I once invested a dollar when Mantle raffled off a ham. I won, only there was no ham. That was one of the hazards of entering a game of chance, Mickey explained.

— Jim Bouton, *Ball Four*, 1970
On Being the Right Size
J. B. S. Haldane, 1928

The most obvious differences between different animals are differences of size, but for some reason the zoologists have paid singularly little attention to them. In a large textbook of zoology before me I find no indication that the eagle is larger than the sparrow, or the hippopotamus bigger than the hare, though some grudging admissions are made in the case of the mouse and the whale. But yet it is easy to show that a hare could not be as large as a hippopotamus, or a whale as small as a herring. For every type of animal there is a most convenient size, and a large change in size inevitably carries with it a change of form.

Let us take the most obvious of possible cases, and consider a giant man sixty feet high—about the height of Giant Pope and Giant Pagan in the illustrated Pilgrim’s Progress of my childhood. These monsters were not only ten times as high as Christian, but ten times as wide and ten times as thick, so that their total weight was a thousand times his, or about eighty to ninety tons. Unfortunately the cross sections of their bones were only a hundred times those of Christian, so that every square inch of giant bone had to support ten times the weight borne by a square inch of human bone. As the human thigh-bone breaks under about ten times the human weight, Pope and Pagan would have broken their thighs every time they took a step. This was doubtless why they were sitting down in the picture I remember. But it lessens one’s respect for Christian and Jack the Giant Killer.

To turn to zoology, suppose that a gazelle, a graceful little creature with long thin legs, is to become large, it will break its bones unless it does one of two things. It may make its legs short and thick, like the rhinoceros, so that every pound of weight has still about the same area of bone to support it. Or it can compress its body and stretch out its legs obliquely to gain stability, like the giraffe. I mention these two beasts because they happen to belong to the same order as the gazelle, and both are quite successful mechanically, being remarkably fast runners.

Gravity, a mere nuisance to Christian, was a terror to Pope, Pagan, and Despair. To the mouse and any smaller animal it presents practically no dangers. You can drop a mouse down a thousand-yard mine shaft; and, on arriving at the bottom, it gets a slight shock and walks away, provided that the ground is fairly soft. A rat is killed, a man is broken, a horse splashes. For the resistance presented to movement by the air is proportional to the surface of the moving object. Divide an animal’s length, breadth, and height each by ten; its weight is reduced to a thousandth, but its surface only to a hundredth. So the resistance to falling in the case of the small animal is relatively ten times greater than the driving force.

An insect, therefore, is not afraid of gravity; it can fall without danger, and can cling to the ceiling with remarkably little trouble. It can go in for elegant and fantastic forms of support like that of the daddy-longlegs. But there is a force which is as formidable to an insect as gravitation to a mammal. This is surface tension. A man coming out of a bath carries with him a film of water of about one-fiftieth of an inch in thickness. This weighs roughly a pound. A wet mouse has to carry about its own weight of water. A wet fly has to lift many times its own weight and, as everyone knows, a fly once wetted by water or any other liquid is in a very serious position indeed. An insect going for a drink is in as great danger as a man leaning out over a precipice in search of food. If it once falls into the grip of the surface tension of the water—that is to say, gets wet—it is likely to remain so until it drowns. A few insects, such as water-beetles, contrive to be unwettable; the majority keep well away from their drink by means of a long proboscis.
Of course tall land animals have other difficulties. They have to pump their blood to greater heights than a man, and, therefore, require a larger blood pressure and tougher blood-vessels. A great many men die from burst arteries, greater for an elephant or a giraffe. But animals of all kinds find difficulties in size for the following reason. A typical small animal, say a microscopic worm or rotifer, has a smooth skin through which all the oxygen it requires can soak in, a straight gut with sufficient surface to absorb its food, and a single kidney. Increase its dimensions tenfold in every direction, and its weight is increased a thousand times, so that if it is to use its muscles as efficiently as its miniature counterpart, it will need a thousand times as much food and oxygen per day and will excrete a thousand times as much of waste products.

Now if its shape is unaltered its surface will be increased only a hundredfold, and ten times as much oxygen must enter per minute through each square millimetre of skin, ten times as much food through each square millimetre of intestine. When a limit is reached to their absorptive powers their surface has to be increased by some special device. For example, a part of the skin may be drawn out into tufts to make gills or pushed in to make lungs, thus increasing the oxygen-absorbing surface in proportion to the animal’s bulk. A man, for example, has a hundred square yards of lung. Similarly, the gut, instead of being smooth and straight, becomes coiled and develops a velvety surface, and other organs increase in complication. The higher animals are not larger than the lower because they are more complicated. They are more complicated because they are larger. Just the same is true of plants. The simplest plants, such as the green algae growing in stagnant water or on the bark of trees, are mere round cells. The higher plants increase their surface by putting out leaves and roots.

Comparative anatomy is largely the story of the struggle to increase surface in proportion to volume. Some of the methods of increasing the surface are useful up to a point, but not capable of a very wide adaptation. For example, while vertebrates carry the oxygen from the gills or lungs all over the body in the blood, insects take air directly to every part of their body by tiny blind tubes called tracheae which open to the surface at many different points. Now, although by their breathing movements they can renew the air in the outer part of the tracheal system, the oxygen has to penetrate the finer branches by means of diffusion. Gases can diffuse easily through very small distances, not many times larger than the average length traveled by a gas molecule between collisions with other molecules. But when such vast journeys—from the point of view of a molecule—as a quarter of an inch have to be made, the process becomes slow. So the portions of an insect’s body more than a quarter of an inch from the air would always be short of oxygen. In consequence hardly any insects are much more than half an inch thick. Land crabs are built on the same general plan as insects, but are much clumsier. Yet like ourselves they carry oxygen around in their blood, and are therefore able to grow far larger than any insects. If the insects had hit on a plan for driving air through their tissues instead of letting it soak in, they might well have become as large as lobsters, though other considerations would have prevented them from becoming as large as men.

Exactly the same difficulties attach to flying. It is an elementary principle of aeronautics that the minimum speed needed to keep an aeroplane of a given shape in the air varies as the square root of its length. If its linear dimensions are increased four times, it must fly twice as fast. Now the power needed for the minimum speed increases more rapidly than the weight of the machine. So the larger aeroplane, which weighs sixty-four times as much as the smaller, needs one hundred and twenty-eight times its horsepower to keep up. Applying the same principle to the birds, we find that the limit to their size is soon reached. An angel whose muscles developed no more power weight for weight than those of an eagle or a pigeon would require a breast projecting for about four feet to house the muscles engaged in working its wings, while to economize in weight, its legs would have to be reduced to mere stilts. Actually a large bird such as an eagle or kite does not keep in the air mainly
by moving its wings. It is generally to be seen soaring, that is to say balanced on a rising column of air. And even soaring becomes more and more difficult with increasing size. Were this not the case eagles might be as large as tigers and as formidable to man as hostile aeroplanes.

But it is time that we pass to some of the advantages of size. One of the most obvious is that it enables one to keep warm. All warm-blooded animals at rest lose the same amount of heat from a unit area of skin, for which purpose they need a food-supply proportional to their surface and not to their weight. Five thousand mice weigh as much as a man. Their combined surface and food or oxygen consumption are about seventeen times a man's. In fact a mouse eats about one quarter its own weight of food every day, which is mainly used in keeping it warm. For the same reason small animals cannot live in cold countries. In the arctic regions there are no reptiles or amphibians, and no small mammals. The smallest mammal in Spitzbergen is the fox. The small birds fly away in winter, while the insects die, though their eggs can survive six months or more of frost. The most successful mammals are bears, seals, and walruses.

Similarly, the eye is a rather inefficient organ until it reaches a large size. The back of the human eye on which an image of the outside world is thrown, and which corresponds to the film of a camera, is composed of a mosaic of "rods and cones" whose diameter is little more than a length of an average light wave. Each eye has about a half a million, and for two objects to be distinguishable their images must fall on separate rods or cones. It is obvious that with fewer but larger rods and cones we should see less distinctly. If they were twice as broad two points would have to be twice as far apart before we could distinguish them at a given distance. But if their size were diminished and their number increased we should see no better. For it is impossible to form a definite image smaller than a wavelength of light. Hence a mouse's eye is not a small-scale model of a human eye. Its rods and cones are not much smaller than ours, and therefore there are far fewer of them. A mouse could not distinguish one human face from another six feet away. In order that they should be of any use at all the eyes of small animals have to be much larger in proportion to their bodies than our own. Large animals on the other hand only require relatively small eyes, and those of the whale and elephant are little larger than our own. For rather more recondite reasons the same general principle holds true of the brain. If we compare the brain-weights of a set of very similar animals such as the cat, cheetah, leopard, and tiger, we find that as we quadruple the body-weight the brain-weight is only doubled. The larger animal with proportionately larger bones can economize on brain, eyes, and certain other organs.

Such are a very few of the considerations which show that for every type of animal there is an optimum size. Yet although Galileo demonstrated the contrary more than three hundred years ago, people still believe that if a flea were as large as a man it could jump a thousand feet into the air. As a matter of fact the height to which an animal can jump is more nearly independent of its size than proportional to it. A flea can jump about two feet, a man about five. To jump a given height, if we neglect the resistance of air, requires an expenditure of energy proportional to the jumper's weight. But if the jumping muscles form a constant fraction of the animal's body, the energy developed per ounce of muscle is independent of the size, provided it can be developed quickly enough in the small animal. As a matter of fact an insect's muscles, although they can contract more quickly than our own, appear to be less efficient; as otherwise a flea or grasshopper could rise six feet into the air.

And just as there is a best size for every animal, so the same is true for every human institution. In the Greek type of democracy all the citizens could listen to a series of orators and vote directly on questions of legislation. Hence their philosophers held that a small city was the largest possible democratic state. The English invention of representative government made a democratic nation
possible, and the possibility was first realized in the United States, and later elsewhere. With the development of broadcasting it has once more become possible for every citizen to listen to the political views of representative orators, and the future may perhaps see the return of the national state to the Greek form of democracy. Even the referendum has been made possible only by the institution of daily newspapers.

To the biologist the problem of socialism appears largely as a problem of size. The extreme socialists desire to run every nation as a single business concern. I do not suppose that Henry Ford would find much difficulty in running Andorra or Luxembourg on a socialistic basis. He has already more men on his pay-roll than their population. It is conceivable that a syndicate of Fords, if we could find them, would make Belgium Ltd or Denmark Inc. pay their way. But while nationalization of certain industries is an obvious possibility in the largest of states, I find it no easier to picture a completely socialized British Empire or United States than an elephant turning somersaults or a hippopotamus jumping a hedge.
dropping of the apple does meet baseline criteria for interaction: there is a reciprocal relationship between the elements of the system (such as the person’s hand, the apple, and the ground). But is it a designed interaction? Is the interactivity situated within a specific context? Do we have any ideas about what dropping an apple might “mean” as a form of interaction between a person and an apple? Do we have a sense of the connection between action and outcome?

No. All we know is that an apple has been dropped. What is missing from this description is an explicitly stated context within which the dropping of the apple occurs. If we change the scenario a little by adding a second player and asking the two participants to toss the apple back and forth, we move toward a situation of designed interaction. If we ask the two apple-tossers to count the number of times in a row they caught the apple before dropping it, we add an even fuller context for the interaction. The simple addition of a rule designating that the players quantify their interaction locates the single act of toss-catch within an overall system. Each element in the system is assigned a meaning: the toss, the catch, and the dropped toss. Even in the simplest of contexts, design creates meaning.

Interaction and Choice
The careful crafting of player experience through a system of interaction is critical to the design of meaningful play. Yet, just what makes an interactive experience “meaningful”? We have argued that in order to create instances of meaningful play, experience has to incorporate not just explicit interactivity, but meaningful choice. When a player makes a choice in a game, the system responds in some way. The relationship between the player’s choice and the system’s response is one way to characterize the depth and quality of interaction. Such a perspective on interactivity supports the descriptive definition of meaningful play presented in chapter 3.

In considering the way that choices are embedded in game activity, we look at the design of choice on two levels: micro and macro. The micro level represents the small, moment-to-moment choices a player is confronted with during a game. The macro level of choice represents the way these micro-choices join together like a chain to form a larger trajectory of experience. For example, this distinction marks the difference between tactics and strategy in a game such as Go. The tactics of Go concern the tooth-and-nail battles for individual sectors of the board, as individual pieces and small groups expand across territory, bumping up against each other in conflict and capture. The strategy of the game is the larger picture, the overall shape of the board that will ultimately determine the winner. The elegance of the design of Go lies in its ability to effortlessly link the micro and the macro, so that every move a player makes works simultaneously on both levels. Micro-interaction and macro-interaction are usually intertwined and there are, of course, numerous shades of gray in-between.

Keep in mind that “choice” does not necessarily imply obvious or rational choice, as in the selection of an action from a menu. Choice can take many forms, from an intuitive physical action (such as the “twitch” firing of a Time Crisis pistol) to the random throw of a die. Following are a few more examples of designed choices in games.

The choice of whether or not to take a hit in Blackjack. A Blackjack player always has a clear set of choices: the micro-choice of taking or not taking a hit will have the eventual outcome of a win or a loss against the house. On the macro-level, each round affects the total amount of money the player gains or loses over the course of the game. Playing each hand separately, according to its probability of beating the house is like tactics in Go. Counting cards, which links all of a players’ hands between rounds, is a more long-term, strategic kind of choice-making.

The choice of what to type into the flashing cursor of a text adventure. This is a more open-ended choice context than the simple hit or pass of Blackjack. The micro-choice of typing in a command gives the player feedback about
how the player moves through or changes the world. The choice to type the words “Move North” takes the player to another location in the game where different actions are possible—perhaps actions that will eventually solve the multi-part puzzles that exist on the macro-level of gameplay. Even when a player tries to take an action that the program cannot parse (such as typing “grab rock” instead of “get rock”), it is meaningful: the outcome of bumping up against the limits of the program’s parsing ability serves to further delineate the boundaries of play.

The choice of what play to call in a football game. This moment of game-choice is often produced collaboratively among a coaching staff, a quarterback, and the rest of the offensive players. There are a large number of possible plays to call, each with variations, and the choice is always made against the backdrop of the larger game: the score, the clock, the field position, the down, the strengths and weaknesses of both teams. The most macro-level of choices address the long-term movement of the ball across the field and the two teams’ overall scores. The most micro-level of choices occur once the play is called and the ball is hiked: every offensive player has the moment-to-moment challenge of executing the play as the defensive team does its best to put a stop to it.

As these examples demonstrate, choice-making is a complex, multi-layered process. There is a smooth transition between the micro- and macro-levels of choice-making, which play out in an integrated way for the player. When the outcome of every action is discernable and integrated, choice-making leads to meaningful play. Game designer Doug Church, in his influential online essay “Formal Abstract Design Tools,” outlines the way that these levels of choice transition into a complete game experience.

In a fighting game, every controller action is completely consistent and visually represented by the character on-screen. In Tekken, when Eddy Gordo does a cartwheel kick, you know what you’re going to get. As the player learns moves, this consistency allows planning—intention—and the reliability of the world’s reactions makes for perceived consequence. If I watch someone play, I can see how and why he or she is better than I am, but all players begin the game on equal footing.

As Church points out, the macro-levels of choice-making include not only what to do over the course of a game, but also whether or not you want to play a game, and against whom. If you are beaten in a fighting game that doesn’t contain clear and meaningful play, you will never know why you lost and you will most likely not play again. On the other hand, if you know why your opponent is better than you are, your loss is meaningful, as it helps you assess your own abilities, gives you ideas for improvement, and spurs on your overall interaction with the game.

Choice Molecules

[The designers of Spacewar!, the first computer game] identified action as the key ingredient and conceived Spacewar! as a game that could provide a good balance between thinking and doing for its players. They regarded the computer as a machine naturally suited for representing things that you could see, control, and play with. Its interesting potential lay not in its ability to perform calculations but in its capacity to represent action in which humans could participate.—Brenda Laurel, Computers as Theater

The capacity for games to “represent action in which players participate” forms the basis of our concept of “choice.” If we consider that every choice has an outcome, then it follows that this action > outcome unit is the vehicle through which meaning in a game emerges. Although games can generate meaning in
many ways (such as through image, text, sound, etc.), to understand the interactive nature of meaningful play, we focus on the kinds of meaning that grow from player interaction. At the heart of interactive meaning is the action > outcome unit, the molecule out of which larger interactive structures are built.

In order to examine this concept more closely we look at the classic arcade game Asteroids, a direct descendant of Spacewar. In Asteroids, a player uses buttons to maneuver a tiny spaceship on the screen, avoiding moving asteroids and UFOs and destroying them by shooting projectiles. The action > outcome interactive units of Asteroids are manipulated through a series of five player commands, each one of them a button on the arcade game’s control panel: rotate left, rotate right, thrust, fire, and hyperspace. Within the scope of an individual game, possible player actions map to the five buttons:

- Press rotate right button: spaceship rotates right
- Press rotate left button: spaceship rotates left
- Press thrust button: spaceship accelerates in the direction it is facing
- Press fire button: spaceship fires projectile (up to four on the screen at a time)
- Press hyperspace button: spaceship disappears and reappears in a different location (and occasionally perishes as a result)

Action on the screen is affected through the subtle (and not so subtle!) orchestration of these five controls. As the game progresses, each new moment of choice is a response to the situation onscreen, which is the result of a previous string of action > outcome units. The seamless flow that emerges is one of the reasons why Asteroids is so much fun to play. Rarely are players aware of the hundreds of choices they make each minute as they dodge space rocks and do battle with enemy ships—they perceive only their excitement and participation inside the game.

Anatomy of a Choice

Although the concept of choice may appear basic upon first glance, the way that a choice is actually constructed is surprisingly complex. To dissect our action > outcome molecule, we need to ask the following five questions. Together, they outline the anatomy of a choice:

1. What happened before the player was given the choice? What is the current state of the pieces on a game board, for example, or the level of a player’s health? What set of moves just finished playing out? What is the game status of the other players? This question relates to the both the micro and macro events of a game, and addresses the context in which a choice is made.

2. How is the possibility of choice conveyed to the player? On a game board, the presence of empty squares or a “draw pile” might indicate the possibility of choice, whereas choices in a digital game are often conveyed through the game’s controls. In Asteroids, for example, the five buttons on the control panel communicate the opportunity for choice-making to the player.

3. How did the player make the choice? Did the player make a choice by pulling a lever, pressing a button, moving a mouse, running in the opposite direction, or passing on a turn? The mechanisms a player uses to make a choice vary greatly, but all are forms through which players are given the opportunity to take action.
4. **What is the result of the choice? How will it affect future choices?** A player taking action within a system will affect the relationships present in that system. This element of the anatomy of a choice speaks to the outcome of a player action, identifying how a single choice impacts larger events within the game world. The outcome of taking a "hit" in Blackjack impacts whether or not the player wants to take another hit, as well as the outcome of the game.

5. **How is the result of the choice conveyed to the player?**

   The means by which the results of a choice are represented to a player can assume many guises, and forms of representation are often related to the materiality of the game itself. In a game of Twister, for example, the physical positioning of bodies in space conveys the results of choices; in Missile Command, the result of the choice to "fire" is conveyed by a slowly moving line of pixels, ending in an explosion; in Mousetrap, the mechanical workings (or non-workings) of the mousetrap convey the results of moving a mouse into the trap space. Note that step 5 leads seamlessly back to step 1, because the result of the choice provides the context for the next choice.

These are the five stages of a choice, the five events that transpire every time an action and outcome occur in a game. Each stage is an event that occurs internal or external to the game. **Internal events** are related to the systemic processing of the choice; **external events** are related to the representation of the choice to the player. These two categories make a distinction between the moment of action as handled by the internal game state and the manifestation of that action to the player.

The idea that a game can have an internal event represented externally implies that games are systems that store information. Jesper Juul, in a lecture titled "Play Time, Event Time, Themability," describes this idea by thinking of a game as a state machine:

A game is actually what computer science describes as a state machine. It is a system that can be in different states. It contains input and output functions, as well as definitions of what state and what input will lead to what following state. When you play a game, you are interacting with the state machine that is the game. In a board game, this state is stored in the position of the pieces on the board, in computer games the state is stored as variables, and then represented on the screen.

In Juul's example of a board game, the "internal" state of the game is immediately evident to the players in the way that the pieces are arranged on the board. In the case of a computer game, as Juul points out, the internal variables have to be translated into a representation for the player. The distinction between internal and external events helps us to identify and distinguish the components of a choice. Within the action > outcome molecule, stages 1, 3, and 4 are internal events, and

<table>
<thead>
<tr>
<th>Anatomy of a choice</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What happened before the player was given the choice?</td>
</tr>
<tr>
<td>2. How is the possibility of choice conveyed to the player?</td>
</tr>
<tr>
<td>3. How did the player make the choice?</td>
</tr>
<tr>
<td>4. What is the result of the choice? How will it affect future choices?</td>
</tr>
<tr>
<td>5. How is the result of the choice conveyed to the player?</td>
</tr>
</tbody>
</table>
Figure 1

<table>
<thead>
<tr>
<th>Anatomy of a Choice</th>
<th>Asteroids</th>
<th>Chess</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. What happened before the player was</td>
<td>Represented by the current positions and trajectories of the game elements</td>
<td>Represented by the current state of the pieces on the board.</td>
</tr>
<tr>
<td>given the choice? (internal event)</td>
<td>The possible actions are conveyed through the persistent button controls</td>
<td>The possible actions are conveyed through the arrangement of pieces on optical event)</td>
</tr>
<tr>
<td></td>
<td>as well as the state of the screen, as it displays the relationships of the game \</td>
<td>The player makes a choice by moving a piece.</td>
</tr>
<tr>
<td></td>
<td>elements.</td>
<td>Each button press affects the system in a different way, such as the position or \</td>
</tr>
<tr>
<td>2. How is the possibility of choice</td>
<td></td>
<td>orientation of the player's ship.</td>
</tr>
<tr>
<td>conveyed to the player? (external event)</td>
<td></td>
<td>The result of the choice is then represented to player via screen graphics \</td>
</tr>
<tr>
<td></td>
<td></td>
<td>and audio.</td>
</tr>
<tr>
<td>3. How did the player make the choice?</td>
<td></td>
<td>The players makes a choice by moving a piece.</td>
</tr>
<tr>
<td>(internal event)</td>
<td></td>
<td>Each move affects the overall system, such as capturing a piece or shifting \</td>
</tr>
<tr>
<td></td>
<td></td>
<td>the strategic possibilities of the game.</td>
</tr>
<tr>
<td>4. What is the result of the choice?</td>
<td></td>
<td>The result of the choice is then represented to the player via the new arrangement of pieces on the board.</td>
</tr>
<tr>
<td>How will it affect future choices?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(internal event)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5. How is the result of the choice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>conveyed to the player? (external event)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

stages 2 and 5 are external events. These two layers of events form the framework within which the anatomy of a choice must be considered. To see how this all fits together, let us take an even closer look at the way choice is constructed in two of our example games, Asteroids and Chess. (Figure 1)

Although all five stages of the action > outcome choice event occurred in both games, there are some significant differences. In Asteroids, the available choices and the taking of an action both involve static physical controls. In Chess, the pieces on the board serve this function, even as they convey the current state of the game. The internal and external states of Chess are identical, but in Asteroids, what appears on the screen is only an outward extension of the internal state of the software. The "anatomy of a choice" structure occurs in every game, although each game will manifest choice in its own way.

This way of understanding choice in a game can be extremely useful in diagnosing game design problems. If your game is failing to deliver meaningful play, it is probably because there is a breakdown somewhere in the action > outcome chain. Here is a sample list of common "failure states" that can often be found in games and the way that they relate to the stages of a choice.

- Feeling as if decisions are arbitrary. If you need to play a card from your hand and it always feels like it doesn't matter which card you select, the game probably suffers in stage 4, the effect of the player's choice on the system of the game. The solution is to make sure that player actions have meaningful outcomes in the internal system of the game.
Not knowing what to do next. This can be a common problem in large digital adventure games, where it is not clear how a player can take action to advance the game. The problem is in stage 2, representing choices to the player. These kinds of problems are often solved with additional information display, such as highlights on a map, or an arrow or indicator that helps direct the player.

Losing a game without knowing why. You think that you're about to reach the top of the mountain, when your character dies unexpectedly from overexposure. This frustrating experience can come about because a player has not sufficiently been informed about the current state of the game. The problem might be in stage 5, where the new state of the game resulting from a choice is not represented clearly enough to the player.

Not knowing if an action had an outcome. Although this sounds like something that would never happen, there are many examples of experimental interactivity (such as a gallery-based game with motion sensor inputs) in which the player never receives clear feedback on whether or not an action was taken. In this case, there is a breakdown at stages 3 and 4, when a player is taking an action and receiving feedback on the results.

These examples represent only a small sampling of the kinds of problems that a game's design can have. The anatomy of a choice is not a universal tool for fixing problems, but it can be especially useful in cases where the game is breaking down because of a glitch in the player's choice-making process.

Space of Possibility
We conclude this chapter with an excerpt from David Sudnow's book, Pilgrim in a Microworld, a wonderfully detailed personal account of one man's very real obsession with the video game Breakout. Sudnow brings readers into the space of designed interactivity through detailed descriptions of what he experienced—physically, psychologically, emotionally—as he played. There are remarkably few documents that offer such a sensitive and insightful analysis of designed interaction.

...I'd catch myself turning my chair into a more en face position vis-à-vis the TV. An obvious delusion. Maybe I could rest one elbow on the set to help feel the angle of my look and deepen a sense for the scale of things. See it from this side and that, see the invisible backside of things through an imaginary bodily tour of the object. Nonsense. If only I could feel the impact of the ball on the paddle, that would certainly help, would give me a tactile marker, stamping the gesture's places into a palpable little signature so I'd feel each destination being achieved and not just witness the consequences of a correct shot. Nonsense.

Non-sense, just your eyes way up top, to be somehow fixed on things in ways that can't feel them fixing, then this silent smooth little plastic knob down there, neither near nor far away but in an untouchable world without dimensions. And in between all three nodes of the interface there's nothing but a theory of electricity. So fluid, to have to write your signature with precise consistency in size within the strict bounds of a two and three-sevenths of an inch of space, say, while the pen somehow never makes contact with the paper. There's nothing much to hold on to, not enough heft in this knob so your hands can feel the extent of very minor movements, no depth to things you can use to anchor a sense of your own solidity.

As game designers, what can we glean from Sudnow's observations? His analysis suggests that there is a wealth of information to be gained about a game's interactivity by looking at it from the player's point of view. One of our disappointments with current writing on games and interactivity is that much analysis occurs not from the point of view of the player, but from the point of view of an outside spectator. This style of over-the-shoulder journalism fails to recognize that interac-
tivity is something to be experienced, rather than observed. In writing a player-centric account of his encounter with the game, Sudnow calls attention to key concepts for designed interaction. Concepts such as directed choice, player control, amplification of input, system representation, and direct, visible feedback emerge in his poetic meditation on perception, attention, cognition, and the body.

Creating a game means designing a structure that will play out in complex and unpredictable ways, a space of possible action that players explore as they take part in your game. What possible actions might players take in the course of a game of Musical Chairs? They might push, shove, tickle, poke, or fight for their seat once the music stops and the mad scramble for chairs begins. The game designer must carefully craft a system of play in which these actions have meaning in support of the play of the game, and do not distract or interrupt its play.

