing act between what's cool and what's possible. Be disciplined and ruthless while scoping, but never lose sight of your original vision. Be confident in your instincts about what is fun.

> "You need to… learn when to fail, and recognize that failure, and sometimes celebrate it."

LEARN MORE

• Play *Downwell* by Ojiro "Moppin" Fumoto or *FTL*: *Faster Than Light* by Subset Games. Consider the kind of experience that can be produced by a game with a relatively small scope. Focus on the small design decisions that produce a lot of fun, and take note of them in your Concept Book.

• Play one of the open-world Rockstar Games, like *Grand Theft Auto V* or *Red Dead Redemption.* Consider the experience of a large-scope game, focusing in particular on the kind of fun that is only possible in an expansive game world. Take note of these in your Concept Book.

ASSIGNMENT

Use the template on the following page to practice Will's discipline of feature triage. As you do, consider how balancing features and tasks helps you set a realistic scope for your game.

FEATURE TRIAGE TEMPLATE

Below is a blank template to use as you apply "feature triage" to your own games during production. List the features, then have the engineers assign an effort cost on a 1-10 scale. Next, have your design team decide how valuable a given feature is in executing the core experience of your gameplay, and assign a value on an A-F or 1-10 scale. Finally, analyze the two values together to prioritize features as either Critical (C), Non-Critical (NC), or Out of Scope (OOS).

FEATURE DESCRIPTION	ENGINEERING COST	DESIGN VALUE	PRIORITY

Playtesting

TERMS

Kleenex test (v.) To playtest a game with a pair of players, without the intention of having them test the game again.

user interface (n.) The external graphical elements within a game through which the player interacts with and impacts the game world.

focus group testing (n.) An open discussion with a sampling of players in the demographic you are trying to reach about their experience with your game.

beta test (n.) The final test phase of your game before launch.
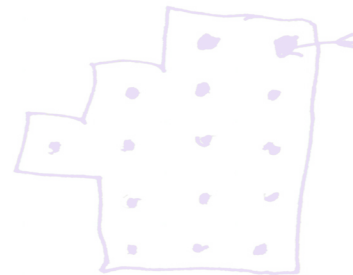
The playtest is your first chance to get inside the player's mind and gain a sense of how a general audience will experience your product. Focus on where your tester gets stuck, what they learn quickly, and where they choose to spend their time. Learn to cherish and appreciate the criticism you get from your playtesters. Player feedback is your most valuable resource as a designer. When approaching playtesting, keep in mind the following:

1. Playtesting should begin as early as possible in the design process. Build multiple prototypes and put them in front of users immediately. In these early playtests, you should be thinking about simple things, like whether or not a mechanic works. Once you have multiple parts in place, then you can start to playtest the game as an experience.

2. Try Kleenex testing. It has two advantages: Every pair of new users comes to your game without assumptions, and a pair will verbalize their thoughts about the game to one another.

3. As a designer, you should never intercede during a playtest. The point of testing is to make sure the game communicates concepts on its own. Observe quietly, take notes, and compare with your team afterwards. If you and your team notice similar things, those are the first to attack in the next iteration.

4. You won't always know who your audience is before playtesting. Start with a wide range of playtesters. If you notice a pattern in the kind of player who likes your game, design toward that demographic in future iterations.

5. Expect your playtesters to find problems in your game, not solutions. When playtesters offer suggestions about how to improve or change your game, focus on the difficulties they encountered to prompt those suggestions. Reverse-engineer their solution until you discover the problem, and design your own way to solve it.

6. Keep an eye out for emergent behavior when you playtest. If you've created a robust game environment, play patterns will emerge that you didn't intend to create as a designer. If you discover emergent behavior that fits your core game experience, encourage players to pursue it by designing rewards into that area of the game.

> "…Your vision has to carry you through. Not just your vision, but your ability to communicate that vision to other stakeholders in the project."

LEARN MORE

Sometimes, very minor adjustments in your game have a huge impact in the way your game is received during testing. Watch Martin Jonasson and Petri Purho's famous talk on "Game Juice" to learn simple tricks that have huge upsides in your game's presentation. Before entering a public beta test, make sure you've made your game as "juicy" as possible, so it feels like a finished product.

