MERIT BADGE SERIES

GAME DESIGN

Scouting America

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GAME DESIGN

"Enhancing our youths' competitive edge through merit badges"

Scouting America

Note to the Counselor

The project portion of the Game Design merit badge gives Scouts flexibility to work with a medium of their choosing. The level of effort required to make a game in different mediums can vary significantly. However, the requirements define what individual Scouts must include in their design notebooks so that there is a baseline for all Scouts to meet.

The notebook must demonstrate a thoughtful initial concept, multiple design iterations based on initial testing, and feedback from blind testing. Encourage Scouts to use their notebook to record brainstorming sessions, test parameters, and any game-related ideas throughout the process. Also encourage them to record thoughts behind key design decisions to help them trace and retrace their steps as their designs evolve.

Before beginning the prototyping phase, *the Scout must have counselor approval for the design concept.* Notebooks can take just about any form the Scout wants — an actual notebook, a binder, a sketch pad, or a digital document. The counselor must make sure that the Scout has put enough effort into the concept phase to have a good foundation for the prototype phase. Watch out for overly ambitious projects that could lead to unnecessary frustration. It is important to understand that the Scout is making a *prototype.* The challenge of the project is to develop and experiment with gameplay, not to develop extensive programming skills, create beautiful artwork, or spend a lot of time fabricating components.

When prototyping, Scouts should devote most of their energy to assessing and improving the play experience. With each iteration, Scouts should identify game elements that they want to change and how the changes will alter the play experience. After making changes, they then test the game and evaluate whether or not the changes had the desired outcome. It is acceptable for the final prototype to be very different from the initial concept, provided that the notebook shows the progression.

Because the project is so flexible, it is likely that you will have Scouts working in mediums with which you are unfamiliar. The game design community has a vast array of publicly available resources. If you have a specific concern about programming an electronic game prototype, there are a number of free or inexpensive game design

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software packages available online that Scouts could use. Some are very easy to use with little or no computer programming knowledge, and most have robust information resources to support them. See the resources section at the end of this pamphlet.

The merit badge includes many opportunities for teamwork and group play. Group participation is mandatory to complete requirement 7, but all of the other nonproject requirements also work well in collaboration. Note, though, that each Scout must deliver their own game prototype to complete the project. This ensures that every Scout has the chance to develop and use the critical thinking skills that are part of testing and design iteration. If they want to collaborate on their projects after completing the requirements for the badge they are encouraged to do so, but that is beyond the scope of this badge.

The Game Design merit badge relies heavily on specific terminology. Game design is broad and game analysis is relatively young. There is no official dictionary for game design, and there may be disagreements on precise meanings. Please refer to the glossary at the end of this pamphlet for definitions applicable to the pamphlet and requirements. For additional questions, refer to the resources listed at the end of the pamphlet.

Requirements

Always check scouting.org for the latest requirements.

1. Do the following:
   (a) Analyze four games you have played, each from a different medium. Identify the medium, player format, objectives, rules, resources, and theme (if relevant). Discuss with your counselor the play experience, what you enjoy in each game, and what you dislike. Make a chart to compare and contrast the games.
   (b) Describe four types of play value and provide an example of a game built around each concept. Discuss with your counselor other reasons people play games.
2. Discuss with your counselor FIVE of the following 17 game design terms. For each term that you pick, describe how it relates to a specific game: story, setting, characters, play sequence, level design, interface design, difficulty, balance, depth, pace, replay value, age appropriateness, single-player vs. multiplayer, cooperative vs. competitive, turn-based vs. real-time, strategy vs. reflex vs. chance, abstract vs. thematic.
3. Define the term *intellectual property*. Describe the types of intellectual property associated with the game design industry. Describe how intellectual property is protected and why protection is necessary. Define and give an example of a licensed property.
4. Do the following:
   (a) Pick a game where the players can change the rules or objectives (examples: basketball, hearts, chess, kickball). Briefly summarize the standard rules and objectives and play through the game normally.
   (b) Propose changes to several rules or objectives. Predict how each change will affect gameplay.
   (c) Play the game with one rule or objective change, observing how the players' actions and emotional experiences are affected by the rule change. Repeat this process with two other changes.

(d) Explain to your counselor how the changes affected the actions and experience of the players. Discuss the accuracy of your predictions.

5. Design a new game. Any game medium or combination of mediums is acceptable. Record your work in a game design notebook.

   (a) Write a vision statement for your game. Identify the medium, player format, objectives, and theme of the game. If suitable, describe the setting, story, and characters.

   (b) Describe the reason that someone would want to play your game.

   (c) Make a preliminary list of the rules of the game. Define the resources.

   (d) Draw the game elements.

You must have your counselor's approval of your concept before you begin creating the prototype.

6. Do the following:

   (a) Prototype your game from requirement 5. If applicable, demonstrate to your counselor that you have addressed player safety through the rules and equipment. Record your work in your game design notebook.

   (b) Test your prototype with as many other people as you need to meet the player format. Compare the play experience to your descriptions from requirement 5(b). Correct unclear rules, holes in the rules, dead ends, and obvious rule exploits. Change at least one rule, mechanic, or objective from your first version of the game, and describe why you are making the change. Play the game again. Record in your game design notebook whether or not your change had the expected effect.

   (c) Repeat 6(b) at least two more times and record the results in your game design notebook.

7. Blind test your game. Do the following:
   (a) Write an instruction sheet that includes all of the information needed to play the game. Clearly describe how to set up the game, play the game, and end the game. List the game objectives.
   (b) Share your prototype from requirement 6 with a group of players that has not played it or witnessed a previous playtest. Provide them with your instruction sheet(s) and any physical components. Watch them play the game, but do not provide them with instruction. Record their feedback in your game design notebook.
   (c) Share your game design notebook with your counselor. Discuss the player reactions to your project and what you learned about the game design process. Based on your testing, determine what you like most about your game and suggest one or more changes.
8. Do ONE of the following:
   (a) With your parent or guardian's permission and your counselor's approval, visit with a professional in the game development industry and ask them about their job and how it fits into the overall development process.
   (b) Meet with a professional in game development education and discuss the skills they emphasize in the classroom.

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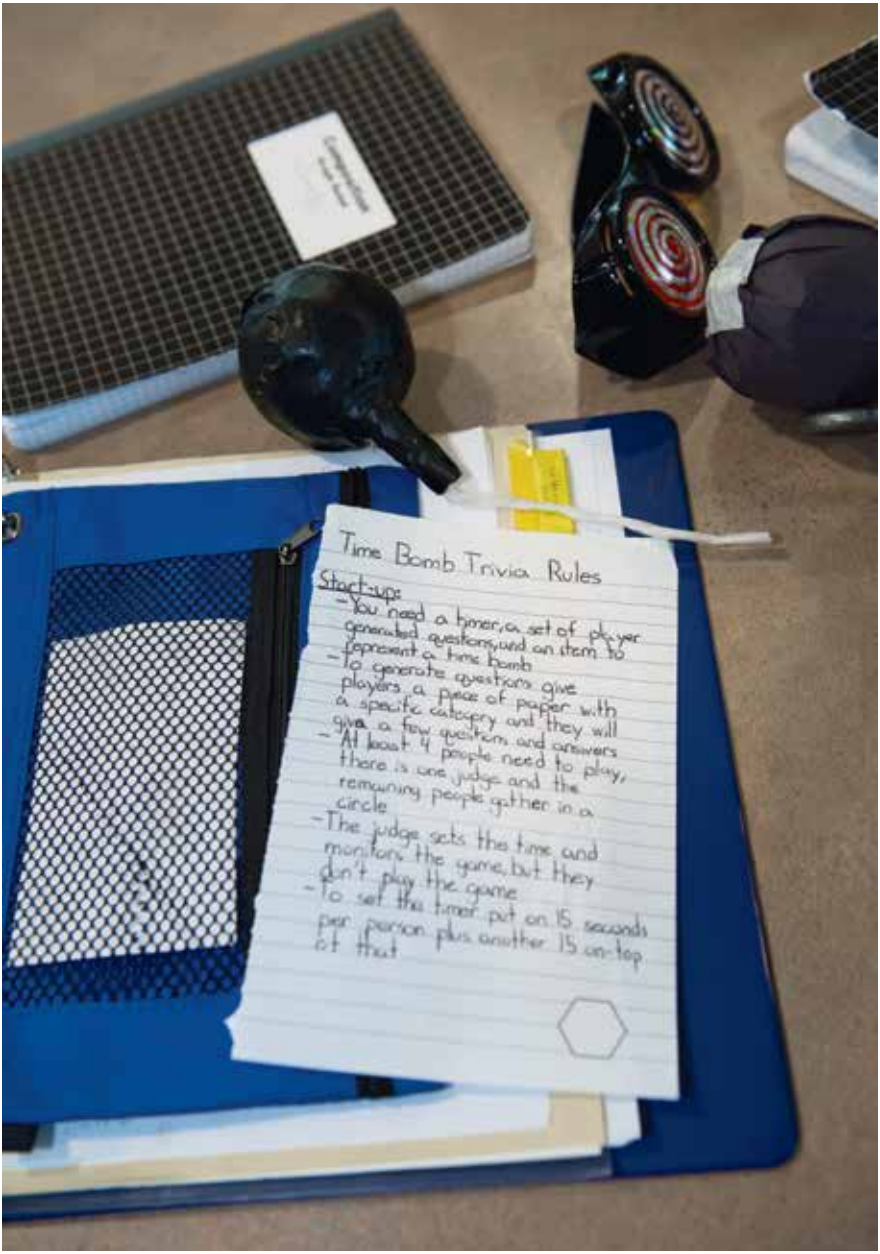

Time Bomb Trivia Rules
Start-up:
- You need a timer, a set of player generated questions, and an item to represent a time bomb
- To generate questions give players a piece of paper with a specific category and they will give a few questions and answers
- At least 4 people need to play, there is one judge and the remaining people gather in a circle
- The judge sets the time and monitors the game, but they don't play the game
- To set the timer put on 15 seconds per person plus another 15 on top of that

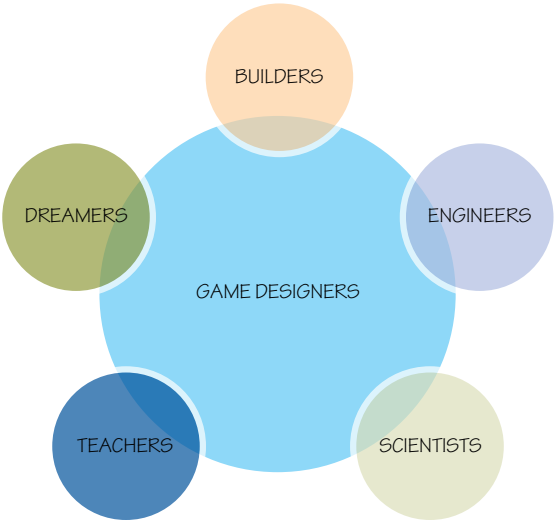
What Is Game Design?

For thousands of years, in every culture, across every part of the globe, people have played games. Games challenge us to overcome long odds, tell compelling stories, and allow us to work with or against one another. They give structure to play. Games motivate us to find creative solutions, practice new skills, and spend time with others.

Games also come in almost every shape, size, format, and flavor imaginable. Games can be fast-paced, slow, or anything in between. Some are competitive. Some are cooperative. They may be for individuals, small groups, or thousands of players at a time. They might take seconds to complete or last for years. However you slice it, everyone has played games, and games help make us who we are.

Game design is the process of creating the content and rules of games. Along the way, game designers take on many different roles.

- **Builders** make worlds to explore.
- **Engineers** make systems and mechanics that link together into a complete picture.



- **Scientists** test new ways to improve the play experience.
- **Teachers** teach players what to do and how the rules of the game work.
- **Dreamers** create new, unique, amazing experiences.

Game Design Goals

1. Fun
2. Interactive
3. Social
4. Easy to learn
5. Hard to master
6. Manageable in scope and time
7. Well-paced
8. Immersive
9. Replay value
10. Affordable

—Pete Fenlon, Eagle Scout and chief executive officer, Catan Studios

What Is a Game?

Even though games are everywhere, "game" is a tricky word to define. Here are a few common traits of most games.

1. Games are a form of play. Most games are played for recreation, others are played by amateurs and professionals alike, and some are even used as tools for training and education.
2. Games have objectives or goals that players work to achieve.
3. Games have rules. Rules govern the components of the game and the ways that players interact with those components and each other.
4. Games have feedback. As players work toward their goals, the game provides information about how they are doing. Scores are a form of feedback.
5. Games have challenges. In the vast majority of games, the rules, other players, or other elements impede player progress toward the objectives.
6. Games employ a variety of skills. These include physical abilities, communication, strategic thinking, patience, observation, and problem solving.
7. Games present choices. Players make meaningful decisions in order to affect game outcomes.
8. Games are participatory. Unlike many other forms of entertainment, games are not just about observing. They are about taking action.

History of Games Timeline

Year	Game	Medium	Comments
5200 B.C.	Bocce	Physical/ Sport	Egyptian hieroglyphs depict a rock-throwing game that became the origin of bocce and bowling.
3500 B.C	Senet	Board	An Egyptian tomb housed the pieces of the first known board game.
3000 B.C.	Dice	Dice	These randomizing tools first appeared in India and have been found alongside early backgammon sets. Sheep knuckle bones were used by other cultures for dice-like games.
2000 B.C.	Polo	Sport	The Persians developed this horse-riding game to train their cavalry.
1400 B.C.	Ulama	Sport	Throughout Latin America, temple ruins can be found for a Mayan game played with a rubber ball.
600	Chatrang	Board	This Indian board game was the origin of checkers and chess.
1100	Handball/ Racquetball	Sport	French monks developed an indoor handball game that later evolved to include a racket.
1250	Dominoes	Tile	This game, related to dice games, originated in China.
1457	Golf	Sport	The Scottish parliament banned golf to keep troops from getting distracted during archery practice.
1529	Trump	Card	This English trick-taking game later evolved into bridge, euchre, and hearts.
1630	Lacrosse	Sport	When Europeans reached North America, they witnessed natives playing this team stickball game.
1791	Baseball	Sport	The first known American reference to our future national pastime was a law prohibiting it near the town meeting house in Pittsfield, Massachusetts.
1800s	Conquian (Rummy)	Card	The ancestor of rummy, this game of card sequences was played in Latin America.
1848	Charades	Party	The novel *Vanity Fair* described this party game of acting and guessing.
1891	Basketball	Sport	This sport was developed by Dr. James Naismith to provide indoor physical activity for his gym class.
1913	Little Wars	Miniatures	The first set of rules for civilians to play with toy soldiers was written by H.G. Wells.
1934	Monopoly®	Board	The modern form of Monopoly®, first published in 1934, was based on The Landlord's Game of the early 1900s. It struck a chord in impoverished Depression-era America.