But game designers do not directly design play. They only design the structures and contexts in which play takes place, indirectly shaping the actions of the players. We call the space of future action implied by a game design the space of possibility. It is the space of all possible actions that might take place in a game, the space of all possible meanings which can emerge from a game design. The concept of the space of possibility not only bridges the distance between the designed structure and the player experience, but it also combines the key concepts we have presented so far. The space of possibility is designed (it is a constructed space, a context), it generates meaning (it is the space of all possible meanings), it is a system (it is a space implied by the way elements of the system can relate to each other), and it is interactive (it is through the interactive functioning of the system that the space is navigated and explored).

The space of possibility springs forth out of the rules and structures created by the game designer. The space of possibility is the field of play where your players will explore and cavort, compete and cooperate, as they travel through the experience of playing your game. But like David Sudnow who wishes he could reach out and touch the electronic blip of his Breakout paddle, as a game designer you can never directly craft the possible space of your game. You only can indirectly construct the space of possibility, through the rules you design. Game design is an act of faith—in your rules, in your players, in your game itself. Will your game create meaningful play? You can never know for sure. But understanding key concepts like design, systems, and interactivity can help bring you closer to a meaningful outcome.

Further Reading

*Computers as Theater,* by Brenda Laurel

Although Laurel is not speaking about games directly, her discussion of a dramatic theory of human-computer activity has many connections to the interactivity of games. The most relevant discussions to game design focus on the mechanics of interaction and the way people interact with machine interfaces.

*Recommended:*

Chapter 1: The Nature of the Beast
Chapter 5: Design Principles for Human-Computer Activity

*The Design of Everyday Things,* by Donald Norman

Norman’s book is a must read for any designer involved in the design of interactive systems. His approach has been formalized more recently within the catch-phrase “experience design,” which places the user at the center of any designed activity. Although Norman is writing about everyday objects such as telephones and car doors, his observations have direct application to the design of games as interactive systems.

*Recommended:*

Chapter 1: The Psychopathology of Everyday Things
Chapter 2: The Psychology of Everyday Actions
Chapter 3: Knowledge in the Head and in the World
Chapter Three  
WHAT IS IT GOOD FOR?

So, for the first time in the history of the videogame form, people who aren't programmers or corporations can easily make and distribute games. But why would they want to? Why make a game—especially when there already exist the means to write stories, play songs, film yourself for YouTube? What can we do with games that we can't do with those forms?

To begin, let's define what a game is.

You've played games and you have assumptions about what they are. Maybe when you read game you imagine a videogame; maybe when you imagine a videogame you imagine a big-budget run-jump-shoot game. Maybe you imagine Tetris. Since I'm more interested in games, digital and otherwise, that don't resemble games that already exist, I think a fresh definition is in order. I also think it's worthwhile to have a definition that isn't specific to digital games, because I'm interested in the commonalities between digital and non-digital games, and in connecting videogames to that much older tradition.

So here's my definition:

A game is an experience created by rules.
That's pretty broad, huh? I'm interested in as inclusive a definition as possible, though you might argue that mine is too broad: for example, you can use it to describe getting stuck in a traffic jam or paying your taxes. A tax form is nothing but a series of rules you follow to produce a final number, after all. But is it useful to think about your taxes as a game? Not really. Do the rules on a tax form really create a strong experience, or are they just a method for producing a number?

A game is an experience, and that experience has a certain character. Maybe a game is a story, or maybe it's the experience of control giving way to panic giving way to relief. Maybe it's about taking something and making it grow bigger and bigger, or maybe it's about two rivals, equally matched, each trying to out-guess the other's plans. The experience that we identify as a game has character, and we can talk about what that experience is.

And if we're discussing an experience, then that implies someone is there to have that experience, someone we refer to as a player. We can't talk about a game without talking about the experience of the player playing that game, even if the playing experience we're talking about is often our own.

The experience we call a game is created by the interaction between different rules, but the rules themselves aren't the game, the interaction is! A game can't exist without a player or players: someone needs to be engaging with the rules for the experience to happen.

How does that work? Consider a game of Tag. Rules: One player is IT, and must tag as many of the other players as possible with a touch. Each of those other players is SAFE when she touches this gnarled-up oak tree. You can see the way the interaction between those two rules creates an interesting (and volatile) dynamic. The players who aren't IT want to
reach the tree, but the player who is IT wants to stop them.

You can imagine a situation where the IT player is standing between two other players—one to her left, one to her right—and the SAFETY of the tree. Maybe one of them will make a break for the tree, maybe IT will be forced to pick one of the two to chase while the other gets to make a run at the tree, maybe a fourth player will take advantage of IT's distraction to make a run at the tree from behind. When we talk about a game of Tag, we're talking about this experience. But this situation (and it's a good, tense one) isn't explicitly defined anywhere in the rules. However, notice how these rules guide the creation of that situation. The rules set the players in opposition to each other, give most of the players a goal, and give the other player a reason to intervene, creating a tense dynamic.

What if we were to take either of these rules away: the SAFE location or the player who's IT? Without a SAFE location, players have no reason to stay nearby and interact with the other players, especially the IT player. The ideal strategy to avoid IT would be to go as far away as possible, and that breaks the tension and hence the experience of the game. What if there was no IT player? Then it'd just be people running around, and while a bunch of people running around has value, it doesn't have the character or dynamic of a game.

But there's certainly room to change the details of the rules. Tag, being a folk game, has been played by many people, in many places with many, many different versions of the rules. In one version, a player might be done once she's tagged the SAFE tree. As more and more players tag the tree and leave the game, the players who are less fast become greater and greater targets because the IT player can focus less on monitoring the tree and more on pursuing them.
Alternately, what if a player who touches the tree isn't permanently safe—what if players are only allowed to be in contact with the tree for five minutes at a time? That keeps players vulnerable to IT and keeps the game from stagnating. Maybe a player who leaves the tree has temporary immunity to allow her to get safely out of IT's sight, or maybe it becomes a stand-off, where the escaping player has to wait for another player to distract IT's attention before she can make a break for it.

What about freeze tag? In this case, a player who's tagged by IT is "frozen" and has to wait for another player to come and "rescue" her before she can move again. This variation has much more direct interaction between the non-IT players. Instead of just depending on one another as decoys, they have to actively put themselves at risk to aid other players, which only adds to the tension of the game. And it creates a new dynamic between the non-IT players: I rescued you this time, but if I get tagged you're going to have to leave the tree and rescue me.

And that's what games are good at: exploring dynamics, relationships, and systems.

The Story of Tetris
A "system" is what we'll call the interaction (or ongoing interactions) between a set of rules. Let's talk about Tetris now.
What are the rules of Tetris, essentially? The basic rules that drive Tetris are:

The game is played with pieces, comprised of every possible combination of four squares. (See the image above.)

- Pieces fall continuously into a well of a certain volume. The player can guide the pieces' fall to the left and right of the well, and also rotate the pieces both clockwise and counterclockwise.
- Pieces are removed from the well when and only when the player organizes them into complete rows.
- If there is no room left in the well for a new piece to fall, the player loses.

You can see how these rules create a system where the player's mistakes compound on one another to cause further mistakes: Only full rows are eliminated, so incomplete rows stick around and take up space in the well. Clutter in the well then makes it more difficult to position other pieces and to create rows. As the row fills with mistakes, it eventually
becomes impossible to fit more pieces, and the game ends.

These rules function in tandem to give the game a momentum and shape: the player makes errors that cause further errors, until eventually the player is overcome. (And consider how well a commonly added rule, “the pieces fall faster every time ten lines are made,” works with these basic rules to help the game escalate.) We could consider this a system.

All games aren’t necessarily simulations of existing systems: it would be difficult to imagine a situation in the world that actually resembled Tetris. But it’s easy to imagine simulations that model systems of rules that are far less abstract: urban planning, politics, oil drilling. And there are games whose rules mimic such systems. Will Wright’s SimCity is a game in which the player plans a city, Jim Gasperini’s Hidden Agenda is a game in which the player governs a post-revolutionary South American nation. Arch D. Robison’s Seismic Duck models the way drillers use aimed sound waves and seismogram to find oil reservoirs.

You can begin to see how systems can be translated into game rules: a commercial zone in SimCity, for example, needs people to act both as a work force and as consumers. That means the people need homes to live in, transportation to get them around the city, power to make sure the lights are on. The system teaches concepts about the interdependency of urban forces. To again cite Greg Costikyan’s “Maverick Award Speech”: “I want you to imagine a world in which the common person is no longer ignorant of economics, physics and the functioning of the environment—things which are themselves interactive systems—because they have interacted with them in the form of games.”

Every game of Tetris has the same shape—errors compound on errors until the well is filled and the player is
overcome—because the system of rules we've discussed guides the experience in that direction. But the player places all the pieces herself. Every player will place the pieces differently, will play a different game, but experience a similar result. The same holds true for any system of rules, as simple as Tag or Tetris or as complicated as SimCity. Games have a lot of potential for examining the relationships between things—or, rather, for allowing the player to examine the relationships between things, because the player does not merely observe the interactions; she herself engages with the game's systems.

**The Rise of the Designer**

Tag is an example of a folk game, along with Go, Chess, Poker, Stickball, Hide and Seek, and most of the world's oldest games. Games have been around as long as civilization has; the game is by no means a new form or a recent invention. What is relatively recent is the shift from folk to authored games. Folk games, like folk songs and folk texts such as the Bible, have no single credited author, but rather many untraceable authors over many years. They're artifacts shaped by entire cultures, and generally they can tell us a lot about those cultures.
For example, compare Chess, a continental European board game of warfare, with Hnefatafl, a Viking board game of warfare. Chess is a game of combat between kings with equal resources. Each player has the same pieces and starts in the same position on opposite sides of the game board. Each player’s goal is to capture the other player’s king. In Hnefatafl, one player represents a king and his defenders, who start in the center of the game board. The other player represents the attackers, who surround the king’s forces on all sides of the board. The king player’s goal is to get the king through the attacking hordes to safety, while the other player’s goal is to surround and capture the king. The differences between these games’ interpretations of combat tell us a lot about the differences between strategic thought between European vassal kings and Viking warrior bands: their priorities, the nature of their battles, and whether they approach warfare as a platonic war between equals. And the games themselves, in turn, shape the strategic thought of those who play them.

Our history is full of folk board games. Authored board games—games created by a single person or small group, and whose authors can be identified—are a more recent phenomenon. For example, I can tell you that the board game Cosmic Encounter was designed in 1977 by Bill Eberle, Bill Norton, Jack Kittredge, and Peter Olotka of Eon Games. (We can date Cribbage, by Sir John Suckling, to the 1630s.) These are games as texts of specific rules, rather than as patterns of rules that are subject to change through mimicry. A game of Tag will always have a chasing player and a safe position, but the actual rules will change from play to play. The majority of contemporary board games are designed by a single author or team, and the same is true of digital games.
Can there be folk videogames? Videogames retain credits better than board, card, and physical games. I think that there are digital games, though, that exist as patterns of similar rules, perpetuated through duplication with small mutations. There are a thousand different versions of Tetris, for example, each coded by one of a thousand different authors, and each version with a slightly different set of rules, a slightly different set of numbers, and often (to avoid litigation) a different name. There's a digital game that's commonly known as "the snake game," which began as an arcade game called Nibbler by Joseph Ulowetz and John Jaugilas. In this game, the player directs a snake to gobble pieces of food. The snake dies whenever it crashes into either a wall or its own body by coiling around itself. Each piece of food causes the snake's tail to grow longer, making it take up more space and making it more difficult for the player to avoid collisions with her own body. So many different authors have remade this game on so many different machines that all of its forms and variants are usually just referred to as "the snake game." Is this how authored games become folk games?

But what can authored games tell us that's different from folk games? Folk games tell us about the culture that created them; authored games tell us about the author that created them. Authored games have the potential to be more personal, and thus more specific and diverse, than folk games. Two plays of an authored game are likely to be more similar than two plays of a folk game, because the authored game retains the rules set created by its original designer. It's the fact that folk games change with each player that makes them so long-lived, that makes them adapt to suit the culture that adopts them. But in this book, it's authored games, and the diverse set of voices they embody, that I want to focus on.
What's Video Good For?

In a board game, players have to track how much money is left in the bank, which pieces are in play, how high the water level rises. A deck of cards can keep players from knowing in what order pieces will come into play, dice can generate random outcomes to situations, and players have hands of cards that represent information they keep from the other players, but beyond these basic devices, little information can be hidden from the players, because the players must make sure the rules are being observed by tracking most of the information themselves.

In digital games, the computer keeps the rules. The computer tracks all the numbers. Digital games therefore have much greater control over what information the players have access to, making videogames capable of much greater ambiguity than board or card games.

What’s ambiguity good for? Telling stories! Digital games have great potential for storytelling. The author has a lot of control over the pace at which information is revealed; therefore the author can pace the telling of a story. This is not to say that videogame stories are being told as well as they could be. But the format of a videogame—which lets rules be changed and introduced over the course of the experience, and which lets the author hide the causes for events and show only the effects—lends itself more easily to an overt, sustained narrative than any physical game format.

Because the rules are kept by the machine, the rules in digital games tend to be more numerous and more subtle. Think of a game like Shigeru Miyamoto and Takashi Tezuka’s Super Mario Bros. Unless you’ve studied the game in great detail on a technical level, you probably don’t know exactly how high Mario can jump relative to the height of the screen, or how
fast he accelerates horizontally when he runs. The interactions between these hidden rules in videogames can result in very complex systems without necessarily complicating the game, because the player isn’t required to track and compare all the numbers. For example, imagine the designer creating a situation where there’s a tiny platform with a long pit on either side. Mario has to run to build up the momentum to clear the pit and land on the platform, but instead of stopping there he needs to immediately jump again in order to make the second pit without losing the momentum that will let him cross it. This is a problem that wouldn’t be obvious to someone who had just approached the game.

Through playing the game, the player develops a sense of the limits and subtleties of these hidden rules. This interaction between the player and the game, dependent on the game’s hiding information, gives digital games their special capacity for subtlety and nuance. You could compare it to the use of “English” in a physical sport: the difference between hitting a ball and hitting it with a particular force, and in a particular direction.
Because of this capacity, videogames are often performative: they allow the player room to interact with rich and complex systems with grace and finesse. We usually refer to this as “skill.” A system may persist through an entire game, but the game may start very permissive of less graceful playing and require the player to play with more and more finesse as the game goes on. The game gets HARDER, asking that the player become more skillful, but allowing her to learn the game’s systems over the course of navigating increasingly difficult situations.

The systems that the player manipulates in *Super Mario Bros.* are introduced very early in the game, with the only added rules coming with the periodic introduction of new enemy characters or hazards. But the situations that Mario has to navigate start fairly relaxed and demand more and more skillful playing as the game progresses. In the first stage of the game, obstacles are low enough that a simple jump from a standing position will allow Mario to clear them. In later stages, the height of obstacles will require Mario to run and build momentum before jumping, in order to jump higher. In this way the designer teaches the player the subtleties of the game’s complex system through careful use of machine-controlled variables. Digital games are thus good at teaching, and at communicating a sense of the player’s progress, which often parallels the progress of the protagonist and the development of a story.

What else is handy for telling a story? The ability to generate or play video and audio, either as accompaniments or as central vehicles for information. Digital games can incorporate a variety of media when telling their stories. Consider how the music in *Super Mario Bros.* speeds up when there’s only a hundred ticks left on the time limit to complete a stage, creating a
sense of urgency, or how the sound played when Mario jumps on an enemy gets higher and higher pitched, indicating that a reward—in this case, an extra life—will come if the player keeps doing what she's doing. Consider how the player's journey takes her through a changing visual landscape, from a sunlit field to a black-and-blue underground, to treetops, to the mushroom forest, and to Bowser's castle, and the way each of these sights— withheld from the player until her skill develops to give her access to later areas—provides a sense of progression through the Mushroom Kingdom.

I don't mean to imply that non-digital games are incapable of the things I've described, or that digital games are in some absolute sense better or more worthy of interest. There are many different kinds of games, all of them suited to different things. Digital games, because of their ability to withhold and pace the player's access to information, because of the strict narrative control the author is able to have over the player's experience (because the machine enforces the rules), and because of their capacity for generating a wide variety of sights and sounds to enhance or even define the playing-out of the rules, are particularly well suited for the telling of stories. And the telling of stories—games becoming more personal—is what especially interests me about games as a form.

**Role-Playing Games**

Digital games have certain strengths for telling stories, but
CATALOGUE OF OBSOLETE ENTERTAINMENTS
by Adam Pennyman

GAME: PAC-MAN
Format: Coin-Op Arcade Machine
Manufacturer: Midway license of Japanese Namco property
Year: 1980
CPU: Z80 3.072000 MHz
Sound: Namco mono (1 channel)
Screen resolution: 288 x 224 pixels

The most universally recognized of the arcade machines, Pac-Man's central icon is the player's avatar, his on-screen representation: the game's eponymous, voracious yellow three-quarter circle. By removing a simple pizza slice, Namco game designer Toru Iwatani breathed life into the simplest geometric form, turning it into a snapping mouth, lovable... but hungry, always hungry, all the time chomping with want just like the player it represents. The Pac-Man must eat its way through the 240 dots and four Power Pill energizer dots that line his blue, bilaterally symmetrical maze, while dodging (or, when under the fleeting influence of a Power Pill, eating) the game's antagonists, the four Pac-Man ghosts.¹

The Pac-Man's insatiable hunger for the dots and Power Pills that fill the corridors of his maze-worlds suggests weighty parallels, such as the ravenous hunger for More Life that Darwin saw in all species, any one of which would overpopulate and overrun the earth if not for the predatory ghosts of natural selection. Also, we are reminded of Marx's "need of a constantly expanding market" that "chases the bourgeoisie over the entire surface of the globe" (Communist Manifesto) with the "vocation to approach, by quantitative increase, as near as possible to absolute wealth" (Capital), casting the Pac-Man in the

¹Pinky, Blinky, Inky and Clyde are undeniably cute, cuter than the Pac-Man himself: the first time the author played the game as a fat ten-year-old boy with microwave pizza grease on his fingers at Ed's Convenience Mart in Woodhill Grove, Illinois, his virgin Pac-Man lasted all of ten seconds as he instinctively moved to connect with them, somehow trying to assimilate their cuteness and their all-seeing eyes into his blind yellow proxy.
role of corporate antihero in a utopian fantasy where the agents protesting his unfettered domination of the maze-world actually defeat him in the end. Obvious metaphors, lurking just beneath the surface of the game.

Suspiciously obvious. These kinds of interpretations belie the poverty of imagination that has become all too typical of practitioners of the interpretive arts. If Pac-Man and the games that followed in its wake mean anything to us, if they are central switching stations through which thousands of our most important memories are routed, it is our duty to dig deeper.

To us, the Pac-Man's lives appear short, cheap, and relatively inconsequential once we discover the overwhelming importance of sex and money. But if we perform a thought experiment and try to occupy a Pac-Man's subjectivity, we will realize that these three short spans are not so short to him. We must allow that each dot eaten takes on a meaning for the Pac-Man that we can barely fathom.

I suggest that if we, through force of imagination, were to dilate time to experience it as the Pac-Man does, and increase the resolution to allow us to read as much into each pixel as the Pac-Man must, we would not see the identical dots as identical at all. When the microscopic differences in each pixel are made large, each dot will possess a snowflake's uniqueness, and the acquisition of each—no, the experience of each—will bring the Pac-Man a very specific and distinct joy or sorrow. The dots all rack up points equally, of course; in retrospect, however, some are revealed as wrong choices, links in a chain of wrong choices that trace out a wrong path leading to a withering demise beneath the adorable and utterly unforgiving eyes of Blinky, Inky, Pinky or Clyde. As anyone who ever played the game seriously must know, the order in which the dots are experienced is of great importance. For each labyrinth, there are rigid and precise patterns through the maze—i.e., specific sequences of dot acquisition—that, if followed with a samurai's unwavering, arrow-into-hell certainty, allow the knowing Pac-Man to ascend from level to level with Zen ease and deliberateness.

An often-overlooked, seemingly minor feature of the game has implications which, once unraveled, are more radical than anything
heretofore discussed. In the middle of each maze, on the left and right sides of the labyrinth, there are two identical tunnels that lead off the borders of the screen. These tunnels are connected, with the left tunnel leading to the right, and the right to the left. In itself, this disappearing off one side of the screen to reappear on the opposite side broke no new ground. In Atari's Asteroids, for instance, a player's ship can do as much.

When an Asteroids ship leaves the screen, however, it reappears on the other side instantaneously; thus, the three-dimensional space described by Asteroids' two-dimensional screen is a continuous, perfect sphere. In Pac-Man, this is not the case at all. When a Pac-Man disappears into one of the off-screen mid-maze tunnels, there is a lag of about a half second before he reemerges on the other side. Assuming his speed remains constant, we can extrapolate some other-dimensional space of approximately six dots' length that the Pac-Man must traverse each time he goes through the off-screen tunnel. Were it not for the pursuing ghosts, he could remain in this off-screen space indefinitely.

In its evocation of an unseen world beyond the rectangle of the seen screen, Pac-Man forces us to reckon with a space that is real, yet never experienced directly, empirically. An area where no points can be earned, yet one crucial to the successful completion of the higher-level screens. The truly tapped-in player never forgets the off-screen tunnels, like a religious man with one mental foot planted firmly in the hereafter.

Pac-Man is the world's first metaphysical video game. Like a black hole's event horizon, the impassable barrier of its CRT screen hides a richness we can speculate about but never experience directly. What happens in its unseen regions? Perhaps the laws that reign there are not the brutal laws of the maze. Perhaps the tunnels move through an endless Valhalla of energizer dots with no ghosts in sight, tantalizingly close, if only we could break free.

There is a world beneath the glass that we can never know.
It is true that every aspect of the role of dice may be suspect: the dice themselves, the form and texture of the surface, the person throwing them. If we push the analysis to its extreme, we may even wonder what chance has to do with it at all. Neither the course of the dice nor their rebounds rely on chance; they are governed by the strict determinism of rational mechanics. Billiards is based on the same principles, and it has never been considered a game of chance. So in the final analysis, chance lies in the clumsiness, the inexperience, or the naiveté of the thrower—or in the eye of the observer....

As for billiards, it can easily be transformed into a game of chance by simply tilting the table, outfitting it with studs that would cause the balls to rebound and swerve, and by placing the six pockets at the bottom of the table, or at other points, so that the ball would necessarily fall into one of them. Since we're not trying to favor skill, there would be a mechanical trigger and the ball would be shot up the slope by a spring that the player would pull with more or less force. This game of mechanical billiards is no less random than traditional dice.—Ivar Ekeland, The Broken Dice
Introducing Uncertainty

Imagine how incomplete you would feel if, before the game, you were already declared the winner. Imagine how purposeless the game would feel.—Bernard DeKoven, The Well-Played Game

Uncertainty is a central feature of every game. That's right: every single game. As game designer and philosopher Bernard DeKoven points out, uncertainty about the outcome of a game is a necessary ingredient in giving a game a feeling of purpose. Uncertainty, in other words, is a key component of meaningful play.

In this chapter, we explore games as Systems of Uncertainty. Games express uncertainty on two levels: on a macro-level relating to the overall outcome of a game, and on a micro-level relating to specific operations of chance within the designed system. Although all games possess uncertainty on a macro-level, not all games formally possess elements of uncertainty on a micro-level. As we will see, a player's experience of uncertainty is not always congruent with the actual amount of mathematical chance in a game. Exploring these relationships, linking macro- and micro-uncertainty to each other, and understanding how both of them impact the design of meaningful play, is our primary focus in this schema.

Does every game really possess uncertainty? The word uncertainty brings to mind ideas of chance and randomness. But a game does not have to have a die roll or random algorithm to contain an element of uncertainty. If you are playing a multi-player session of Halo against players of roughly equivalent ability, the outcome of the game is uncertain, even though the game is a game of skill, not chance. When we say that uncertainty is a central feature of every game, we are echoing DeKoven in the quote above: it is crucial in a game that players don't know exactly how it will play out. Think about it: if you knew who was going to win a game before it started, would you even bother to play? There is a reason why televised sports are almost always aired live: robbed of the drama of uncertain outcome, they fail to hold our interest.

One way to understand why games need uncertainty is that if the outcome of a game is predetermined, the experience cannot provide meaningful play. If a game has no uncertainty—if the outcome of the game is completely predetermined—then any choices a player makes are meaningless, because they do not impact the way that the game plays out. Meaningful play arises from meaningful choices. If a player's choices have no meaning in the game, there really is no reason to play.

There is an intrinsic connection between uncertainty and meaningful play. Uncertainty is usually thought of as something that disempowers players by removing a sense of choice and agency, yet paradoxically, it is the uncertain outcome of a game that allows players to feel like their decisions have an impact on the game. Meaningful play, as we know, emerges from these kinds of decision-outcome relationships.

Throughout a game system, this larger notion of an uncertain outcome is linked to the micro-level of uncertainty within a game. The specific mechanisms of uncertainty that incorporate randomness and chance, whether through the spin of a Roulette wheel or the generation of a random number in a game program, are just as important as the larger feeling of uncertainty linked to a game's outcome. From the interaction between these two levels, the meaningful play of uncertainty arises.

Certainty, Uncertainty, and Risk

The essence of the phenomenon of gambling is decision making. The act of making a decision consists of selecting one course of action, or strategy, from among the set of admissible strategies. A particular decision might indicate the card to be played, a horse to be backed, the fraction of a fortune to be hazarded over a given interval of play. . . Decisions can be categorized according to the specific relationship between action and outcome.—Richard Epstein, The Theory of Gambling and Statistical Logic
In *The Theory of Gambling and Statistical Logic*, mathematician Richard Epstein investigates the mathematics of uncertainty in gambling. His research, however, can be applied to all kinds of games. In his emphasis on decision making and the relationship between action and outcome, Epstein echoes some of our own core ideas.

In his book, Epstein identifies three types of decision-outcome relationships, leading to three degrees of uncertainty: *uncertainty*, *risk*, and *certainty*. Each category corresponds to a different kind of decision-outcome relationship and game experience. A game that is completely certain is hardly a game at all, and certainly not much fun to play. It is like flipping a two-headed coin: there is no doubt what the end result will be. Sometimes, certainty is contextual. A game of Tic-Tac-Toe between two people that are completely familiar with the logic of the game play has a certain outcome: the game will always end in a draw. Although the specific decisions of the players aren’t certain, the overall result of the game will be. In a game that is completely certain, meaningful play is impossible.

Epstein’s other two categories describe what we normally think of as uncertainty in games. Risk refers to a situation in which there is some uncertainty but the game’s players know the nature of the uncertainty in advance. For example, playing a game of Roulette involves placing bets on the possible outcome of a spin and then spinning the roulette wheel to get a random result. There is some uncertainty in the spin of the wheel, but the percentage chance for a particular result occurring and the resulting loss or gain on the bet can be calculated precisely. Of the thirty-one numbers on the Roulette wheel, 15 are red, 15 are black and one of them (the zero) is neither red nor black. If you bet on red, you have 15 out of 31 chances (or 48.39%) to win and double your bet. In other words, in a game of pure risk, you can be completely certain about the degree of uncertainty in the outcome of the game.

Epstein’s category of *uncertainty* describes a situation in which players have no idea about the outcome of the game. For example, imagine that you are a moderately skilled Chess player and you go to an online game site to play a game of Chess with an opponent that you select at random. You have no idea who you are going to play against. It might be a Chess master, who will most likely beat you, or it might be someone learning to play for the first time, who you will most likely beat. There is no way for you to predict the outcome of the game. If, in contrast, you are playing a friend that you have played many times before and you know that you usually win three out of four games, you have a good sense of the outcome. But without knowing your opponent, you can’t make that kind of guess.