ASSIGNMENTS

Try off-the-shelf prototyping with some of your favorite games. Take one of your prototypes from your library and consider if any of the mechanics there have been executed in another game. Develop a question about that mechanic, and then try to answer that question by playing the off-the-shelf game. Imagine how the executed mechanic could be repurposed or expanded to fit into the context of your prototype. Arrange a small blind playtest for a prototype you intend to use in your Capstone Game. Use the sheet on the following page as a guide.

STEP-BY-STEP

Arrange a small blind playtest for a prototype you intend to use in your Capstone Game, such as the one you developed in Chapter 9: Game Mechanics.

1. First, bring the prototype to a point where players can interact with it without explicit instructions from you. This might involve writing a small rulebook or tutorial.

2. Next, invite three groups of players to test. They can be friends or strangers, gamers or non-gamers. If you're having trouble finding play-testers, look for local independent developer groups through social media like Facebook and Meetup. com. Sometimes these groups will meet as part of a university program, so look there as well.

3. Group the players together by common demographics like age and experience.

4. Set up three copies of the game in the same room. Have beverages and snacks on hand.

5. Offer the briefest introduction you possibly can, then have the test groups sit down to play.

6. Rotate through the room with the other designers, taking notes. Only answer questions if play is completely halted. Otherwise, have the groups puzzle through the challenges on their own. Focus on when they get frustrated, or problems they encounter. Note when they linger on a certain moment of the game, or try to prolong it.

7. After the test, study your notes with your other designers.

- What patterns did you observe?

- What joys and frustrations were shared among all three groups?

- Did you observe any unexpected behavior?

- Can that behavior be factored into the core experience of your game?

8. How can your future designs maximize the successes and minimize the failures observed during the test?

9. Begin writing a description of the Player Experience (1.d) in your Game Design Document. Remember that this language will evolve over the course of the game's development.
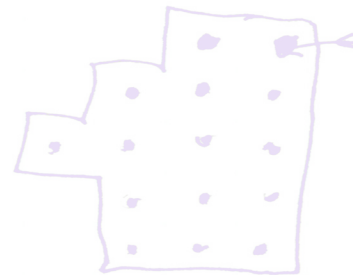
Designing a Sound Aesthetic

TERMS

generative music (n.) Music produced algorithmically in response to player inputs and game objects, as opposed to a track that plays independently of gameplay.

diegetic sound (n.) Any sound or music that exists in your game world and can be heard by the characters populating it, e.g. music coming from a radio, or the sound of an engine revving.

non-diegetic sound (n.) Any sound that can only be heard by the player and does not exist in the game world, e.g. music played as a soundtrack.

DESIGNING A SOUND AESTHETIC

sound designer, find someone comfortable working in all these mediums.

LEARN MORE

- Play *NEO Scavenger* by Daniel Fedor at Blue Bottle Games. In the game, you play a survivor in a post-apocalyptic landscape, forced to scavenge in order to survive. Study how the UI sound effects of the item crafting system help paint a picture of the game world in your mind.

- Play *Wandersong* by Greg Lobanov in which you play a wandering bard, using your singing voice to manipulate the game world. Study how the music works together with the colorful visuals to create a unique emotional palette.

- Play *Overwatch* from Blizzard Entertainment. Focus on the ways in which the sound cues during intense battles help you interpret chaos and dictate strategic decision-making.

Great music and sound design can improve the experience of your game exponentially. Bad sound design can render it almost unplayable.

Like your visual aesthetic, the sound design in your game should contribute to the emotional experience you are trying to create for the player. Scoring a video game is very similar to scoring a film. The music cues should coincide with the visuals to create an emotional punch.

The discipline of sound design encompasses several different areas of expertise. A sound designer should consider not just music and in-world sound effects, but user interface sound effects and voice acting. When seeking out a

"Sound design can take a really good game and make it great."