Year	Game	Medium	Comments
1938	Scrabble®	Tile	The word tile game was created in 1938 but was not successfully sold to a manufacturer until 1952.
1956	Yahtzee®	Dice	This dice-throwing game from Milton Bradley was a commercial iteration of the earlier games Yacht and Generala.
1966	Twister®	Party	The colorful party game became a classic.
1972	Pong®	Electronic	The first electronic game to reach mainstream popularity, the table tennis simulation was a training project for a new engineer at Atari.
1974	Dungeons and Dragons®	Text-based RPG	The first text-based role-playing game created a new form of interactive storytelling.
1980	Pac-Man®	Electronic	Providing the first iconic video game character, Pac-Man was the highest-earning arcade game in history.
1984	Tetris®	Electronic	This colorful puzzle game was released on the personal computer but has spread to many devices.
1985	Super Mario Bros.®	Electronic	This side-scrolling platform game helped launch the home game console market and Nintendo®.
1987	Warhammer™	40,000 Miniatures	Players paint futuristic figurines and face them against one another in this war game.
1993	Magic: The Gathering®	Card	Its gameplay became the model of many collectible card games, and new content continues to be released 20 years later.
1995	Catan®	Board	One of the first Eurogames to sell well outside of Europe, Catan® became a gateway for bringing players to modern tabletop games.
1998	The Legend of Zelda™: Ocarina of Time™	Electronic	The combination of storytelling, mechanics, art direction, and technical power made this one of the best-regarded electronic games in history.
2004	World of Warcraft®	Electronic	Peaking at 12 million subscribers, this game changed expectations about persistent online worlds.
2009	Angry Birds™	Electronic	This mobile puzzle game had more than a billion downloads in its first three years.
2009	League of Legends®	Electronic	This computer game is at the center of the eSport industry with championships watched by more than 100 million viewers.
2016	Pokemon Go®	Electronic	Pairing cameras and GPS, this game brings "monsters" to real-world locations.
2017	Fortnite®	Electronic	More than a game, Fortnite® has experimented with in-game concerts and partnerships with Star Wars and Marvel.

TURBO
AUTO
SLOW

Game Mediums

To think like a game designer, it is useful to analyze games that you play or know about. Thinking about how games work, grouping them based on similarities and differences, and learning common words to describe games will give you tools for making your own games. One obvious way to categorize a game is by medium, or the form of the game. Newspapers, magazines, and books are different printed media. In the same way, games can be described by the shape they take and the way players interact.

Physical Games and Sports

The oldest recorded game in history was a ball game played in ancient Egypt. Ball games and sports are physical games. They typically feature competition between players or teams, like capture the flag. These games involve athletic activities and are played with special equipment like balls, nets, or sticks. Generally, the gameplay revolves around one or more specific physical

actions, and the objectives reward players who most skillfully perform those actions. Basketball, for example, is built around dribbling, passing, and shooting the ball. The shape and details of the field of play are an important part of the game design. Rules and objectives may be related to specific portions of the field.

When designing a physical game or sport, it is important to consider safety. Rules and mechanics should enforce safe play, and protective equipment should be used to reduce risk.

Board Games

Also dating back to ancient Egypt, board games usually involve placing and moving pieces on a game board. They come in a variety of gameplay types including:

- Abstract games in which the board is divided into regular spaces and the players compete to claim pieces or spaces. Examples include checkers, chess, and go.
- Territorial strategy games like Risk® and Scythe®, where the board is a map with distributed resources and attributes.
- Candy Land® is an example of a game where players compete to be the first one to reach the finish space.
- Building games where players earn points by completing construction objectives. In Ticket to Ride® players try to earn the most points by building train connections between cities.

Eurogames are a broad category of modern games that originally flourished in Europe. Covering several mediums, they emphasize strategy over chance and often have multiple victory conditions or paths to win.

Tile Games

Tile games are played with a limited set of tiles (usually rectangular) that may contain pips (dots), letters, or special symbols. Play consists of players placing one or more tiles from their hand adjacent to those already placed and then replenishing their hand with new tiles (if available). Scoring is usually performed when tiles are played. Dominoes, Carcassonne™, and mahjong are all examples of tile games.

Dice Games

Dice are often used to introduce chance into other types of games and can also be the primary focus. Some games, such as Yahtzee and Bunco®, use standard six-sided dice (abbreviated d6). Others, such as Boggle® or Cosmic Wimpout™, replace the dots with letters or special symbols. Dice games can usually be played by any number of players, with the dice being passed from player to player. A "turn" calls for the player to roll the dice once or a number of times, depending on the game and prior rolls. Games are typically scored, with the various combinations of dice having a specific scoring.

Card Games

Card games are played with sets or "decks" of cards. Generally, the order of the deck is unknown. Cards are mixed or shuffled by the players at the beginning of the game. This creates suspense, uncertainty, and surprising situations to which players must react. Information is communicated to the players by symbols or writing on the cards, which can be on one or both sides of the card.

Many card games use a standard playing card deck of hearts, diamonds, spades, and clubs. Hearts, rummy, and solitaire are well-known examples. Collectible or tradable card games are another common form of card game. Magic: The Gathering is the earliest example. In these games, players use their own deck with only a small portion of the available cards. Each player's deck is typically used to achieve the game outcome through a particular strategy, based on how the decks compare with one another. There are even card games like Dominion® where the players are building their decks as they play.

Party Games

Most board and card games are for no more than six players. Party games are generally for four to 16 or more players and are often arranged in teams. Because they are meant for larger social

situations, the gameplay emphasizes interaction between players and often involves some form of creativity. Drawing, acting, singing, and giving word clues are all common activities in party games. Trivia games also typically fall into this medium.

These games may include boards, cards, and dice, but they are distinguished by the player format and play experience. The party game designer places special emphasis on making gameplay that is fun for players and observers, easy to join, and encourages participation from everyone at the event. Party games include charades, Twister®, Trivial Pursuit®, Cranium®, HedBandz®, Morphology™, Telestrations®, Pictionary®, and Jenga®.

Games With Miniatures

Miniature games are played with small, detailed models of pieces and terrain. Originally, they were used to teach and experiment with military tactics and strategy. Miniature gaming as a hobby emerged in the early 20th century, in large part because the H.G. Wells book *Little Wars,* which set forth rules for playing with toy soldiers.

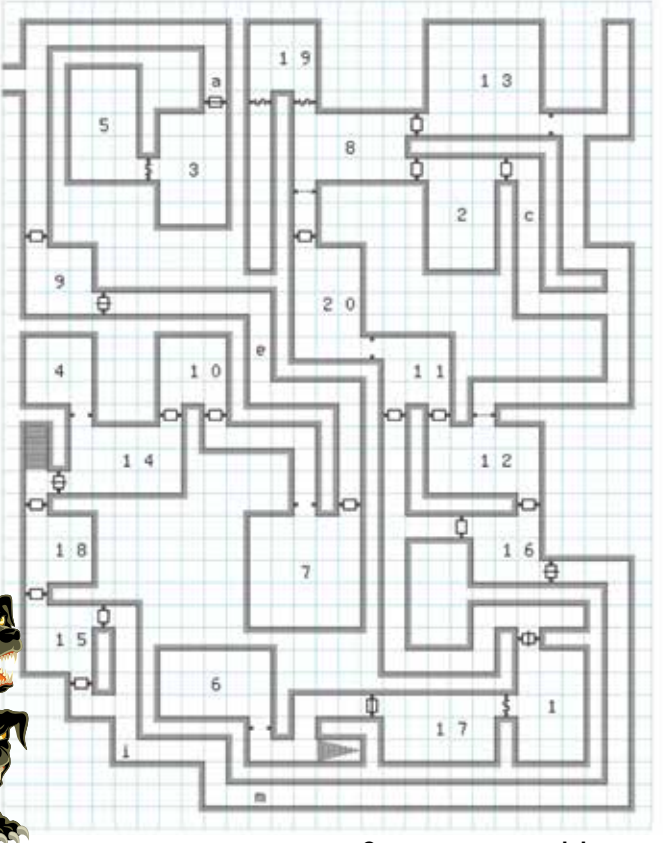
Today, miniature game settings include historical reenactments, fantasy, and science fiction. The gameplay might focus on just a few or many pieces. Most miniature games are turn-based. This style of gameplay has contributed to the design of many board and electronic strategy games. Miniatures are also commonly used in tabletop role-playing games to act out the action.

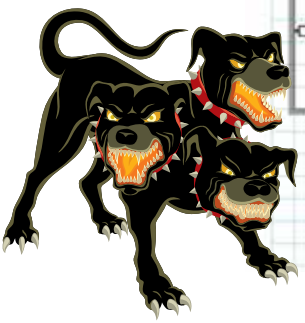
Text-Based Role-Playing Games (RPGs)

This game medium can be most easily described as interactive storytelling. A ruleset or system is used to define the gameplay, but the game's objectives may change during play. The end point of an RPG campaign—a complete story arc—is often flexible.

Players take on the roles of distinct characters within a fictional setting and then take actions based on the capabilities of those characters. Typically, these capabilities increase over time, as the characters practice skills, acquire knowledge, or obtain equipment. This allows players to take on progressively more challenging game scenarios. The most well-known RPG is Dungeons and Dragons, but there are many others.

Gamers call role-playing games *RPGs*.





Computer-generated dungeon

In most RPGs, one player serves as the gamemaster (GM). This player is the moderator and primary storyteller of the game. The GM determines the setting and rule system of the game, takes on the role of the environment and any non-player character (NPC), helps the players create their characters, and provides the initial game objectives. A GM is like the host of a party: A GM cooks the food, sets the table, and provides different choices for entertainment. The GM is not in charge of the players but is in the game to give the players a compelling experience.

Once the campaign is underway, the players choose the actions they want to take, game mechanics determine whether their actions succeed or fail, and the GM determines the effect of those successes and failures. The GM then moves the story forward. A good GM keeps all the players engaged, uses a strong imagination to begin the story and react to the players, and maintains a moderate level of game balance. In electronic role-playing games, the GM role is usually played by the game software.

Role-playing games typically have strong themes, narratives, and character advancement, and unique gameplay elements. Text-based and miniature-based role-playing games—collectively called tabletop RPGs—are two forms of RPGs. These games are particularly strong in the following ways:

- Control over the story—The players and GM move the plot along as they see fit and are limited only by their creativity. Players take ownership of the stories in a deeply personal way.
- Social interaction—At their heart, tabletop RPGs are about hanging out with friends.
- Problem solving—Tabletop RPGs reward creativity and thinking "outside the box" to solve problems. This applies to both the players and the GM.
- Customization—Many game systems can be adapted to different game themes. Also, if you do not like a system, you can make any changes you want.

Electronic Games

Electronic games are the largest-growing medium of games today. Almost every other game type could be implemented in an electronic form. Electronic games present information to players through video screens and audio signals. Players interact with the games through electronic sensors. Buttons, touch screens, control sticks, and computer mice are common input devices. Newer technologies include GPS, motion sensors, and cameras that respond to physical motion and detect a player's position and movements.

Electronic games are limited by the game hardware and fall into several categories: personal computer (PC) games, console games, and games for mobile devices. For example, PC games like World of Warcraft® or League of Legends® typically use the mouse and keyboard for input. Console games like the Super Mario Bros. series use hand-held controllers. Game apps for mobile platforms use touch controls that are often simplified to make them effective.

As a game designer, think about the benefits and constraints of the mediums you want to work in. How do the players get information? What kind of actions can they take? What are they unable to do? How does the medium restrict you?

Remember that whenever you participate in online gameplay with multiple players, you should first have your parent or guardian's permission to do so.

Gameplay is affected by medium, but it is not completely constrained by medium. Most forms of gameplay can be replicated in several different mediums, and mediums can overlap. For example, Strat-O-Matic® Baseball was first published in 1961 to recreate the sport of baseball as a board game. Many versions of chess can be played on computers, and the Madden® football series has been around since the 1988. Electronic and card versions of the game series Pokemon™ are both very popular. In each of these cases, some of the rules are exactly the same between the different mediums, and some of the rules have been changed to make the game functional.

Mediums can also be mixed together to utilize the advantages of each one. Monopoly is clearly a board game, but it also uses stacks of cards that can be mixed up and dice that add an element of chance to player movement.

Core Game Elements

Every game is built around four core game elements: **player format, objectives, rules,** and **resources.** A fifth element, **theme,** is also central to many games.

Much of the material in this section is based on Ian Schreiber's *Game Design Concepts Level 3: Formal Elements of Games,* found at gamedesignconcepts.wordpress.com/2009/07/06/level-3-formal-elements-of-games, and is used here under the Creative Commons license.

Player Format

Player format defines the number, arrangement, and alignment of players in a game. How many players does the game support? Must it be an exact number (four players only) or can the number vary (two to five players)? Can players enter or leave during play? How does this affect play? Are players on teams? Can teams be uneven? Do all the players on a team have the same objectives?

These examples of player structures are by no means a complete list.

Single-player (one player vs. the game system). Examples range from simple solitaire card games to epic electronic games like The Legend of Zelda: Breath of the Wild®.

Head-to-head (one player vs. one player). Chess and go are classic board game examples.

Formats where players compete against one another are generally known as Player vs. Player (PvP). If the players are competing against the game or game elements, then the game is Player vs. Environment (PvE).

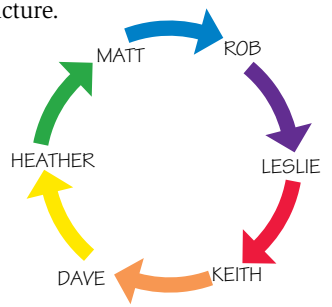
Cooperative or player vs. environment (PvE) (multiple players vs. the game system). This is common in online games like World of Warcraft® and Destiny®. Some purely cooperative board games exist too, such as Pandemic®.

One-against-many (one player vs. multiple players). In the Nintendo Land™ game Luigi's Ghost Mansion® for the Wii U™ game system, one player takes the role of a ghost trying to scare the other players while they work together to trap the ghost with their flashlights. This asymmetric structure has one player acting as an antagonist or as the game world while the other players work as a team. It is common in text-based role-playing games (RPGs).

Free-for-all (one player vs. one player vs. one player vs. …). Perhaps the most common player structure for multiplayer games, this can be found everywhere, from board games like Monopoly to the basic mode in most competitive first-person shooter electronic games. This popular model appears everywhere from the battle royale modes of Fortnite® to board games like Monopoly® and card games like Dominion®.

Team competition (multiple players vs. multiple players [vs. multiple players …]; includes pair vs. pair). This is also a common structure, finding its way into most team sports and card games like bridge and spades.

Predator-Prey. Players form a (real or virtual) circle. Everyone's goal is to attack the player on their left and defend themselves from the player on their right. The live-action game Assassin uses this structure.



Predator-prey player format

Social Deduction. This is the team model of Among Us® and The Resistance®, where only one of the teams knows who its members are, and part of the goal of the other team is to figure out who is who.