Although games of pure certainty are extremely rare (and not much fun to boot), games of pure risk and games of pure uncertainty are also quite rare. Most games possess some combination of risk and uncertainty. Even though you know something about the general chances of winning against your friend, you certainly don’t have absolute mathematical certainty about your chances of winning. And although you know the exact risk each time you make a bet on the Roulette wheel, your overall loss or winnings over an evening of play is much more uncertain.

**The Feeling of Randomness**

Roulette and Chess point to a very important aspect of uncertainty. Often, the degree of chance in a game has less to do with the actual mathematics of the game system and more to do with how the player’s experience of the game is framed. When we look at only a single round of Roulette, the game is an experience of pure risk. But when we frame it as the gain and loss of money over many rounds, the overall outcome is more uncertain. Similarly, it is possible to produce a feeling of uncertainty in games that do not formally possess an element of chance. Below are two examples:

Chinese Checkers. When four, five, or six players play this game, it can feel quite random. As the game unfolds and players move their pieces, the center of the board becomes crowded with a seemingly random arrangement of pieces. This is true even though every single move on the board is the result of a player making a strategic choice about where to play next.
If you roll more than one die, determining outcomes becomes more complex. With two dice, Knizia notates the basic outcomes in the form of 3–4, where the first number is the number rolled on the first die and the second number is the number rolled on the second die. A chart of all of the possibilities of basic outcomes for two dice are shown in Table 1.

Note that symmetrical outcomes such as 2–5 and 5–2 both appear on the chart, as they represent different possible basic outcomes. There are 36 basic outcomes with two dice, so the chance of anyone outcome appearing is 1/36. When two dice are thrown in a game, instead of the individual results on each die, the game uses the combined total of both dice. We can determine the chance of rolling a combined outcome equal to a particular number in the same way as with a single die: by adding up the basic outcomes. To determine the chance of rolling a 5, count the basic outcomes that add up to 5: 1–4, 2–3, 3–2, 4–1. This is four basic outcomes, and 4/36 = 1/9 or 11.11 percent.

<table>
<thead>
<tr>
<th>Total Outcomes</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>2–1</td>
<td>1/18</td>
<td>1/12</td>
<td>1/9</td>
<td>1/6</td>
<td>1/9</td>
<td>1/12</td>
<td>1/18</td>
<td>1/12</td>
<td>1/9</td>
<td>1/6</td>
<td>1/9</td>
<td></td>
</tr>
<tr>
<td>2–2</td>
<td>2.78</td>
<td>5.56</td>
<td>8.33</td>
<td>11.11</td>
<td>13.89</td>
<td>16.67</td>
<td>13.89</td>
<td>11.11</td>
<td>8.33</td>
<td>5.56</td>
<td>2.78</td>
<td></td>
</tr>
</tbody>
</table>

Table 1

What is the chance of rolling doubles? There are six basic outcomes that are doubles: 1–1, 2–2, 3–3, 4–4, 5–5, 6–6. This is six outcomes, and 6/36 = 1/6 or 16.67 percent.

Putting all of the two-die outcomes on one chart, we get the figures in Table 2. Notice the radically unequal distribution of probabilities for rolling the highest and lowest numbers, as opposed to rolling numbers in the middle of the range.
We can apply the same basic principles Knizia articulates to a wide variety of game design situations. For example, if your game requires players to flip a coin, you can determine the two basic outcomes as heads and tails, with a 50 percent chance of achieving each outcome. Or you might be designing a computer simulation game that uses lots of random numbers to determine the frequency of events, or a special deck of cards with a particular chance of certain cards appearing each turn. In any of these cases, the general principles remain the same. If players are flipping three coins, how likely is it that they will all come up heads? What is the chance of having a hand of five cards that are all the same?

If you are designing a game that involves dice-rolling, card-shuffling, or other forms of random number generation, it is important that you understand the basic principles of the probabilities involved. However, mathematical principles alone won't lead you to design meaningful play. The key, as with other aspects of games, is in understanding how probability relates to player decisions and outcomes. For example, in designing a board game such as Monopoly, in which players' pieces circle the board on a track, how will you determine the number of spaces on the board? In Monopoly, the board has forty spaces. Because the average combined outcome of a two-die roll is 7, it takes on average six throws to get around the board. This means that by about turn seven, some of the players will likely have already started their second loop, and will begin to land on each other's properties. If you are creating a game with a similar structure, design the board and the use of dice to achieve a pacing of events appropriate for your game.

**Chance and Game Play**

There is a curious relationship between chance and game play. One way of framing chance, especially a game of pure chance, is that players completely give up control and have to passively accept the results of the game as they occur. As anthropologist Roger Caillois writes in his book *Man, Play, and Games*, chance "signifies and reveals the favor of destiny. The player is entirely passive: he does not deploy his resources, skill, muscles, intelligence. All he need do is await, in hope and trembling, the cast of the die."

With all due respect to Caillois, we wholeheartedly disagree. What Caillois describes may in fact be an accurate depiction of the emotions of some players during a game of chance, but there are plenty of chance-based games that do offer player decision and meaningful play. Even in a game of pure chance, a well-designed game continually offers players moments of choice. Meaningful play requires that at some level a player has an active and engaged relationship to the game and is making choices with meaningful outcomes. A player that does nothing but "await, in hope and trembling, the cast of the die" cannot be engaged in meaningful play.

Let us look again at a game with which we are all too familiar, Chutes and Ladders. Formally, it is a game of pure chance. On your turn, you roll the die, move your token appropriately, and then pass the die to the next player. Players do not make any strategic decisions in the course of play. However, Chutes and Ladders can be a fun game. Even without considering the social, narrative, and cultural forms of pleasure the game might provide, there are any number of ways that Chutes and Ladders provides pleasure through formal aspects of its game play:

- The mechanistic pleasure of inhabiting a game system and helping that system move forward by rolling dice, counting spaces, and moving your token.
- The uncertainty of knowing who will win and the struggle to finish first.
- The chutes and ladders themselves, which reinforce both of the previous pleasures. On the one hand, with the erratic swoops of movement they produce, the chutes and ladders make the mechanistic system itself richer and more fun to inhabit. They also allow for unexpected reversals of fortune, increasing the dramatic potential of who will finish first.
Although it is true that almost any game will possess the first two qualities, it is always challenging to harness these two pleasures in the service of meaningful play. In Chutes and Ladders, it is the chutes and ladders themselves that serve as the central feature in the formal game structure to provide interest. Imagine the game without the chutes and ladders: rolling a die, moving a token, and getting to the last space first. As a game, it would be a completely flat experience. The chutes and ladders create a structure that results in more meaningful play, even without any real choices to make.

How does this happen? Consider the formal flow of the game play. Without the ups and downs of the ladders and the chutes, players' scores would slowly accumulate at a roughly equivalent rate. A player might pull ahead or fall behind, but the pattern of the game would remain fairly flat, with each player moving ahead from one to six spaces each turn. In fact, if a player does move substantially ahead or behind of the rest of the players, he or she is on average more likely to stay there, further reducing dramatic uncertainty. The chutes and ladders provide changes of position greater than the die roll's relatively modest adjustment of 1–6. These leaps disrupt the otherwise flattened chances of winning.

A second and very different example of pure chance games are lottery-based games. The basic game play of a lottery game is incredibly simple: pick a number or series of numbers and then wait to see if your number or numbers were picked. Again, at first glance, it is difficult to imagine how such a simple game could be so compelling. Yet even though a lottery is a game of pure chance, there are many moments at which players make choices: selecting the kind of lottery game to play, selecting a number or set of numbers, selecting the number of times to enter a given lottery, and even (for regular players) selecting a pattern of play over time. Many lottery games offer additional choices, such as a selection of "scratch-off" spaces on a lottery card. Each moment of choice is an event with the potential for meaningful play. Lottery players often use elaborate systems to help them select numbers, based on past winning numbers, their birthdays, random hunches, or other numerological speculations. The simple choice of what number to play becomes infused with meaning as players explore the space of possible options. Of course, the chance to win money is undeniably an essential part of the appeal of lottery games. However, it is not the only aspect of the game that makes its play meaningful. The opportunities for players to decide how to navigate the system of chance are the decisions that let players rail against pure fate, keep hope alive for winning, and help give the game its meaning.

The lesson learned from successful games of pure chance such as Chutes and Ladders or a lottery game is that meaningful play can occur in systems in which there are no actual strategic decisions to make. In games of pure chance, the players' relation to the game system needs to be carefully designed. At every moment that they come into contact with the system, the possibilities for meaningful play should be teased out and emphasized.

Case Study One: Thunderstorm

Although Dice Games Properly Explained has an entire chapter on dice probability theory, most of the book offers descriptions and analyses of more than one hundred dice games. The games range from simple children's games to complex betting and bluffing games. Some of them are of Knizia's own design, but most of them are traditional games. Following are two simple game examples from Dice games Properly Explained that clearly illustrate the successful integration of chance into game play.
Thunderstorm

This is a popular family game in Germany, there called Gewitter. Hit the required target number, or watch the thunderstorm move close, until lightning finally strikes. Any numbers of players can participate, best with four to eight. You need six dice and a notepad.

Object. The aim of the game is to produce at least one 1 on each turn to become the last remaining player in the game.

Play. One player begins, then play progresses clockwise. The first player throws all six dice. Later players may have fewer dice available, even only one.

- If your throw contains at least one 1, you are fine. Set aside all 1s and pass the remaining dice to the next player. If you roll nothing but 1s, recover all six dice and pass them to the next player.
- If your throw does not contain any 1s, you fail and pass the dice to the next player.

In the course of the game, a six-line house is drawn for each player. Each time you fail, a line is added to your house. When your house is complete and you fail again, your house is struck by lightning and you are out of the game.

The game continues until only one player remains. This player wins.

Even though Thunderstorm is a game of pure chance, the kind of chance that a player faces changes from turn to turn. If you are rolling six dice, you have a relatively safe roll and are quite likely to roll a 1. On the other hand, if the previous player hands you just a single die, your chances of rolling a 1 are much lower. Initially, players are making relatively safe rolls, rolling many dice at once. Occasionally a player will get unlucky and miss rolling a 1, but chances are better than 50 percent that for the first few rolls with four, five, or six dice, they will roll a 1. As 1s appear and these dice are stripped away from the group of rolling dice, the tension mounts and the game accelerates as the chance for rolling a 1 decreases. A single die might be passed for quite some time without anyone rolling a 1. Then suddenly someone rolls a 1, avoids drawing a line on his or her house, and the next player begins the pattern again by rolling all six dice.

As a player, you feel two ways about this progression. It is great to see the other players rolling a single die, not rolling 1s, and adding a line to their houses. On the other hand, as the die approaches you around the circle of players, you would love for another player to roll a 1 because it means that the next player rolls all six dice, making it likely that you will have more dice to roll on your turn. This formal structure of uncertainty results in a game with a compelling dramatic rhythm, which takes place in a number of overlapping cycles:

- Every turn a player throws the dice, establishing a regular pace to the game.
- On top of this rhythm, the reduction of the number of dice from six to one and then back to six again sets up a cycle that lasts for many turns and repeats itself a number of times within a single game.
- Each player also sets up a linear progression of house-building. Although the elements of this construction occur in the same sequence for all players, it happens at a different pace for each player.
The fourth cycle happens near the end, as players begin to drop out of the game and the circle closes until there is only one house left standing, the house belonging to the winner.

The overall result is an exciting game with a sense of dramatic inevitability—the destruction of all of the houses but one becomes a dreadful certainty. What is striking about Thunderstorm (no pun intended) is that all of this complexity arises out of a simple game of pure chance—and no betting. Thunderstorm is an example of a game that provides players with a rich chance-based system that generates surprisingly meaningful play.

Case Study Two: Pig
The game of Pig differs from Thunderstorm in that it offers choice within the context of a game of chance. Like Thunderstorm, Pig demonstrates how meaningful play can be designed into a system with a great deal of uncertainty. The description from Dice Games Properly Explained is as follows:

Pig
This is an amusing family game based on a very simple idea. You throw one die and keep adding to your total. If you do not stop before you roll a 1, everything is lost.... Any number of players can play, best is for three to five. You need one die and a notepad.

Object. The aim of the game is to avoid rolling 1s and to be the first player who reaches 100 points or more.

Play. One player begins, then play progresses clockwise. On your turn, throw the die:

- If you roll a 1, you lose your turn and do not score.
- If you roll any other number, you receive the corresponding points.

As long as you receive points you can throw again, and again. Announce your accumulated points so that everybody can easily follow your turn. You may throw as often as you wish. Your turn ends in one of two ways:

- If you decide to finish your turn before you roll a 1, score your accumulated points on the notepad. These points are now safe for the rest of the game.
- If you roll a 1, you lose your turn and your accumulated points.

Record all scores on the notepad and keep running totals for each player. The first player to reach 100 points or more is the winner.

The first thing to note about Pig is how it creates interesting game choices from a very simple structure. A core component of the game—to avoid rolling 1s—is actually an inverse of the formal demands of Thunderstorm, where the players attempt to roll 1s. In Pig, the player has to balance the desire to keep on rolling and accumulate a higher score with the risk of rolling a 1, which becomes more and more likely each time the player chooses to roll again.

We can analyze the game mathematically. From a probability point of view, one out of the six basic outcomes spells disaster for the player: rolling a 1. This means there is a 5/6 or 83.33 percent chance of rolling safely each time you roll—or conversely, a 1/6 or 16.67 percent chance of rolling a 1. However, even though the chances are the same for every roll considered in isolation, the more that you decide to roll, the more likely it is that you will eventually roll a 1. If you decide in advance that you are going to roll twice, the chances of rolling a 1 on your turn is the combined outcome of a 2-die roll. In the 36 possible 2-die rolls, there are 11 ways you can roll a 1 (1-1, 1-2, 1-3, 1-4, 1-5, 1-6, 2-1, 3-1, 4-1, 5-1, 6-1). This adds up to 11/36 or 30.56 percent chance to roll a 1 in two rolls.

Each time you roll again, your overall chance of rolling a 1 increases, and as soon as you roll a 1, your entire accumulated points for that turn are erased. The drama of the decision to roll or not to roll is that each time you roll the die, you increase your chances of getting more points, as well as increasing your chances to fail. But because you have control over your decision to roll more than once, you know the degree of risk. Knizia
plots out the chances of rolling a 1 with successive rolls in the table above. He also calculates the average points you are likely to earn with a certain number of rolls, using 4 as the average number of points per roll (as your possible earnings are 2, 3, 4, 5 or 6). See Table 3.

Knizia suggests that the best Pig strategy is to stop rolling once you have 20 points or more. However, he also acknowledges that a good player takes into account the progress of the other players as well. There are two sides to the formal strategy of playing Pig. On the one hand, there is the aspect of a single player playing against chance, trying to maximize points earned each turn. But this moment-to-moment decision-making process also takes place within the larger context of the other players’ scores. In other words, if you are falling behind, you may want to press your luck to try and catch up; but if you fail, you will have to risk even more to regain ground. If you are in the lead, perhaps you should play more conservatively. But then it might be easier for other players to catch up to you.

Pig is an elegant game design because the player’s simple choice to roll or not to roll is a decision that sits at the nexus of many intersecting vectors of game play meaning. The result is a game that is astonishingly simple, strategically deep, and increasingly dramatic. Pig is a great example of how pure chance can be harnessed through simple choices and transformed into meaningful play. Can you say that the decisions in your game are as meaningful the decision to roll in Pig?

## Breakdowns in Uncertainty

*Luck is very much fate’s last hope. It is the play of the last chance. It is the play of everyman.... In this sense it is useful to think of games of chance not only as models of the irrevocability of fate but also as fate fantasized. —Brian Sutton-Smith, The Ambiguity of Play*

That ends our brief introductory investigation into the classical operations of probability. But before departing from this subject altogether, we would like to discuss a few ways that probability fails to operate in exactly the way that we think it should. As the “feeling of randomness” we discussed earlier demonstrates, the actual operation of probability does not always match up with the way that players experience or interpret it. For the design of meaningful play, understanding the player’s point of view is paramount. The next few sections touch on three problematic contexts for probability: randomness on a computer, strategic manipulation of chance processes, and commonly held fallacies about uncertainty.

### Breakdown 1: Computer Randomness

If you are designing digital games, it is important to have a sense of how computer programs generate random numbers. Digital games make extensive use of random algorithms, whether to determine which player goes first, to generate the background texture of a game level, or to randomize the behavior of an in-game agent. Ironically, computers cannot produce random numbers. They can execute algorithms that result in random-seeming results, but they are not capable of producing pure randomness. Why is this so? John Casti offers an explanation:
Back in the early days of computers, one of the more popular methods of generating a sequence of random numbers was to employ the following scheme:

1. Choose a starting number between 0 and 1.
2. Multiply the starting number by 4 ("stretch" it).
3. Subtract 4 times the square of the starting number from the quantity obtained in step 2 ("fold" the interval back on itself in order to keep the final result in the same range).

Given a starting number between 0 and 1, we can use the procedure—often termed the logistic rule—to generate a sequence of numbers that to all appearance is completely random. For example, in such a sequence each of the ten digits 0 through 9 appears with equal frequency and the statistical correlation between groups of digits is zero. Note, however, that the members of this sequence are specified in a completely deterministic way by the starting number. So the sequence is certainly not random in the everyday sense of being unpredictable; once we know the starting number and the rule for calculating an element of the sequence from its predecessor, we can predict with complete confidence what every element in the sequence will be.

Although Casti uses a historical example, the ways that computer programs generate random numbers today are not fundamentally different. Computers can never compute purely random numbers, because the numbers they provide are always the result of algorithms. A computer program can “flip a coin” internally to determine whether a computer-controlled character will turn left or right with equal probability, but the program is iterating a deterministic formula that only superficially resembles the operation of a random coin flip. The generation of random numbers is a well-heeled problem in computer science. We won’t go into detail about it here, except to point out that it remains a challenging dilemma. Still, for most game design purposes, the randomness that computers can generate is sufficiently random.

Usually, an intimate understanding of how computers compute random numbers is not part of what a game designer needs to know. But you should never forget that random functions are not infallible. Eric was once working on a game prototype about swarming microbe-like creatures in a fluid environment (the game was never published). The microbes would grow, give birth, and die, flocking together to seek out food in their environment. Although they exhibited complex behavior, it was more or less clear why the microbes were doing what they were doing. However, one aspect of the game was puzzling. The microbes always tended to seek out the upper left corner of their 2D environment. The designers first thought they had stumbled upon a genuinely emergent behavioral pattern, but couldn’t for the life of them figure out what was causing it. Did it have to do with the way the food multiplied? Or the way a player was handling the mouse? At the same time, the inevitable and universal drift of the microbes was ruining the game play by making the overall behavior too predictable.

Eventually, they discovered that the emergent behavior was coming from an error in a randomizing function. Each timed step, a microbe would move in one of sixteen directions. Even though they could sense their immediate surroundings and moved accordingly (towards food and away from danger), the program always weighted their decision with a random input. The problem was that because of a programming oversight, the program began counting in the upper left corner, and then counted that corner again at the end, giving the randomizer twice as much chance of picking the upper left than any other position. Even though the degree of additional chance this error added was very small, because of the complexity of the system, the emergent effects were quite strong. Once the randomizer was fixed, the corner drift ceased. The lesson? Even if you are not a computer programmer, understand how randomness operates in your game’s program.
Breakdown 2: Strategizing Chance

The second example of the unexpected nature of chance is when the use of chance becomes strategic, when players manipulate uncertainty itself during a game. Will your players really take randomness at face value, or will they scheme to turn chance into strategy? In “Strategies in Counting Out,” an essay in *The Study of Games*, folklorist Kenneth Goldstein looks at the ways that children aged four to fourteen in northwest Philadelphia in 1967 secretly and expertly manipulated the operation of chance. His study focuses on “counting-out,” operations such as “eenie-meenie-miny-moe” that kids use to determine who will be “It” in a traditional neighborhood game like Kick the Can.

Counting Out is not usually considered a game: it is a procedure that helps determine roles in a future game. However, by our definition, we can consider it as a simple game of chance. In Counting Out, a player appoints himself or herself the counter; the goal of the game is to avoid being selected as “It.” The quantifiable outcome requires that one player is selected as the loser. The premise of counting-out procedures is that they are patterns of counting that randomly select a player. This is, in fact, the way that the children in the study described the act of counting-out to Goldstein when he interviewed them. However, his essay’s conclusion is that despite the fact that the children described Counting Out as a purely chance operation, they used complex and subtle strategic methods to achieve the results they desired.

Following are the six general methods of manipulation that Goldstein observed in use. Many of them represent techniques that would require sophisticated mathematical skills to operate in a group with changing numbers of participants.

1. **Extension of Rhyme**: The counting-out rhymes are modular and extendable, and if the rhyme is about to end on someone that the counter does not want to be selected, the counter can spontaneously add an additional phrase or rhyme of the proper length to achieve a different result.

2. **Skipping Regular Counts**: The counter simply skips himself or herself when going around the circle, if the counter is about to be selected. Although this was the most popular technique employed, it was also the most obvious, and the one most frowned upon.

3. **Stopping or Continuing**: Because most rhymes do not specify whether the selected player is “It” or whether the selected player is “counted out” and is safe from becoming “It,” the counter can decide the significance of the selection after the first player has been picked.

4. **Changing Positions**: This mathematically intensive strategy entails the counter subtly switching to a new spot in the circle in order to be selected as the next player counted “out.”

5. **Respite by Calling Out**: In this blatant strategy of avoidance, a player will simply call “safe” or “free” and be exempt from counting in the current round. The groups that allowed this technique did place restrictions on it, such as having only one player be able to call “safe” per counting round.

The paradox of Counting Out is that even though players describe it as a game of chance, it is a game with a rich strategic component, in which experienced players can achieve the results they desire. The point of this example, as with the operation of chance in software, is to demonstrate that sometimes the differences between randomness and non-randomness are more subtle than they appear. When you are designing a game, pay close attention to the procedures used to determine randomness and make sure that they operate in the manner that
you intend. Of course, the bigger issues to which this example points is that when you design a game, that game is always going to be used in a particular context by particular players. In our schemas on Breaking the Rules and Games as Social Play, and in many of the chapters within the primary schema CULTURE, we explore in more detail some of the experiential and contextual issues raised by this complex example.

Breakdown 3: Probability Fallacies
A third example regarding the problems of probability does not concern computer software or strategy and chance, but the ways that players conceptualize and understand randomness itself. You may have created a game that contains very specific kinds of probabilities, and you may even communicate these to players. But this in no way means that your players will accurately understand the way that chance operates in your game.

Game players will rarely have the same grasp of the random functions of your game system that you do. Game players and the public tend to suffer from a number of fallacies and misunderstandings when it comes to the operations of chance. The following list is a paraphrased sampling from Epstein’s longer list of fallacies in The Theory of Gambling and Statistical Logic.10

- **Overvaluing the long shot.** Game players have a tendency to overvalue “long-shot” bets that have a low probability of achieving a high gain, in contrast to “safe” bets that have a higher probability of achieving a low gain.

- **The tendency to think of successive chance events as additive.** For example, the chance of rolling a 1 on one die is 1/6 or 16.67 percent. The chance of rolling a 1 with two dice is not 2/6 or 33.33 percent, as you might think at first glance. As we know from probability theory, the chances are 11/36 or 30.56 percent. This difference might seem small in this example, but with successive iterations, the differences between the actual probability and the presumed one can be quite large.

- **The Monte Carlo Syndrome.** This refers to the tendency to think that after a run of failures, a success is likely, and vice versa. In other words, if the Roulette wheel has just landed on a black number, it is not more likely that the next number will be red.

- **Overemphasis on good outcomes.** Given a very unlikely negative outcome and a very unlikely positive outcome, people tend to overemphasize the good one. Epstein uses the example of winning the lottery and being killed in a car accident in the next year. Both have about the same chance of occurring (1 in 10,000), even though most believe that the lottery win is more likely.

- **Lightning striking twice.** Related to the previous fallacy, people tend to believe that highly unlikely negative events will not repeat themselves (such as getting struck twice by lightning), but that highly unlikely positive events will happen again (such as winning the top jackpot on a slot machine). In fact, the chance of a random event occurring is not related to the frequency of past occurrences.

- **Luck.** From a purely mathematical point of view, there is no such thing as luck. People aren’t lucky, dice aren’t lucky, charms aren’t lucky, calendar dates aren’t lucky. However, widespread belief in luck persists, even among experienced game players.

Each of these fallacies has important implications for game design. For example, think about the long shot fallacy. If your game allows players a choice between a long shot and safe bet, you should expect most players to take the long shot and balance your formal system accordingly. Overemphasis on good outcomes and the lightning striking twice fallacies can help keep players optimistic in a game with a large chance element. Even if a player has seen a lot of bad luck, these fallacies keep hope for a turnaround alive.
The larger lesson is that when you design a game with a random element, it is important to understand not just the probabilistic mechanisms of chance, but also the way that players will interpret or misinterpret these mechanisms. All three “breakdowns” of chance highlight common pitfalls to avoid in game design. On the other hand, any of these hiccups in the strictly formal operation of chance could be used positively, as the starting point for a game design:

- It may be true that a computer cannot generate true randomness. Why not make a digital game in which the operation of randomness is intentionally out of balance? Perhaps what seems to be a randomly generated string of numbers is really a secret code that needs to be deciphered. Or in certain locations of the game-world, the player can shift the operation of chance to his or her advantage.

- It may be true that chance operations become strategic elements in the hands of competitive players. You might design a game in which players can legally construct or modify the ”random” component of a game, such as spending game money to affect the outcome of a die roll or giving players the ability to strategically stack a deck of cards.

- It may be true that players suffer from probability fallacies. Design a game around one of them. Build a game around luck, in which players pick lucky and unlucky numbers for themselves, rolling dice and trying to avoid unlucky numbers and score the lucky ones.

Any “rule” of game design that you might think of can be broken, and as we will discover in Breaking the Rules, broken design rules can often lead to innovative game design ideas.

Meaningful Chance

But [chance in a game] is never sure. That’s what makes the game interesting. Not only is there a possibility that, despite the odds against us, the chance we take will pay off. There is also the further possibility that, despite the apparent confidence of the players, this hand, which seems to be of markedly unimpressive value, might be, in fact, the best of all. My two kings might win the game for me. That’s what confidence games are all about. They provide the opportunity and reward for your display of self as well as for your ability to play well with chance—they call for control over yourself as well as control over the game.—Bernard DeKoven, The Well-Played Game

In thinking about games as systems of uncertainty, we have looked at the micro-level of chance operation as well as the macro-level of the uncertainty of the game as a whole. One important insight we can apply to both of these levels is that the purely mathematical functioning of uncertainty is insufficient to understand the richness of chance within the mechanisms of a game.

As DeKoven observes, it is true that a player interacts with the system of a game, taking risks, placing bets, and calculating the odds. At the same time, that system is also playing with the player, making demands, rewarding and punishing, and asking for leaps of faith. In thinking about games as formal systems, we cannot ultimately divorce the formal system of a game from the ways that players manipulate and inhabit the system. This is as true for the operation of chance as it was for the emergence of complexity. Uncertainty is in the eye of the beholder, or perhaps, in the play of the player.
Further Reading

The Broken Dice and Other Mathematical Games of Chance, by Ivar Ekeland
Part philosophy, part mathematics, and part folklore, The Broken Dice is an idiosyncratic book that explores philosophical questions of chance and fate from multiple points of view. Particularly relevant is Ekeland's analysis of the impossibility of generating random numbers on a computer.