ASSIGNMENTS

• Create a playlist of songs that evokes the emotional tone of your Capstone Game in iTunes or Spotify. Link songs to certain moments in your game's experience, such as the menu, loading screen, and each of your levels. If your game has a narrative, draw out a timeline and plot out where specific songs on your playlist capture the feeling of a certain moment.

• Develop the Sound Design section (4) of your GDD. Include songs from the playlist above in the Audio References section (4.b). Write a few sentences describing the sound palette your game will create in the Audio Aesthetic section (4.a). Feel free to reference other games in your genre.
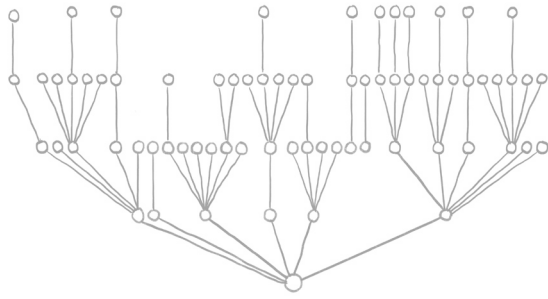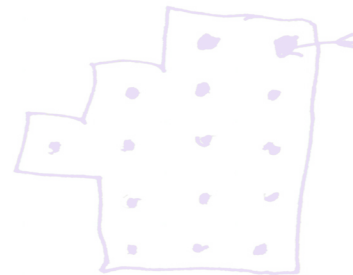
Pitching Ideas

TERMS

turn-based (adj.) A game system in which the sequence of play is broken down into rounds during which a player takes some limited number of actions.

real-time (adj.) A game system in which play proceeds without stoppage.

pitch (n.) A concise description of your game, meant to sell the experience to a specific audience.

elevator pitch (n.) The shortest possible version of your pitch, usually 30 seconds to one minute.

logline (n.) A marketing pitch in one or two sentences describing the core experience of your game.

Pitching your game is a relevant skill at nearly every stage of the design process. The art of pitching is modifying your message so that it connects with each specific audience. When crafting your pitch, consider the following:

1. **Pitch from the perspective of the player.** Don't lead with a genre or compare your game to others on the market. Instead, describe the feelings a player will experience while playing your game. Talk about the control your player will have and the interactions that will be available to them. Have the pitch audience playing your game in their head while you speak.

2. **There is no "one size fits all" version of a game pitch.** Potential team members want to hear about something they would be proud to build. Investors want to hear why your game will be successful. Game journalists want to hear why your concept is fresh and innovative. Refine and modify your language based on who you're talking to. No matter your audience, always demonstrate enthusiasm and passion for your game.
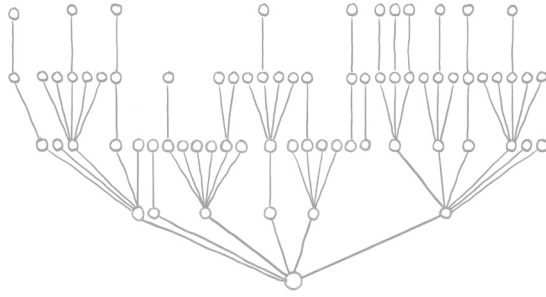
LEARN MORE

- Read the book *Blood, Sweat, and Pixels* (HarperCollins, 2017) by Jason Schreier about the trials and tribulations of various professional game studios. Pay particular attention to how a studio will adapt their messaging to the demands of their audience, whether it be publishers, investors, or journalists.

- The logline will be the strongest part of your pitch, and the first thing to appear in marketing materials for your game. Read the loglines from the marketing materials of popular games reproduced below. Note how the language of each logline starts to build an experience of the game and creates expectations in your mind, helping you begin to build a mental model about how it operates during play.

1. *Hotline Miami* from Dennaton Games (Devolver Digital, 2012)
   — "Hotline Miami is a high-octane action game overflowing with raw brutality, hard-boiled gunplay, and skull-crushing close combat."

2. *Stardew Valley* from ConcernedApe (Chucklefish, 2016)
   — "You've inherited your grandfather's old farm plot in *Stardew Valley*. Armed with hand-me-down tools and a few coins, you set out to begin your new life. Can you learn to live off the land and turn these over-grown fields into a thriving home?"