Objectives (Goals)

What are players trying to do? Game objectives determine who won or whether a player has beaten the game or a portion of the game. They can also vary in scale. *Complete the level or mission* is an objective, but the bigger objective might be *complete a series of levels or complete this storyline.* Here are some common game objectives.

Score: Get more points than your opponent as in soccer or get a lower score such as in golf. Alternately, be the first player to reach a particular number of points or, in a single-player game, get more points than you have before or beat a previous score. In other cases, the game ends after a certain amount of time, and the best score wins. There might be more than one source of points, or individual actions might have different point values. The way that points are assigned can give game designers flexibility to adjust the play experience.

Capture/destroy: Eliminate all of your opponent's pieces from the game. Chess and Stratego® are well-known examples where you must eliminate opposing forces to win.

Collection: The card game rummy and its variants involve collecting sets of cards to win. Many electronic jumping and exploration games like LittleBigPlanet™ or Super Mario®, commonly referred to as "platformers," require the player to collect a certain number of objects scattered throughout the levels.

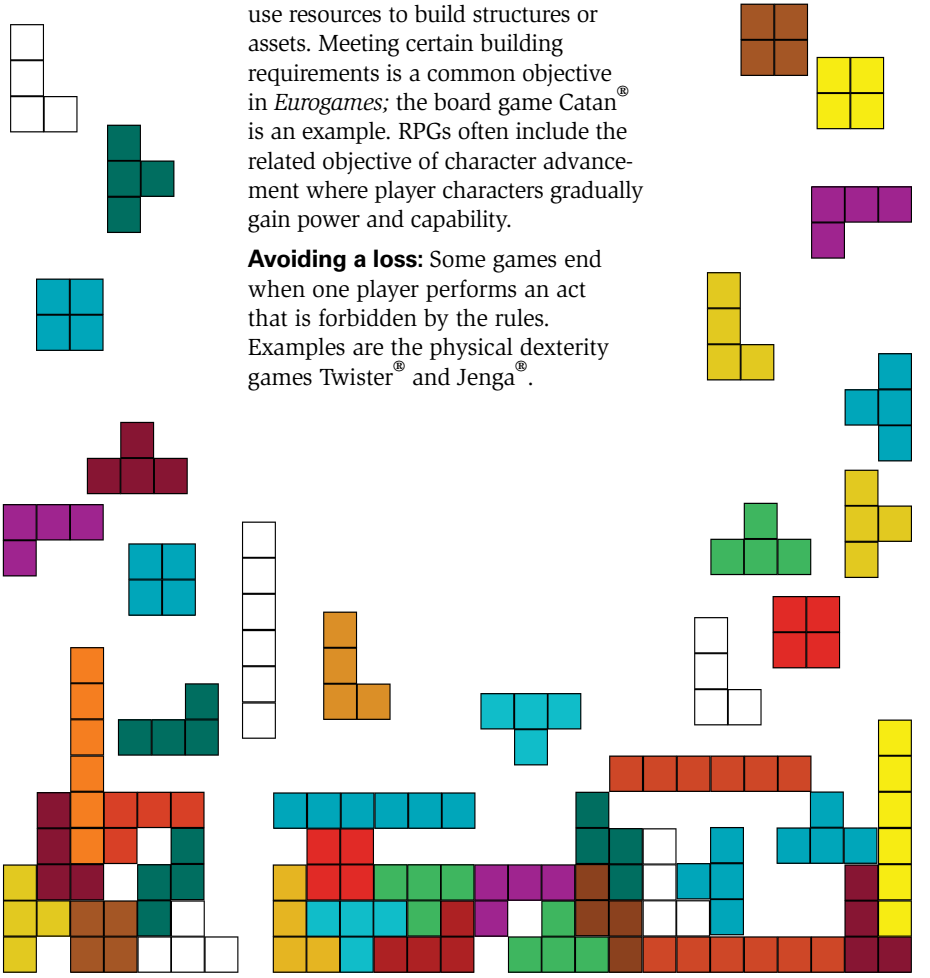
Solve: The board game Clue® is an example of a game where the objective is to solve a puzzle.

Chase/race/escape: Generally, anything where you are running toward or away from something. The board game Candy Land® is a race to the finish.

Spatial alignment: A number of games involve the positioning of elements as an objective, including the nondigital games tic-tac-toe and Pente® and the electronic game Tetris®.

Build: The opposite of "destroy," players use resources to build structures or assets. Meeting certain building requirements is a common objective in *Eurogames;* the board game Catan® is an example. RPGs often include the related objective of character advancement where player characters gradually gain power and capability.

Avoiding a loss: Some games end when one player performs an act that is forbidden by the rules. Examples are the physical dexterity games Twister® and Jenga®.



Advance the story: Sometimes the objective of a game is just to continue a storyline and see what happens next to the characters. This is especially common in role-playing games of all types.

Explore: Game worlds like the Legend of Zelda series encourage players to travel around the world and discover new characters and places.

Rules, Mechanics, and Systems

There are three categories of rules, all important to a successful play experience.

- *Setup* involves things you do once at the beginning of the game.
- *Progression of play* entails what happens during the game.
- *Resolution* indicates the conditions that cause the game to end and the outcome when the end is reached.

Mechanics are collections of rules that combine to form a discrete chunk of gameplay. In a similar way, **systems** are collections of mechanics that make up the biggest chunks of the game. For example, basketball has a system for determining which team has possession of the ball. Mechanics for turning over the ball to the other team are a subset of that system. For example, a rule says that a team loses possession of the ball if a member of that team takes three steps without dribbling.

These categories help designers to understand how their games work and can be powerful all the way from concepts through final iterations. If tests suggest a problem, the designer must determine whether the problem involves an individual rule, a mechanic, or an entire system.

Many games also have unwritten rules implied by player expectations. For example, many turn-based games do not have a time limit on the turns. Players may be expected to take turns in a "reasonable" amount of time and not stall the game indefinitely. When in doubt, designers should clearly define such rules in order to encourage smooth play.

Resources

Resources are all the things directly under a player's control that can be used as the game advances. This includes explicit resources (pieces in chess; health, mana, and currency in League of Legends®) and can also include other items under player control:

- Territory in Risk®
- Number of questions remaining in 20 questions
- Objects that can be picked up in electronic games (weapons, power-ups)
- Time (either game time or real time or both)
- Turns or opportunities to take action
- Known information (the suspects that you have eliminated in Clue®)

What kinds of resources do players control? How are these resources manipulated during play? How are the resources limited? The game designer must clearly answer these questions through the game rules.

Resources are almost always limited or constrained in some way, and these limitations create the tension that makes game decisions interesting. Does the player have enough health to survive the attack? Can the player miss the jump and still have enough time to reach the end? Can the player afford to spend $200 on a property this turn knowing that a subsequent move will lead through a dangerous part of the board? Should the player use a turn to improve defenses or attack the opponent?

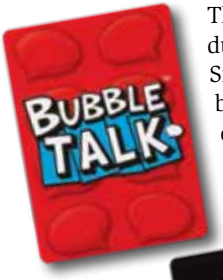
Games also have resources that are available but not yet under the control of a player. Gameplay can develop around both spending resources and acquiring resources. Systems or mechanics also need to be in place to track resources not yet under player control. For example, in most card games, the players know what cards are in a deck, but they do not know the order, and they often do not know what cards have been drawn by other players. In other cases, the available resources are completely unknown.

Theme

Thematic elements—stories, settings, characters, etc.—give games topics. They answer the question "What is the game about?" which is different from the question "What is the *gameplay* about?" Not every game has a theme, and not every game needs a theme. Most playing card games and sports do not have themes. However, a well-chosen theme can have a big impact on the play experience.

Thematic elements have three primary purposes:

1. **Help players become more engaged.** Players personalize the game experience if they identify with their **character** *(I am Pedro the wizard)*. Similarly, an interesting **setting** can add emotional weight. A game set in a haunted mansion will cause a response different from one set in the Wild West, even with the same mechanics.
2. **Make a game easier to learn.** The piece movement rules in chess have a limited relation to the theme and must be memorized by players. By contrast, players in a racing game expect mechanics for accelerating, braking, and steering because that is how real vehicles work.
3. **Tell a compelling story.** Games can be used to share interesting stories, just like other media.



Themes also create player expectations. If your game is set during the American Civil War, airplanes would be out of place. Similarly, players would expect a board game version of basketball to include a three-point shot, just like in the sport. Such expectations can also create unwritten rules for how a player or a designer thinks a game "should be" played. Designers must be sure to write down or program all the rules that they want players to follow so that there is no confusion on how the game is played.

Instead of creating new thematic elements themselves, a game designer may **license** an existing setting and characters. Examples include themed editions of standard board games, like Monopoly NFL as well as games based on successful movies or books, like *Star Wars*®. Follow appropriate intellectual property requirements when working with licensed material. It is also important to be consistent with the story, setting, and characters of the source material.

Even for a simple game like Bubble Talk™, having rules that are clear and easy to understand helps make the game more enjoyable.

Scouting has its own special edition of Monopoly®.

The Benefits of a Theme

The best thing that a theme can do is make it easy to learn the rules. If you have a game about building automobiles, and your goal is to build factories, make cars, and hire salespeople to sell those cars, the theme makes it easy for you to remember the goals of the game because the goals are very similar to what would happen in real life if you ran a car company. A game can be without a theme, but themes both add a framework that makes it easier to understand the rules and goals of a game and give players a way to "escape" into the game—to become the head of a car company, or an army general, or a starship pilot. Themes are what catch the imagination of a potential player, for games are in fact interactive stories. At the same time, games are puzzles, so the theme should always lead you to how the game works.

—Alex Yeager, submissions editor, Catan Studios

PLAY

Why We Play Games

Game elements are building blocks that designers use to make games, but they do not tell the full story. It is equally important for the designer to consider the player's perspective. Why would someone want to play your game? If they are playing "for fun," what does that mean? Every player will have an opinion about what kinds of activities are enjoyable or engaging, and these opinions will reflect the player's personality.

Play value refers to reasons that a player chooses to play a particular game. There are many different reasons that people want to play games, and they changed based on situation and mood. This is not a complete list, but here are five categories for describing why people might enjoy a specific game: novelty, challenge, stimulation, harmony, and threat.

The following is based on Jason VandenBerghe's "Domains of Play" presentation at the 2012 Game Developers Conference and is used with permission.

Novelty

Novelty describes how much a game provides the player with imaginative, new, or unexpected experiences. Novelty can be introduced through theme (fantasy, art, and storytelling) and mechanics (chance and sandbox modes).

Sandbox mode gives players more freedom, options, and flexibility. For example, it might allow players to ignore certain game objectives, have unlimited access to resources, or enjoy safety from enemies and dangerous obstacles. Minecraft® has a hugely popular sandbox mode. It allows players to be extremely creative, but it also puts a burden on the players to decide what they want to do within the game—to make their own objectives.

Games with a high novelty factor often have a high *replay value,* meaning they are fun to play more than once.

Have you ever dreamed of being a superhero who can fight crime with a range of powers and can fly? What about a medieval king defending your kingdom from invaders? Perhaps you want to search the stars on a spaceship. Games can allow players to take on roles that would otherwise be impossible in real life.

Role-playing games can tell engaging stories. Novelty is also related to storytelling. Sometimes the most fun part of a game comes from creating a unique storyline and play sequence, meeting characters, and interacting with them as they overcome tough challenges or go on amazing adventures. Lastly, novelty may be about the senses: fantastical artwork, intricate visual details, stirring music and sounds, and even the weight and feel of physical pieces. All of these can add depth to a game and make it more engaging to play.

Players who like novelty may gravitate toward games with randomized content or chance-based mechanics as part of the game design. These add unpredictability and uncertainty that can keep a game fresh.

Challenge

Some players enjoy games that provide challenging tasks to be practiced and mastered. Unlike other forms of entertainment, games have a unique ability to provide meaningful "work" where we can make clear progress and are happy to try again if we fail. Difficulty, advancement, and completion are all ways players experience challenge.

Challenge can be introduced through mechanics, resources, and objectives. A game based on difficulty is like an obstacle course. The fun comes from successfully overcoming the hurdles made by the game designer. To do so, the player must learn or improve particular skills. The game designer must decide whether particular content is difficult enough to be interesting but easy enough to match what the player has learned from the game.

The quickest way to lose your audience is by creating obstacles that are far too hard, resulting in a reward inadequate for the player's effort, or far too easy. A designer can lose their audience if their game is far too hard or far too easy. Games can test a player's physical skills, reaction speed, problem-solving ability, and more. Many games, especially those implemented electronically, have a varying degree of difficulty in order to better match the game to the player's personality and skill.

Character advancement is when the player becomes more powerful over time. World of Warcraft® is an example of a game with a significant advancement component. In most RPGs in any medium, as the player's character performs tasks, the player gradually gains access to new or more powerful abilities and stronger armor and weapons. Players can then defeat progressively more powerful monsters. While this is similar to difficulty-based gameplay, the player is not necessarily becoming more skillful. Instead, the player's character becomes more powerful as the player spends time with the game. Found in most role-playing games, player advancement is increasingly common in other types of games. This is useful for design, because it provides a way for talented players to show off by beating the game faster, while other players still have a chance to win if they are patient and keep trying.

An old slogan of Pokemon—Gotta Catch 'Em All™—is a good description of completion in gameplay. For this kind of challenge, the player may be trying to collect all the coins, buy all the property, conquer the entire map, or accomplish all of the possible tasks. The gameplay provides a journey to that final collection, and each step should be satisfying on its own. It is important for the game to communicate to players when they have made progress and how far they need to go to reach the end.

Besides letting people play new roles, games can bring players to uncharted territories, magical places, new worlds. Once there, a natural reaction is to take a look around. The challenge is to explore the new world and uncover its secrets. Discovery is a big part of text-based role-playing games and many electronic games.

Stimulation

Have you ever played a game that was exciting? What about a game that pushed you to express yourself creatively? These are both forms of stimulation. Stimulation deals with the emotional element of play. Self-expression, role, pace, and excitement are all ways in which players experience stimulation. Stimulation can be introduced through player format (team play, player roles), objective (solve, chase, escape), and mechanics (how players take turns and time limitations).

Many party games involve forms of self-expression like acting, singing, and drawing because they are enjoyable for both the person doing the work and the people sharing it. Text-based RPGs also place a heavy emphasis on creativity.

In many team and multiplayer games, a player's role can be key to how a player experiences the game. Think of soccer—playing as the forward is very different from playing as a goalkeeper. In role-playing games, players often choose different roles (fighter, magic user, ranger, etc.) based on what the player experiences as fun.

Pacing and the play sequence also have an impact on fun. Players with a high need for stimulation would most likely enjoy real-time games (most team sports) or games with strict time limitations, while those with a low need for stimulation might prefer turn-based games (most board games) or games that are more open-ended.