Recommended:
Chapter 1: Chance
Chapter 2: Fate
Chapter 5: Risk

Dice Games Properly Explained, by Reiner Knizia
This book by board game designer Knizia packs in descriptions and analysis of more than a hundred dice games, some of which are original designs by the author. It also contains a chapter on probability theory applied to dice—a great non-technical introduction to the subject. The dice games range from the purely random to the intensely strategic and are a good source for classroom games.

Recommended:
Chapter 3: The Theory of Dice

The Jungles of Randomness: A Mathematical Safari, by Ivars Peterson
Ivars Peterson writes popular books about mathematics, and in this playful work he tackles the thorny dilemmas of randomness and probability. He makes common references to games throughout, and the chapter recommended below includes a spectacular analysis of the layout of the Chutes and Ladders gameboard.

Recommended:
Chapter 1: The Die is Cast

Notes

- Uncertainty is a key component of every game. If a game is completely predetermined, the player's actions will not have an impact on the outcome of the game and meaningful play will be impossible.

- There are two levels at which uncertainty operates in a game. On the micro-level are the actual operations of chance that occur at isolated moments in the system of a game. On the macro-level are larger questions of uncertainty, which relate to the ultimate outcome of the game.

- The relationship between a game decision and a game outcome can have three degrees of uncertainty. A certain outcome is completely predetermined. A risk is an outcome with a known probability of happening. An uncertain outcome is completely unknown to the player. It is rare to find a game of pure certainty, risk, or uncertainty. Most games combine some degree of risk and uncertainty.

- It is possible for a game to possess a "feeling of randomness" even if no actual random mechanisms are present in the game system. This feeling can stem from strategic or social complexities that cannot be predicted in advance.

- A game that has very little feeling of randomness can become too dry or competitive. A game that has too much of a feeling of randomness can become overly chaotic, leaving the players feeling powerless. There is no magic formula for how much randomness should be present in a game. In all cases, the key is to create meaningful play that takes unique advantage of the game structure.

- When designing a game with chance elements, it is vitally important to understand the basic mathematics of probability and how they will impact the system you are designing.

- Even games of pure chance can provide meaningful game play as long as players are given meaningful opportunities to take action within the game system.

- There are many surprising ways that the operation of uncertainty can "break down" in the system of a game:

  - Because computer programs cannot generate true randomness, game designers should be skeptical about the random number-generating algorithms in a game.

  - Players can sometimes take a random component of a game and turn it into a strategic activity.

  - There are many commonly held fallacies about chance.
4.2 Characteristic: Snowball and Catch-Up

Many games, especially multiplayer games, have "catch-up features": features whose purpose is to help losing players catch up, such as the shells (missiles) in *Mario Kart* that let you shoot at the drivers ahead of you. And many games naturally have a tendency to "snowball": once you start winning, you win more and more due to your initial advantage, such as the ability of a winning *Monopoly* player to use her money to buy even more advantage. In *Chutes & Ladders*, one can think of the chutes and the ladders as a catch-up feature—the viewpoint is slightly problematic given that it is not obvious the chutes hurt the leader more than the other players, or that the ladders help the loser more than the other players (more on this later), but surely if one player were twenty squares ahead she would vote to get rid of all the chutes and ladders if she could, and the players who were far back would vote against her. And any political game tends naturally to exhibit catch-up in the form of "pick on the leader" and sometimes snowballing as well in the form of "eliminate the weak."

![Figure 4.2](iStockphoto.com)
But if one thinks about catch-up and snowball features a bit more, it becomes quite tricky. Suppose you’re way ahead of me. But the game has a lot of catch-up features. Then I still have a chance to win. Well, then perhaps you are not so far ahead of me after all. (For example, a twenty-square lead in *Chutes & Ladders* might be basically the same as a five-square lead in the equivalent game without the chutes and the ladders.) Or, if the game has a lot of snowball features, then you are even further ahead of me than it seems. In either case, how meaningful are the ideas of “catch-up” and “snowball” at all? If we both understand the game well, we understand that you are however far ahead of me you truly are, and “catch-up” and “snowball” are illusory.

There is partial truth to this idea that catch-up and snowball are illusory. But it will take us a fair amount of untangling to sort out what is really going on. We will start by looking at some more examples of snowball and catch-up. Then we will give a more precise way of defining the terms, look at how those more precise concepts reveal the illusion, and examine how that illusion relates to the perceived realities of games. Armed with our new (and hopefully more enlightened) viewpoint, we will look at a number of issues surrounding snowball and catch-up.

![Image of board game](image-url)

**Figure 4.3**

Is A really ahead? And if so, by how much?
More on Snowballing

Any game in which your score (either in the sense of official score that determines the winner, i.e., victory points, or “unofficial” score in the sense of a simple and easy to use metric, such as money) equals your power tends to have snowballing. *Monopoly* is a classic example; more money helps you to make even more, until you are unstoppable. In no-limit poker, having a high score definitely increases your power. Chess can also be viewed this way, if you think of “score” as your lead in pieces. On the flipside, in go a territorial lead does not typically help you make even more territory. Players often trade away territory for power, in the hope that that power will allow them to get even more territory later in the game.

In most sports, having a lot of points doesn’t really help you score more. You can’t “spend” a touchdown you made in football to get a new player. Boxing is one of the few exceptions (and indeed boxing is also exceptional in having an explicit snowball-handling mechanism: early ending of fights by the referee). In a PvP computer game with experience points and leveling up, snowball is the rule: win a few fights early, and you will be higher-level and win even more fights later on (*Defense of the Ancients* being an extreme example). In an RTS like *Starcraft*, if one thinks of army size, or army size plus economy size, as a kind of score, then one certainly sees snowballing.

Another natural effect that increases snowballing in some multiplayer games arises from players’ reaction to randomness (although randomness itself is generally a catch-up feature; see below). If a game has a lot of uncertainty, knocking out a losing player can be beneficial to the winning players. His elimination means he doesn’t have a chance to randomly get lucky later and defeat one of the leaders. Poker is a common example: players who are ahead in no-limit poker are typically happy to knock out a player in a worse position.

Snowballing is often considered bad by designers and players. Partly this is just a natural feeling of unfairness: why reward the player who is already winning? A more sophisticated point of view is to think of it as a problem in logical elimination. Nobody thinks it “unfair” simply because a game ends and someone wins it. What’s bad is when someone who has little or no chance to win is forced to continue playing for a long time before the game is over. So a snowball feature that directly leads to the end of the game might be a fine thing (and in fact might not be perceived as a snowball feature at all, but simply as a mechanism for determining when the game is over).

6. Power meaning your ability to make the game go your way—your ability to affect the overall game state.
7. “Having points doesn’t help you score more” is true here only to first approximation. Certainly one could argue that there are psychological gains from being ahead that might lead to scoring even more points: momentum, demoralization of the other team, and so on. But that’s nothing compared to the advantages of being able to put hotels on all your property in *Monopoly*. 
Less appealing is a snowball feature that pushes the game to a state where the winner has an even higher chance of winning, with the game still nowhere near its conclusion.

One way to limit snowballing is to un-link power and score, say by adding victory points that are used to determine the winner but that cannot be spent or otherwise used during the game. Sports and European boardgames commonly use this technique. The price of limiting snowballing in this way is often a more complicated game (gold and victory points as in many European boardgames rather than simply dollars as in Monopoly). Race games have this feature naturally: you typically can’t “spend” your lead in the race to buy anything, so your lead in the race is simply a specialized and intuitive kind of victory point. In fact, many physical races have something like the opposite of spendable victory points in that not only can’t the leader “spend” her lead, she is often harmed by her lead position due to air resistance and the ability of nonleaders to draft.

Although designers largely tend to look for ways to limit snowballing, there are often good reasons to increase it. If games are dragging on too long, or the game suffers too much from player-elimination issues, adding snowballing effects can be helpful. Rewards for knocking out a player (as in Risk) are one example.8 These are strictly speaking snowball effects—they make losers lose by even more—but it’s often better to have a 0 percent chance to win (and thus be able to go get a cup of coffee) than to have a 1 percent chance to win (and thus be forced to remain in the game with almost no chance for victory). Games that use the “eliminate the winners” mechanic (e.g., a footrace, or the card game known variously as Asshole, President, or Dai Hin Min) are similarly snowball games—once you drop out, you are no longer in any danger of being the loser.

More on Catch-Up
The dynamic of the rich getting richer means snowballing tends to appear naturally in games. By contrast, catch-up features are more often deliberately included, and less often appear as natural outcomes of game features put in for other reasons.

There are countless examples of deliberately added catch-up features in games. The shells in Mario Kart fire forward, so the person in the lead can’t make use of them, but people who are behind can fire on those ahead of them. And the Spiny Shell specifically homes in on the person in first place. Some racing games go so far as to speed up the car of anyone who is behind. In Warcraft III, the upkeep tax on large armies is a catch-up feature limiting the snowballing effect of large-army dominance.

8. As mentioned above, some games (like poker) have these rewards naturally so they don’t need to be added. In Risk, though, the odds of an all-but-eliminated player coming back and winning are fairly small, so encouraging the knockout blow makes sense.
As mentioned above, any game with voting or other political features will typically thereby have catch-up, sometimes to the point of making "in the lead" a meaningless concept for much of the game. If someone has a clear lead, it is in the interests of all the other players to stop him. Note that this kind of catch-up is especially agential—one playgroup may think it is fine to pick on the leader, but another may impose limits on it (similarly for political snowballing—various groups will be for or against knocking out weak players, say). But politics is surely a net catch-up feature, since picking on the leader in some form is all but universal in political games.

In general, randomness may be thought of as a kind of catch-up feature. Although a random event may not differentially help losing players over winning players, change in the game state is still appreciated more by the players who are losing than by those who are winning.\(^9\) Reset buttons are one example: if a player is losing in a race game, she is happy to play a card that says "everyone goes back to Start," or that scrambles everyone's position around randomly. Note that although scrambling everyone's positions at random is in some sense "treating all players equally," it can only help the person in last place and only hurt the person in first. Even a seemingly equitable random jolt like "each player rolls two dice and moves forward that many spaces" is probably better for someone who is behind.

**Expansion and Contraction of Win Probabilities**

Saying that "each player moves forward a random number of spaces" is a catch-up feature is perhaps counterintuitive (although the fact that the player who's behind is in favor of it is evidence in favor of this viewpoint). And we still haven't addressed the question of how meaningful catch-up is once you take it into account: if I'm way behind you in *Chutes & Ladders*, but I might roll a 4 and land on a ladder and wind up ahead of you, then I'm not really so far behind you after all, am I? To address these issues, let's try to be a bit more precise about what catch-up and snowball really mean by creating a simple mathematical model of the progress of a game over time.

At any moment in a game, we can write down each player's chance to win. Typically those chances will start out more or less equal (for a fair game), change somewhat over the course of time, and then gradually shift toward 1 (for the winner) and 0 (for everyone else).\(^10\) If we write the various chances for each player in a row, say for a

---

9. Indeed, a basic strategy common to all games with a certain minimum amount of skill is to look for highly variable lines of play when losing, and to try and make the outcome as simple and straightforward as possible when winning. Bridge is perhaps the supreme example—when losing, assume various low-probability distributions of the cards in an attempt to find some chance to win; when winning, try to find a line that succeeds no matter how badly the cards are distributed.

10. Readers with some knowledge of mathematical modeling will realize that, like most models, this one comes in a discrete-time and a continuous-time variety. We ignore such issues here, although with its emphasis on events, our model is essentially a discrete one.
Games as Systems

four-person game that lasts ten turns, we might see something like (0.25, 0.25, 0.25, 0.25) at the start of turn 1, (0.3, 0.2, 0.15, 0.35) on turn 4, and (0.9, 0.03, 0.03, 0.04) on turn 9. We'll call this list of numbers a state vector. Note that the sum of the numbers is always 1.

If there's no chance involved at all (i.e., the game is completely determined), then the vector will look like (0, 0, 0, 1, 0)—all 0s for the players who have no chance and 1 for the player who is certain to win.

In a two-player game, if I am 70 percent likely to win at a certain point (perhaps it's a simple race game and I am eight squares ahead), and then later I am only 60 percent likely to win (perhaps you've rolled well and I'm only five squares ahead now), then you have caught up. If instead later I am 95 percent likely to win, then that's a snowball situation relative to the earlier game state.

What we're really looking at is the spread of the state vector: as it spreads out, the game is snowballing toward its conclusion. If the player who is behind catches up, the vector will be less spread out. The standard way of defining spread is by the variance: the expected sum-of-squares deviation from the average. The average is just the sum of the values divided by $n$, so for a state vector that's 1/$n$. Thus for a state vector $(p_1, \ldots, p_n)$ the variance is

$$[(p_1 - 1/n)^2 + \cdots + (p_n - 1/n)^2]/n.$$ 

This number represents how far the state $(p_1, \ldots, p_n)$ is from the "most caught up state" $(1/n, \ldots, 1/n)$. Naturally, the state $(1/n, \ldots, 1/n)$ has the smallest possible variance, namely 0. The largest possible variance belongs to vectors like $(0, 1, \ldots, 0)$—the most extreme snowball states.

So we'll define a catch-up event as one that decreases the variance of the state vector, and a snowball event as one that increases the variance.

It should be mentioned that ending state vectors like $(0, 1, \ldots, 0)$ represent a game with a unique winner. Some games, however, end in draws, thus ending with minimum

11. By "chance" we mean uncertainty in the outcome of the game, not overt chance elements like cards or dice. In this sense, even a game of chess has chance—in fact, quite a large amount of chance between two evenly matched players, for whom the state vector in the early game might be something like (0.47, 0.53). See section 5.1, on randomness.

12. Note that the number of squares until the end of the race factors into the probability estimate of each player's chances, in addition to the number of squares one player is ahead of the other. For concreteness, you might like to imagine the race as two players taking turns rolling a single die, with the winner being the first player to reach 100 total points.

13. The square root of the variance is called the standard deviation, and is another common measure of spread. The variance is more convenient for our purposes—it's easier to compute with—but it conveys essentially the same information.

14. $(n-1)/n^2$, not that it matters for this discussion.

Exercise 4.26: Compute this.
rather than maximum variance. This also happens in games with scaled victory conditions, for example poker, where the ending state of the players can be any redistribution of the total buy-in one likes.

Note that hurting the player in the lead and helping the player who is behind are exactly the same thing in this model: if we go from (0.7, 0.3) to (0.6, 0.4) we have both hurt the leader and helped the follower. Any increase in one player's chances must represent a decrease in the chances of some other player(s). Similarly, in a snowball event, the leader does better as the person behind does worse.

Thinking about games in this manner abstracts away a great many features, but a surprising amount of the flow of the game can be read from the time history of a player's chances to win. Some examples:

Here's a three-person game that progressed in a typical fashion (figure 4.4). One player (the thick black line) started out with a $1/n = 1/3$ chance to win, fell a bit behind, started winning, and then continued to widen his lead until the end of the game.

In the two-player game represented in figure 4.5 our player took a modest early lead, but eventually lost the game.

Figure 4.6 shows what a player's history might look like in a highly political game (perhaps the chip-taking game), where none of the early choices matter because an apparent lead results in getting "picked on." The player represented by the thick black line may have gained a lot of points early on, or he may not have, but none of that affected his chances to win. Each player had about as good a chance to win as any of

![Figure 4.4](image-url)

Typical win
Figure 4.5
Typical loss

Figure 4.6
Only the end matters
Figure 4.7
Effective elimination

the others throughout most of the game. The winner of this game was determined entirely at the end.

This same graph might also describe a game with extremely strong catch-up features—for example, a race game where cars behind the leader are given a significant speed boost.

In this unhappy game (figure 4.7), our player (the solid black line) was beaten down about halfway through the game. At that point, she had almost no chance to win, but she wasn't actually eliminated until the very end of the game. (Perhaps it was a race game in which she was so far behind that she had no real chance to win.)

Catch-Up: What Is Apparent and What Is Real?
One might ask the question of what part of catching up is real and what part is illusory. Imagine a game with an easy first-order state heuristic like a race. The game has a "catch-up mechanic" that helps people who are behind. Players enjoy playing because they feel like they can catch up if they fall back and remember pleasurably the number of great comebacks they have seen. But if players understand how this mechanic works, they should adjust their heuristics and when they evaluate their chances to win (i.e., use their new state heuristics) they will find there is no catching up from behind in the race—in fact there is no falling behind and never was, at least to the extent they once believed. It just means that a large lead on score really represents a small lead in chance to win.
Real catch-up features can come in two types. The first type is features that put some limitations on how big the variance can get (until the very end) and how fast it can get there. The second type is features that tend to reduce the variance in ongoing games by having events that either end the game in favor of the leader or reduce the variance going forward. For a simple example, consider a duel, with two duelists shooting in turn, each with a 60 percent chance to hit (which ends the duel). At the start, the first shooter has a greater than 0.6 chance to win, but if he misses, the other shooter is now ahead. Many games have features that work in this manner: the player who is ahead must press his advantage and attempt to win quickly lest the other player catch up.

It's true that for games with a unique winner, it is common that catch-up is the apparent catch-up that comes from imperfect state heuristics, not necessarily "true catch-up" (if one thinks of "true catch-up" as variance control).\(^{15}\) But that's okay. It is important to remember that since it is rare for players to have perfect state heuristics, it may be true that there is no reason to draw a distinction between a "true" versus "apparent" catch-up feature. When a catch-up feature is put in, by and large what is happening, as we have stated, is partially actual variance control and partially catch-up relative to a particular heuristic—for example, the lead in *Mario Kart*. The feature's effect is one of muddying the heuristics, but as long as those heuristics don't change, for all practical purposes the effect is real—the player who thinks he is far behind thinks he is catching up. The danger lies in players developing new heuristics, perhaps seeing that there is no catch-up but instead only a nonintuitive ranking of the leaders, and placing themselves back into the state the designer was attempting to avoid—namely player dissatisfaction with their ability to come back from behind.

Catch-up features can still do good things:

- Sometimes skill can be used to apply the catch-up feature if you are behind (or avoid it if you are ahead).
- Catch-up features allow a nice first-order heuristic (score/position without the catch-up feature considered) and a more advanced second-order\(^ {16}\) heuristic. Since climbing the heuristic tree is a big part of the enjoyment of games, that's no small thing.
- Catch-up features keep more players in the game in the sense that they have a reasonable chance to win. In other words, catch-up features slow down the spread of the

15. And we'll generally just say "catch-up" from now on, since there's no point in making the distinction any longer.
16. Strictly speaking, it may not be first-order and second-order. It may be third-order and seventh-order, say—"first-order" and "second-order" are a stand-in for "lower-order" and "higher-order." Heuristics don't have absolute numbers associated with them in any case; at best one can say that a certain heuristic is more advanced than another (typically by taking the other one into account, along with additional information).
state vector. The catch-up feature may also put a cap on the variance of the vector until just before the end. (To see this is true, just consider a game with some catch-up feature, and delete that feature partway through the game; now the players' chances to win are as far apart as they would seem with the simpler heuristic, which is further apart than they would be with the more complex heuristic, i.e., with the catch-up feature implemented.) In fact this may be the most important true catch-up function—that at no time until the very end will any player have too great a chance to win. Features like this often work better if player heuristics do not fully take this lack of variance into account, so that players feel exciting "comebacks" are common.

- Catch-up features with the "maybe it fires, maybe it doesn't" coin-flip type event (the missile that hits or misses) make the point lead more random-seeming, make it change more, and make the typical game more exciting for most players. Pushed to extremes, this can backfire with some sophisticated players, who realize that the point lead is such a bad indication of the true game state that they lose interest in it—a race where nobody cares who is in the lead is probably not an enjoyable game. Worst of all is if there is no useful state heuristic left whatsoever.

- Catch-up features can have the real quality that at any time the state vector has too high a variance, the game will either end or shrink the variance. This effect is very important since generally the harshest problem of having a small chance to win isn’t losing itself, but rather playing a game where one has too low a chance of winning. There are catch-up features that consistently deal with this problem by ending games or making them fairer. Either way is often a gain for the player behind, especially in a noncompetitive game.

Despite all these positive features of catch-up, it is worth remembering that it is often easy to see the bad in snowballing, but not the good (control of game length, better player-elimination characteristics), and the good in catch-up features, but not the bad (poor positional heuristics, relative irrelevance of early-game choices, opportunity for kingmaking because the last-place person has more power, overly long games).

**Miscellaneous Catch-Up Topics**

Now with more perspective under our belts, we can tackle several issues involving catch-up and snowballing.

**Randomness and Catch-Up**

Stirring the pot (e.g., resetting everyone's scores to the starting score, or adding a random amount to everyone's score) is somewhat like what people tend to think of as catch-up, and somewhat not: it doesn't differentially help losers and hurt winners, but it tends in practice to hurt winners and help losers simply because the winners are ahead and the losers are behind. Events of this kind tend to be "catch-up events"
in the sense of decreasing the variance in the state vector when they happen (com-
pared to the variance of the vector when they fail to happen). So one can think of
random elements in a game as being in themselves a kind of catch-up feature—if a
game has a lot of randomness, you are probably not as far ahead as the score (or other
first-order state heuristic) might indicate.

Random features in a game often give rise to “press-your-luck” situations: cases
where a player can choose to make the game more random or less. Typically a player
chooses to make things more random when behind, less random when ahead. Hail
Mary passes in football, going for three-point shots in basketball, guessing in Clue, or
pushing for a risky Yahtzee combination are all examples, but perhaps the ultimate
example of a press-your-luck game is Sid Sackson’s boardgame Can’t Stop.

Over-Catch-Up
Sometimes catch-up features are so strong that it is better to be second, or at the very
least it does not hurt to be second. Race games with lots of ways to hurt the leader,
shoot the person in front of you, speed up if you are behind, and so on, can have this
problem. Highly political games tend to be this way, due to the “pile on the leader”
tendency almost all playgroups have. Over-catch-up tends to be frustrating—people
want to pump up their score, or get ahead in the race, and they do not want to be
punished for it. In theory, jockeying for second (or should it be third?) and then
jumping to win at the end can be a reasonable game, but in practice it is not much
fun if it happens all the time. And games of this type tend to have all the play choices
other than those near the very end of the game be irrelevant to the outcome.

A game with this attribute will generally become less fun when players realize it.

Catch-Up in Very Long-Running Games
Catch-up can take certain unusual forms in games that go on for a very long amount
of time—typically one and a half player games (like single-player RPGs) or MMOs.
Long one and a half player games tend to have a great deal of catch-up: if one thinks
of the basic metric of player level compared to stage in the game (for an RPG), then
grinding is a mechanic that lets the player freely “catch up” anytime she wants. The
same applies to an MMO.

The reason very long games require catch-up is that if a game lasts ten hours (say),
then without some form of catch-up, a losing player would be clearly losing for the
last several hours, which is just too long to be in a state of all-but-certain loss. Of
course, if the catch-up features are extremely strong, one gets the problems one often
sees in these genres: choices in the early stages of the game may not matter very much,
or the player may be discouraged on realizing that a painstaking and tedious method
of play is most likely to guarantee victory. One common attempt to solve the problem
of catch-up in very long games is to use dynamic difficulty adjustment. This basically
amounts to catching up the player invisibly whenever she falls behind, and catching up the AI if the player moves ahead. The problem is that it is rather like your spouse cheating on you: arguably fine if you know nothing about it, but liable to make you feel bad if you do find out about it, which eventually you will (at least in the case of games, given the Internet). Players who are trying to play well want to feel that if they do play well, they will be rewarded. This feeling is hard to come by if the game tries to ensure equal outcomes regardless of player skill.

Even for games with a short game length, one can think of the ongoing metagame as a corresponding game with very long game length. This very long game has some of the same issues—for example, if a dozen people all learn to play chess together, as time goes on their skill levels will spread apart. After a number of months, some of the players may be in a permanently winning or losing state. Those players have (all but) won or lost the have-the-most-skill metagame, leading to a bad play experience. Better players in the group teaching weaker ones provides a sort of catch-up feature, arguably analogous to level grinding (the weaker players are spending more time improving their skills, the stronger players are spending less).

**Targeting and Catch-Up**
A catch-up feature may hit various targets: it may hurt the leader specifically, the player of your choice, the guy in front of you, a random player, everyone but you, everyone in front of you, and so on (likewise for catch-up features that help a player, although “help yourself” is by far the most common sort). Depending on whom the catch-up feature targets, different gameplay effects can occur. We’ll give just a few examples of problems that can arise, especially if the catch-up feature is too strong.

Hurting the leader often tends to lead to over-catch-up and a “play for second” style of game. Each player hurts the leader, nobody else gets hurt, and thus the lead cycles regularly, but having the lead isn’t necessarily meaningful. There are no cliques, so the only skill increase comes from the disguise of the first-order “who’s ahead” heuristic, a heuristic that may be so heavily damaged as to be almost useless.

Hurting your choice of player tends to lead to highly political games. As with any targeting mechanic, carried to an extreme it may result in a chip-taking game.

Hurting someone near you (in whatever sense the game defines “near”: a player sitting adjacent to you in a boardgame, a car driving near you in a racing game) can be good in that it is less political, although of course it does represent some diminishing of player choice. However, such a mechanic—say the Green Shell in *Mario Kart* (which, being unaimed, typically is used against players who are close)—may not give large-scale catch-up. Instead, it may cause clumping: groups of players who are close together keep shooting each other, forming clumps, but one clump can’t affect another far-off clump (although occasionally a player will break away from one clump and
push ahead or fall behind until pulled into the orbit of another clump). In this sense
*Mario Kart* is almost exactly like a large bicycle race, with the Green Shell playing the
same role as drafting: something that pulls together nearby vehicles but does not affect
faraway ones. They are a catch-up feature within a given clump, but less so when viewed from the point of view of the race as a whole.17

**Conclusion: Limitations and Effects of Catch-Up**
The limitations presented on catch-up are interesting for both player and designer. The most critical of these is the idea that catch-up relative to a fixed state heuristic is real even when the situation relative to winning percentage is not. Any time a player is in a game that he perceives to have a catch-up feature, there is some indication that his state heuristics may be insufficient and there is a possible gain in strategic understanding to be had by altering them. Similarly the designer needs to take care that adding a catch-up feature relative to a state heuristic continues to serve the basic intention of keeping players excited and hopeful without eliminating some core element of the game. It is probably true that you don't want to naively add a catch-up feature to maintain player hope at the expense, for example, of actually wanting to be in the lead in a race, or gather the most power in a political game. While the simple state heuristic of the lead being good in a race is arguably more important than keeping all players involved, there is often a lot of leeway for players maintaining naive state heuristics depending on the player audience. It is much more likely that adding a catch-up feature to a race for children or casual players will be seen as a true catch-up feature relative to the lead heuristic, rather than causing a shift in player heuristics to devalue the lead in favor of a more complicated formula. Even for a more hardcore game, features like dynamic difficulty adjustment may cause players to believe they “caught up” due to good or lucky play when in fact the existence of the feature meant they were never really behind. This situation can break down in a game meant to be highly replayable as players refine their state heuristics. Few players are interested in a game where they see they always have a 50 percent, or even 95 percent, chance of winning no matter what they do.

True catch-up in the sense of limiting state vector variance has an important place as well. Very often this will achieve the goal of continuing player involvement while maintaining clean first-order heuristics. The difficulty here lies in the potential to disenfranchise competitive players who may feel slighted they can only be a limited amount better than a truly bad opponent. Again the audience is the key. A feature that limits a player's downside to 1 percent of the leader's chance to win may not go

17. This whole clumping phenomenon only arises if the outcome of the catch-up affects future targeting, as in a race game with missiles. If the two are unlinked, as in a card game where you can only affect players sitting next to you, the clumping won't happen.
far enough to keep many people interested in the game. Conversely, a feature that sets that limit at 40 percent may scare away more competitive players.