3. *Super Meat Boy* (Team Meat, 2010)
   — "*Super Meat Boy* is a tough-as-nails platformer where you play as an animated cube of meat who's trying to save his girlfriend (who happens to be made out of bandages) from an evil fetus in a jar wearing a tux."

4. *Bully* (Rockstar Games, 2006)
   — "*Bully* tells the story of mischievous 15-year-old, Jimmy Hopkins, as he goes through the hilarity and awk-wardness of adolescence. Beat the jocks at dodgeball, play pranks on the preppies, save the nerds, kiss the girl, and navigate the social hierar-chy in the worst school around."

"The first game you're actually designing is the pitch."

ASSIGNMENTS

• Take one of your favorite game con-cepts, or prototypes from your library, and write an elevator pitch for it spe-cific to these audiences: 1) your team, 2) some possible investors, 3) a gen-eral media journalist, and 4) a games journalist.

• *Writing your own logline:* Draft several versions of a logline for your Capstone Game. Write from the perspective of the player and describe their ex-perience. Focus on using clear game nouns, strong game verbs, and evoc-ative adjectives. Try to build a small model of your game in the reader's mind. Once you settle on one sentence, record it in the logline subheading (1.b) of your Game Design Document.

Choosing and Understanding Your Platform

TERMS

**platform (n.)** The hardware that runs and controls the software of your game.

monetary model (revenue model) (n.) The payment method and pay structure the player uses to purchase your game.

microtransaction (n.) Small purchases made by the player during the course of play.

free to play (F2P) (adj.) A revenue model in which the core game loop is available for free, but players can purchase upgrades through microtransactions that accelerate their progress through the experience.

accelerometer (n.) The internal instrument in a device that tracks acceleration and tilt.

platform affordance (n.) Interactions available to the player through the hardware specific to a given platform, such as a touchscreen or controller vibration.
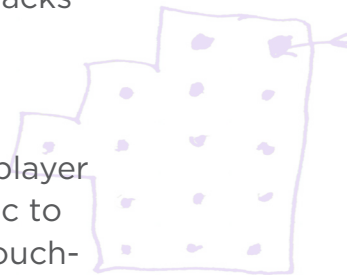
When deciding what platform your game will use, you're also deciding which communities and audiences your experience will reach. Mobile games are more likely to reach older players, casual gamers, and women than a game made strictly for Xbox. Nintendo consoles are more likely to attract kids and families. Will prefers the wide audience reached by PC games, especially since those games tend to have more active social communities. When choosing the platform for your game, keep in mind the following:

1. **The rise of accessible digital marketplaces, like the iOS App Store and Steam, have made it easier** for independent developers to launch their games than ever before. You no longer have to rely on large publishers to print your game to disc. The popularity of cross-platform tools in development like Unity also mean that games are more likely to be released across multiple platforms.

2. **Different player communities have different expectations when it comes to monetization.** Mobile users are far more likely to be familiar with free-to-play structures, while PC players understand a subscription-based model. Choose your revenue model only after you have a full understanding of your audience.

3. **Don't rely too much on the hardware features of a certain platform when designing your game,** because these experiences become obsolete as the technology changes. Strive to find the most accessible user interface that you can, and think about platform affordances like touchscreens and unique controllers as ancillary to the core experience.

LEARN MORE

- The free to play (F2P) model is not a good choice if you're a small independent developer, because the overwhelming majority of players will not choose to spend money through microtransactions. In fact, the revenue

model for F2P games is sustained by a top spending group of about five percent of players. In order to have a successful F2P game, then, you'll first need a player base large enough to produce this lucrative minority group. This kind of player base is usually developed through large-scale marketing campaigns.

— Go to the app store and play the most popular free to play game on your mobile device. Whenever you encounter a microtransaction, consider whether it feels fair or exploitative to you as a player. Then, decide whether microtransactions add or subtract from the core experience of playing the game.