A final aspect of stimulation is the thrill of victory and agony of defeat. Many live-action and electronic sports games have gameplay that fulfills a player's need for stimulation.

Harmony

Harmony reflects the rules of player-to-player interaction. Trust, integrity, helpfulness, competitiveness, and compassion are all ways in which players experience harmony. Game elements that can be used to emphasize harmony include player format (cooperation vs. competition) and objective (build vs. destroy).

Cooperation and competition reflect two ends of a spectrum. Individual players often have a preference for where they fall along this spectrum; for them, a game's fun factor and player

interest is higher the closer it comes to their personal preference. Picture cooperation and competition as opposite ends of a line for describing multiplayer games. Some players are super competitive and prefer games at that end of the line. Others prefer to work together at the cooperative end. And many people are interested in a bit of both.

Whether playing with friends, family, or even rivals, multiplayer games help build and strengthen social ties. Games pull people together for common interests. In some cases, the game drives a social event, but for some games like Apples to Apples®, the game is a backdrop to start conversation. Party games lean heavily toward friendly competition. Going one step further, cooperative games make players work together to complete objectives. Massively multiplayer online games often include lots of cooperative gameplay.

In many games, the objective is to outperform an opponent. Competition motivates people to practice skills and think of different ways to succeed. A good competitive game will allow players to display their skills and ingenuity against players of a similar skill level. In more casual competitive games, an element of chance might help ensure that the same player does not win every time.

Note that in many individual sports and games, the competition is often with the players against themselves, where they are seeking to improve their time, score, ranking, etc., rather than focusing only on their opponents.

Fun is not the only reason to play. Other motivations to play are to get exercise, master a skill, and teach someone else how to play.

Games that incorporate a high degree of reflex into their game mechanics appeal to the player's desire for threat.

Threat

Tension, danger, provocation, and humiliation all are ways that players experience threat. Player format (team structure), mechanics (real-time play), objectives (chase, escape, and race), and resources (better weapons, armor, cars, etc.) are the primary game elements used to incorporate threat.

These games are fun because of their heart-pounding action and the enjoyment people get out of crushing their opponents. Paintball and racing games are examples of games that appeal to a player's threat instinct.

Most games incorporate multiple types of play value. Basketball, for example, involves novelty (playing against a different team, having multiple lineups as players come off the bench), challenge (mastering basic techniques such as shooting, dribbling, and passing), stimulation (a fast pace), and both aspects of harmony (cooperating with your team and competing against the opposing team).

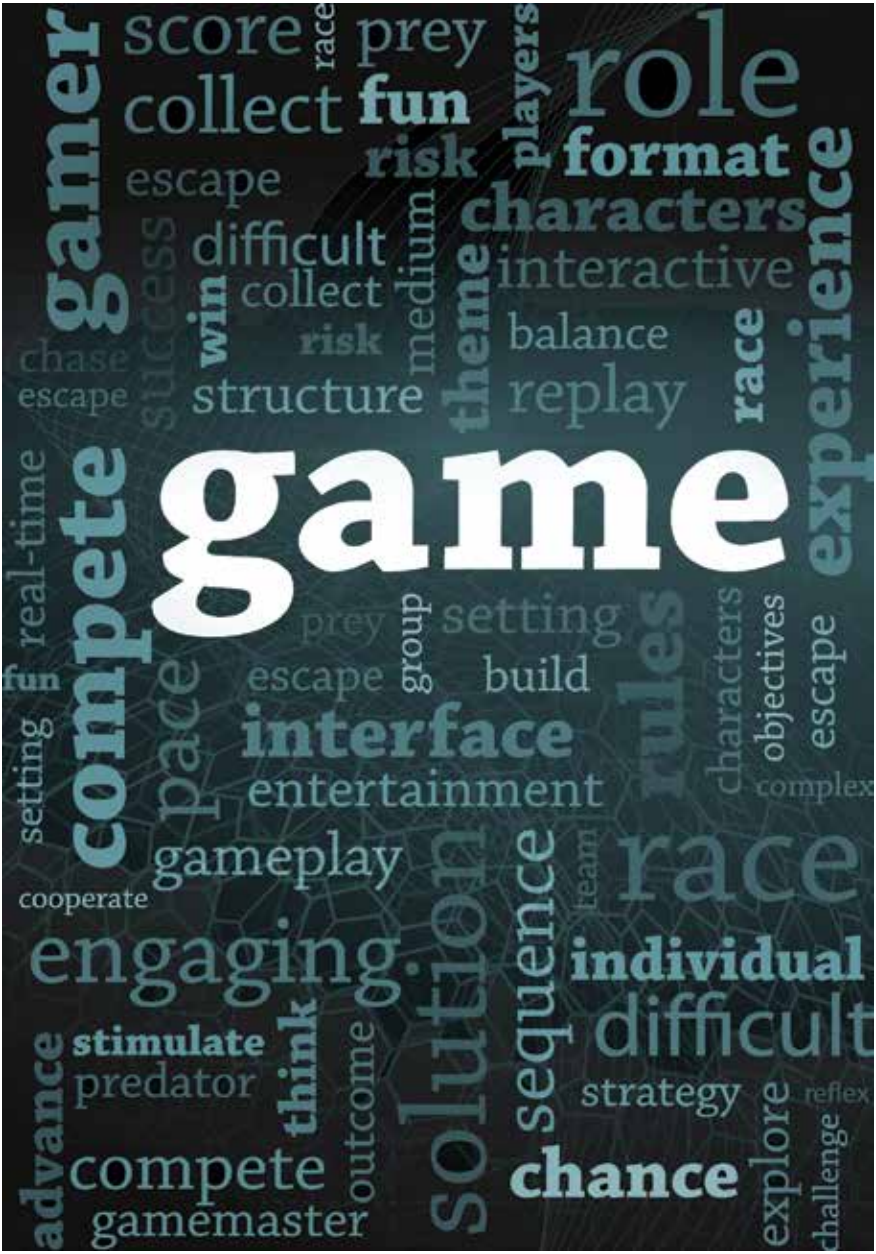
A Lesson From Valve

Making a game fun is extremely difficult because we know precious little about what "fun" actually is. At Valve, the electronic game maker, the philosophy is that, while game designers can partially predict what is fun, they cannot do this entirely. As such, "designing" a game (in the conventional sense) is only one part of the process. The rest involves a core iteration cycle:

1. Playtest—Recruit people to play the game, then watch them. Take notes on what seems to work, where people seem engaged, where they seem frustrated, etc. At Valve, sometimes playtesters are people involved in the production of the game and sometimes they are people from outside the company. We try to mix it up because you get different kinds of information from each group.
2. Evaluate playtest results—Just because one player did not like something does not mean a game should be scrapped. Look carefully at the playtest results. Decide what to act on, what to watch in the future, and what feedback to discard.
3. Apply evaluated playtest feedback—Act on the conclusions from step 2.

We tend to think about this process like a series of experiments. You may even notice that these steps have a lot in common with the classic scientific method. Not only does this give us concrete data about where within a game we are succeeding and failing, it also keeps us focused on *fun* as the primary goal. (That can be surprisingly difficult when you work on a single project for years!)

—Erik Robson, Game Designer, Valve Software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challenge
gamemaster

Game Terminology

In addition to the core game elements, many other terms are useful for analyzing games. Game designers need a strong knowledge of game vocabulary.

Thematic Elements

Games have two types of stories: *narrative stories* and *player-created* stories. The *narrative story* or plot is created by the game designer. A well-written story can overshadow bad gameplay, but a poor story can ruin an otherwise well-designed game experience. In some games, player decisions change the overall narrative. This requires the designer to use specific techniques to script how the storyline can split, continue, end, or come back together over the course of a game.

All games have *player-created* stories that tell what the players did during the game. Here is an example from a baseball game: "Their batter smacked a line drive toward right field, but Kelly made a leaping catch, whirled, and zipped the ball to first base for a double play!" Designers can empower player stories by giving players interesting decisions to make and opportunities to collaborate and demonstrate their skills.

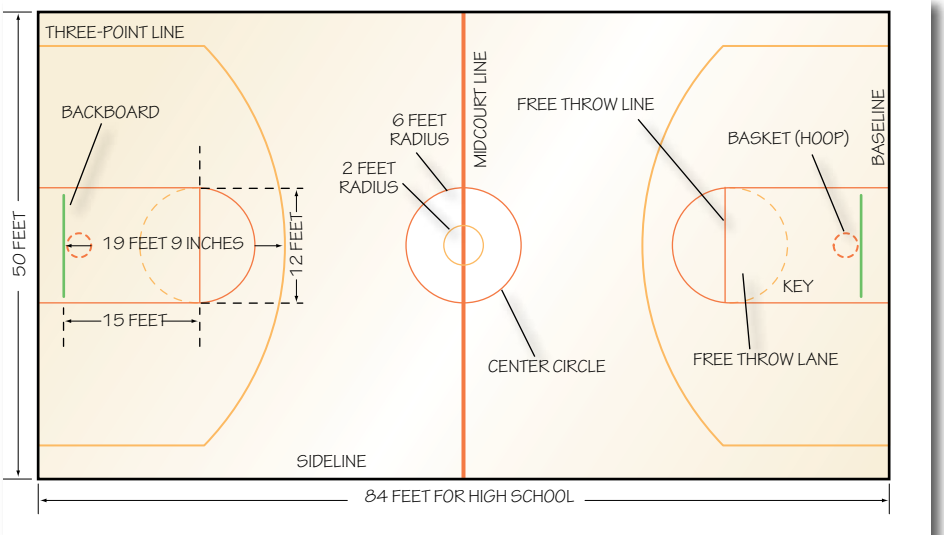
The **setting** of a game—the fictional environment in which it occurs—can have a big impact on the play experience. A game about exploring a haunted mansion at night has a different emotional hook than a game about exploring a fantasy kingdom, even if the rules and mechanics are very similar.

Game **characters** can have a similar impact. If the player character has a loosely defined personality (such as Chell from Portal™ and Master Chief from Halo®, the player can project their own personality onto that character. If the player character has a well-defined personality, then the character comes across as more realistic. The player then relates to that character's story. This element is even more pronounced in RPGs, where the players create the characters they will play, then the designer can tell a deeper narrative story to keep the player interested.

Gameplay Terms

Whose turn is it? Do we take turns? Can we play at the same time? The **play sequence** of a game answers these questions. Changing the play sequence can have a big impact on the play experience. In Magic: The Gathering there are some cards that allow players to take actions when it is someone else's turn. As a result, participants remain actively engaged even when waiting for their turn. By contrast, the card game bridge requires one player to set his or her cards down during each hand.

Level design (or environment design) is the process of creating game spaces. It is separate from designing rules and mechanics. As an example, think about the three-point line in basketball. If it is too close, players want to take every shot from behind the line. If it is too far, no one attempts three-point shots. The design of the play space determines how and where the action occurs. The play space should also help players identify objectives and judge their progress toward the objectives.



How do the size and shape of a basketball court affect the gameplay? What would happen if the three-point line was closer or the court was narrower?

Interface design is the process of developing effective methods for communicating information between players and games. The interface describes how players get information from a game and how they physically interact with it. Consider the design of a deck of playing cards. One side of each card usually has some sort of design that is the same throughout the deck so that the cards can be randomly mixed and their values hidden. The other side sports symbols, colors, and numbers to communicate information to players. In electronic games, the user interface includes the screen and button layouts. Rule sheets, glossaries, FAQs, tutorials, and help sections are also parts of the interface.

Card interface: A card game designer should carefully consider what information should be on each card and how the player will read or interpret it.

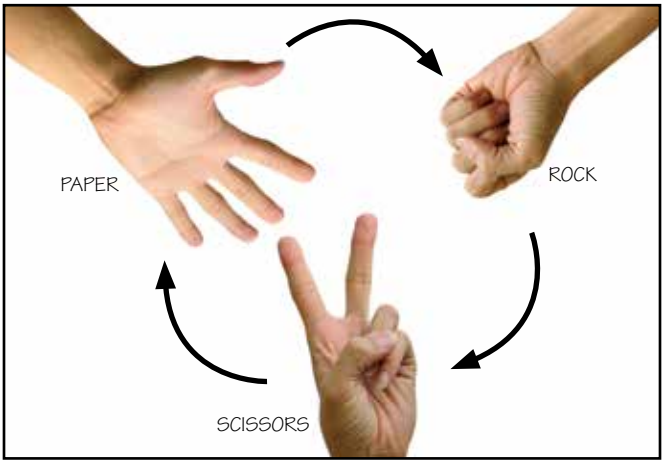
A *tutorial* is a part of a game that introduces new rules or mechanics and gives the player a chance to practice them before using them in combination with all of the other game systems.

Terms for Game Analysis

The following terms—**difficulty, balance, depth, complexity, pace, replay value,** and **age appropriateness—**describe the nature of the play experience. They are useful tools for comparing different games.

Difficulty describes how easy or hard it is for a player to complete a game objective. As a designer, you can adjust game difficulty in many ways. For example, you could make a puzzle harder by increasing the number of steps to complete it, increasing restrictions on the player, or reducing the amount of time the player has to complete it. Electronic games often have settings, such as novice, standard, and expert, that adjust difficulty by changing the strength of the player and enemies. Board games or card games may include a second, simpler set of rules for new players.

Balance is a description of the relative strength of different resources, mechanics, objectives, or starting states. At the highest level, a balanced game does not give an unequal advantage or disadvantage to any player. Consider the classic rock–paper–scissors game. One player might win more often because of skill or luck but not because the game favored that player. Similarly, balance applies to decisions within a game. If a player can choose between two different paths but one of the two is always better, then the choice is not balanced.



Rock-paper-scissors: rock beats scissors; scissors beats paper; paper beats rock

Depth vs. Complexity

Imagine that every game is a house. **Depth** represents how much house there is to explore. **Complexity** is the cost of the rent.

Tic-tac-toe

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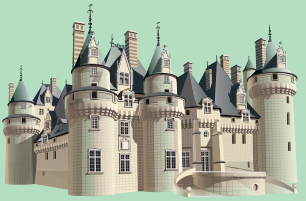
Chess



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Monopoly

$$$$$$

Depth is directly related to the number of interesting decisions that players make. Tic-tac-toe has few decisions, but it also has few rules. Chess has more rules and elements, but tons of interesting decisions. Monopoly has loads of rules and elements but relatively few meaningful, interesting decisions.

Depth and complexity are related. **Complexity** refers to the number of rules or the number of elements with which a player interacts in the gameplay. **Depth** refers to the ability to continue to find enjoyment in a game as one's skill improves. Increasing complexity might increase depth, but that is not guaranteed. Chess is a board game that gets great depth from relatively modest complexity.

Complexity is the price designers pay to make gameplay, not a benefit. The greater the complexity, the harder it is to learn how to play the game. When creating rules, think about the purpose behind each one and what it will do for the play experience. Each rule or mechanic should have a purpose.