Catch-up features that either end games or make them fairer can work especially well in achieving the basic goals for player hope in a long game. They may have the tendency, however, to create a lack of control over the length of the game, since by their nature they achieve their leveling by ending some games early. Still, it is encouraging for many to know that there are no bounds on how good they can get at the game while at the same time worse players will never have to be in a game they feel they can't win for long.

Exercise 4.9: Give some examples of pressing your luck in baseball and hockey.

Exercise 4.10: Give some examples of pressing your luck in a chess tournament.

Exercise 4.11: What types of audiences would be more interested in games with catch-up features?

Exercise 4.12: Do games with catch-up features tend to have poor or good state heuristics? Why?

Exercise 4.13: What are the risks of dynamic difficulty adjustment? Do all the risks go away if no players know that the difficulty is being adjusted?

Exercise 4.14: For a game to have a “true” catch-up feature what needs to happen? How might this be beneficial for the player audience? (Hint: Think about the elimination qualities inherent in such a game.)

4.3 Characteristic: Complexity Tree Growth and Game Arc

Game Complexity Trees
One can think of a game as a series of choices. In fact, the game designer Sid Meier famously defined a game as “a series of interesting choices.” There are certainly games with no interesting choices, and in fact examples of games without any choices, but these tend to be limited to the sphere of gambling. For logical completeness, one would typically consider all possible choices at any given node (decision point). But from the point of view of human players, what matters is the number of meaningful choices. “Meaningful” is of course an inherently agential concept: for the exact same game state, a beginning player might be choosing at random (no meaningful choices), an intermediate player might feel pressure to examine a great many choices, and an

18. This point of view is quite explicit in the Nash/Von Neumann game theory's extensive form, the definition of game in combinatorial game theory, or the game state trees one searches through in a computer chess program.

Problem-Driven Game Design

by Kory Heath • April 3, 2014 • 3 min read • original

In my experience, a problem-driven approach is the only reliable generator of high-quality game designs. The more time I spend focusing on specific, well-articulated problems and questions, the more likely it is that my final design will be novel, deep, and valuable.

This approach pervades every stage of my design process, including the initial choice of what to work on. I won’t even start a project if I don’t have at least one clearly-stated problem or question in mind. Maybe I dislike something about an existing game or genre. Maybe I have a question about some game system that I’ve never seen in action before. It doesn’t need to be an earth-shattering question. It just needs to be well-formed, interesting, and unresolved.

The desire to get rich is unlikely to generate a high-quality design. The desire to create a new game in a genre that I truly love is equally unlikely to generate a high-quality design. The issue is not one of ethics or aesthetics. The issue is that design space is mind-bogglingly vast and only sparsely populated with high-quality games. I’m standing in a desert, and I need to know which way to go. Neither love nor money helps me in this situation.

Problems provide direction. They point. They’re features of the local environment that say, “There may be water over there.” Success isn’t guaranteed, but this methodology succeeds more often than random chance would dictate, which is not true of any other approach I’ve tried.

An Example
Werewolf is a great game, but there are things I don’t like about it:

- It requires a moderator and a logistically awkward eye-closing phase.
- It doesn’t play well with fewer than seven players, and is often long.
- Being a werewolf is unpleasantly exhausting.
- Players are often eliminated early and must either leave the room or sit in silence.

Not everyone is bothered by these problems. That’s fine. My unique design sensibilities determine which problems I choose to work on. The important point is that my problems are specific enough and unambiguous enough to suggest a direction.

Indeed, on the day I clearly articulated these problems to myself, I had the following game idea: assign a hidden character card to each player, and then try to discover the owner of a different card each round.

This hypothetical proto-game addresses all four of my problems, to varying degrees. It requires no moderator or eye-closing. It works with as few as three players. It doesn’t put an individual player on the chopping block for an entire game. And if players are ever eliminated, they’re allowed to stick around and keep talking, because they don’t have any game-ruining information.
This isn’t a complete design, but there’s enough there for an initial playtest. We tried it, and the results were promising. Of course, we then had a new list of problems to solve. Good! Problems are our signposts in the vast and trackless land of game design.

We iterated on this cycle of problem-solving and playtesting (with Dave Chalker doing much of the heavy lifting) until we didn’t have any more problems to solve—or at least, until we were able to live with the remaining unsolved problems. The result is a cute little card game called Criminals.

**Money, Love, Originality, and Fun**

With this concrete example in place, it’s easier to see why the desire to make money is unlikely, in isolation, to lead to good game design. That desire will never help me come up with a specific idea like the one that lies at the core of Criminals, because it doesn’t (and can’t) tell me where in design space to search. The desire may be an excellent motivator, but it’s a terrible navigator.

If I declare that I love Werewolf and would love to design my own psychology game, my desire is also unlikely, in isolation, to help me design Criminals or any other interesting game. There are millions of ways to modify Werewolf, and almost all of them are bad. I need some methodology that actually helps me figure out what to try, and why.

The honest desire to create something original is similarly useless, because it has nothing to say about how to find non-derivative moves through design space. If the only clear problem I can articulate about my current rule-set is that it’s too much like some existing game, my solution is not to search for ways to differentiate it. My solution is to scrap the project. Otherwise, I’ll end up with a derivative result which differs from its inspiration in ways that exist only for the sake of differentiation, and likely make the game worse. I want an actual methodology that helps me find unexplored, high-quality regions of design space.

Finally, the honest desire simply to create a fun game fares no better than any of these other motivations. If the only clear problem I can articulate about my current rule-set is that it’s “not fun enough,” I’m strongly inclined to return to an earlier, better iteration and branch out from there, or scrap the project entirely. “Not fun enough” is navigationally useless, unless I can translate it into a specific, unambiguous problem-statement that doesn’t include the word “fun”. If I can do that, great! Now I have a problem to focus on which will likely suggest new ideas and directions. Otherwise, I’m just wasting my time.

**Closing Thoughts**

Why might I design a game?

- To make money.
- To pay homage to an existing beloved game.
- To create something original.
- To create something fun.

There’s nothing wrong with these motivations, but they’ve never helped me design good games. I’ve always obtained my best results when I’ve ignored these motivations and focused on solving interesting problems and answering interesting questions.
In any conversation, we need someone to talk with. Without a player, a game is just a set of instructions, whether executed by a computer or human beings who learn what cards to draw on their turn. An unplayed game is like a piece of sheet music: you can see its potential and imagine what it might be like brought to life. You can grasp from notation or rules that it's complex and maybe glimpse its nature. Instructions need someone to carry them out to leap from untapped potential into a living, changing experience. To deepen our practice of playing games, we have to think about our own role in shaping what happens—and understand how our role as game designers intersects and tangles with the choices of players.
Players
My first real player was my little sister. I was around 12 years old when I discovered a digital game that let you design and play your own levels: the Macintosh version of Lode Runner (1984). It boasted a straightforward but deep system of climbing up ladders and racing across platforms, collecting bags of gold, running from nebulously defined enemies, and digging holes for them to fall into (see Figure 5.1).

Figure 5.1  A typical level in Lode Runner, with the player at the bottom, three enemies, and six bags of gold to collect.

I found the real magic of Lode Runner to be in the level-editing mode, which put the dozen or so objects of Lode Runner at my disposal. All of a sudden I was experimenting, creating scenes where the hero would be overwhelmed instantly by a horde of implacable enemies, or clamber and fall into a treasure chamber with hundreds of coins. I could create new scenarios that were completely unlike anything that came with the game; I could tell simple stories that played out in a series of twisty, challenging corridors.

When the player has collected every bag of gold in a level of Lode Runner, a new object often appears: a ladder that reaches to the top of the screen, allowing exit to the next level. In my own levels, I came up with new ways of using this suddenly appearing ladder. The space of the level would suddenly rearrange, and it would become clear that completing it required getting back across the dangerous level, being chased by enemies, to reach a previously invisible path. Suddenly I was creating plots with turning points!

Even though I could play those levels myself to see how they unfolded, there was something missing: a player, someone else who could experience the dangers and surprises I was crafting. I wanted to express something to someone, through this game. I wanted to see how another player would respond and if what I'd done would be clear. So I started using my 10-year-old sister as a guinea pig.
My sister knew how to play *Lode Runner*, and I'd make her sit in my well-warmed chair once I had finished creating a level. I'd tell her, “Go on, see if you can beat it!” She could beat my easier levels without much trouble, and although she had a big smile when she did, I felt disappointed somehow. I could tell that she was smiling in part because she'd beaten me somehow—as if I'd asked her a riddle and she'd managed to outwit me and find the solution with no help.

Before long I started creating fiendishly difficult levels for her to play: they required precise timing and exact knowledge of how to manipulate the movements of each enemy in order to win. These scenarios had lots of hidden trapdoors that looked like ordinary sections of floor but dropped the player right through them into certain death. I orchestrated the behavior of the enemies so that they'd start chasing the player at exactly the moment I wanted.

My sister would insist that these levels were impossible, and I'd smugly show her that they weren’t... well, as long as you had exactly the right skill, the correct strategy, if you knew the right path through the scene. As the designer, I possessed all the above, of course. I was thinking more like a player competing with a sibling, though, rather than crafting something for her. I wanted to beat her and see her admit defeat. That’s a natural impulse that I’ve seen play out many times since in games and levels made by kids for each other to play. But creating a system that’s practically impossible for anyone but the creator is just a tiny, tantalizing fraction of what we can do when we create games and ask others to play.

I was trying to create a harrowing experience for my sister, something with narrow escapes, unanticipated secrets, and perfect moments where a choice to run left or right made for an instant life-or-death difference. All the pieces were there, but with these fiendishly difficult levels, I hadn’t succeeded in engaging my sister, in showing her the magic I was trying to conjure. Eventually, when faced with a level full of tricks that were impossible to understand ahead of time, she rolled her eyes and refused to play.

**Creating Conversation**

So far, this book has talked extensively about the elements of vocabulary: verbs and objects, the pieces of context that aid in understanding those elements, and the ways those elements combine into scenes that develop verbs and create pacing. In the second part of the book, we look at some broader questions: why might you want to pace the development of a particular verb? What kind of story is conveyed when contextual elements, objects, and verbs work together... or against each other? What might you try to say with all that vocabulary? And how might you invite players to say something in response? Do you want to invite players to put their own stamp on your game, or are you trying to convey something that’s best understood if a player primarily absorbs and listens to what your game has to say?
We use the vocabulary of written and spoken language to communicate with other people. The vocabulary of games allows us to express ourselves in tremendously powerful ways, saying things with systems in ways that words can’t. It lets us create different kinds of dialogue with each other. We’re lucky to live in a time when expressive systems—another way of thinking about games—are being explored by creators and players in all sorts of new ways, to converse about and reflect on our every idea.

It’s compelling to think of a game as a conversation: players make choices and use verbs within a system. In multiplayer games, these choices can communicate with other players. A single press of a button or move of a chess piece can convey aggression or uncertainty or less obvious concepts that are specific to a particular game. Players who are highly conversant in a system can read the moves of an opponent, whether human- or computer-controlled, and understand what’s being said even without words.

As the creator of a game, you also participate in the conversation, but in an unusual and special way. Unlike the times I peered over my sister’s shoulder and watched her play Lode Runner, you’re usually not there to watch your players. Instead, you’ve facilitated a conversation by deciding many aspects of how it will work beforehand. As a game creator, you craft the particular vocabulary of its conversation, deciding how verbs will develop and shaping the space of possibilities in which the conversation will happen. As creators, we try to shape a space where a good conversation with or between players could happen; we hope that players won’t throw their hands up in frustration and leave or get bored and drift away.

During a play session of a single-player game—the kind of game that’s the primary focus of this book—all the conversation is happening between the creators of the game and the player. It’s a tricky kind of conversation to have. As the creator, you have to hope that what you’re saying in the conversation—through the rules and shaping of the experience as well as the words, images, or sounds you’ve added to the mix—gets across and finds a player, somewhere out there, who responds with choices, thoughts, and maybe even interesting strategies and emotional engagement.

This challenge can feel like a gamble, like sealing a letter in a bottle and hoping someone figures out how to open that bottle and understands what you wrote. If you’re drawn to creating games—if you’ve ever felt the spark of excitement that I did when I started making Lode Runner levels for my sister—then maybe you have things to say which can’t simply be expressed in words, but which could find a compelling form in the systems of a game. Take the gamble! The good news is that in recent decades, many others have gone before you. We've tried, failed, succeeded, and tried again. Despite the fact that we’re all still learning exactly how to talk about games, finding words to use and models to think with, creators of games have found a lot of techniques and tricks to get our “letters in a bottle” read.
Iterating to Fun and Beyond

When I first started making levels in Lode Runner, I intuitively discovered one of the most pervasively used techniques for refining a game and fine-tuning the conversations that can emerge from it: I got someone to play it, went back and changed it, and made her play it again. Games need players, and as the participants in the conversation who might not be there when our games our played, we need to see people play and hear about their experience. Playtesting and iteration—the process of changing a game based on what you see and hear from the player during play—are the cornerstone of many creators' process. After all, very few composers could create great works of music without ever being able to hear them; Beethoven, who lost his hearing, is the astonishing exception.

We playtest because we want to see a response to determine whether we’ve succeeded in eliciting the kinds of responses we were hoping for. Usually, the response a game creator is looking for is a smile, a look of intense concentration, the raised hands and lifted eyes that accompany a feeling of victory—all the hallmarks of someone who’s really into what’s going on and having fun. Playtesting lets us spot the barriers to reaching that place and then think about ways around those barriers. The barriers might include confusion about how to use a verb or pacing that’s too difficult for the kinds of players you’re hoping will play your game.

"Fun" is the most popular and traditional goal that game designers try to reach, however. Think about the metaphor of conversations again: talking with others, especially your circle of friends or other like-minded people, has often been described as one of the most consistently engaging and pleasurable things in life. That doesn’t mean that all conversations are fun. Some are deadly serious, even if they’re hard work to stay engaged with, and some conversations are necessary to convey important ideas. More and more, game designers are finding that fun is just the traditional role that games have played in society. We have to remember that it’s what most players expect of games still, but there’s a huge variety of other kinds of system-driven conversations that remain to be explored.

Papers, Please (2013) by Lucas Pope doesn’t try to present itself as a straightforwardly fun game. It tells you that you’re going to work: you play an immigration inspector, checking and stamping the documents of hundreds of would-be border-crossers (see Figure 5.2). You’re employed by a harsh, totalitarian regime that tramples on rights and demands your diligent and detail-oriented assistance in exchange for a meager stipend to keep your family alive. The scenario is grim and mind-numbing, and so is the gameplay: you’re literally inspecting paperwork for discrepancy, expiration, and forgery and stamping it APPROVED or REJECTED, over and over. For each mistake you make, you’re penalized, which could make a life-or-death difference for your inspector’s family.
Figure 5.2 Stamping a seemingly endless series of border documents in Papers, Please.

This may not sound fun at all, on the surface—but Papers, Please manages to thoroughly express the workings of an unjust system that you find yourself trapped in when you play. You’ve got to decide whether to prioritize helping mistreated and threatened border-crossers or preserve your own family’s health and wealth. The shape of the game—the difficulty and balance of costs and payment—always holds out the possibility that if you’re good enough at your job, you can get away with some purposeful “slip-ups” to help people. Just as surely, your power to act is limited by the fact that you’re only one cog in the machine.

Lucas Pope playtested Papers, Please extensively to fine-tune the workings of the game’s fictional injustices. As one of the participants in the web forum where he posted early versions of the game, I took part in that process and saw the game get better at eliciting the kinds of feelings and experiences he was aiming for. Do all games benefit from playtesting, though? There’s an argument that can be made that the goal of some games is less about persuading the player to respond, feel particular things, or make certain kinds of choices, and more about expressing something that the creator wants to say—regardless of whether a particular player is willing to hear it.

When we playtest and iterate a game, we make changes that attempt to adapt the game’s form and the possible spaces that can emerge from it to the psychology and behavior of players. If we’re making a game that’s intended for young children, for example, we might change the controls so that they’re easier for players with less developed reflexes and motor skills, or we might adjust the difficulty of the game differently than we would for an experienced gamer. We move the game away from purely being about our own expression to adapt it for an audience.
That's not necessarily a bad thing, of course, but it means changing what we're saying or how we're saying it through game systems to attract, retain, or persuade players into hearing and engaging.

Your Conversation

What happens when game creators simply put their thoughts out there in an expressive system and ask players to listen without compromising or adapting? What if a game is trying to express something real about the creator's life? As mentioned in Chapter 1, "Language," Anna's game *dys4ia* (2012) reveals her own experiences of taking hormones through dozens of small systems; it asks players to help unfold that story, piece by piece. *dys4ia* is a game that's less about players choosing what happens or expressing themselves and more about a kind of listening through interaction to understand a kind of life experience that most players don't share.

Telling and listening are part of conversations, too. Sometimes it makes sense to rest our active responses and simply hear what the person who's talking is trying to say and understand what they mean in the stories they tell—or the systems they build. Games can present us with overt choices and ask us what we think; they can also show us that in some circumstances and systems, choices are limited or don't necessarily make a difference. For example, as a single immigration inspector in *Papers, Please*, you can't help every single person cross the border. When you play *dys4ia*, you can't change the course of Anna's life or experiment with the system to see what would happen if she stopped taking hormones or reacted differently to emotionally trying circumstances. It's part of the story of her life, and it recounts through its systems what's already happened.

When you go into a conversation, you help shape how it'll evolve and turn out. Conversations can be polite and formal or raucous and free-wheeling; the same is true of games. As the creator of a game, even if you're not present when it's played, you'll make many choices that determine and limit what might happen in the conversation of play. Games can present us with overt choices and ask us what we think—like an interrogator demanding answers or a friend posing questions to help us understand how we feel. What would you do in a difficult situation? What kinds of choices would you make when faced with limited resources? We can also create wider spaces within games where we invite players to come up with their own strategies, reactions, and explorations into territories that we might never have anticipated as the creators of the game's vocabulary. Or we can limit those spaces and ask players to listen—to understand that not every system is open to being changed through the agency of players, not every story can be diverted toward a happy ending, and not every difficult challenge can be mastered and conquered.

These are all different ways of communicating through games, and they raise all sorts of questions. What kind of space do you want to shape? If you have something you want to say, how do
you get that across in a way that feels honest and true to players? How do you decide when to try to adapt to players' expectations and psychology to try to elicit feelings of fun or persuasion, and when do you stop doing that in favor of holding on to your own expressions and just ask players to listen? If you're inviting more open contributions to the conversation from players, how do you help them become conversant enough with our vocabulary to say something interesting in reply? Can we create space for a player to tell their own stories and express themselves in the space of a game, while also conveying what we have to say?

The brightest and most passionate game designers in the world continue to struggle with these questions because it's exciting to explore a space with so much possibility that remains untapped. Although there are no definitive answers, the next few chapters share plenty of ideas about and around these questions. Maybe you'll come up with some of your own answers.

Twenty years after I started experimenting with Lode Runner, I had a job designing games and another 10-year-old sister in my family. When I went home for the holidays one year, I brought my youngest sister one of the games I'd been working on. She was delighted and played it for weeks, mastering the intricacies of its system. She talked to me about it, asked me for help, and showed me her strategy. Inside the game, around it, and beyond it, we had a conversation.
Difficulty is one of the oldest ways to look at a player's journey through a game. A novice player usually starts with simple challenges: learn to jump over this obstacle, understand that pushing the joystick to the right will move her avatar to the right. Even in multiplayer games like chess or golf, a new player will often take on easy opponents: other novice players, or skilled players who are "taking it easy" on the novice by playing with a handicap or deliberately playing below their level of skill. As the player masters some simple verbs, she's faced with more difficult challenges.
Push and Pull

As a beginning designer making Lode Runner levels, I had a naive idea of difficulty: harder is better, and the ultimate challenge of playing any game is to master the hardest challenges. It’s an upward narrative of progress and increasing conflict, the same kind of story we find in many heroic narratives of literature or film. At the peak of difficulty, there’s an epic battle. On one side, there’s the player, with everything she’s learned. On the other side, there’s the game’s system at its utmost, wielding a climactic scene that the designer of the game has made to “throw the kitchen sink” of possible challenges at the player.

Difficulty can be compelling and dramatic: the player starts off easy, learns and deepens her understanding of the game’s possibilities, and climbs through increasing challenges to master the system. Overcoming difficulty is deeply appealing to us as human beings for good reason: it can give us confidence in our own ability to learn and even master difficult aspects of our lives.

In earlier chapters, we looked at how verbs can develop in relation to objects and other verbs. These elements of vocabulary are the building blocks of a conversation that players have with games we create, a conversation that we enable and shape by developing the game’s vocabulary. In this chapter, we discuss how ideas about pacing and development can be applied to the entire experience of a game, from the start through the middle and toward the end—assuming the game even has an end!

When we think about games as a conversation, we can discover many potential ways of looking at games. After all, not every conversation needs to be about challenging the participants, even if many important conversations are challenging. In a conversation, challenge can mix with pauses for reflection, times when we listen quietly, and statements of support and reassurance. Conversations are about push and pull: one person says something, and the other person listens and responds. At times we challenge each other, and at other times we allow another’s thoughts to explore and develop. A good conversation isn’t necessarily led by one person either; some or all the participants have ways to voice their own input about the pace and goals of the conversation.

We can find ways to do all these things with games as well, in the unique ways that conversing through a system can create. As the creators of a game, we can shape the ways that the player can push and pull through the game’s system. Verbs are a great example of how a player can take an action and push into a game. We can share decisions with the player about how the push and pull of its conversation evolves—even the purpose of the conversation.

Resistance is another way of thinking about the push and pull of games. When a player uses the verbs at her disposal, she pushes against the game to see what will happen, and the game responds. As discussed in Chapter 3, “ Scenes,” when the player of Tombed uses the “dig” verb against a metal section of floor, causing Danger Jane to hit it with her shovel, the game
responds with Jane's digging animation and a metallic “ting” sound, but nothing else. The metal block does not give way but resists the verb. In that single moment of gameplay, the game has responded to the player’s push by pushing back and providing resistance.

In longer stretches of time than a single moment, the player may try many different ways to push into the system of the game: perhaps using the “dig” verb in different circumstances, or combining digging with left or right movement to drop Jane further into the vertical column that comprises the space of Tombed. The player may develop strategies to deal with the different scenes that follow in succession, developing her understanding of when and how to use verbs—including the “un-verb” of simply waiting for the ceiling to descend and destroy metal objects—so she can keep playing and reach the bottom.

The player of Tombed will also think about the goals presented by the game and her own goals in playing—the aspects of the game that pull her forward as she pursues them. She’ll have to reconsider how to reach those goals after she finds that Jane gets crushed by the descending spiked ceiling and falls off the bottom of the screen, followed in turn by the game resetting itself to an earlier state. This is a different kind of push from the game, declaring that the player won’t be allowed to proceed if the spiked ceiling contacts the top of Jane’s hat. The player must decide how to respond and if she wants to keep pushing. Does the player want to win? Then she has to find ways to push when the system pushes her back.

At each turn, the player pushes in different and increasingly complex ways, and Tombed pushes back: always applying pressure with the unstoppable descent of the spiked ceiling, but also with the changing objects that make up each scene, pushing the player to find new ways to use verbs and keep descending. Finally, Tombed stops pushing when the player reaches the bottom of the shaft. The oppressive ceiling disappears, the player uses the “dig” verb one last time, and the game ends.

Tombed is a straightforward game in many ways. It has a few different verbs and can be played from beginning to end in under three minutes. Even so, the player must find many different ways to use those verbs and push to reach the end. Tombed was designed and paced to push back in different ways as well, sometimes giving the player a longer span of time to consider her decisions, and sometimes demanding that she act immediately. Sometimes she’s allowed many choices, and sometimes very few.

Flow

Back in Chapter 1, “Language,” we made fun of the word “flow.” It’s a term that’s often used by game designers to talk about difficulty, pacing, and challenge in games, but sometimes “flow” is tossed around so freely that it becomes a substitute for “fun” or “quality”—as if flow is a magical substance needed to keep players captivated by your game.
Flow is part of a psychological theory, first proposed by Mihály Csikszentmihályi; it describes a state of focused motivation where someone's so involved and energized by what they're doing that they become completely absorbed and caught up in it. This state of flow is similar to colloquial ideas like “being in the zone.” It sounds like a wonderful thing; understandably, many game creators want as much flow as possible in their games. Flow doesn’t just come out of nowhere, though. Much has been written about flow, but most of what’s useful for making games can be summarized in three elements that Csikszentmihályi says are necessary for flow to occur.

The first condition for flow is a situation with goals and a participant who can take action to make progress toward those goals. Luckily for us, both these things are fairly common elements of games. The second condition for flow is feedback: the person experiencing flow has to see what happens as they try to move toward their goal and be able to adjust their actions to respond to changing demands. If this sounds familiar, it’s because feedback is exactly what we’ve been referring to as resistance. Flow is just one way to talk about what happens when the objects, verbs, and resistance of a game develop at a particular pace that encourages a player to stick around for more of the conversation.

It’s not enough to simply give players feedback in response to their actions. The third element of flow is that demands on the player’s choices and actions must change and evolve over time. At first, figuring out how to use a game’s verbs to jump over a wall might be an interesting goal with feedback. The player figures out when to jump, and the game shows her that she made it over the wall. Now imagine repeating that action. If she had to jump over the same wall in a modded version of Super Mario Bros., at the same interval, for ten minutes on end, it would become tedious. It would turn into a test of patience more than anything else, and it potentially would feel like a waste of time (see Figure 6.1).

![Figure 6.1](image)

Figure 6.1 What if your avatar had to tediously jump over a long series of walls?

The simplicity and lack of evolution in repetitive, already mastered tasks results in boredom, one of the two pitfalls that disrupt flow. On the flip side, flow can also be disrupted if challenges are too difficult before the player has enough understanding and mastery of verbs to overcome them. If the next challenge after jumping over a simple wall involves a highly developed use of the verb that requires a lot of timing, the player may fall over and over again. She may end up feeling like her attempts are futile. This results in frustration and, like boredom, it can feel like a waste of time. The player feels stuck “doing nothing” rather than continuing to move through a flow-inducing series of evolving choices, actions, and challenges.
In terms of resistance, boredom is what happens when a player isn't being pushed by the game system to do anything except repeat an action she already knows how to push with. Frustration can be similarly repetitive, such as a player pushing into the conversation of the game and being told, “No, that's not it, try again” over and over again. Although resistance is happening, it’s stuck in a loop.

A commonly expressed idea about flow and games is that as designers, we should try to stick carefully to a channel between boredom and frustration, like a shark swimming between dangerous rocks on either side. Also like a shark, the challenge of a game in this model has to keep moving, so that repetition of actions that the player's starting to master doesn’t get boring. Get the difficulty exactly right, and the player will stick with your game, developing more and more skill. The game then needs to respond in new ways, pushing back by providing the player with ever greater challenges. This upward ascent resembles a slope toward the maximum possible challenge (see Figure 6.2). It’s similar to the narrative of difficulty mentioned earlier, an uphill battle toward an epic conflict. Unlike the simple idea of “the most difficult is the best,” however, thinking in terms of flow lets us focus more on the process of this journey. All along the way, the game must keep evolving the system to provide more difficulty so that the player will stay engaged until she reaches that pinnacle.