• Consider how experiences can be designed beyond popular platforms by researching the games submitted to the alt.ctrl.GDC festival at the Game Developers Conference every year. This festival highlights independent video games that use non-traditional controllers as their primary interface. Voiceball by Hella Velvet, for example, uses the pitch of your voice to create a visualizer. Players use this visualizer to bat around a ball.

ASSIGNMENTS

• Take a game concept from your notebook and imagine how it would be executed on three different platforms: PC, Nintendo Console, and mobile. Write a brief describing how the control scheme would work, as well as how the design would change to reach the audience expectations for that platform.

• Fill out the Platform (2.a) and Revenue Model (2.d) sections of of your Game Design Document. Describe why you've chosen the given platform and model, and how those decisions will impact your audience.
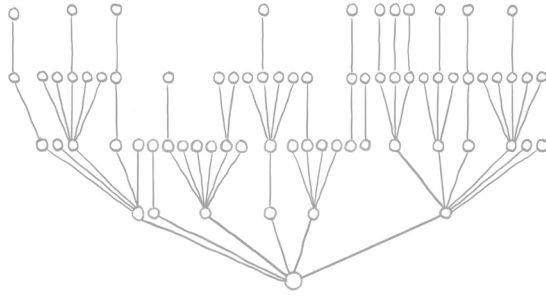
System Design

TERMS

cellular automaton (n.) A grid-based system in which cells have programmed rules for population or depopulation.

agent (n.) An object that populates your system. Each has their own properties and behaviors.

**network (n.)** Linked pathways through which agents move within your system.

layer (n.) Global parameters which govern the behavior of agents within your system.

stable system (n.) A system in which outcomes do not vary dramatically based on small changes in initial conditions.

chaotic system (n.) A system in which outcomes vary dramatically based on small changes in initial conditions.

determinism (n.) Moments in which players can predict the outcomes of their behaviors with certainty.

POSSIBILITY SPACE
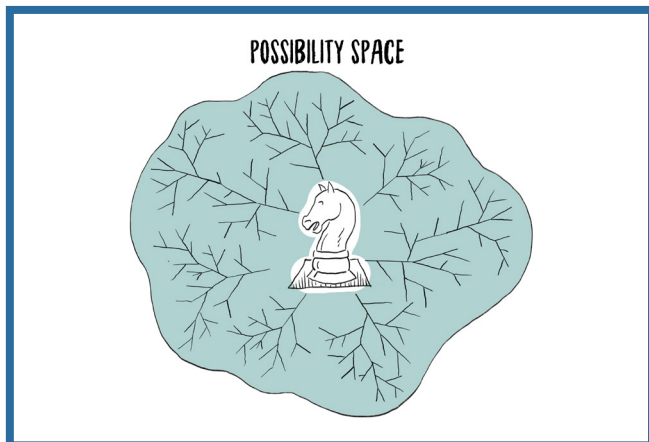
1. **Game systems are structured with agents, networks, and layers.** When designing your own systems, think about agents as characters that your player can immediately read, and even empathize with. The networks of your system should be clear and legible, so your player can see which channels of movement are available to the agents.

Games are interactive systems operated by your player. Knowledge in the fundamentals of system design will help you build and discover more robust and interesting interactions in your game.