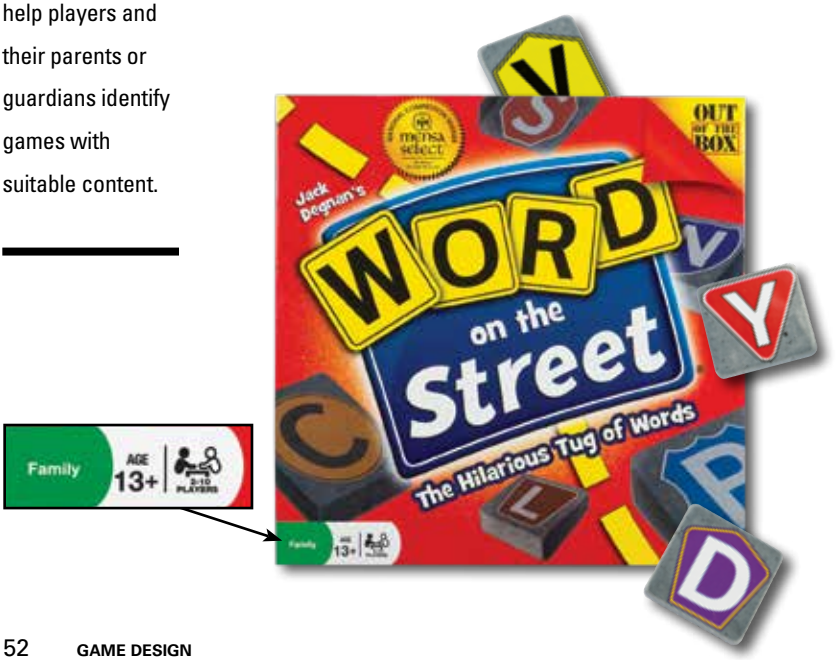
Pace describes the speed of a game. Specifically, it is how quickly the player receives information and makes decisions. Consider the strategy games StarCraft®, League of Legends®, and Risk®. The games are about controlling territory and resources, winning battles, and defeating an opponent. In Risk®, play is not simultaneous—only one player takes a turn at a time—and turns have no time limits. By contrast, StarCraft play is simultaneous and real-time. Professional players make more than 300 actions

The Entertainment Software Rating Board (ESRB) is a nonprofit group that assigns age-appropriateness ratings to electronic games. These ratings help players and their parents or guardians identify games with suitable content.

per minute and process information very quickly. The two games stimulate players at different levels as a result of their very different paces.

If **play value** is the reason someone plays a game, then **replay value** is the reason someone plays a game over and over again. Designers increase replay value by introducing choices of characters, difficulties, starting positions, maps, levels, storylines, and more. All of these options add novelty to additional play sessions. Increasing gameplay depth also increases replay value. Lastly, multiplayer games generally have much greater replay value than single-player games.

Like with movies and music, games can have subjects that are not suitable for everyone. **Age appropriateness** refers to the age or maturity level of a game's intended audience. For example, a game with minimal cartoon violence might be suitable for elementary school students, but a game with frequent, graphic violence would be more appropriate for a much older audience. Another example is the difference in size between Little League baseball fields and the fields for professional baseball; the field for younger players is smaller to fit with their expected athletic capability. Most retail games have markings on the outside of the packaging that indicate the suggested audience age range.



Related Terms

The following pairs of terms represent opposite ends of a spectrum. In each case, games can be designed to fall at either end or somewhere in between.

If a game is played with only one (human) player, it is said to be **single player.** While this term mainly applies to electronic games, card games such as solitaire are also single-player games. Games with more than one player are **multiplayer.** Some electronic games include both single-player and multiplayer modes.

While many multiplayer games are **competitive**—with clearly defined winners and losers—others are not. Designers can sometimes make games less competitive by eliminating gameplay elements, such as by not keeping score. Similarly, single-player games can add a competitive element by including comparisons between players like high score lists for online games.

Cooperative games require players to work together to complete objectives. Games on social media websites, for example, often include cooperative elements to keep more people engaged. Most team games—like capture the flag—are both cooperative and competitive.

Most board and card games are **turn-based,** allowing one player or team to control the play at any given time and then switching control to the next player or team. Some turn-based games also have **simultaneous play,** which means that more than one player or team can act at the same time. In a **real-time** game, all players act at the same time throughout the game.

Turn-Based vs. Real Time

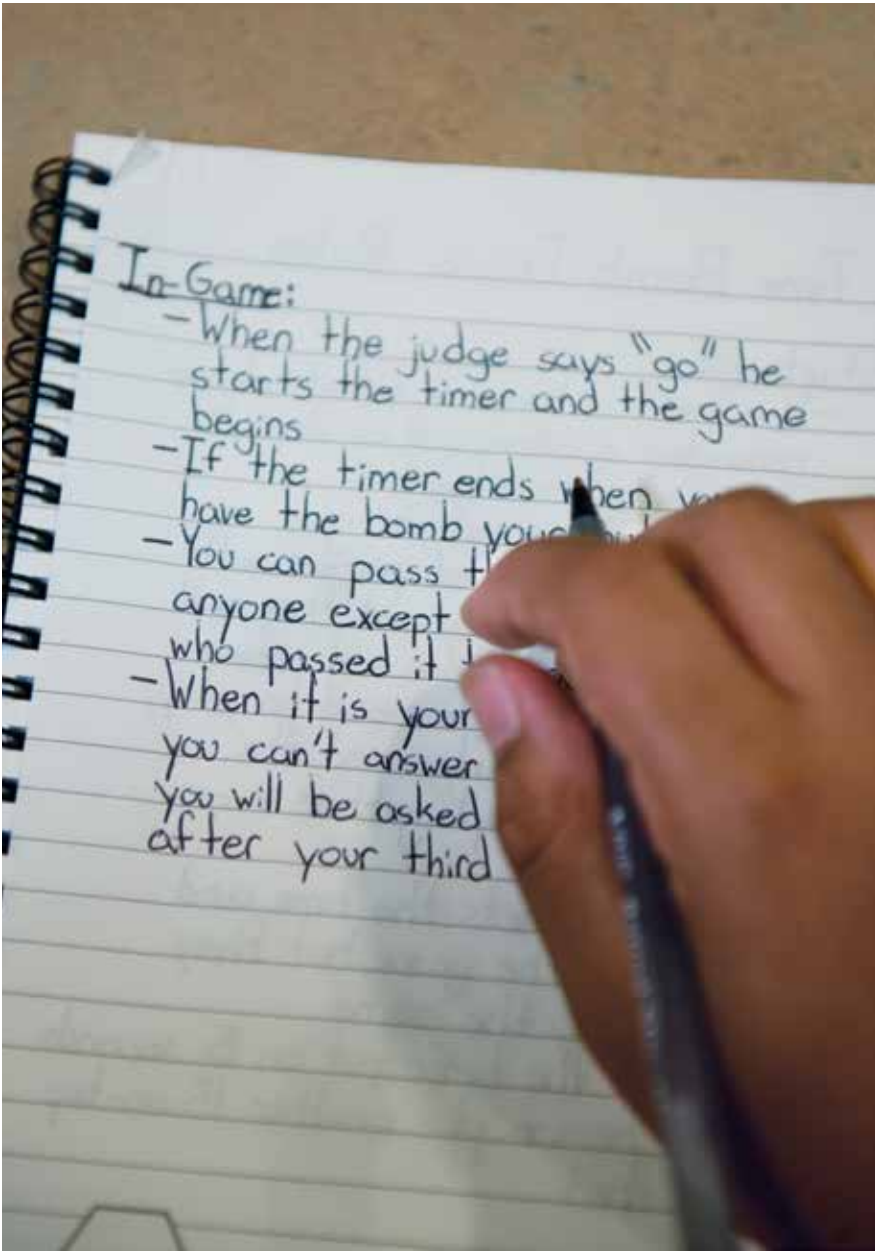
Chess	Baseball or Softball	Capture the Flag
Players alternate turns.	Teams switch between offense and defense.	Players are always on both offense and defense.
While one player plays, the other waits.	After each pitch, play finishes before the next pitch begins.	Flags are reset only when a point is scored.
	During a play, players from both teams participate.	Action happens continuously.

Compare bowling to baseball to capture the flag. In bowling, one player takes a turn—up to two throws—to try to knock down pins. The other players wait until it is their turn to play. Baseball and softball have innings split into halves where the teams switch between offense and defense. However, players from both teams are participating at the same time. In capture the flag, both teams are constantly trying to steal and defend flags.

While many games are **thematic** (as discussed earlier), some are **abstract,** meaning that they don't incorporate nongame information into the game. Checkers, most playing-card games, dominoes, golf, and Tetris® are all examples of abstract games.

Strategic (mental) and **reflex** (physical) gameplay are different expressions of player skill. In both cases, players have control over the outcome through their decisions and actions. By contrast, **chance-**based mechanics have a randomized outcome. Chance adds uncertainty to a game, which can create tension and make it more exciting. Too much randomness can be frustrating. Players want to make meaningful decisions, but decisions lose meaning if the outcomes are decided solely by dice rolls or card shuffles.

Chance-based mechanics also come in different flavors and with different mathematical characteristics. Should players roll one six-sided die or two six-sided dice? What about 10- or 12-sided dice, flipping a coin, or drawing cards from a shuffled deck? If the player is using a six-sided die, what do the different numbers mean? Determining the right type and amount of chance-based mechanics for a game is a big part of being a game designer.



In-Game:

- When the judge says "go" he starts the timer and the game begins
- If the timer ends when y
have the bomb you
- You can pass th
anyone except
who passed it i
- When it is your
you can't answer
you will be asked
after your third

Making Your Game

How does someone make a game? You know the elements of games, words that describe games, and the types of experiences that players enjoy and look for. How do you make the jump from having that knowledge to making your own game? It all depends on you and on the game you want to make.

Where to Begin

Almost any kind of idea can launch your game, and you can start at many different places.

Your Game Could . . .

- Take the player on a story of adventure or discovery.
- Teach a skill or topic.
- Use a special game mechanic, like a dice roll or an auction.
- Simulate another activity or event, like running the Roman empire or flying a plane.
- Follow an established game form, like a racing game or a role-playing game.
- Explore a certain theme or setting, like space travel or pizza delivery.
- Use a particular technology, like a motion sensor or a sound recording.

Professional game designers use these and many other ideas as starting points. Think about each one and see what comes to mind, then write those ideas in your designer's notebook so they do not get lost.

Starting Your Designer's Notebook

Once you have your "launch idea," you should create your designer's notebook. A "notebook" can be made from any tool you want for gathering and tracking your game ideas as long as it is easy to add to and easy to review. A bound composition book or a spiral notebook works just fine, as does a three-ring binder with filler paper. Also consider using an engineering or drafting pad that has both horizontal and vertical lines. Your notebook can be large enough for a book bag or small enough to fit in your pocket. As long as you can keep your pages together and feel comfortable writing in it, then you have found a good tool to use as your designer's notebook. Keeping notes digitally, either in a document or note application, is fine, too. Do not throw anything out—no matter how off-topic—as it might be important later on in the process.

Introduction

Most good books have an introduction; your notebook is no exception. Your introduction should describe what you are aiming for in your game in three brief sections:

1. **Vision statement.** Describe your game in a sentence or two. Make sure to leave room for changes, as your vision will certainly be fine-tuned over time. However, it may also wander, so it is helpful to keep your vision of the completed game in a single place.

2. **Limitations.** The game will have limitations, depending on the medium and the equipment needed to play the game. A mobile application will have different memory space requirements from a graphics-heavy computer game. The components for a board game represent a significant expense, so the quantity and composition are important.

3. **Timeline.** For your game, you may be able to take whatever time you want (particularly if you don't care if it ever gets finished). However, for most projects the designer will set

some progress goals with specific time milestones so that the project can be completed in a reasonable time. The timeline can be changed, but frequent delays may be a symptom of problems.

Main Text

Brainstorming is the process of coming up with as many ideas as possible to solve a problem or accomplish a task. Take some time (from five to 30 minutes), and think about what your game could be. *Write down every idea in your designer's notebook.* Do not worry about the details behind the ideas. If you get stuck, review the game elements or types of fun to ask yourself questions about your game: Where does it take place? What is the player trying to do? What is the player experience like?

From now on, whenever you get an idea about game design—any idea at all—write it down or type it into your notebook. It might be an idea about anything relating to your game. It might be something you saw as you rode the bus or an idea that popped into your head as you talked with a friend. Whatever it is, write it down along with the date and your initials. You do not want to lose your ideas!

Writing down the ideas is the most important part of brainstorming. By writing them down, you are giving your mind permission to think about other things, like which idea sounds the most interesting. Do not try to organize them or think about whether this idea sounds better than that idea. Do not even think about that as you write. If an idea comes to mind, but you think you already wrote it down, write it down anyway. When you look back at the list, you might discover that you wrote that same idea three or four times. That is perfectly OK; in fact, it is great! It shows that you were really thinking about that topic, so it might be especially interesting or important to you.

The key to developing our project "Vessel" was to grow it around a singular idea. "Vessel" started life as . . . an experiment with making liquid move in games. . . . In "Vessel" you can make creatures out of a variety of liquids, including water and lava. If you mixed water and lava, it would make steam, and this same effect occurs in the game if creatures made of the two liquids collide. We taught the players that their real-world expectations of materials (water + lava = steam) would carry over to the liquids in the game. Finding that connection was the core of the puzzle and was something that we developed through playing the game.

—John Krajewski, Founder, Strange Loop Games

Organizing Your Ideas

Now that your notebook contains a bunch of ideas, start reading through them. Put a star next to all of the ones that catch your attention. Take time to think about them some more. What makes those ideas so fascinating? What would a game using some of those ideas look like? Write your answers in your designer's notebook.

Sift through everything in your notebook. Pick out the items that seem most interesting. This will help you focus your thoughts and get you closer to your game design. Keep narrowing your ideas by asking yourself questions. For example, consider a game about first aid. Would you focus a) on how to perform first-aid techniques or b) on knowing which techniques to apply when someone gets injured? By adding details to your ideas, you begin to see your game more clearly. Use the game elements to guide this process.

Players vs. Designers

Game designers and game players look at games very differently. A game designer needs to understand both viewpoints and consciously move back and forth between them. Those who can do this design great games.

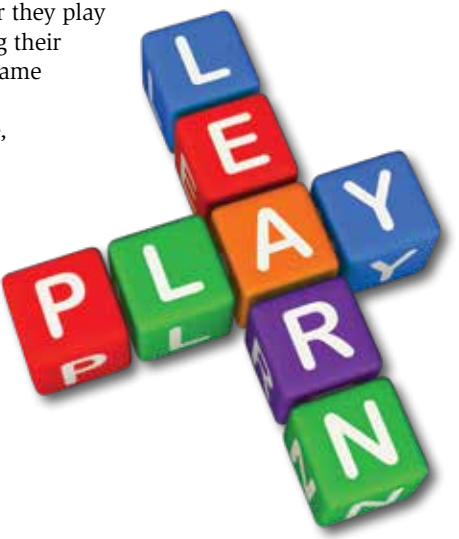
As a designer, you are focused on how the game works. You are concerned with questions such as:

- What are the different segments of the game and how do they fit together into a complete whole?
- Can a player successfully play the game to the end and win?
- Does each player have an even chance of winning and a fair shot at everything the game has to offer?