**Figure 6.2** For some game creators, the ideal experience involves staying in the zone between boredom and frustration as the player’s skills improve.
The channel between boredom and frustration is an ideal path, like a perfect model that many games strive for. In a game with perfect flow, the player would push and be pushed back but would be so engaged in what’s going on that it would all feel seamless, natural. Some games are good at finding this channel—even if they don’t start there at the beginning of a player’s experience!

*Super Hexagon* (2012) by Terry Cavanagh is an interesting example. To play, you simply use the verbs “rotate clockwise” and “rotate counterclockwise” to keep the arrow you control from colliding with a series of walls closing in from the outside of the screen (see Figure 6.3). The player has to rotate the triangle to go through the gaps. At the beginning, this is an incredibly difficult task, and a player is likely to die by colliding with a wall almost immediately, making game sessions last less than ten seconds. At first, this seems like a clear violation of the “perfect model” of flow, but *Super Hexagon* uses a simple enough system that it doesn’t need to start off slow and easy. The player learns what to do by colliding with walls, over and over again. Because these early sessions are so short, it’s easy for the player to jump in again, grasp the patterns of walls that close in on her, and hone her reflexes.

![Super Hexagon](image)

**Figure 6.3** *Super Hexagon* dares to start off super-challenging.

Before long, many players will improve—and notice that they’ve improved, since their game sessions (and “longest time” records) will be getting longer. This kind of motivating feedback is essential for flow, but it’s worth noting that *Super Hexagon* doesn’t start off at the bottom-left
corner of a flow diagram—the kind of very easy, no-skill-required experience that often involves a tutorial that holds your hand or practice levels that go easy on you. Instead, it drops the player into the frustration of the game like a skier descending a steep slope (see Figure 6.4) and lets her figure out through short bursts of intense play that once she starts to get the hang of it, the challenge will become manageable. That steep slope may even be part of why getting better at this game feels so exciting. *Super Hexagon* shows us that not all games have to adhere to or strive for one model of flow. Following the “ideal” channel from bottom left to top right is just an idea that’s become traditional for many game creators.

![Flow Diagram](image)

**Figure 6.4** If a player isn’t put off by the difficult beginning, finding the flow of *Super Hexagon* can be a thrilling ride.

Instead of a straight line running from bottom left to top right on the flow diagram, the experience of many games involves a zigzag path. A game will present a new challenge, like a more difficult kind of jump, a new verb like “shoot” that has to be used in a different way (for instance, timing your shots so that they don’t miss), or a combination of verbs, like “jumping” and “shooting “at the same.

The player has to figure out how to master this new challenge. It’s a process that often feels frustrating at first as the player learns how to deal with it, especially if she doesn’t get it right on
the first try. As she masters the new challenge, the push of frustration lessens. Repeating the same action again and again drifts toward boredom, creating a zigzag. Of course, not all players are the same: some might master a verb or combination of verbs quickly, especially if they have experience from other games, while others may spend longer being frustrated. The purple line in Figure 6.5 shows the traditional idea of ideal flow, with a frustrated player following the red line and a player who masters challenges easily following the blue line.

![Figure 6.5](image)

**Figure 6.5** Same flow diagram but with zigzag lines for different players.

In shaping the conversation of their game, game designers have figured out how to make this zigzag pattern part of a story that's told through play. A moment of intense challenge that requires the player to use the verbs they've been practicing in previous sections might involve fighting a boss, for example. The visual and audio cues that accompany this moment might include a larger graphic to represent this dangerous obstacle, with music or sound effects that convey an ominous or climactic feel. Before and after this moment, the context isn't as intense, and neither is the challenge: the player can relax and prepare for the next big moment, following an arc that builds up to the next conflict (see Figure 6.6). We discuss more ways to create these kinds of pauses and plateaus (where the line of flow becomes more horizontal) throughout this chapter.
Adjusting Difficulty

Games like Super Hexagon require the player to deal with frustration and failure and commit the time to overcome hard challenges. Competitive multiplayer games have a long legacy of putting this responsibility in the hands of players—in these games, not just a single player but a pair of competitors, or even a group or community of players who play together. Players who enjoy sport-like digital games such as Hokra (2011) or BariBariBall (2012) have to teach newcomers how to master the challenges of the game, growing a community of players so they have more opponents to face. The difficulty in these games comes largely from how good your opponent is. Players can take it easy on beginners or play with deliberate limitations (or handicaps) to help them learn.

Single-player games face a different kind of problem because the player is alone in conversation with a system that can only say as much as its designer has allowed it to. Even so, it’s possible for the creators of a game to reveal some of what’s going on in the system and give players control over whether it offers more risk of frustration or boredom.
One common way to provide this control is to have the player select a difficulty mode at the beginning of the game. The player chooses whether she wants an experience that starts off challenging and evolves to become even more difficult, or one that’s easier—potentially to the point of boredom. Creating more than one way to pace the same game system can be difficult, however; one mode often ends up being perceived by players as the “real game.” Often this is the most difficult mode, especially for players who value skill and mastery. In addition, giving players this choice at the beginning of the game, before they understand the kind of resistance that the game offers, asks them to guess which difficulty setting will be most satisfying for them. What if a player is good at one aspect of the game but not others? Some games offer detailed controls for adjusting many aspects of difficulty, but there’s still a paradox: to understand how all those controls will affect a player’s experience, the player first has to learn how to play the game well enough to grasp her options.

In the early decades of digital games, the audience of players was relatively limited. Not only were most self-identified gamers white, male, and well-off enough to have steady access to computer technology (or at least quarters to dump into an arcade machine), but gamer culture and the systems it produced were focused on difficulty, challenge, and mastery. By the turn of the millennium, things had already changed a lot, and the game industry launched a new wave of “casual” games. These games were targeted toward players outside the usual suspects, many of them women, girls, and older people who weren’t part of the earlier eras of game enthusiasm. Casual games were known for being much less punishing and intensely difficult than games of earlier decades, and for bringing a much larger segment of the population to gaming. Gamers who had less experience with and fewer preconceptions about a particular kind of system are even less likely to grasp intuitively whether they want to play the “Hard” or “Easy” setting. Ever since the “casual revolution,” game creators are more likely to ask, “Who is this game for?” and sometimes, “How can we make this game more fun for more people?”

Game developers have been searching for many years for ways to seamlessly mold the resistance of a game to match each player’s abilities rather than create a kind of flow experience that works for some players but frustrates or bores others. Many of these attempts fall under the concept of dynamic difficulty adjustment (DDA): methods of adjusting the rules and resources of a game to help players who are struggling with a game’s resistance, and increasing the challenge for players who are doing very well. When you’re playing the first-person shooter Half-Life 2 (2004), you’ll occasionally come across crates that contain helpful items to replenish your health points or ammunition (see Figure 6.7). If you’re well stocked with these resources, you’ll find fewer items inside a particular crate, but if you’re doing poorly and running low on ammo or health, that same crate is more likely to contain items that will help you replenish those resources. Many players of Half-Life 2 never notice that they just happened to get a more powerful healing item when they were running low on health; designers who use DDA extensively, helping players who struggle while increasing challenge for others, often try to do so subtly.
Figure 6.7 If you're running low on ammunition in *Half-Life 2*, this crate is likely to contain some to help you out.

Much more egregious examples abound in games. In many racing games, for example, your opponents will actually drive faster if you're in the lead and slower if you're trying to catch up to them. It's not hard to understand how this kind of adjustment keeps the game interesting in the service of flow, but becoming aware of how strangely fluid the behavior of the competition is can be jarring. It might even make the player feel like her own abilities and struggles don't really matter, because the reality of the game world will be adjusted based on the player's situation.

Subtlety is necessary in DDA because of how it changes and manipulates the conversation between player and game. When the player pushes against the game and doesn't manage to make a difference or she meets an expected goal, the game pulls back its own resistance; when the player pushes forward successfully, the game's resistance increases as well. Learning a game through your own ongoing conversation with it is a process of exploration. Exploring a system with an intense amount of DDA is like having a conversation with someone who's changing her mind constantly based on what you're expressing.

Used bluntly, DDA can give the resistance of a game a mushy feeling, as if there's no fixed structure that the player can meaningfully encounter and push against. Used subtly, DDA may go unnoticed by players, but it's still quietly manipulating the shape of resistance to create the
smoothish experience of flow, rather than presenting some unmoving challenges to the player and letting her decide how to overcome it—or simply stop playing. It’s no wonder that many creators of smaller games in recent years avoid DDA and simply let their game systems function without constant adjustments and modifications. Would Super Hexagon be a better game if Terry Cavanagh had designed it to get easier when the player inevitably fails at its extreme challenge? The shape of that game’s relentless resistance to player effort would become different, more malleable—and perhaps less meaningful for players who are willing to throw themselves again and again to build their skills in a hard kind of fun.

DDA doesn’t have to leave players’ choices about how much resistance they encounter by the wayside. f/OW (2006) was one of the first games designed by Jenova Chen, who chose that name because part of what he and his collaborators were influenced by and seeking to explore was the idea of flow in games. Rather than adjusting the system’s resistance purely based on the player’s performance, f/OW tries to give the player concrete choices about pacing the game. In f/OW, you control a fish-like creature swimming in an area with other creatures that can be eaten—and that will sometimes try to eat you. If you successfully maneuver your fish’s mouth onto one of these creatures, they burst into white food pellets that can be eaten to make your own fish’s tail longer and capable of withstanding more bites from other creatures. Each area also has a red food pellet your fish can eat that lets you dive deeper into waters with more dangerous, challenging enemies, and a blue food pellet that takes you in the opposite direction, to safer areas. Every player’s journey through the shallows and depths of f/OW is slightly different because players can retreat and advance based on how much challenge they’re seeking. Also, losing all your health doesn’t result in the game ending; you instead bump up one level to an easier area.

The organic, player-controlled difficulty of f/OW is more integrated into the course of playing the game than asking the player to choose “Hard” or “Easy” before the game starts or via a settings control panel. Structurally, it has similarities to early digital games like NetHack (1987), where the player learns that travelling deeper into a dungeon via a staircase she’s discovered will lead to greater challenge. In NetHack, your goal as a player is stated from the beginning: reach level 100 and claim the ultimate prize, the “Amulet of Yendor,” before you succumb to various threats and enemies that end the game.

f/OW, like Chen’s other games, is much less explicit about the player’s purpose and whether she should be trying to dive as deep as possible at all. Although reaching the bottom layer of f/OW does give the player the opportunity to unlock more varieties of fish to play as, it’s possible to play and enjoy the game while simply wandering through higher layers and surviving and eating like a simple oceanic organism, content with its lot. Many players, especially those trained to think of games as challenges to overcome, can play f/OW as a game of increasing challenge, much like they might play NetHack, but f/OW avoids stating overtly what a player must do to win.
There's no single correct way to shape the difficulty of a game into exactly the right kind of resistance for every player. The right decision for your game depends on its goals and what it's trying to say in a conversation with players: do you want a highly flexible push-and-pull game that changes shape depending on how the player approaches it? Or will you establish a firm structure, making a hard declaration of what your system requires, and let players figure out how to handle it—even if it means some of them may leave the game before finishing it or miss the perfect flow by a wide margin? Do you intend to involve players in deciding how the game's resistance evolves? If games are conversations, they're ones where, as designers, we have to choose what we say carefully and know what we're going to say in advance, even though we're often unable to anticipate how all the unique players will react. When we create spaces for players to make their own choices and determine their own approaches to a system, all sorts of things can happen—but that may mean that our own ideas of how the conversation will unfold have to play less of a role as well.

Alternatives to Flow

So far, our discussion of flow has revolved around the idea that games ought to try to adapt to players, avoiding frustration or boredom for too long, and sometimes including players in decisions about how the games' resistance evolves. Seeking flow states means “meeting players where they are” and ceding some degree of authorial control to foster feelings of engagement and, gradually, mastery through skill building.

Striving for a game with ideal flow that always moves perfectly between frustration and boredom isn't the only way to make a game, however. It's possible to create interesting games that don't seek out a perfect flow state. For example, what would happen if a game didn't start out slow and easy and didn't get harder?

Three Body Problem (2012) by Robin Burkinshaw doesn't change at all as the player continues to interact with it (see Figure 6.8). The system starts off as hard as it's ever going to get, but with simple rules: the player has to maneuver a square to collect points that appear, while two other squares try to collide with and kill it. Just as with Super Hexagon, the first time you play Three Body Problem you're likely to die very quickly, because the other squares are relentlessly chasing you. It's not an impossibly frustrating problem, however; you can quickly learn to survive longer by watching and learning how the other two squares move.

With practice, a player of Three Body Problem can close the gap between her abilities and the challenge, making the game easier. This model puts all the responsibility for creating flow into the player's hands: she has to accept that she's a long way from mastery and keep working at it of her own accord. Once she can handle the challenge, the task becomes to survive as long as possible to collect more points, challenging both endurance and skill. If we made a diagram of a player's experience of flow in this game, it would look very different for each player depending
on how each dealt with the challenge of the game's simple system. Rather than trying to meet players where they are, it's up to an individual to decide where to meet *Three Body Problem*.

Figure 6.8 *Three Body Problem* is always just as difficult as when it began.

Games like this demand more from a player than games that hold the player's hand, but for players who are willing to start in a frustrated place and learn their way out of it, powerful feelings of flow can still emerge.

There's another reason to consider alternatives to traditional flow and require players to meet the game, rather than the other way around: although it's often strategic in a conversation to try to adapt how you speak to your listeners, sometimes that's not enough. Sometimes you have to ask the other participants to hear exactly what you're saying—and as we discussed in the previous chapter, some games are more about asking players to listen. *Gone Home* (2013) is a game in which players enter a house seemingly abandoned by its family, taking on the role of the eldest daughter who's returned from abroad. At first, *Gone Home* seems to play with some conventions of horror games—you explore dark rooms, looking for secrets, and are startled by creepy noises (see Figure 6.9).

The revelation of *Gone Home* is that it's not a game about facing undead horrors or even about a mounting arc of difficulty and mastery. Instead, you find clues as to the recent and long-buried history of the house of the protagonist's family, uncovering the truth about why nobody's home through diary entries, letters, bills, notes hastily left on the kitchen table, and
the mundane details of household life. There's challenge and problem-solving in Gone Home as you piece together clues and search for secret passages, but it's not an experience that needs to grow more challenging or gradually build the player's skills. Instead, the player comes to understand the systems at play—the relationships of characters, the ways that different members of the family inhabit and use various parts of the house—by uncovering new information, some of it in the form of words or diagrams, some of it ingrained in the spatial arrangement and visual representation of a home.

Figure 6.9  Gone Home subverts expectations with unnerving experiences that can't be conquered with typical game verbs.

Gone Home is set in a world that closely mirrors our own—it could be drawn from the experiences of real people. Of course, some games are overtly autobiographical, like dys4ia, which we've already discussed, or Mainichi (2012) by Mattie Brice, a game that represents a single day within the author's life. It doesn't necessarily make sense to create a traditional journey of flow through a game that recounts actual events—after all, real people's lives don't always progress from easier to more challenging. They can't necessarily be conquered by building skills and systemic understanding, but they can be represented through systems. The shape of resistance in these games plays a role—showing players where the systems represented can or can't be pushed—but the experiences that result aren't necessarily about players overcoming resistance or finding strategies to plant their own flag of victory at the top of a mountain. Instead, they offer players an opportunity to listen and understand systems that they might not otherwise have considered.
THE BOWERBIRD'S DILEMMA

IN THE ANNALS OF MALE COURTSHIP DISPLAY, THE BOWERBIRD IS JUSTLY FAMED...

NOT FOR HIS DRAB, MEAGER PLUMAGE, BUT FOR THE BOWER HE BUILDS. A GREAT THING WOVEN FROM TWIGS AND LEAVES, AND OFTEN DECORATED WITH SHINY SHELLS, COINS, AND PARROT FEATHERS.

I'M AN ARTIST, ALL RIGHT?

(Actually, there are at least 18 species of bowerbird, of which some three-quarters build a bower of one kind or another.)

AT MATING TIME, THE FEMALE BOWERBIRD VISITS EACH BOWER IN TURN, JUDGING ITS MERITS WHILE THE BUILDER WABERL HIS LONGING.

CHORTEL YODEL FLIRT

If she likes the effect, passionate bowerbird mating ensues.

So... WHERE'S YOUR GALLERY?

On the bower, naturally.

FLUTTER WAGGLE

IF SHE LIKES THE EFFECT, PASSIONATE BOWERBIRD MATING ENSUES.

But then, while he's out marauding, his own bower is left defenseless... so what's the point?

OHH, FOR - ?

Ugh.

STAKES ARE HIGH! SOME ARTISTIC MALES WIN DOZENS OF MATES, WHILE OTHERS, AFTER WORKING LIKE DOGS, SUFFER REJECTION AFTER REJECTION.

CRITIC?

DERIVATIVE...

Hey! Haven't you heard of appropriation art?

No wonder, then. That besides building his own bower, a male also tries to ruin his neighbor's! In no time, he can do damage that takes hours to repair...

THE COUPLE ModeLED THE COMPETITION AS A GAME BETWEEN TWO BOWERBIRDS, EACH WITH A CHOICE BETWEEN OCCASIONAL MARAUDING AND A PURE, STAY-AT-HOME GUARDING STRATEGY.

They wrote equations for the number of matings - i.e., the payoff - a bird could expect under different conditions...

PASS THE ALGEBRA BOOK.

TO ESTIMATE THE COSTS AND BENEFITS OF MARAUDING BEHAVIOR, CHICAGO ORNITHOLOGISTS STEPHEN AND MELINDA PRUETT-JONES TURNED TO GAME THEORY, THE BRANCH OF MATHEMATICS THAT COMPUTES THE PAYOFFS OF COMPETING STRATEGIES.
AND FILLED IN A MATRIX SOMETHING LIKE THIS (THEIRs ALSO INCLUDED MORE TERMS SPECIFICALLY FOR DECORATION-STEALING, OMITTED HERE FOR SIMPLICITY):

THE EXPRESSION $E(G,N)$, FOR EXAMPLE, MEANS THE EXPECTED PAYOFF TO A GUARDER WHOSE OPPONENT IS A MARAUDER.

SO FAR, SO GOOD—EXCEPT FOR ONE UNSETTLING FACT:

IN SHORT,

$E(G,G) < E(M,G)$

$E(G,M) < E(M,M)$

BUT ALSO

$E(M,M) < E(G,G)$

ALAS?

THIS PARADOX, CALLED THE PRISONER’S DILEMMA, IS A HOT TOPIC IN GAME THEORY... WHEN PLAYED REPEATEDLY, IT SEEMS TO CALL FOR A FLEXIBLE STRATEGY BASED ON YOUR OPPONENT'S LAST MOVE...

O.K... O.K... LET ME TRY TO THINK THIS THROUGH...

WHAT'S A BOWERBIRD TO DO? SCIENTISTS AREN'T SURE... ASIDE FROM SOME PARTIAL OBSERVATIONS, NO THOROUGH STUDY OF INDIVIDUAL MARAUDING DIFFERENCES HAS BEEN DONE...

I'M GOING TO LEAVE YOU ALONE UNTIL YOU MESS WITH ME!

I'M GOING TO QUIT THE GAME AND BECOME A MONK...

I'M GOING TO ATTACK ANYTHING THAT PUSHES MY ANGRY BOWERBIRD BUTTONS!

BIRDS! BIRDS! WE'RE ALL VICTIMS OF THE SYSTEM! WHY CAN'T WE JUST AGREE TO LIVE IN PEACE?

HEY, CMON, YOU MEN! LET'S SEE SOME FEATHERS FLY!!

GET OFF!! WE'RE TOO STUPID!

BUT RESEARCH CONTINUES!

HEY!! WHO MESSED UP OUR PAPERS?
These are the main problems: How does each player plan his course—i.e., how does one formulate an exact concept of a strategy? What information is available to each player at every stage of the game? What is the role of a player being informed about the other player's strategy? About the entire theory of the game?—Oscar Morganstern and John Von Neumann, Theory of Games and Economic Behavior
Introducing Game Theory?

Perhaps you thought that this entire book was about game theory. If that were the case, what does “Games as Game Theory Systems” mean? Actually, game theory is not what it may appear to be. It is not a general term that means theoretical approaches to games. Game theory means something quite specific: it is a branch of economics that can be traced back to the work of two mathematicians, Oscar Morganstern and John Von Neumann. The classic text in the field is *Theory of Games and Economic Behavior*, published in 1942.

Game theory is the mathematical study of decision making. It looks at how people behave in specific circumstances that resemble very simple kinds of games. The founders of game theory intended to create a new kind of mathematical approach to the study of economics. Morganstern and Von Neumann were writing during a time when Marxism was very much in vogue in the field of economics, and *Theory of Games and Economic Behavior* was, in many ways, an attempt to replace the ideological approach of Marxism with a more rational and scientific set of techniques. Although it caused quite a sensation when it was introduced, the promises of game theory were never quite fulfilled, and it has largely fallen out of favor as a methodology within economics. But game theory can still be quite useful for game designers.

First, it analyzes situations that resemble simple games in a very detailed way. Even more importantly, as game theorist Morton D. Davis points out in the previous quotation, game theory specifically focuses on relationships between decisions and outcomes. We know from our earlier discussion of interactivity that actions and outcomes are the building blocks of meaningful play. Within this schema, we explore questions of how players plan their course of action within a game and how they formulate strategies and make decisions. From decision trees to degenerate strategies, we will look closely at the application of game theory concepts to the design of meaningful play.

Decision Trees

As a formal approach to understanding games, game theory looks at games as a series of strategic decisions made by the players of a game. What does it mean to reduce a game to its strategic decisions? One common game theory method is to create a decision tree for a game. A decision tree is a branching tree-style diagram that outlines all of the possible moves a player can make in a game. Decision trees are a common way of flow-charting interactive experiences. For example, if you are programming an interactive story that has a hypertext structure, you might draw a diagram that shows all of the links between the different parts of your story. This kind of diagram would be a decision tree.

As a formal game design schema, *Games as Game Theory Systems* looks at games as systems of rational choice. It is potentially useful to game designers for two chief reasons.
Creating a decision tree for a game is more complicated than creating a decision tree of a hypertext structure. The difference is that in a typical hypertext, the links and the actions that a player can perform at any location in the larger structure do not change as the participant moves through the structure. A reader's first choice in a hypertext structure does not change the way that the other hypertext links function. The only thing that changes is where the reader is positioned in the structure.

A game is more complex. In a game, what you can do at any given moment depends on what has already happened in the game. At the beginning of a game of Chess, for example, you can't move either of your rooks because they are both blocked by pawns. Later in the game, you might be able to move your rooks if your pawns have been maneuvered out of the way. The complexity of games leads to a system of many possible actions. Which actions can happen at a given moment is contingent on the current state of the game.

Because Chess is a complicated game to diagram as a decision tree, let's start with a simpler example: Tic-Tac-Toe. In *Prisoner's Dilemma*, a book about game theory and its historical context, writer William Poundstone leads us through the process of making a decision tree of the game of Tic-Tac-Toe.

Tic-tac-toe starts with the first player ("X") putting a mark in any of nine cells. There are consequently nine possible first moves. The nine choices open to Player X on the first move can be diagrammed as nine lines radiating up from a point. The point represents the move, the moment of decision, and the lines represent the possible choices.

Next it's Player O's move. There are eight cells still open—which eight depending on where the X is. So draw eight secondary branches at the top of each of the nine primary branches. That leaves seven open cells for X on his second move. As the diagram of possible moves is continued upward, it branches like a very bushy tree.

As you continue the process, you will eventually diagram moves that put three markers in a row. That's a win for the player who moves. It's also the termination of that particular branch in the diagram, for the game ends when someone gets three in a row. Mark that point (call it a "leaf" of the diagram) as a win for X or O as the case may be.

Other branches of the diagram will terminate in a tie. Mark them as ties. Obviously, the game of tic-tack-toe cannot go on forever. Nine moves is the maximum. So eventually, you will have a complete diagram of the game of tic-tack-toe. Every possible tic-tack-toe game—every game that ever has been played or ever will be played—must appear in the diagram as a branch starting at the "root" (X's first move) and continuing up to a "leaf" marked as a win for X, a win for O, or a tie. The longest complete branches/games are nine moves long. The shortest are five moves (this is the minimum for a win by the first player).

Creating a decision tree can be a powerful way of understanding the formal structure of a game. It is in essence a way of mapping out a game's formal space of possibility. For a simple game such as Tic-Tac-Toe, the complete space of possibility can in fact be diagrammed. However, not all games can be mapped out in this way.

Being able to make a decision tree of a game or other interactive structure implies that the decisions participants make are discrete decisions that lead to knowable outcomes. For example, a game that involves physical skill, such as American Football, does not have self-contained moments of decision making that can be diagrammed like the alternate turn-taking of Tic-Tac-Toe. Instead, the game exists as a continuous flow of action. When the ball is hiked, a quarterback does not take a single discrete action. Instead, the game flows forward in a complex web of activity. Perception, movement, and the granularity of the real world creates a non-discrete game space.

Although the moment-to-moment play of Football is continuous, the game can be broken down into a system of separate
plays. Does that mean it is possible to create a decision tree of Football by widening the frame of analysis, so that each decision point on the chart represents the choice of a play by one team's coach? The answer is no. The problem with this proposal is that to create a decision tree, the result of a decision needs to be a knowable outcome or set of outcomes. Think about a game of Tic-Tac-Toe. When a player makes a decision to place an X or an O in a particular square, there isn't any doubt that the player will finish the action and make the mark. On the other hand, just because a Football team picks a certain play does not mean that they will be able to successfully complete it, or complete it in a way that can be predicted with any accuracy. The outcome of picking a particular play in a Football game could result in a yardage loss or gain, a penalty, a fumble, a reversal, or a touchdown, making it impossible to diagram the outcome in the same way that we could Tic-Tac-Toe. (Note also that "X and O" play diagrams that show where players will run on certain plays can be used to schematize the play of Football. But these play diagrams do not qualify as decision trees.)

What kinds of games can we turn into decision trees? Decision trees work for any game that has the following qualities:

- Time in the game takes place in turns or other discrete units.
- Players make a finite number of clear decisions that have knowable outcomes.
- The game is finite (it can't go on forever).

Although this disqualifies many games (including Football), it does include a wide variety of games, such as turn-based strategy games like Tic-Tac-Toe, which clearly fulfills all three criteria listed above. What about Chess? Chess takes place in turns and decisions have clear outcomes, but is it finite? Chess might seem like an infinite game (imagine an endgame with two kings shuffling back and forth between the same squares forever), but in fact there are rules that resolve the game in a stalemate when a certain number of moves have elapsed without a capture. How about a game such as Chutes and Ladders? It seems to fit the three criteria, but it does have a random die roll. Could we map it out with a decision tree? Surprisingly, yes we could. The first point or "root" of the decision tree would have six branches coming out, depending on what the first player rolled. Each of those six branches would have six more, depending on what number the next player rolled. And so on. Of course, there would have to be a different tree for a two-player game, a three-player game, and a four-player game.

Although the decision tree for games as simple as Tic-Tac-Toe might seem large, a decision tree for a game such as Chess or Chutes and Ladders would be extraordinarily vast and complex. Remember that the decision tree contains all of the possible games that have ever or will ever be played. The decision tree for Chutes and Ladders would have to contain every possible die roll at every possible moment in the game with every possible arrangement of players on the board, in every possible sequence that could logically occur. The decision tree for Chess would have to contain every possible move and every possible response to every possible response to every possible move. The decision trees for these games would be immense. According to Poundstone, if a decision tree for Chess were graphed out on paper at a legible size, the diagram would span the solar system.