GATED EXPERIENCE

GATE   GATE

BEGIN   END

BRANCHING EXPERIENCE

OUTCOMES
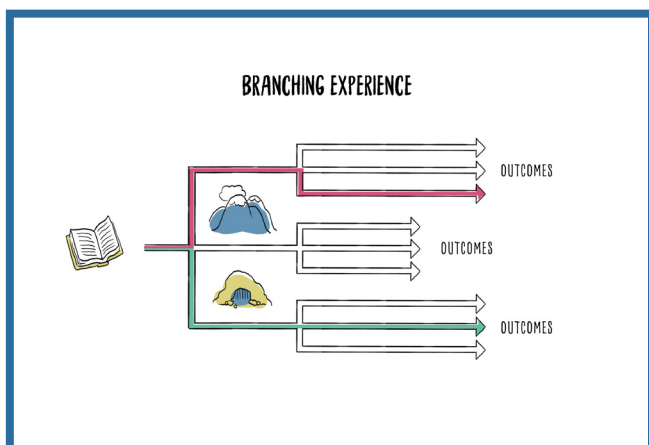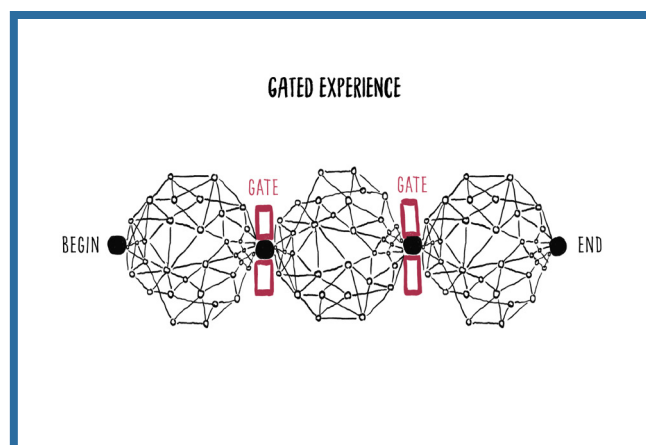
OUTCOMES

OUTCOMES

2. **Even a simple rules layer within your system can create incredibly complex, unpredictable outcomes.** Encouraging emergent behaviors will enable you to produce play patterns that vary from game to game, or even moment to moment, to keep gameplay fresh.

3. **Common game dynamics include growth, allocation, destruction, and evolution**. Each produces different emotions and challenges for the player. When you discover a dynamic in your game system, theme it in a way that it becomes more clear. Find metaphors in nature and society that match the behavior in your system, such as a spreading wildfire to describe a destruction dynamic, or migrating populations to describe an allocation dynamic.
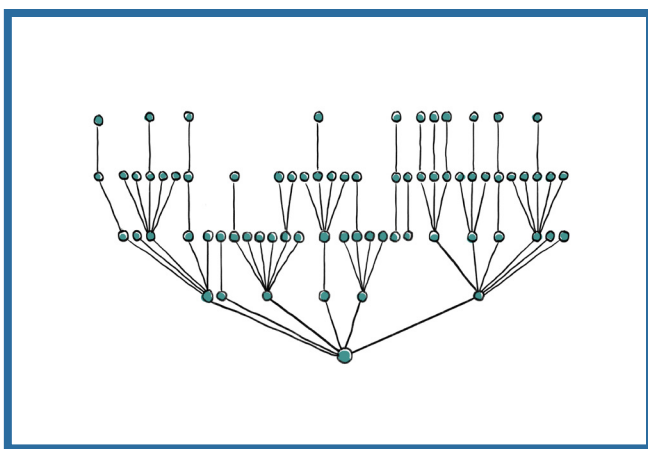
4. **Stable systems are more likely to produce determinism, while chaotic systems have outcomes that seem more random to the player.** Too much stability risks boring players, but too much chaos makes the player feel out of control. Use your system dynamics to strike a balance.

5. **When balancing and tuning your system, make dramatic changes to the variables rather than small incremental ones.** Push your system to its outer limits to discover what is possible, then slowly reign it back in until it is fun for the player. Learning what's possible at the extremes helps you discover what the balanced choices are likely to be.

LEARN MORE

- Play John Conway's *Game of Life*. Imagine how his system could be applied in other game contexts. Consider what metaphors in nature or society you could use to theme the system's dynamics, or the behavior of the agents within it.

- Play with Nicky Case's interactive system modeling tool Loopy. First, look at the example for "Automation and Job Loss" to get a sense of how the tool works. Next, build your own simple system based on one of your concepts from your Concept Book.

- Read *Thinking in Systems: A Primer* by Donella H. Meadows (Chelsea Green Publishing, 2008). As you do, consider how systems in the natural and social world can be adapted into small-scale game experiences.