Game players, on the other hand, want the enjoyment and challenge of playing a game, as well as the camaraderie of spending time with friends. They are looking for the experiences that playing games provide. Whether they play a game for fun or to learn, they are spending their time playing in exchange for whatever the game offers them.

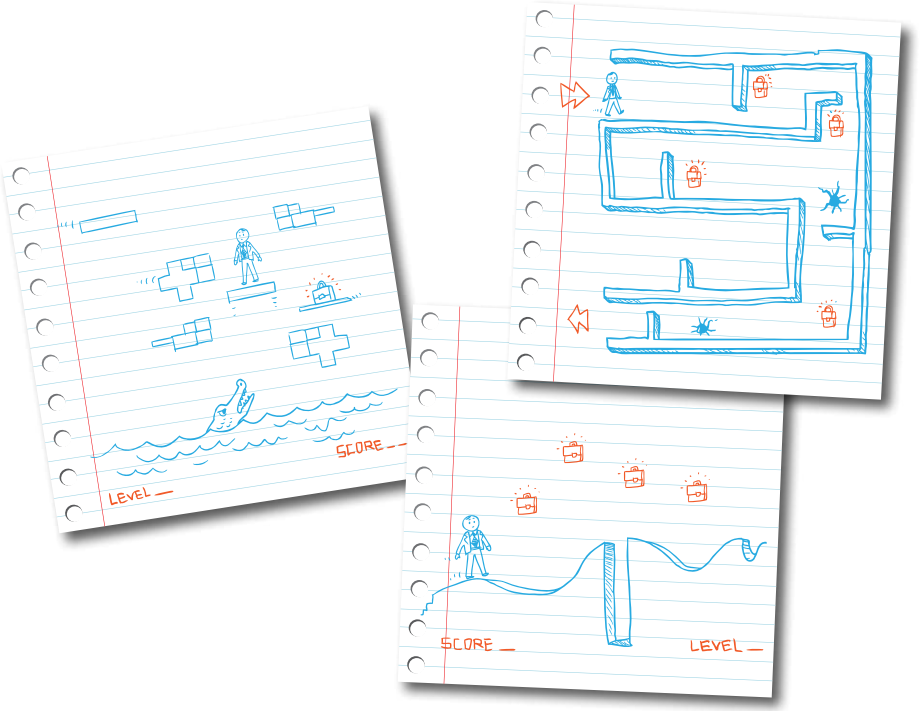
While developing and testing your game, you will frequently switch back and forth between designer and player. With your designer hat on, you will think of something to add to your game. With your player hat on, you will give the idea a try to see what you think about it.

When making changes to a game based on player feedback, remember that players want to have *fun* with games. They will often make suggestions that would have helped them do that. Ask yourself, "Is this better for the game itself or just for that player?"



"Game design is an iterative [repetitive] process. Even the best designers don't get it right on the first try: They play lots of games, plan their designs, make their games, get feedback from users, analyze data, and use it to improve the game … over and over."

—National STEM Video Game Challenge, stemchallenge.org



Intellectual Property (IP)

To demonstrate what intellectual property is and how laws are designed to protect it, basic information about each area of protection is described by using the example of a hypothetical Scout named Justin, who is developing a mobile phone game as part of his effort to earn the Game Design merit badge. Justin will be programming the game and might want to commercialize, or be able to sell the game in the future.

Let's say Justin creates a game, an instruction manual, and a name for the game. In particular, Justin has created computer source code as part of the game development process. Source code is computer instructions that people can write and edit. Let's also say that Justin's game includes an electronic controller that is novel—brand new in the video game industry—and the technology is not obvious to other video game developers. What kinds of IP could he protect?

First, Justin can protect his software and instruction manual under copyright law. *Copyright* protects computer code and visual displays made by the program. In general, copyright law protects creative, literary, and artistic works. He can use copyright to prevent others from making copies of his code, its displays, or his manual. He can also stop others from making new games based on his game. All you—as the creator—need to do to claim copyright is to put the symbol "©" (or the word "copyright") along with the year and your name on any materials that you distribute. On the other hand, if you want to make a game based on a book or movie, you would need to license (rent) the rights to those images and characters in order to legally make that game.

A copyright is still enforceable decades after the creator has died.

Second, Justin may have a patentable invention—his controller technology. Patent law protects useful inventions that are novel and not obvious to people in the field. For instance, key inventions in history such as the airplane, the telephone, and the laser have received patent protection. Patent law can prevent others from performing Justin's method or making or selling games that utilize his invention.

Patents are issued by the U.S. Patent and Trademark office after a detailed and often costly application submission and review process that can often take years to complete. A patent is good for up to 20 years, provided that you pay the required maintenance fees to the U.S. Patent and Trademark Office.

Third, if Justin maintains the secrecy of his source code, he may have trade secret protection. *Trade secrets* are items of information or technology that provide the owner with a competitive advantage in the marketplace and are kept secret by reasonable measures. Well-known examples of trade secrets include the formula for Coca-Cola® and the "Original Recipe" used by Kentucky Fried Chicken®. If Justin's software source code provides him an advantage in the marketplace, and he uses reasonable measures to protect his source code and methods, he can protect it under trade secret law.

Fourth, the name of Justin's game can serve as a *trademark.* Trademarks and service marks protect words, names, symbols, sounds, or colors that distinguish goods and services of a business from those of others. McDonald's®, NIKE®, and Apple® are examples of famous trademarks. Similarly, the name of Justin's game can act as a trademark to show that he or his business is the source of the game. All a designer needs to do to claim a trademark is to put the regular trademark symbol (™) close to any instances of the design to be trademarked. However, if you want to use the registered symbol (®), you must register your creation with and pay a fee to the U.S. Patent and Trademark Office, which verifies that your use will not be confused with any other use of that same design.

SM

TM

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Finally, you may be able to use the intellectual property rights of others. To do so you need to "license" their rights. A *license* is a contract between you and the rights owner that allows you to use the rights in a particular way in return for a licensing fee and other terms. For example, you may be able to use the title, art, and story of a movie but not photographic images of the actors. Many opportunities are available for licensing, but the value of the rights determines (through contract negotiation) how much you must pay for their use. However, if you have done the work outlined above, you may have rights that someone else may want to pay for.

This From the U.S. Copyright Office

"Copyright does not protect the idea for a game, its name or title, or the method or methods for playing it. Nor does copyright protect any idea, system, method, device, or trademark material involved in developing, merchandising, or playing a game. Once a game has been made public, nothing in the copyright law prevents others from developing another game based on similar principles. Copyright protects only the particular manner of an author's expression in literary, artistic, or musical form."

Morphing From Game Player to Game Designer

Game designer Kate Ryan Reiling will tell you that, as a child, she "never really seriously thought about the rules of games" she played. She said she just "liked games that made sense, and the rules faded into the background and allowed creativity and competition to thrive." From that little girl playing crazy eights with her grandmother and soccer with friends during recess, Reiling has become a self-made game designer with many accolades for her game Morphology®.

In 2002, inspired by wanting to play something different, she started designing her own board game. Reiling said, "I had to make decisions about what I felt about luck vs. skill, how long the game should last, and how hard it should be. I had to decide what to spell out as rules of play and what to leave open to house rules. I wanted to find that sweet spot I experienced as a child, when I forgot about everything else and found myself immersed in creative competition. I wanted to find a way to recreate joy."

Of the development process, Reiling says it was much more than "just sitting back and playing a game. It is rare now that I can 'just' play a game. I'm always thinking about who invented it and why they decided to do certain things. I've become a lot more aware—and critical!—of games and game play."

In Morphology, she seems to have found the perfect way to recreate joy for many people. Although it took seven years for Reiling to fully develop her game and see it to fruition, it has been wildly popular since she took it to market in 2009. During its first year, *TIME* magazine named Morphology the No. 2 "Toy of the Year."

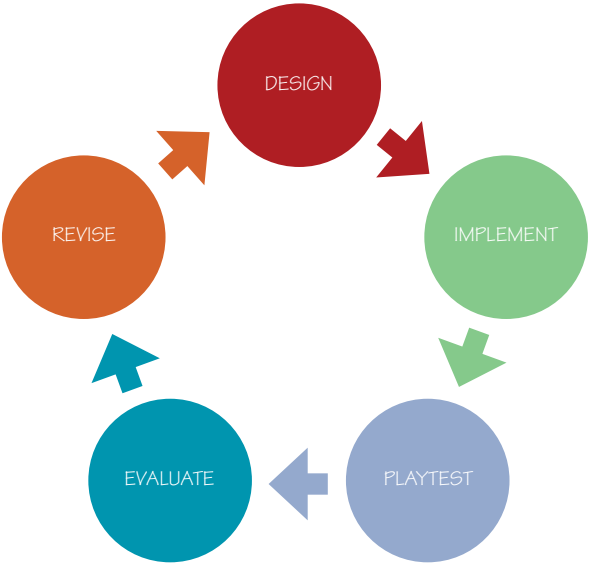
Kate Ryan Reiling has since quit her day job to found Morphology Games. She now works in her studio, creating new games. Says Reiling, "For me, game design has become a game in and of itself."

U I C O R N

Prototyping

Designing games on paper is challenging. Simple games like Candy Land® and the card game War translate pretty well from paper to actual play. However, as players are given more decisions to make, gameplay becomes less and less predictable. Often, what looks good on paper does not turn out to be fun when put into practice, and the game designer needs to make adjustments.

To address this challenge, game designers rely heavily on **iteration.** This involves designing mechanics and systems, building a version of the game, predicting how it will work, testing it, and adjusting it, and then repeating the process many times until a game is engaging and satisfying. Testing and evaluation take a lot of time. There is no way to rush creativity, so the best place to save game development time is in the building phase.



The game design process

A **prototype** is an early playable version of a game, section of a game, or game system. It allows a game designer to rapidly experiment with rules and objectives without having to wade through full game design and implementation. A prototype must meet three fundamental goals:

1. **A prototype is playable.** The rules are complete enough to try out but do not need to be fully formed. It is perfectly acceptable to test individual systems and include only enough of the rest of the game to make those systems function.

2. **A prototype is quick to make.** Prototypes do not need pretty artwork, a fancy board, or perfect equipment. Developing artwork can be a useful part of the creative process, but once construction has started, the focus should be on getting the mechanics and systems up and running.

3. **A prototype is easy to change.** If you can, include features that can be changed on the fly. On a board game, for example, use Post-it® Notes to designate special spaces; if you want to change the spaces, you can just reposition the notes. Similarly, with a card game, use blank note cards so that you can add or cross out text on the cards easily.

You are encouraged to make your prototype as quickly as possible. Do not worry about making your prototype pretty or including all of the rules in the first pass. The faster you can get to testing your game, the sooner you will be able to decide what works and what does not.

Developing Your Game

When prototyping, think about the following:

- Component list: What are the game pieces? Boards? Cards? Displayed resources?
- Setup: What, if anything, must be done before play can begin?
- Sequence of play: Precise description of what players must do, in what order, to play the game. This can be a game-turn sequence or a flowchart, depending on the game structure and medium. For an electronic game, what interface screens will there be?
- Play progression: How does the game move from start to finish? Are there multiple levels or phases that must be completed in some sequence? Are there different rules for different times or circumstances?
- End-game and objectives: When does the game end? What are the game objectives? How do players measure their progress toward game objectives? Can the game end in a draw?
- Difficulty levels: If the game has multiple levels of challenge, explain how they work and how they differ from one another.

Prototyping With Paper

Regardless of the medium of the final game, making a paper prototype can be very valuable. Paper prototypes can often be made in minutes and are easy to modify. Board and card games translate directly, but paper prototypes are simply a launch point for sports, electronic games, and others. They work best for turn-based games, but with some ingenuity, you can even use the paper method to test mechanics of action-heavy games.

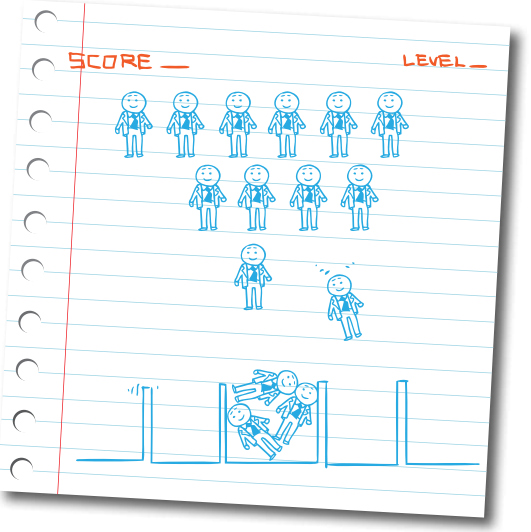
Here are some materials that can be found at most craft or office supply stores and are great for making paper prototypes:

- Index cards
- Blank playing cards
- Paper (construction paper, lined paper, graph paper)
- Post-it Notes (easy to move around a board)
- Stickers (use to mark special pieces, locations, etc.)
- Tape
- Markers
- Colored pencils
- Dice (six-sided, 10-sided, 20-sided, etc.)
- Coins or discs
- Glass beads
- Game pieces from other games (chess, checkers, etc.)
- Paperclips
- Other tokens (wooden blocks, pencil erasers, small household objects, etc.)
- Scissors

Use your imagination to help you figure out how to represent the parts of your game.

The following game mechanics can be represented using the paper method.

Game Parameters

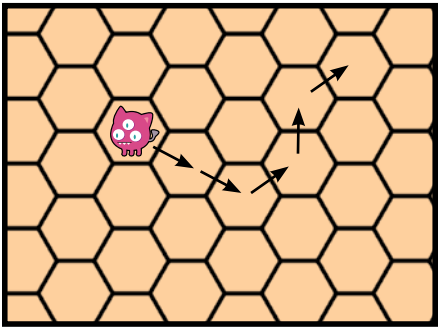


In many games, a player's or character's abilities and possessions are represented as numbers: character attributes, power gauges, money indicators, and score totals. In a paper prototype, abilities and possessions can be recorded on a character sheet—using a pencil and eraser—so that players can change the values during the course of the game. Money, energy, and other values that can change frequently in the game can be represented in the prototype as coins or tokens that the player can collect or expend so that they do not have to constantly erase and update numbers on their character sheet. A die can be used as a player token, with the number representing a key character attribute like health points.

Game parameters that might be represented in the final game as meters in the interface—health bars, power gauges, and the like—can also be represented by boxes drawn on a piece of paper. To model the meter increasing or decreasing, place tokens in or remove tokens from each box.