If decision trees for games are so unwieldy in the real world, how are they possibly useful for game designers? Decision trees are more theoretical constructs than engineering tools. At the same time, the ability to understand what a decision tree is and how it works is crucial to game design. Why? Because a decision tree is also a diagram of the formal space of possibility of a game. Being able to conceptualize the space of possibility you are designing is an important game design skill.
Even though true decision trees are usually impossible to create, often you can create very useful decision trees for sections or aspects of a game. For example, say you are designing a mission-based strategy game that contains many level "missions" that the player has to complete. A player can succeed or fail at a mission, and the next mission depends on the outcome of the most recent mission. While it might be impossible to draw a decision tree of the battle that takes place within an individual mission, it would be extremely useful to chart out the relationships between missions.

Making a decision tree of the game's missions will tell you, for example, how many missions a single player will play through in an average game. Or it will help you eliminate game designs that loop back on themselves. When you can make use of them, decision trees are a straightforward and useful way of understanding the structure of a game. Perhaps more importantly, however, decision trees are an important part of understanding game theory.

**Strategies in Game Theory**

Decision trees help us understand how players move through the space of possibility of a game. To see how this works, think back to the Tic-Tac-Toe decision tree. The tree contains every conceivable move, in every possible iteration of the game. This is actually more information than we need. Most players will not randomly pick their next square, but will actively try and score three in a row while keeping an opponent from doing the same. With this in mind, we can start to trim all of the "stupid move" branches from our tree. Poundstone describes what this process of "trimming" would be like:

Go through the diagram and carefully backtrack from every leaf. Each leaf is someone's last move, a move that creates a victory or a tie. For instance, at Point A, it is X's move, and there is only one empty cell. X has no choice but to fill it in and create a tie.

Now look at Point B, a move earlier in the game. It is O's turn, and he has two choices. Putting an O in one of the two open cells leads to the aforementioned Point A and a sure tie. Putting an O in the other cell, however, leads to a win for X. A rational O player prefers a tie to an X victory. Consequently, the right branch leading upward from Point B can never occur in rational play. Snip this branch from the diagram. Once the play gets to Point B, a tie is a forgone conclusion.

But look: X could have won earlier, at Point C. A rational X would have chosen an immediate win at Point C. So actually, we can snip off the entire left branch of the diagram.

Keep pruning the tree down to the root, and you will discover that ties are the only possible outcomes of rational play. (There is more than one rational way of playing, though.) The second player can and will veto any attempt at an X victory, and vice-versa.3
From this pruned-down version of Tic-Tac-Toe, it is possible to create what game theory calls a strategy. A strategy in game theory parlance offers a more precise meaning than what is commonly meant by “strategy.” A common understanding of a strategy in Starcraft might be: “If you're playing the Zergs, create a lot of Zerglings at the beginning of the game and rush your opponent’s central structures before they have time to build power.” A strategy in this casual sense is a set of general heuristics or rules of thumb that will help guide you as you play. However, a strategy in game theory means a complete description of how you should act at every moment of the game. Once you select a strategy in the game theory sense of the word, you do not make any other choices, because the strategy already dictates how you should act for the rest of the game, regardless of what the other player does. This can make game theory strategies quite intricate. Poundstone lists a sample strategy for Tic-Tac-Toe for the first player X.

Put X in the center square. O can respond two ways:

1. If O goes in a non-corner square, put X in a corner cell adjacent to O. This gives you two-in-a-row. If O fails to block on the next move, make three-in-a-row for a win. If O blocks, put X in the empty corner cell that is not adjacent to the first (non-corner) O. This gives you two-in-a-row two ways. No matter what O does on the next move, you can make three-in-a-row after that and win.

2. If instead O’s first move is a corner cell, put X in one of the adjacent non-corner cells. This gives you two-in-a-row. If O fails to block on the next move, make three-in-a-row for a win. If O blocks, put X in the empty cell adjacent to the second O. This gives you two-in-a-row. If O fails to block on the next move, make three-in-a-row for a win. If O blocks, put X in the remaining cell for a tie.4

As you can see, the strategy for even a simple game such as Tic-Tac-Toe is somewhat complex. A complete strategy is ultimately a methodology for navigating the branches of a decision tree. A strategy prescribes exact actions for the player utilizing the strategy, but it also has to take into account all of the possible branches that an opposing player could select. In Poundstone’s example, the strategy dictates the way that the first player would move from the root of the tree to the first of nine possible points. From there the opposing player could move to any of the other eight points, a move that the strategy has to take into account.

A complete strategy for a game such as Chess would be mind-bogglingly huge. However, game theory does not study games as strategically complicated as Chess. In fact, the games that game theory studies are remarkably simple. But as we already know, even very simple games can play out in quite complex ways.

Game Theory Games

Game theory demands a sacred character for rules of behavior which may not be observed in reality. The real world, with all its emotional, ethical, and social suasions, is a far more muddled skein than the Hobbesian universe of the game theorist.—Richard Epstein, The Theory of Gambling and Statistical Logic

Now that we have outlined decision trees and strategies, we are ready to take a look at what it is that game theory calls a game. As the mathematician Richard Epstein points out, game theory games are not about real-world situations or about all kinds of games. Game theorists look at very particular kinds of situations in a very narrow way. What kind of situations? We can summarize a game theory game in the following way: a game theory game consists of rational players who simultaneously reveal a strategy to arrive at an outcome that can be defined in a strict measure of utility. Usually, game theory limits itself to games with only two players.
Rational play, simultaneity, strategy, outcome, utility, and two players. Let us look at each of these elements separately. First, game theory focuses its attention on rational players. Rational players are perfectly logical players that know everything there is to know about a game situation. Furthermore, rational players play to win. As Poundstone puts it, “Perfectly rational players would never miss a jump in checkers or ‘fall into a trap’ in Chess. All legal sequences of moves are implicit in the rules of these games, and a perfectly logical player gives due consideration to every possibility.” As we know from our detailed investigation of Tic-Tac-Toe, if two rational players played the game, the outcome will always end in a draw, because both players would select strategies that would stalemate the other player. Rational players are a fiction, of course, as Epstein makes clear. Real-world players are not like game theory players, as rational as Mr. Spock, completely immune from “emotional, ethical, and social” liabilities. But rational players are still a useful theoretical construct, for they allow us to look at games in a very isolated and controlled way.

The fact that rational players follow a strategy is an important aspect of a game theory game as well. As we mentioned previously, a strategy is comprehensive. It is a complete plan for playing an entire game, from start to finish. A strategy includes explicit instructions for playing against any other strategy an opponent selects. In a game theory game, both rational players simultaneously choose and reveal their strategies to each other. In other words, instead of the “I take my turn, you take your turn” pattern of many games, in a game theory game, players only make one decision, at the same time, without knowing what the other player will do. In making a simultaneous decision, a player has to take into account not just the current state of the game, but also what the opponent is thinking at that very moment. A classic example of a simultaneous decision game is Rock-Paper-Scissors, in which both players have to decide what they are going to do based on the anticipated action of the other player.

So although game theory does not study psychology directly, there is a psychological element in game theory games, where players might consider “bluffing” or using other indirect strategies against each other. Though they might take these kinds of actions, rational players are still psychologically predictable. Players in a game theory scenario are never going to be vindictive, forgetful, self-destructive, or lazy, as this would change their status as rational players. In game theory games one can always assume that both rational players are acting in their own best interest and are developing strategies accordingly.

Why would game theory choose blind, simultaneous decision making as the game play process that it studies? Remember that game theory is not a form of game design; it is a school of economic theory. Within an economic situation, decisions have to be made without knowledge of how the other “players” are going to act. Should you sell your stock in Disney, or buy more shares? Should you purchase two gallons of milk this week, or buy one and wait to see if the price goes down? Should a nation increase or decrease import taxes? All of these micro- and macro-economic scenarios involve making decisions. But the outcome of the decision is based on factors outside the decision maker’s direct control. Simultaneous, blind decisions offer a way of simulating this decision making context, a context that lies at the intersection of mathematics and psychology. As Morganstern and Von Neumann explain,

It is possible to describe and discuss mathematically human actions in which the main emphasis lies on the psychological side. In the present case, the psychological element was brought in by the necessity of analyzing decisions, the information on the basis of which they are taken, and the interrelatedness of such sets of information (at the various moves) with each other.

Another important component of a game theory game is utility, which is a mathematical measure of player satisfaction. In order to make a formal theory of decision making, it was necessary that Von Neumann and Morganstern numerically quantify the
desire of a player to achieve a certain outcome. In a game theory game, for every kind of outcome that a decision might have, a utility is assigned to that decision.

A utility function is simply a “quantification” of a person’s preferences with respect to certain objects. Suppose I am concerned with three pieces of fruit: an orange, an apple, and a pear. The utility function first associates with each piece of fruit a number that reflects its attractiveness. If the pear was desired most and the apple least, the utility of the pear would be greatest and the apple’s utility would be least.

Utility can become more complex when multiple factors come into play. For example, if you were building a house for yourself on beachfront property, thinking in game theory terms, you could measure different locations of your house in terms of utility. You might be able to get the highest utility, say +10, if you built right on the beach. There might be a lower utility, such as +5 or +2, if you had to build it several meters away from the shoreline.

On the other hand, if you had to build the house so far away from the beach that the ocean was no longer in view, your utility might go into the negative numbers, indicating an outcome that you would find unpleasant. Of course, you might not have the money to afford the situation with the highest utility. For example, you might require a house of a certain size and if it were directly on the beach it couldn’t have a basement and would have to be smaller. Or the cost of the house might be higher on the beach because of the extra architectural complexity required to build in the sand. Cost, size, and location would all be assigned different values. In making your decision, you would try and maximize the total utility given your available options.

These examples touch on the ways that game theory employs the concept of utility. It might seem silly to turn something like human satisfaction into a numerical value, given the innumerable complexities that go into our feelings of pleasure, but Morganstern and Von Neumann felt very strongly that a scientific theory of economics necessitated such an approach. In their book, they use an analogy to physical properties such as heat. Before scientists developed a way of conceptualizing and measuring heat, it was an unknown, fuzzy property that seemed impossible to measure: a sensation that occurred as one approached a flame. But the precise measurement of heat is now an important part of contemporary physics. The aim of Von Neumann and Morganstern was to begin a similar revolution in economics, by quantifying pleasure as a measure of utility.

Utility may well be an oversimplification of human desire, but it does make a good fit with the formal qualities of games. As we know from our definition of games, all games have a quantifiable outcome: someone wins, or loses, everyone wins or loses, or player performance is measured in points, time, or some other numerical value. The concept of assigning a numerical utility to decision outcomes is really just another way of creating a quantifiable outcome. When looking at games through a formal frame, we do not have the luxury of being non-numerical. The formal systems of both digital and non-digital games require an exactness that does in fact come down to numbers. How many kills did you earn that round? What qualifying time do you need on the next heat in order to continue the race? Which team won the game? These very simple game results are all quantifiable outcomes, and are all examples of utility as well.

The last component of most game theory games is that they are usually played by only two players. This was not part of the original formulation of game theory as proposed in Theory of Games and Economic Behavior. The original idea was that the theory could cover n-player games, where n was a number of any size that indicated the number of players. But Von Neumann and Morganstern found that, as with the problem of three planetary bodies discussed in Games as Emergent Systems, their theory became vastly more complex when it took three or more players into account. As a result, most game theory work has focused on two player games. We follow suit in the material to follow.
Cake Division

It is finally time to take a look at a real game theory game. The following description is taken from *Prisoner's Dilemma* and is the classic “cake division” game theory problem:

Most people have heard of the reputed best way to let two bratty children split a piece of cake. No matter how carefully a parent divides it, one child (or both!) feels he has been slighted with the smaller piece. The solution is to let one child divide the cake and let the other choose which piece he wants. Greed ensures fair division. The first child can’t object that the cake was divided unevenly because he did it himself. The second child can’t complain since he has his choice of pieces...

The cake problem is a conflict of interests. Both children want the same thing—as much of the cake as possible. The ultimate decision of the cake depends both on how one child cuts the cake and which piece the other child chooses. It is important that each child anticipates what the other will do. This is what makes the situation a game in Von Neumann’s sense.

Game theory searches for solutions—rational outcomes—of games. Dividing the cake evenly is the best strategy for the first child, since he anticipates that the other child’s strategy will be to take the biggest piece. Equal division of the cake is therefore the solution to this game. The solution does not depend on a child’s generosity or sense of fair play. It is enforced by both children’s self interest. Game theory seeks solutions precisely of this sort.

The cake division problem contains all of the elements of a game theory”game”listed earlier. There are two rational players (the children motivated by self interest). These two players choose a strategy about how to behave (how to cut or select the pieces). These strategies result in some kind of utility for the two players, measured in how much cake they get. Note that even though the “play” of this very simple game consists of a two-part action (first slice the cake and then choose a slice), the two players can still reveal and enact their strategies simultaneously. For example, the strategy of the player that chooses from the two pieces is always going to be “take the bigger piece.” A rational piece-choosing player is going to choose this strategy regardless of the strategy that the cake-cutting player takes. (Note that although these “strategies” may seem like forgone conclusions rather than choices, this is because this game theory game has a saddle point, a concept explained in detail later on.)

A powerful analytical tool provided by game theory is to map this decision making process into a grid. One axis of the grid represents one player’s decision. The other axis represents the other player’s decision. The cells in the grid represent the outcomes reached depending on which decisions were made. A game theory table of this sort is called a payoff matrix (payoff being another term for utility). Figure 1 shows a payoff matrix for the cake division problem, taken from *Prisoner’s Dilemma*. Note that William Poundstone makes the assumption that the cake slicing is going to happen in an imperfect world, so that even if the child that cuts the cake tries to slice it evenly, the two resulting slices will still differ a tiny bit, say by one crumb.

Along the left side of the matrix are strategies that the cutter can take: either cut the cake evenly or cut it unevenly. Although there are any number of ways to cut the cake, these are the two essential strategies from which the cutter can choose. Across the top of the matrix are strategies the chooser can take: choose the bigger piece or choose the smaller piece. The cells show the utility or payoff for only one of the players (the cutter), but it can be assumed that the inverse payoff would happen for the chooser. If the payoff matrix indicates that the cutter receives the “small piece,” the chooser would therefore receive the “big piece.” This is also true for half of the cake plus or minus a crumb.
The cake division problem illustrates two important game theory concepts. The first is the concept of a zero-sum game. In a zero-sum game, the utilities of the two players for each game outcome are the inverse of each other. In other words, for every gain by one player, the other player suffers an equal loss. For example, playing a version of Poker in which everyone puts money into a pot is a zero-sum game. At the end of the game, every dollar won by one player is a dollar lost by another player. A group of gamblers playing Roulette is not a zero-sum game between the players, because they are not playing directly against each other. On the other hand, if we frame Roulette so that one player is playing against the casino, then it is a zero-sum situation: if a player wins a dollar, it is taken from the house, and vice-versa.

Many games are zero-sum games, even those that do not involve money. When one player wins a game of Checkers and the other player loses, the loss by one player equals a gain for the other player. In this case, game theory would assign a utility of −1 for the loss and +1 for the gain. The utilities add up to zero, which is exactly why it is called a “zero-sum” game. Some games, such as the cooperative board game Lord of the Rings, are not zero sum games. In the basic version of Lord of the Rings, players cooperate against the game system itself. Players either all lose, or they all win. Because the players are not competing against each other, they either all get a −1 for losing or all get a +1 for winning. The losses and wins among the players do not add up to zero; it is therefore not a zero-sum game.

Not all game theory games are zero-sum games, but many are. Cake division is clearly a zero-sum game. Consider the problem intuitively: there is only so much cake, which is all going to be divided into two slices and eaten. The more cake that one player eats, the less the other player eats. We could assign the following utilities to the four cells of the diagram:

![Figure 1: Cake Division payoff grid](image)

We know that the two player outcomes are inverses of each other. If one player receives half of the cake minus a crumb (-1) the other player will receive half of the cake plus a crumb (+1). The total is zero. Cake division is a zero-sum game.

Why is this important? Because, according to game theory, every finite, zero-sum, two-player game has a solution (a proper way to play the game), the strategy that any rational player would take. What is the solution to the cake division problem? The game will always end in the upper left corner. The cutter will get half of the cake minus a crumb and the chooser will get half of the cake plus a crumb. Why is this so? Look at the cutter’s strategies. The cutter would love to end up with the lower right cell, where he gets the big piece. So perhaps he should choose the strategy of cutting the pieces unequally. But the cutter also knows that if the chooser is given the chance to choose, the chooser will always choose the bigger piece. As a result, the cutter has to minimize the bigger piece that the
chooser will select by cutting the cake as evenly as possible. The game resolves to the upper left corner.

This situation clearly illustrates another key game theory concept: the saddle point property of payoff grids. In cake division, each player is trying to maximize his own gains while minimizing the gains of the other player. When the choices of both players lead to the same cell, the result is what Von Neumann and Morganstern call a saddle point. A saddle point refers to a saddle-shaped mountain pass, the intersection of a valley that goes between two adjacent mountains. The height of the pass is both the minimum elevation that a traveler going across the two mountains will reach, as well as the maximum elevation that a valley traveler crossing the mountain pass will achieve. The mathematical proof of saddle points in games is called the minimax theorem, which Von Neumann first published in 1928, many years before the 1944 publication of *Theory of Games and Economic Behavior*.

The concept of saddle points is extremely important in game design. In general, you want to avoid them like the plague. Remember, a saddle point is an optimal solution to a game. Once a player finds it, there is no other reason to do anything else. Think about the cake division saddle point: if either player deviates, that player will lose even more cake. If you think of the space of possibility that you are crafting as a large 3D structure carefully crafted to give a certain shape to the experience of your players, saddle points are short-circuits in the structure that allow players to make the same decision over and over. That kind of play experience does not usually provide very meaningful play. Why? Because if there is always a knowable saddle point solution to a game, a best action regardless of what other players do or what state the system is in, the game loses the uncertainty of possible action. Meaningful play then goes out the window.

Saddle points do not just occur in game theory games. Many fighting games are ruined, for example, because despite all of the special moves and combinations that are designed into the game, the best strategy to use against opponents is simply to use the same powerful attack again and again and again. Saddle point! Another common occurrence of saddle points involves the programming of computer opponents. In many real-time strategy games there are “holes” or weaknesses in the AI that allow for saddle points. If a player discovers that the computer opponent does not know how to defend well against a certain type of unit, he is likely to abandon all other game strategies and simply hammer on the AI’s weakness over and over, regardless of how much care went into carefully designing missions that require different kinds of problem-solving. Saddle point!

This style of play, based on exploiting a strategic saddle point, is called an exploit or degenerate strategy. A degenerate strategy is a way of playing a game that ensures victory every time. The negative connotation of the terms “exploit” and “degenerate” imply that players are consciously eschewing the designed experience in favor of the shortest route to victory. There are some players that will refuse to make use of degenerate strategies, even after they find out about them, because they wish to play the game in a “proper” manner. On the other hand, many players will not hesitate to employ a degenerate strategy, especially if their winnings are displayed in a larger social space outside the game, such as an online high score list.

Degenerate strategies can be painful for game designers, as players shortcut all of the attention lavished on a game’s rich set of possibilities. Try to find degenerate strategies and get rid of them! We learned in the previous schema that positive and negative feedback systems can emerge unexpectedly from within a game’s structure and can ruin a game experience for players. The same is true of degenerate strategies. A close analysis of your game design can sometimes reveal them but the
only real way to root them out is through rigorous playtesting. If you see players drawn to a particular set of strategies again and again, they may be exploiting a weakness in your design.

Playing for Pennies
Not all game theory games have a saddle point. Consider a simple game that requires a more complex playing strategy: Matching Pennies, another classic game theory problem. Here is how the game works: two players each have a penny. Hiding their penny from view, both players pick a side, heads up or heads down, and then simultaneously reveal their pennies. If they match, Player 1 gets both pennies. If they don’t match, Player 2 gets them. We can graph this game on a payoff grid:

```
<table>
<thead>
<tr>
<th>Player 2's choices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heads</td>
</tr>
<tr>
<td>Heads</td>
</tr>
<tr>
<td>Tails</td>
</tr>
</tbody>
</table>
```

This table shows the outcomes for Player 1, the player that wins if the pennies match. Because this is another zero-sum game, the utility for Player 2 is the inverse of Player 1’s payoff. What is the proper way to play this game? What strategy should a rational player choose: heads or tails? There does not seem to be a single best answer to the question. If one player decided to pick heads or tails as a permanent strategy, the other player could take advantage of this strategy and win every time. But Matching Pennies is a finite, zero-sum, two-player game, and game theory should be able to solve this game and provide the proper strategy for two rational players. The solution turns out to be more complex than the cake division problem: players do not choose a single, fixed strategy, but select a mixed strategy. In a mixed strategy, players choose one of their options according to a certain probability ratio. For Matching Pennies, the mixed strategy requires rational players to randomly pick heads or tails, with a 50/50 chance of selecting either one.

Remember that rational players will attempt to maximize their own gains in utility while minimizing the gains of their opponents. If rational players play many, many games of Matching Pennies, they will end up with an average utility of zero. This means that neither player will ever come out ahead, but that is the best that they can hope for in this “game.”

The Prisoner’s Dilemma
Of course, it is possible to construct payoff grids in many different ways, and they do not always have to be zero-sum. In fact, constructing game theory problems that are intentionally less symmetrical than Mixed Pennies and Cake Division can lead to some very perplexing “games.” One famous game theory problem is called the Prisoner’s Dilemma. It is from this problem that William Poundstone takes the title of his book. He describes the “story” behind this game as follows:

Two members of a criminal gang are arrested and imprisoned. Each prisoner is in solitary confinement with no means of speaking to or exchanging messages with the other. The police admit they don’t have enough evidence to convict the pair on the principal charge. They plan to sentence both to a year in prison on a lesser charge. Simultaneously, the police offer each prisoner a Faustian bargain. If he testifies against his partner, he will go free while the partner will get three years in prison on the main charge. Oh yes, there is a catch:... If both prisoners testify against each other, both will be sentenced to two years in jail.

The prisoners are given a little time to think this over, but in no case may either learn what the other has decided until he has irrevocably made his decision. Each is informed that the other prisoner is being offered the very same deal. Each prisoner is only concerned with his own welfare—with minimizing his own prison sentence.
Game theorists do not agree on the proper solution to the Prisoner’s Dilemma. There are two ways of thinking about this problem. Using a minimax approach, it is clear that it is always better to defect, no matter what the other prisoner does. If you defect and the other prisoner does not, you get the best possible outcome. But if the other prisoner decides to defect, then it is a good thing you did too, because you saved yourself from the worst possible outcome. According to this logic, both players will defect and the rational outcome is the lower right cell of the payoff grid. The other approach is to say that because both players are rational and because the payoff grid is symmetrical, both players will make the same choice. This means that the two players are choosing between the upper left and the lower right cells. Given this choice, two rational players will end up choosing the better of their two options, the upper left, where they receive only one year of jail time.

The Prisoner’s Dilemma remains an unsolved game theory problem. It clearly demonstrates that even very simple sets of rules can provide incredibly complex decision-making contexts, which raise questions not just about mathematics and game design, but about society and ethics as well.

**Game Theory and Game Design**

Game theory is a curious thing. It promises to be a detailed theory of decision making in a game context. At the same time, its relationship to real-world games seems incidental: the “games” that game theory studies are far removed from the kinds of games that most game designers would like to create.

Does that mean that game theory is irrelevant to game design? Absolutely not. This schema on Games as Game Theory Systems, like most of our other RULES-based schema, borrows concepts and theories from disciplines that make a formal study of systems. Like systems theory, complexity theory, information theory, and cybernetics, game theory was not created in order to assist in the game design process. But that doesn’t mean that it isn’t relevant to designers.
Decision trees that mark out a game's formal space of possibility; utility that measures the desire of a player for a given game outcome; saddle points that erase meaningful play—game theory is rife with connections to some of our core design concepts. Game theory games are microcosms for game design problems, an opportunity to plot out a simple decision in great detail and appreciate the complexity that even elementary moments of choice can generate. Game theory, as a formal approach to understanding decisions, is an extremely useful game design tool.

The rules of games constitute systems of incredible subtlety and complexity. As a design discipline with a very young history, game design must turn to these more established ways of thinking in order to try and make sense of the phenomena of games. Perhaps as the field matures, the theoretical borrowings that take place in this book will be replaced by more game-centric schools of thought. At least, we certainly hope so.

Further Reading

*Emergence: From Chaos to Order,* by John Holland (see page 169)

*Recommended:*

Chapter 2: Games and Numbers
Chapter 3: Maps, Game Theory, and Computer-Based Modeling

*Prisoner's Dilemma,* by William Poundstone

*Prisoner's Dilemma* combines a biography of John Von Neumann with an analysis of Cold War politics and a detailed explanation of game theory. It is the clearest non-technical book on game theory we have found, with a range of detailed examples. Taken as a whole, *Prisoner's Dilemma* helps put game theory in its proper historical and cultural context.

*Recommended:*

Chapter 3: Game Theory
Chapter 6: Prisoner's Dilemma
Chapter 12: Survival of the Fittest

Notes

3. Ibid, p. 46.
Game theory is a branch of economics that studies rational decision making. It often looks at game-like situations, but it is not a general theory of games or game design.

A decision tree is a diagram that maps out all of the possible decisions and outcomes that a player can take in a game. A completed decision tree is equivalent to the formal space of possibility of a game. A game must have the following characteristics to be reducible to a decision tree:

- Time in the game takes place in turns or other discrete units.
- Players make a finite number of clear decisions that have knowable outcomes.
- The game is finite (it can't go on forever).

Even if a game meets these criteria, most games are too complex to be diagrammed as a decision tree. Decision trees are most useful for mapping aspects of games, or as conceptual tools for thinking about the formal structure of a game.

A game theory game is limited to rational players who simultaneously reveal a strategy to arrive at an outcome, which can be defined in a strict measure of utility. Usually, game theory limits itself to games with only two players.

- A rational player doesn't exist in the real world. A rational player is a completely logical player that plays only to maximize winnings, regardless of emotions, ethics, and social attachments.
- A game theory strategy is a complete plan for playing a game. A strategy explicitly and comprehensively covers every possible situation that a player might encounter in the course of playing a game, including every possible strategy that an opponent might select.
- In a game theory game, rational players make a simultaneous decision about what strategy to take. They know the complete rules of the game and the possible outcomes of their decisions, but they do not know the strategy that the other player will take.
- The results of a game theory game are measured in utility, which is a numerical representation of the players' desire for a certain outcome. Attractive outcomes are assigned higher positive numbers, and less attractive outcomes are assigned lower numbers. Negative numbers represent an unpleasant utility.
- A payoff matrix is a grid of cells used to diagram the possible outcomes of a game theory problem.

- In a zero-sum game, the winnings of the victor are equal to the losses of the loser. Games such as Chess with a single winner and a single loser are zero-sum games.

- Every two-player, zero-sum game theory game has a solution, a proper way to play the game that will maximize winnings for the player every time. When there is a single best solution to a game for both players, the solution is known as a saddle point.

- Saddle points in any game can lead to degenerate strategies, also called exploits. A degenerate strategy is a way to play a game that leads to victory every time. Generally, degenerate strategies are to be avoided in games because they diminish uncertainty and meaningful play.

- Some game theory solutions consist of mixed strategies, where players select among different strategies with a weighted percentage.
Don’t follow these rules!
A Primer for Playtesting
Nathalie Pozzi and Eric Zimmerman

During our 2012 residency at the University of the Arts Berlin, we spent the summer with Graduate Fellows playtesting projects from theater, architecture, sound installation, games, philosophy, and more. This essay outlines the playtesting methodology we used by suggesting possible “rules” for structuring your own playtests.