ASSIGNMENTS

• Use the sheet on the following page to learn more about balancing your system through positive and negative feedback loops.
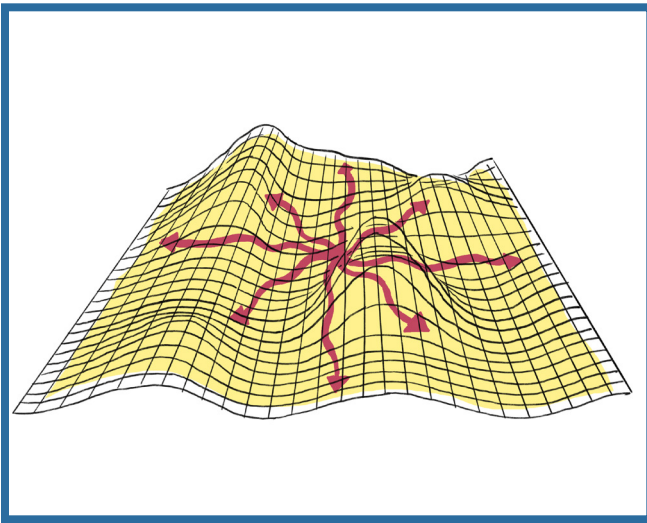
• *Hacking simple systems:* Add small rules to folk games and board games and see what kind of behavior emerges during play. Add randomness to make the system more chaotic, or determinism to make it more stable. Here are some examples to follow:

— Create a rule for what happens when there is a tie in Rock, Paper, Scissors.
— Draw a larger grid for Tic-Tac-Toe. Design a way for it to be played by four players in teams of two.
— Circle two spaces on a checkerboard. Design rules for duplicating the pieces that land on the circled spaces.

— Allocate 20 chips to each player before a game of War. Allow them to spend those chips to add to the value of their cards before and after the card is flipped (at different rates).

• *Using Feedback Loops:* Play the most recent prototype for your Capstone Game. Identify the agents, networks, and layers within it. Then, design a positive or negative feedback loop (see the sheet on the following page) and integrate it into the game. Add a description of the mechanic to the Core Mechanics section of your GDD (1.g).

"So as we start building open-ended games...We're actually looking at a possibility space that is vast. And this is when we really have to view it now as a system."

Complete the following exercises to learn how positive and negative feedback loops can reinforce player behavior and balance outcomes within a game system. Record your answers to the exercises in your Concept Book.

POSITIVE FEEDBACK LOOP

In a positive feedback loop, players are rewarded for successful behavior. The reward reinforces that behavior, so the player is more likely to pursue it again. Positive feedback loops create a "snowball" effect, in which the winning player continues to win more and more quickly.

Ex: In Massive Online Battle Arena (MOBA) games like League of Legends (Riot Games, 2009), players receive gold for killing enemy players. They can then spend that gold on better items in the shop, which makes them more powerful during the next fight, and therefore more likely to win the next fight.

TASK 1: Describe several positive feedback loops from your favorite games.

TASK 2: Think of a game you enjoy that slows down dramatically at some point during play. Consider games that become a grind, or even reach a stalemate. Then, design a game mechanic with a positive feedback loop that will accelerate progress through that period in the game.
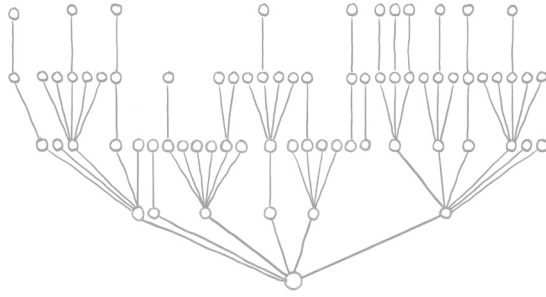
NEGATIVE FEEDBACK LOOP

In a negative feedback loop, players are punished or disadvantaged for successful behavior. Negative feedback loops balance play and create parity among competitors. Often, they present as "catch-up" or "rubber banding" mechanics, which propel players who are losing into a winning position and vice-versa.

Ex: In Mario Kart, the racer in first place gets the worst items, while the last-place racer gets the best. This creates a dynamic in which the last players always have a chance to catch up, while the player in first is constantly in danger of losing their position.

TASK 3: Describe several negative feedback loops from your favorite games, as well as the game dynamics they create.