Playing Area

To represent sports fields, battle arenas, or other environments in your game, you can use game boards from existing games or you can draw your own. Graph paper is excellent for games where precise location, movement, or distance matter. Post-it Notes are a great way to mark special locations on the field. These can be easily moved from place to place and information can be written on them.



Hex grid

For games in which precise movement in all directions is required, consider using a grid based on hexagons rather than squares. The *hex map* has been a favorite tool of war game designers for many years because the distance between the center of each hex cell, or hex, to each of the six cells around it is the same. This is an advantage for games in which it is important to measure movement or distances.

If you cannot find hexagonal graph paper, there are free online programs that will print hex, square, circles, and any other type of graph paper on your printer.

If location and distance are not important factors in your game design, consider creating a card game as your prototype instead of a board game. A card game is easier to create and change. Also, boards restrict character movement and can make rounds take longer during playtesting. When a playfield (or any other game element) is unnecessary for testing game rules, you need not include it in your prototype. Index cards are an inexpensive and easy way to make card games. Paperclips can be used to group cards that are played together, such as *the Wizard was hit with a curse that lasts two turns.* Stickers are an easy way to mark specific cards.

Chance

With a paper prototype, randomness can be modeled in a variety of ways.

One way is to write down all the possible outcomes of a player's actions onto a set of index cards and have the player pick one when taking that action in the game. If some outcomes are more likely than others, simply include more cards with that outcome in the deck.

Instead of using dice, you can also make a spinner with numbers along its edge.

Another way to model randomness is to use dice. Six-sided dice are the most common and can be found in many board games. However, two 10-sided dice can be very useful for rolling percentages from 00 to 99; you can purchase these and other types of dice at hobby stores. To model random outcomes using dice, create a table with the die roll in one column and the outcome in another.

Real-Time Gameplay

Real-time gameplay can be tricky to model in a paper prototype, but other aspects of real-time games—like the layout of the map or the relative strength of different actions—can be explored pretty easily. When using the paper method, change the real-time mechanics into turn-based mechanics so that the other game rules can be tested.

To convert real-time actions into turn-based actions, give each player a maximum number of action points to spend during a turn, and assign a cost to each type of action the player would want to take. For example, in an action game, you may get 3 action points a turn, with running costing 1 point, leaping costing 2 points, and spinning costing 3 points.

The paper method is a very flexible approach for creating a game prototype because it allows you to change your mind often, which is important in the early stages of game design. It is not important to model every aspect of your design as it would appear in the final game. What is important is to model the game rules that make your game fun and unique.

Prototyping Outdoor Games and Sports

Prototyping outdoor games, sports, and any other game of physical action often works well with a combination of design on paper and live testing. Paper sketches and models are a great way to design play spaces for live-action games and for visualizing how the game will be played. It is also very important to think about player safety before you begin testing your game.

In addition to picking game equipment like balls and boundary markers, think about the actions that players could take and possible injuries. If you need help, compare your game to other outdoor games. Does your game need shin guards like soccer or helmets like baseball or softball? Once you have a plan for the play space, rules, objectives, equipment, and safety concerns, then it is time to try your game in the real world.

Prototyping Electronic Games

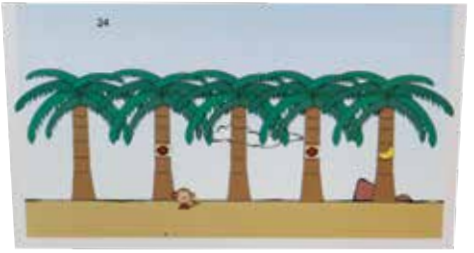
When making an electronic game, a software prototype will eventually be necessary. This prototype will be closer to the final play experience than a paper prototype. It will allow the game designer to better test the user interface, controls, and game timing. However, software prototypes may require much more time to implement than paper prototypes. The designer will need to devote a significant amount of time to technical issues, such as learning how to use the software, rather than on the game design itself.

If you are making a software prototype, consider using either a game creation software package or app or a level editing package. Many are available online, and some are free. (To get started, see the resources section at the end of this pamphlet.)

Game Creation Software

Game creation software programs allow users to design and develop their own electronic games without needing to develop game-making software. Many game creation systems are designed so that a beginner with no programming knowledge can create a playable game in a short time. Others come with a scripting language that gives game designers greater flexibility in creating the game rules.

Many game creation systems are engineered for creating games of only one particular genre or type, whether it is arcade games, adventure games, first-person shooters, platformers, etc. Either select a game system that can work with your game vision or craft your vision and core game elements around the capabilities of the creation software.



If you plan to create a software prototype of your game, ask your merit badge counselor for help in finding a suitable software package.

Level Editor

A level editor is a software tool used to design levels, maps, and campaigns for an existing electronic game. Some products, such as the Halo, Portal™, StarCraft®, and Super Mario Maker™ series, come with a level editor as part of the package, while fan-made level editors exist online for other games. Even more than creation software, a level editor may restrict the types of gameplay that you can produce.

Consider using a level editor if it comes from a game that is similar to the game you wish to design. It does not matter if the game engine is for a modern warfare game but you plan to make a pirate-themed game; what matters is whether the game rules, camera perspective, interface, etc., are similar to what you need. Determine if the editor will allow you to make adjustments to the game rules in order to fit your vision.

Special Considerations

Regardless of the type of software tool you use, a software prototype usually takes longer to make. It is easy to change numbers in a software prototype—building a house costs x gold or the player starts with y lives—but new mechanics take more time to create. You should use this method only after you have the basics of your game design and rules figured out. Test individual rules and mechanics as you program them before trying to implement larger systems. Also, the simpler your initial rules, the easier they will be to program and test.

Testing Your Prototype

Once a game prototype has been developed, **testing** can begin. Testing is the process of playing a game and providing feedback to the designer or development team. Testing will continue throughout the game development cycle, and the purpose and design of the tests will change. At the prototype stage, testing is used to evaluate the game's elements and determine how the play value can be increased and the play experience be improved to make the game more fun and interesting. The game designer is a crucial participant in the first stage of testing.

You do not always need to play through the entire game when testing. Play enough to get the information you need to make more design decisions.

Testing as the Designer (Alpha Testing)

During the earliest testing, the game designer's basic assumptions about the game will be confirmed or rejected. Recruit as many people as you need to meet the player format, and then try playing the game. You either can be a player or can direct the players, but you should be heavily involved in the test.

After the initial play-through, compare the play experience to your notes and decisions from the planning stage. Did the play experience match your expectations? What happened? How did it match your expectations? How was it different? Use the initial tests to help you understand how your game works. As your understanding grows, you will be better able to predict what will happen when you make changes and which changes you need to make. Patience is very important during testing. The players might need to go several rounds before you can determine which problems are because of player inexperience and which are the result of the game systems or rules.

Recording test results in your notebook is a good way to keep track of how your changes affect the play experience. You can use these notes to continue with an idea that works well or backtrack if an idea does not work.

Testing Questions

Here are some questions to consider during testing.

Game Foundation

- Was the game rewarding/fun? In what way?
- What was the best/worst part of the play experience?
- Did the play experience match your vision?
- Should the vision be changed?

Play Experience

- Did the game have a suitable level of difficulty?
- Does the game progress well from beginning to end?
- Does the game have suitable depth?
- Can the game be played multiple times and still remain interesting?
- Does the player feel in control?
- Is the game too frustrating?
- Was the theme used effectively?
- Was the story engaging/interesting/useful?

Implementation

- Were the rules clear? Did they make sense?
- Were there obvious places where rules should be added or removed?
- Were the objectives clear? Did they make sense?
- Was the player format appropriate/rewarding/fun?
- Did the play space work as intended?
- How can the play space be improved?

Outcome

- Who won the game?
- Was there a clear winner?
- What was the winning strategy?
- Were other strategies or tactics successful?
- Was the game's outcome fair?

Use the answers to generate ideas for improving the game. Also, use your understanding of the game to make predictions about what the changes will do.

Game design may look like a very creative field, but it is also very scientific. Each test is an experiment to evaluate game design decisions. With each change to the game elements, you make a kind of hypothesis or prediction about how the play experience will change. After the test, draw conclusions about the change and use them to help you identify more changes you can make. Always keep in mind that your game should be rewarding. Make it fun!

Responding to Setbacks

Sometimes you will have an idea that seems perfect, but when you test it, the idea flops. This might be because of poor implementation, but it might be that the idea is just not as fun as you had expected. Do not worry; this happens to every game designer. Unsuccessful ideas are part of coming up with anything new. Inventors sometimes go through hundreds of ideas that do not work out before they find one that does, and the same is true of game designers.

Whenever you hit a setback, it is OK to feel sad or frustrated. But do not let a setback stop your project. Keep going. Try something different. Use what you have learned from your testing. Look at things from a different angle. Give yourself a fresh start. Your final result may be completely different from your initial vision, and that is OK. Setbacks are vital to design success, regardless of the field or discipline. The ability to recognize unsuccessful designs is actually a very important skill for developers to learn.

This is where your design notebook becomes an essential tool. Look back at prior decisions and see where you lost your path. Did you lose track of your vision? Did you make a decision based on incomplete data or a poor concept? A path that you did not take earlier may be the next one to try (or not). In any case, be sure to completely describe the issues you are having, why you think they are a problem, and what you expect to try to advance the project. Just the process of completely documenting your problem usually helps in finding a new direction.

Blind Testing (Beta Testing)

As the designer, you are unable to look at your game the way a new player would. You know what you want the play experience to be, but a new player has only the game pieces, rules, and objectives to work from. Once you have a fully working prototype and a clear understanding of how the game works when played, it is important for you to arrange a blind test. In a **blind test,** the players have little or no experience with the game beforehand and do not interact with the designer during the test. Instead, they use the rules and components provided by the designer and play the game as well as they are able.

Writing Rules for Testing

Your rules will be used by the players in very different ways, depending on their experience with other games like yours and their prior experience with your game.

- Players with no experience with games like yours will need very complete rules and explanations. They may not even know how to read special dice or prepare components for play. To test this kind of ruleset, have someone who is unfamiliar with your game (maybe a parent or grandparent) explain your game to you after reading your rules.
- Players who have experience with games like yours need fewer elementary rules with an emphasis on differences from standard forms of the game. Players like this respond very well to standard terminology and methodology.
- Players who have learned the game often have specific questions about boundary issues. Answer these questions with clear examples.
- Players sometimes use the rules to create "gotchas," or unfair advantages in interpretations of the rules. Dealing with these "rules lawyers" can be frustrating, but failing to do so often undercuts the impact of the game.

It is difficult to address all of these types of players with a single set of rules. You might consider a tutorial game with simplified rules for the first kind, a set of tournament rules for the third and fourth kind, and solid basic rules for the second kind. Handling this [challenge] is a big part of the art form of game design.

—Darwin Bromley, game designer, Empire Builder®

In addition to tracking game actions, watch body language to help you understand the players' emotional state during the test.

Blind testers should be similar to the people you imagine will be playing your game when it is finished. Consider asking other Scouts or Scout leaders to test your game during a troop meeting or campout. Otherwise, a family member and classmates or friends could be testers. Finding testers can be challenging, but they will provide a unique and crucial perspective on both the intended game and the specific ways you have communicated the rules and objectives.

Begin a playtesting session by handing the testers any rules or instruction sheets that you have written to go with the prototype components. Do not give them extra instructions on how the game is played, but you can provide questions for them to think about while they play. During the playtest, if the players get confused by the rules or stuck, they should make up whatever rules they need for play to continue. This is what would happen if someone bought a new board or card game and the rules were confusing or incomplete.

By observing people as they play your game, you can see how they progress, how they deal with challenges, and where they appear to become confused or bored. It is important to take notes throughout this process so that afterward you have a record of what happened. Write down the problems you find as well as any important contributing factors (number of failures, player frustration level, their score or progress, length of play).

> Much of your testing should involve how others, not you, interpret the rules that you have provided.
>
> —Alex Yeager, submissions editor Catan Studios

During some tests it can be useful to ask general questions. One of the most useful questions you can ask is, "What are you trying to do right now?" This is helpful because it tells you what the player is thinking. The player's answer can give you unexpected and important information about how players are experiencing the game. Then you can ask yourself if their thought process is consistent with the gameplay you are trying to achieve.

After the test is over, ask the players about the game experience. Many of the questions you asked during earlier testing also apply to playtesting. Write down your questions ahead of time. To simplify the process, consider using a questionnaire. Try to ask questions only about what you really need to know so that the questionnaire does not take too long. Good things to find out are what aspects of the game were confusing, boring, or too difficult.

Consider using rating scales on questionnaires to help you get concrete feedback. You can also leave space for testers to explain their answers or include any extra information they feel strongly about.

Game designer Don Cornelson grew up in India with few options for entertainment. He used imagination, ingenuity, and simple objects to create fun and games. "Real entertainment originated from the interaction of the people around you," he said.

Cornelson says it takes hundreds of hours to develop just the game mechanics, before testing the prototype even begins. For his game Word FRENZY®, he used about 45 testers who played the game many times in groups of four, six, and seven players. From conception to production, the process took two years.

He analyzed information such as time per round, time to complete a full game, issues that caused confusion, and rule questions. He also observed "enjoyment levels"—the fun factor—and the social interaction. Afterward, participants completed questionnaires about their gameplay experiences and other elements of the game.

His advice? While "anyone can develop a game that they, themselves, love," developing one that many people will enjoy is the challenge, he said. "Believe in your concept . . . but hire professionals to help with any elements where you are not a professional." For Cornelson, that meant leaving the manufacturing, sales, and distribution to others. However, "No one else will have more passion about your game than yourself," he said.

Using Feedback

After you have all the information from playtesting sessions, it is time to act. What did you learn? What did the testing reveal about your game? How did the playtesters act that was different from how you thought they would act? Most important of all: How are you going to change the game with this new information?

The goal of playtesting is to get feedback you can act upon, but remember that player feedback is just one piece of the puzzle. Problems during playtests are symptoms, and as the game designer you must identify the causes and determine whether or not they need to be changed. If you are unsure about what action to take, perform additional testing to give you more information. Keep at it, and your patience will eventually be rewarded in the best way possible: a rewarding game experience that you created and can share.

Once you think you have identified the cause and have come up with a solution, run tests with the new rules to determine if you are correct.

Careers in Game Design

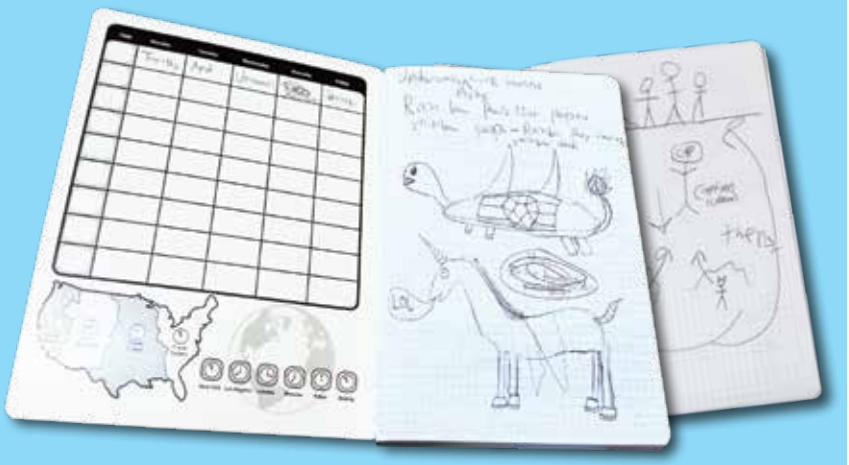
"Dream job" is how many professional game designers describe their career. After all, who would not want to make games for a living? Game design is one of the most challenging fields to break into. There are far fewer positions out there than people who want to make it their career. Many successful game designers can point to a hefty dose of luck, as well as their talent, creativity, passion, determination, and hard work as the keys to their success.

Education and Skill Sets

No matter what kind of game designer you want to become, you should make sure that you take classes in some key areas in school. Many high schools and colleges offer creative writing, which teaches you fundamentals in telling good stories that will be the backbone of narratives for games. Having an excellent grasp of mathematics, especially statistics, can help you create working systems with which to make your game. Understanding statistics will help you fine-tune and balance your game while keeping it fun. You will quickly find how statistical analysis allows you to simulate a typical game even when there is a lot of randomness involved and can dramatically improve the feedback you get from the playtesting that you do.

Additionally, you may want to consider learning about graphic design so that you can make your game look presentable. Although the saying goes "you can't judge a book by its cover," most people's first impression of your game will be based on how it looks, not how it plays. Finally, understanding computer programming is very helpful if you want to work on electronic games.

In addition to formal education, immerse yourself in games of every type. See what other game designers did and put yourself in their shoes. Ask yourself, "Why did they make those particular game design decisions?" Once you are able to understand how other games were made (especially games you like), you will then have an excellent head start on making your own games for others to enjoy.



Nonelectronic Game Design

This area is very crowded with aspiring game designers, and most established companies will not hire anyone who does not already have a successful game. So the question becomes, "How can you make a successful game if no one will hire you?"

Consider self-publishing your first games. This can be expensive and risky, but it is the best way to become known as the creator of a good game. Minimize the risk by publishing your most polished and playtested game design. You are putting everything on the line and you do not want to represent yourself with a substandard product. Internet distribution also allows players to share or sell game documents at little cost.

Many designers of nonelectronic games, even those with successful game titles, consider game design a "hobby career"; that is, they have a full-time job that pays the bills and quite possibly finances their game design work.

Electronic Game Design

It may be easier to begin your career in electronic game design because there are more firms hiring for these positions. Because it sounds exciting, there is fierce competition for those positions. "Knowing someone" is how many game designers got their start in the industry, but that may not be an option for you.

Being a **quality assurance analyst,** or "game tester," is a typical entry-level position for aspiring game designers. It gets your foot in the door and you might get noticed for your hard work, perceptiveness, and persistence. A QA analyst can be a difficult position that is not well-paid. While testing does involve playing games, it can also consist of playing the same game—maybe one you do not even enjoy— every day, for months or years.

Excellent QA analysts with ambition can see themselves promoted to game design. Most entry-level **game designers** have a narrow focus, maybe on mechanics, level design, or dialogue. They generally follow a more senior person's design, and thus may not have a lot of creative control over the content they are creating. However, they are ultimately responsible for that content making it into the game.

Design leaders are in charge of creating and implementing designs of a specific component of a game. This position offers great freedom to truly show your creativity and be extremely proud of the work you do. Eventually this can lead to **lead designer,** where you are in charge of realizing the overall design vision for the game, managing the entire design team, and providing direction and guidance to the team. The ultimate game design position would be **creative director,** where you lay down an overall vision of the game your company is making.

Designers often work with a technical team to bring their design to life, which includes **programmers, artists,** and **audio specialists.** Sharing the overall responsibility for the success of the game is the general manager, who is tasked with the production and business side of the effort. Finally, as with most creative projects, games require **producers**, who coordinate and manage the overall project, schedule, and budget.

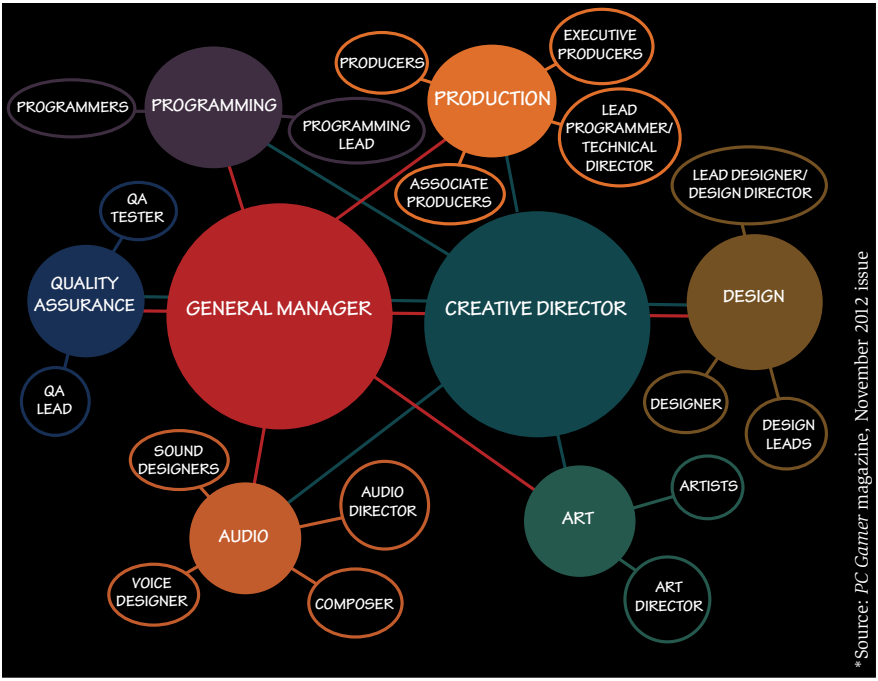


Diagram of game design positions*

Nondesign Career Paths

The skills you hone while designing games can be used not only within the game industry but also in other careers. Artists and animators who can give good input on the graphic design of the game they are working on are extremely valuable and save companies time and money while making a superior product. Computer programmers who have a background in design can consider boundary conditions that the designer may have not thought of. Finally, great project managers in any field can look at their project like a complex puzzle being worked on by a number of different people. Getting them to all work together can be done easier with skills you learned from designing and playing games.

Work within the game industry is not a career everyone can pursue no matter how hard they try, but that does not mean game design cannot be incorporated into everyday life. Coming up with a fun, exciting, and balanced ruleset is a good skill to have in almost any career. As a manager, you can make your employees work smarter and harder by gamifying their tasks—making work activities more like play activities through the use of rules and objectives. Teachers can employ game elements in the classroom to make learning a more engaging, participatory experience. You can also use the psychology of rewarding tasks to get yourself to do things you would not normally want to do. Assign point values to boring chores like cleaning the bathroom or paying the bills, and restrict yourself from fun activities or a new purchase until you achieve a certain point threshold.

If you have a game that you want to pitch to a publisher, remember these tips.

- Show your best, most finished, and most of all fun game. Make sure that the testers are having a blast when they play your game.
- Make sure the game you are showing fits in with what the publisher normally makes. Do not show a board game to a card game company, for instance.
- If you are pitching an electronic game, have a good working prototype and be prepared to answer ANY question about the game's design. Be prepared to hand over all the game design documentation.
- Nondisclosure Agreements (NDAs) protect you and your game idea. It is good practice to get anyone who is looking at your game to sign an NDA. Remember, if you are not 18, you will need to get a parent or guardian to sign on your behalf.

Glossary

abstract. A game that does not have a theme. Checkers and Uno® are abstract games.

age appropriateness. The age or maturity level of the players for which a game's content is appropriate, determined by elements such as language and violence.

balance. A description of the relative strength of different game attributes. A competitive game is balanced if all starting positions, character classes, roles, teams, etc., have a roughly equal chance of being successful. Balance also applies to choices that players make. In basketball, two-point shots and three-point shots are balanced relative to each other because three-point shots are more valuable but more challenging.

blind test. A playtest in which the participants have no prior knowledge of the game and are given no outside assistance beyond the game materials. The game designer should either silently observe the test or have the testers answer questions afterward but should not tell the participants how to play the game. If the testers get stuck, they should make up whatever rules they think are necessary to continue play.

campaign. A story arc played over several sessions involving the same characters and setting in an RPG. Campaigns allow for the characters to develop and gain (or lose) power, abilities, equipment, etc.

characters. An imaginary person or being who is controlled by one of the participants, a gamemaster, or the game itself. A non-player character is controlled by the game.

competitive. A game where not all players can meet the objective(s).

complexity. The number of game elements with which a player must interact and the number of rules a player needs to know. The more complex a game, the more difficult it is to balance.

cooperative game. A game where players can work together to meet the objective(s).

depth. The capability of a game to support or appeal to a broad range of strategies or skill levels. A game with simple rules can still be complex or deep and allow for complicated strategy and skill mastery. Deep games generally have more replay value than shallow games.

difficulty. The amount of challenge for a player to complete a game objective.

exploit. A player action that is unintended by the game designer, allowed (or not directly forbidden) by the rules, and gives a player an unfair advantage or allows the player to ignore or skip game content or mechanics.

gamemaster (GM). The organizer of a text-based role-playing or miniature figure–based game. The GM defines and controls the setting and non-player characters. The GM sets the stage for players to play the campaign and reacts to the actions of players to advance the story of the campaign. A good GM keeps players interested, maintains game balance, has a good imagination, and thinks quickly as players act in unexpected ways. In electronic role-playing games, the software often acts as the GM. See text-based RPG.

gameplay. The experience of the *playing* of a game; the experience of taking actions under the rules of a game. For example, the basic gameplay of a platforming game is get to the end of a level using the movement tools available (running, jumping, ducking, etc.) while avoiding obstacles and collecting items.

game system. A collection of rules or game mechanics that fully describe one section of a game (e.g., combat system, movement system) or a machine for playing electronic games (e.g., Game Boy®, PlayStation®, Xbox®). For text-based role-playing games, it refers to the game's complete set of rules. GMs often modify game systems to fit their needs. The d20 and GURP systems are examples of game systems.

interface design. The process of developing effective methods for communication between players and games. The interface includes how the players provide input to the game and how the game communicates the context and results of the input to the player.

iteration. A version of a game, rule, or mechanic that is changed from a previous version. Game designers use iterations to incrementally improve their games.

level design. The process of creating the spaces in which players work to achieve objectives.

mechanic. A rule or combination of rules designed to create a specific type of gameplay. Mechanics represent the intent behind the rules. For example, many board games have a mechanic for moving players around the board. The specific rule might be to roll two dice and move forward the total number shown.

medium. The form of a game. Mediums include but are not limited to electronic games (PC, web, console, or mobile device), board games, dice games, card games, athletic games, physical games, and text-based role-playing games. Similar gameplay can exist between different mediums, and mediums can mix and overlap.

multiplayer. A game or game mode with more than one player. The game can be cooperative, competitive, or both.

objective. A game goal that defines how to win or complete the game. Often referred to as "victory conditions," objectives can also mark progress through a game.

pace. The speed that information is transmitted to and actions are made by a player. A chess game played through the mail has a very slow pace. Lightning and Blitz chess have a fast pace.

play sequence. The order in which players take actions and how those actions flow together. Some games are real-time, where a player or players can take actions constantly. Other games are turn-based, and the sequence determines the order of the turns. Other games mix real-time and turn-based play.

play value. The core reason for or benefit from playing a game. For example, the value of a game may come from discovering and exploring a game space or from competing and cooperating with friends.

player format. The number, arrangement, and alignment of players in a game. This defines whether the game is single-player or multiplayer and whether the players are competing or cooperating with one another. If there are teams, the format indicates the size of the teams and how they relate to one another.

prototype. A functional model used for testing. The goal of a prototype is to test game elements; therefore, it should be made quickly and inexpensively. It must also be easy to change.

real-time. A game in which players can take actions as fast as they are physically or mentally able. Contrast with turn-based games.

reflex gameplay. Gameplay based on a physical action; also referred to as twitch and dexterity games or gameplay. The player uses hand-eye coordination or an equivalent to achieve game objectives. Reflex gameplay ranges from whole-body motions like swinging a baseball or softball bat to timed button pressing in a game like Pong.

replay value. The characteristic of being able to play a game multiple times while continuing to have fun.

resource. Anything under the control of a player or team or available to come under control. Resources are limited in some way. Examples include health, currency, territory, information, and time.

role-playing game (RPG). A game in which players take a character's role in a fictional setting and act out that character's role within a story. Such games typically include elements for developing the character's capabilities over the course of the game.

rule. Describes an action, activity, or decision within a game that is required, prohibited, or allowable but optional. Rules are used to set up, play, and end games. Rules direct and define gameplay.

setting. The setting is the fictional environment in which a game occurs.

single-player. A game with only one player. The objective of single-player games may require the player to compete against an element of the environment, against their own skill, against time, or against chance. This is often referred to as solitaire play, particularly with card games.

story. The plot line of the game created by the game developer. Just as in a book or movie, games can tell stories about characters and worlds. Through their choices and actions, players can also create their own stories as they play the games.

strategy gameplay. Gameplay in which success is the direct result of having and using a plan to achieve objectives.

testing. Essential to game development, the process of playing a game to provide feedback to the designer about the play experience. There are many types of testing.

text-based RPG. A game medium in which players play as characters and describe their actions through speech or writing. Players determine the actions of their characters within the limits of the game system. A GM creates the setting and initial story then takes on the role of the environment and non-player characters. *See gamemaster.*

theme. A game's core topic; not all games have a theme. The theme does not directly affect gameplay but provides an emotional or mental foundation for the game designer and game player. For example, the theme of Monopoly is to build a property empire.

turn-based. A game divided into separate and distinct opportunities to take actions. Contrast with real-time games.

vision statement. A short description of the central idea or ideas of a game. For example, Scrabble is a game where players compete to earn points by spelling interconnecting words on a board.

Game Design Resources

Scouting Literature

Athletics, Chess, Digital Technology, Inventing, Programming, and *Scouting Heritage* merit badge pamphlets

With your parent or guardian's permission, visit Scouting America's official retail site, **scoutshop.org**, for a complete list of merit badge pamphlets and other helpful Scouting materials and supplies.

Books

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adventuregamestudio.co.uk

Entertainment Software Rating Board
esrb.org

RPG Maker
rpgmakerweb.com

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Massachusetts Institute of Technology
scratch.mit.edu

Stencyl
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Twinery 3D
twinery.org

Unity 3D
unity.com

YoYo Games/GameMaker: Studio
gamemaker.io/en

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