TASK 4: Think of a game you enjoy that has a sense of inevitability about the eventual winner midway through the game, or even earlier. Consider games in which you feel bad playing from a losing position, because you know there is no way you will win. Then, design a "catch up" mechanic for this game, with negative feedback to inhibit the winning player.
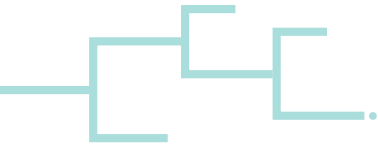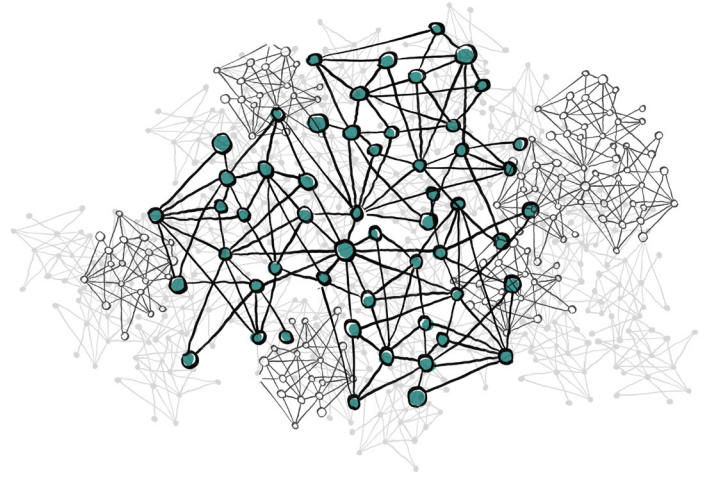
Leadership and Collaboration

TERMS

programmer (n.) A team member responsible for producing the underlying code of the game, or using a scripting language to produce certain game behaviors. Also known as an "engineer."

art director (n.) A team member responsible for determining the overall visual aesthetic of the game. Often doubles as an artist on the project.

character artist (n.) A team member responsible for doing concept sketches for the characters and enemies within the game, then producing the digital art assets that become animate objects in the game world.

environment artist (n.) A team member responsible for doing concept sketches of the game world itself, then producing the digital assets that become the terrain, buildings, and backgrounds.

sound designer (n.) A team member responsible for determining and producing any audio elements within your game, including effects, music, and user interface queues.

user interface designer (n.) A team member responsible for designing the menus, overlays, and other non-diegetic elements a player uses to navigate and interact with the game world.

As the lead designer on a project, your primary responsibility is to ensure a smooth production process. Establish procedures for how decisions get made early in the life of the project. While you'll sometimes be forced to play the dictator and make tough unilateral decisions, ideally you'll be making choices in collaboration.

1. **Seek design insight from your entire team**. Foster an environment in which everyone feels empowered to offer their opinion on the experience you are creating together. Look for team members who are candid, clear, and honest. When you find design talent, make it visible to other team members and offer those people more responsibility.

2. **Use a wiki or a living Game Design Document to keep track of the project** as it evolves over time. Use your GDD in concert with task management software to minimize the amount of meetings your team has to have.

3. **Become comfortable with criticism, and even seek it out when you can.** When offering criticism yourself, present alternatives to the ideas in place rather than just breaking them down.

LEARN MORE

Legendary comedian John Cleese developed theories on Creativity in Management, which outline how collaboration requires traveling through "open" and "closed" states. In the open state, you seek to hear and generate as many ideas as possible, build on other suggestions, and ignore important but stifling parameters such as budget and time. In the closed mode, you select a given idea and execute on it. Teams run into problems when they use closed thinking in the open state and vice versa.

"On a lot of the larger games I've worked on, everybody on the team was contributing to the design."

ASSIGNMENTS

Assemble your team for your Capstone Game. Find collaborators who can fulfill these roles at a minimum: designer, programmer, artist, and sound designer. Review Chapter 15: Pitching Ideas on how to pitch to potential collaborators. Then, fill out the Team Roster section (6.a) of your Game Design Document.