What is playtesting?
Playtesting is a methodology borrowed from game design where unfinished projects are tested on an audience. A playtest happens when people come together to try out a work in progress. The next steps for changing the project are based on the results of the playtest.

Playtesting is also an attitude towards the creative process, an approach that emphasizes problem-solving through iteration and collaboration with members of your audience.

When is playtesting useful?
Playtesting can help develop any kind of work that involves interaction between a created experience and a participatory audience. Although many of the ideas of playtesting come from game design, they can be applied in any field.

What does playtesting look like?
Playtesting can look like any number of things. At the University of the Arts, we met as a group on a regular basis and shared works in progress. We would spend about 30-60 minutes interacting with and discussing one project – perhaps in a studio space, perhaps outdoors in a park or on the street - and then move on to the next.

Isn’t playtesting the same as user testing / editing / rehearsal / critique?
Yes and no. Playtesting is not discipline-specific and versions of it can be found in many practices. The style of playtesting we outline here comes from game design and is particularly relevant for projects that involve direct audience interaction.
THE “RULES”

.....before you playtest

A. Playtest before you think you are ready
You always playtest a work in progress, not a finished design. That means you should playtest as early as you possibly can – usually much earlier than you think you should. It is much much better to playtest your ugly prototype than to wait and playtest a more polished project. A playtest is not a presentation. If you feel ready and comfortable to present and playtest your design, you have waited too long – it is probably too late to make substantial changes. Train yourself to overcome your discomfort and playtest as early in the process as you possibly can.

Is it too early for you to playtest? If the answer is yes, then playtest anyway.

B. Strategize for early playtesting
Figure out how to create a working prototype far in advance of any final deadline. This is often a question of tactical implementation. Can you make a paper prototype of a digital project? Can you scale down a work meant for 100 participants to something you can playtest with a dozen? Rather than plan your entire project in advance, focus instead on what is needed to enable the next playtest.

Simplify your project so that you can playtest today.

C. Know why you are playtesting
Enter into every playtest with a concrete idea about what you want to learn and what questions you hope the playtest will answer. Narrowing what you want the playtest to investigate can help you simplify your project and playtest sooner. Generating research questions in advance will also help you structure the playtest itself. If you are doing things right, your playtest will raise issues and questions that you did not anticipate. However, you should still go into every playtest with a clear agenda.

What is the one key question that you want your playtest to answer?

D. Prepare variations
Go into a playtest with different versions of your project to try out. This allows you to make the most out of the playtest session and it also helps you to improvise and try out new ideas during the playtest. Variations might mean different sets of game rules to play, software settings to cycle through, or contexts for a performance. Variations give you options if something breaks down, and they let you do comparisons to see which variation works best. One tip: change as little as possible each time (only one element) so that you can understand better the exact effects of your change.
What can you change to try out different variations of your project?

E. Be grateful to your playtesters
Whoever is playtesting your project is doing you a big favor. They are donating their time and attention for the sole purpose of helping you with your unfinished project. Playtesting is hard. But no matter how much stress and uncertainty you might have about the project, try and maintain a feeling of gratitude towards your playtesters. Be happy they are there and be sure to let them know how thankful you are for their time.
Take a deep breath and say thanks.

F. Design the learning experience
Remember to design the way that people will learn about your project. If you are creating a complicated interactive system, the experience of learning how to understand and interact with the system is an important part of the overall design problem.
Does your playtest address the learning process?

G. Blame yourself, not your playtesters
Remember to warn your playtesters that they will be interacting with an unfinished, rough version of what will at some later point be a smoother experience. Be sure to tell them that if they are frustrated or confused, it is not their fault – it is your fault for not designing a better experience for them. It’s OK for them to be confused – after all, the most valuable part of the playtest is not what they do understand, but what they don’t.
Never make your playtesters feel foolish.

H. Know your testers
What do you need to know about your playtesters before the playtest begins? If you are meeting them for the first time or don’t know them very well, talk with each person and take notes that will help put their reaction to your project in context. Playtesters come in many varieties. For example, the learning curve of a hardcore gamer is very different than someone without deep experience in a particular game genre.
Do you know who your playtesters are?

I. Don’t explain
Put the project ahead of the theory. Resist the temptation to explain the ideas and intentions behind your project to your playtesters. Instead, let them interact with the LEAST possible explanation from you in advance. By explaining your ideas beforehand, you are ruining the chance to see the authentic reactions that your project provokes. It is hard to hold back and not explain. But by forcing your project to carry your ideas (rather than your explanation), you are challenging your work to be better.
Is it possible to not say anything before the playtest starts?

J. Take notes
In game design, we often prepare a sheet of paper for each playtester, with questions written out and room to take notes. The notes page is structured to facilitate what you need to know BEFORE, DURING, and AFTER each playtest. During a discussion, taking notes will help to elicit better feedback – if your testers see you taking notes they will be more likely to give you detailed and thoughtful answers.

Prepare a notes sheet and use it. It is worth the extra effort.

....during a playtest

K. Be selfish
The purpose of your playtest is not for your playtesters to have fun. It is for you to learn what does and does not work about your project. If you try too hard to give playtesters a good time, you will lose the opportunity to get the hard truth from them. Don’t be afraid to show your playtesters something broken and half-finished. That is in fact the entire premise of the playtest.

Don’t worry about being entertaining.

L. Encourage your playtesters to talk aloud
If it is possible for your project, ask your playtesters to talk out loud about their thoughts and feelings as they interact with your work. A “think-aloud” playtester can give you valuable insight into how they are perceiving and interpreting the details of your project. Let your playtesters tell you why they are doing what they are doing and what they think is happening as a result. This may require that you periodically remind them to vocalize.

Don’t be shy about reminding your playtesters to think aloud.

M. Notice everything
Prepare on your notes sheet the categories of the main things you want to observe, such as when players seemed frustrated, what make them laugh, or how many times they tried and failed before they gave up. Keep track of how long it took to run the playtest, which variations your testers preferred, and any other important information. Try to take notes on everything that you can – otherwise, you will be at the mercy of your selective memory, which will cast everything in the best possible light.

Are you noticing everything – or just what you want to see?
N. Shut up
While you are observing the playtest, say as little as possible. You will feel an overwhelming urge to help out your playtesters, to tell them what to do and what they are doing wrong. But you must do everything you can to not interfere. Their mistakes and misunderstandings are extremely useful: you must let them explore the project on their own. If they are completely confused, step in and assist them, but in general you should do everything you can to shut up. If you tell them what to do, you lose the main purpose of the playtest, which is to see how OTHER people react to your project. Learning to shut up during a playtest requires discipline.
*Can you shut up – not a just little, but really, completely, shut up?*

O. See the big picture
As your playtesters interact with your project, remember to not just focus on the workings of your designed system. Try to see the human element at play. What are the emotional responses of your playtesters, what is their body language, how are they interacting with each other? Seeing the bigger picture can help you understand when your audience is engaged and when they are bored. It is easy to focus too much on what you designed, rather than on the effect it is having.
*Stay focused on the impact of the project, not just the project itself.*

P. Don’t be afraid of data
One way to get objective about your playtest is to record data and put it in a spreadsheet. Every project has data to collect: At what moments did everyone fall silent? How many steps did each participant take as they walked through the space? If you are working in software, the program can record important user input, such as time spent in different areas of the experience. Otherwise, just remember to record the data in your notes. Too much data can be overwhelming to interpret, but tracking the right data can be incredibly valuable.
*What is the data that will answer your key questions?*

Q. Answer a question with a question
When playtesters ask you how something works, or what something means, it is probably because they are confused. Rather than explain it to them, you can answer their inquiry with a question of your own. Don’t tell them what the blue button does – instead, ask them what they think it does, or even better, what they think it SHOULD do. It’s more important to get them to speculate about your project than for you to explain it to them. Their opinions are more valuable than yours.
*Every time a playtester asks you something, ask them something back.*

R. Hunger for failure
One of the attitudes that helps with playtesting is to yearn for your project to fail. Of course we all want successful results, but unsuccessful moments are much
more useful. If you are only looking for the successes, you will remember the smiles and laughter and think that your project is in perfect shape (we call this the “happy face syndrome”). But you need to cultivate a desperate hunger to focus on what is not working properly. Otherwise, your project will never get better. *Are you enjoying the successful moments too much and ignoring the failures?*

#### After a Playtest

**S. Discuss what happened**

After the playtest, talk about the experience with your playtesters. Use your notes sheet to structure the conversation. Begin with very specific questions, such as what was most difficult for them to understand about the project, or why they reacted to a particular aspect of the design. Finish with more general questions, such as what they liked best about the experience or what they would change to make it better. *The more concrete your questions, the more useful answers you will get.*

**T. Put feedback into context**

It can be useful to distinguish between expert and non-expert testers. Experts are familiar with what it means to make a project like yours. Non-experts aren’t. When getting critical feedback from non-experts, remember that they are the patient and you are the doctor – you can take their suggestions as symptoms of what is and isn’t working in the project, rather than as directions for the next steps in your design. If someone tells you to tear down a room and make it bigger, they are really telling you that it feels small. Rather than take their advice, perhaps just rearrange the furniture. Don’t expect your players to understand all of the ramifications of every suggestion they make. *Ask for feedback, but don’t take suggestions literally.*

**U. Collaborate with your playtesters**

One of the most thrilling moments of playtesting is collaborating with your playtesters – brainstorming with them, trying out their ideas, and seeing how the changes impact your project. Plan your playtest session so that you have time to experiment with new ideas as they emerge through the playtesting itself. They are seeing the project with fresh eyes and so their ideas are often better than yours. *Embrace shared authorship with your playtesters.*

**V. The cruelly honest playtest**

Playtests represent moments of truth – when your brilliant ideas may all come crashing down. Playtests are truthful because they are a safe place to simulate your final context. When your project is completed, you probably won’t be there to explain away all of the problems and defend your intentions. In a playtest, you
get to cruelly see whether or not your ideas actually work in practice. Part of the playtest attitude is building up your pain tolerance and coming to enjoy the hard truth of the playtest.

*Face the truth of your playtest, even if it hurts.*

**W. Embrace the unexpected**

Never forget that *play* is half of *playtest*. Being playful means being open to unexpected, happy accidents. Let go of the way you *want* your work to be used or interpreted. Be open to the strange new things people do with your project. Accidents are for those who are ready to take advantage of them.

*If things don’t go as planned, you may be on to something better.*

**X. The playtest’s the thing**

The playtesting process is as important as the actual project you are making. If you can manage to get the process right, then you will find that the problems in your project begin to solve themselves.

*Forget what you are making. Focus on how you make it.*

**Y and Z. Break these rules**

There is no single magic solution that will solve every problem you encounter. So you need to create the process that works for you. Don’t follow these “rules.” They are not meant to be followed – they are meant to be twisted, modified, broken, and refashioned into something new. The best playtest is the one you invent yourself.

- Nathalie & Eric
The Design Evolution of Magic: The Gathering

Richard Garfield

Context

I wrote the original Magic design notes shortly after Magic was published. I felt an urgency to document the development of Magic like I have seldom felt before—there were so many people and ideas and events woven around these years that I knew would quickly slip from memory. I was aware that over the following years my thoughts on what made a good trading card game, and the design principles of games had evolved, so when interest was shown in my original design notes it seemed like a good opportunity to try and add that decade of perspective to the original document. The updated version of this essay was first published in Game Design Workshop, by Tracy Fullerton, Christopher Swain, and Steven Hoffman (published 2004, CMP Books). It is reprinted here with permission.

Richard was teaching at Whitman College for his second year after completing his Ph.D. in Mathematics at the University of Pennsylvania, when his first game, Magic: The Gathering was published. The game was the first trading card game, which has since become an industry of its own. Since then he has published many other trading card games, as well as board and card games.
Thoughts from Richard Garfield, 10 Years Ago and Today

Magic: The Gathering is one of the most important and influential games of our time. It was an instant hit when it first appeared at the Gen Con game convention in 1993 and has grown steadily in popularity since. This is a special two-part look at the creation and development of the game as written by the designer, Richard Garfield. Richard wrote the first part "The Creation of Magic: The Gathering" nearly 10 years ago when the game was first released. In it he muses about the design challenges of a collectable trading card game and he recounts the game’s fascinating playtest history. The second part "Magic Design: A Decade Later" is a retrospective on the original design notes. In it Richard provides insight about how and why the game has evolved the way it has—including thoughts on today’s Magic Pro Tour, Magic Online, and the next ten years for the game.

The Creation of Magic: The Gathering—Notes from the Designer (written 1993)

The Ancestry of Magic

Games evolve. New ones take the most loved features of earlier games and add original characteristics. The creation of Magic: The Gathering is a case in point.

Though there are about a dozen games that have directly influenced Magic in one way or another, the game’s most influential ancestor is a game for which I have no end of respect: Cosmic Encounter, originally published by Eon Products and re-released by Mayfair Games. In this game, participants play alien races striving to conquer a piece of the universe. Players can attempt their conquest alone, or forge alliances with other aliens. There are nearly fifty alien races which can be played, each of which has a unique ability: the Amoeba, for example, has the power to Ooze, giving it unlimited token movement; the Sniveler has the power to Whine, allowing it to automatically catch up when behind. The best thing about Cosmic Encounter is precisely this limitless variety. I have played hundreds of times and still can be surprised at the interactions different combinations of aliens produce. Cosmic Encounter remains enjoyable because it is constantly new.

Cosmic Encounter proved to be an interesting complement to my own design ideas. I had been mulling over a longtime idea of mine: a game that used a deck of cards whose
composition changed between rounds. During the course of the game, the players would add cards to and remove cards from the deck, so that when you played a new game it would have an entirely different card mix. I remembered playing marbles in elementary school, where each player had his own collection from which he would trade and compete. I was also curious about Strat-o-matic™ Baseball, in which participants draft, field, and compete their own teams of baseball players, whose abilities are based on real players’ previous year statistics. Intrigued by the structure of the game, I was irritated that the subject was one for which I had no patience.

These thoughts were the essence of what eventually became Magic. My experiences with Cosmic Encounter and other games inspired me to create a card game in 1982 called Five Magics. Five Magics was an attempt to distill the modularity of Cosmic Encounter down to just a card game. The nature of Cosmic Encounter seemed entirely appropriate for a magical card game—wild and not entirely predictable, but not completely unknown, like a set of forces you almost, but don’t quite, understand. Over the next few years, Five Magics went on to inspire entirely new magical card games among my friends.

Ten years later, I was still designing games, and Mike Davis and I had come up with a board game called RoboRally. Mike was acting as our agent, and among the companies he approached was a brand-new gaming company called Wizards of the Coast. Things seemed to be going well, so that August, Mike and I made our way to Portland, Oregon to meet over a pizza with Peter Adkison and James Hays of Wizards of the Coast.

Both Peter and James were very receptive to RoboRally, but informed me that they weren’t really in a position to come out with a board game right away. This wasn’t what I had come out to hear, of course, but I didn’t want the trip to be a total waste. I asked Peter what he would be interested in. Peter replied that he really saw a need for a game that could be played quickly with minimal equipment, a game that would go over well at conventions. Could I do it?

Within a few days, the initial concept for a trading card game was born, based on another card game I had developed in 1985 called Safecracker. It hadn’t been one of my best games. But then I remembered Five Magics.

The First Designs

I went back to graduate school at the University of Pennsylvania, and worked on the card game in whatever spare time I had. It wasn’t easy; there were three months of false starts on
the project, there are so many aspects of card game design that have to be reconsidered when designing trading card games. First of all, you can’t have any bad cards—people wouldn’t play with them. In fact, you want to prevent too much range in the utility of cards because players will only play with the best—why make cards people won’t play with? Besides, homogeneity of card power is the only way to combat the “rich kid syndrome” that threatened the game concept from the start. What was to keep someone from going out and getting ten decks and becoming unbeatable?

It was a major design concern. I had numerous theories on how to prevent purchasing power from unbalancing the game, none of which were entirely valid but all of which had a grain of truth. The most compelling counter to this “buy-out-the-store” strategy was the ante. If we were playing for ante, the argument ran, and your deck was the distilled fruit of ten decks, when I did win, I would win a more valuable card. Also, if the game had enough skill, then the player purchasing their power would surely be easy prey for the players dueling and trading their way to a good deck. And of course there was the sentiment that buying a lot of poker chips doesn’t make you a winner. In the end, however, the “rich kid syndrome” became less of a concern. Magic is a fun game, and it doesn’t really matter how you get your deck. Playtesting showed that a deck that is too powerful defeats itself. On the one hand, people stopped playing against it for ante unless a handicap was invoked; on the other, it inspired them to assemble more effective decks in response.

The first Magic release was affectionately named Alpha. It consisted of 120 cards split randomly between two players. The two players would ante a card, fight a duel over the ante, and repeat until they got bored. They often took a long time to get bored; even then, Magic was a surprisingly addictive game. About ten o’clock one evening, Barry “Bit” Reich and I started a game in the University of Pennsylvania Astronomy lounge, a windowless, air-conditioned room. We played continuously until about 3:00am—at least that’s what we thought, until we left the building and found that the sun had risen.

I knew then that I had a game structure that could support the concept of individually owned and tailored decks. The game was quick, and while it had bluffing and strategy, it didn’t seem to get bogged down with too much calculation. The various combinations that came up were enjoyable and often surprising. At the same time, the variety of card combinations didn’t unbalance the game: when a person started to win, it didn’t turn into a landslide.
From Alpha to Gamma

Except for the card mix, little has changed about Magic since Alpha. In Alpha, walls could attack, and losing all your lands of a particular color destroyed the associated spells in play, but otherwise, the rules are much the same now as they were in the early stages of playtesting.

Moving from Alpha to the Beta version was like releasing a wild animal. The enjoyable game that was Alpha now burst the confines of the duel to invade the lives of the participants. Players were free to trade cards between games and hunt down weaker players to challenge them to duels, while gamely facing or cravenly avoiding those who were more powerful. Reputations were forged—reputations built on anything from consistently strong play to a few lucky wins to good bluffing. The players didn’t know the card mix, so they learned to stay on their toes during duels. Even the most alert players would occasionally meet with nasty surprises. This constant discovery of unknown realms in an uncharted world gave the game a feeling of infinite size and possibility.

For the Gamma version, new cards were added and many of the creature costs were increased. We also doubled the pool of playtesters, adding in a group with Strat-o-matic Baseball experience. We were particularly anxious to find out if Magic could be adapted for league play. Gamma was also the first version, which was fully illustrated. Skaff Elias was my art director: he and others spent days poring over old graphic magazines, comic books, and game books searching for art for the cards. These playtest decks were pretty attractive for crummy black-and-white cardstock photocopies. For the most part, the cards were illustrated with serious pictures, but there were a lot of humorous ones as well. Heal was illustrated by Skaff’s foot. Power Sink showed Calvin [of “Calvin and Hobbes”) in a toilet; after all, what is a toilet but a power sink? Berserk was John Travolta dancing in Saturday Night Fever. Righteousness pictured Captain Kirk, and Blessing showed Spock doing his “live long and prosper” gesture. An old comic book provided a Charles Atlas picture for Holy Strength, and a 98-pound weakling getting sand kicked in his face for Weakness. Instill Energy was Richard Simmons. The infamous Glasses of Urza were some X-ray glasses we found in a catalog. Ruthy Kantorovitz constructed a darling flame-belching baby for Firebreathing. I myself had the honor of being the Goblins. The pictures and additional players greatly added to the game atmosphere. It became clear that while the duels were for two players, the more players playing, the better the game was. In some sense, the individual duels were a part of a single, larger game.
Striking the Balance
Each playtest set saw the expulsion of certain cards. One type of card that was common in Alpha and Beta was rare in Gamma, and is now nonexistent: the type that made one of your rival’s cards yours. Yes, Control Magic used to permanently steal a creature from your opponent. Similarly, Steal Artifact really took an artifact. Copper Tablet no longer even remotely resembles its original purpose, which was to swap two creatures in play. (“Yes, I’ll swap my Merfolk for your Dragon. On second thought, make that my Goblins—they’re uglier.”) There was a spell, Planeshift, which stole a land, and Ecoshift, which collected all the lands, shuffled them and re-dealt them—really nice for the user of four or five colors of magic. Pixies used to be a real pain—if they hit you, you swapped a random card from your hand with your opponent. These cards added something to the game, often in the form of players trying to destroy their own creatures before their opponents took them for good, or even trying to take their own lives to preserve the last shreds of their decks. However, in the end it was pretty clear that the nastiness this added to the game environment wasn’t worth the trouble, and no card should ever be at risk unless players choose to play for ante.

It was around this time that I began to realize that some players would oppose almost any decision made about the game, often vehemently. The huge amount of dissent about what should and should not be part of the card mix has led players to make their own versions for playtesting—a significant task that involves designing, constructing, shuffling, and distributing about 4000 cards. Each of these games had its merits, and the playtesters enjoyed discovering the quirks and secrets of each new environment. The results of these efforts will form the basis of future Deckmaster games that use the structure of The Gathering, while containing mostly new cards.

To Build a Better Deck
Playtesting a Deckmaster game is difficult. Probably the only games harder to playtest are elaborate, multi-player computer games. After developing a basic framework for Magic that seemed fairly robust, we had to decide which of the huge selection of cards to include, and with what relative frequencies. Common cards had to be simple, but not necessarily less powerful, than rare cards—if only rare cards were powerful, players would either have to be rich or lucky to get a decent deck. Sometimes a card was made rare because it was too powerful or imbalancing in large quantities, but more often, rare cards were cards that were intricate or specialized—spells you wouldn’t want many of anyway. But these design guidelines only
got us so far. The whole game’s flavor could change if a handful of seemingly innocent cards were eliminated, or even made less or more common. When it came down to actually deciding what to include and what to do without, I began to feel like a chef obliged to cook a dish for 10,000 people using 300 ingredients.

One thing I knew I wanted to see in the game was a player using multicolor decks. It was clear that a player could avoid a lot of problems by stripping down to a single color. For this reason, many spells were included that paralyzed entire colors, like Karma, Elemental Blast, and the Circles of Protection. The original plan was to include cards that thwarted every obvious simple strategy, and, in time, to add new cards which would defeat the most current ploys and keep the strategic environment dynamic. For example, it was obvious that relying on too many big creatures made a player particularly vulnerable to the Meekstone, and a deck laden with Fireballs and requiring lots of mana could be brought down with Manabarsbs. Unfortunately, this strategy and counter-strategy design led to players developing narrow decks and refusing to play people who used cards that could defeat them flat out. If players weren’t compelled to play a variety of players and could choose their opponent every time, a narrow deck was pretty powerful.

Therefore, another, less heavy-handed way to encourage variety was developed. We made it more difficult to get all the features a player needs in a deck by playing a single color. Gamma, for example, suffered from the fact that blue magic could stand alone. It was easily the most powerful magic, having two extremely insidious common spells (Ancestral Memory and Time Walk), both of which have been made rare. It had awesome counterspell capabilities. It had amazing creatures, two of the best of which are now uncommon.

Blue magic now retains its counterspell capability, but is very creature poor, and lacks a good way to do direct damage. Red magic has little defense, particularly in the air, but has amazing direct damage and destruction capability. Green magic has an abundance of creatures and mana, but not much more. Black is the master of anti-creature magic and has some flexibility, but is poorly suited to stopping non-creature threats. White magic is the magic of protection, and the only magic with common banding, but has little damage-dealing capability.

Sometimes seemingly innocuous cards would combine into something truly frightening. A good part of playtest effort was devoted to rooting out the cards that contributed to so-called “degenerate” decks—the narrow, powerful decks that are difficult to beat and often
boring to play with or against. Without a doubt, the most striking was Tom Fontaine’s “Deck of Sooner-Than-Instant Death,” which was renowned for being able to field upwards of eight large creatures on the second or third turn. In the first Magic tournament, Dave “Hurricane” Pettey walked to victory with his “Land Destruction Deck.” (Dave also designed a deck of Spectres, Mindtwists, and Disrupting Sceptres that was so gruesome I don’t think anyone was ever really willing to play it.) Skaff’s deck, “The Great White Death,” could outlive just about anything put up against it. Charlie Catin’s “Weenie Madness” was fairly effective at swamping the opponent with little creatures. Though this deck was probably not in the high-win bracket of the previous decks, it was recognized that, playing for ante, Charlie could hardly lose. Even winning only one in four of his games—and he could usually do better than that—the card he won could be traded back for the island and the two Merfolk he lost, with something extra thrown in.

In the end I decided that the degenerate decks were actually part of the fun. People would assemble them, play with them until they got bored or their regular opponents refused to play against them, and then retire the deck or trade off its components for something new—a Magic version of putting the champion out to stud. Most players ended up treating their degenerate decks much like roleplayers treat their most successful characters: they were relegated to the background, to be occasionally dusted off for a new encounter.

After the pursuit of sheer power died down, another type of deck developed: the Weird Theme deck. These decks were usually made to be as formidable as possible within the constraints of their theme. When Bit grew bored of his “Serpent Deck” (he had a predilection for flopping a rubber snake on the playing surface and going “SsssSssSs” whenever he summoned a Serpent), he developed his “Artifact Deck,” which consisted of artifacts only—no land. It was fun to see the “Artifact Deck” go up against someone who used Nevinyrral’s Disk. But the king of weird decks was, without a doubt, Charlie Catin. In one league, he put together a deck that I call “The Infinite Recursion Deck.” The idea was to set up a situation where his opponent couldn’t attack him until Charlie could play Swords to Plowshares on a creature. Then he would play Timetwister, causing the cards in play to be shuffled with the graveyard, hand, and library to form a fresh library. Swords to Plowshares actually removes a creature from the game, so his rival has one less creature. Repeat. After enough iterations, his rival was bloated with life given by the Swords to Plowshares, having maybe 60 life points, but there were no creatures left in his deck. So Charlie’s Elves started in—59 life, 58 life, 57
life—and the curtain closes on this sad game. I still can’t think about this deck without moist emotional snorts. The coup de grace is that this league required players to compete their decks ten times. And, since his games often lasted over an hour and a half, he received at least one concession.

Words, Words, Words

It was not just determining the right card mix that players and designers found challenging. This becomes increasingly clear to me as I participate in the never-ending process of editing the rules and the cards. As my earliest playtesters have pointed out [in their more malicious moods], the original concept for Magic was the simplest game in the world because you had all the rules on the cards. That notion is long gone.

To those who didn’t have to endure it, our struggle for precision was actually rather amusing. My own rules discussions about card wordings were mostly with Jim Lin, who is the closest thing you will ever encounter to a combination rules lawyer and firehose. A typical rule-problem session would go:

Jim: “Hmm—there seems to be a problem with this card. Here is my seven-page rules addition to solve the problem.”

Richard: “I would sooner recall all the cards than use that. Let’s try this solution instead.”

Jim: “Hmm—we have another problem.”

[Repeat until...]

Richard: “This is silly—only incredibly stupid and terminally anal people could possibly misinterpret this card.”

Jim: “Yes, maybe we have been thinking about this too long. If you’re playing with that kind of person, you should find some new friends.”

A specific example of something we actually worried about is whether Consecrate Land would really protect your land from Stone Rain. After all, the first says it prevents land from being destroyed and the second says it destroys the land. Isn’t that a contradiction? It still hurts my head getting into a frame of mind where that is confusing. It is perhaps a little like wondering why anyone would give you anything for money, which is, after all, just paper.

But, then again, I could never tell what was going to confuse people. One of the playtesters, Mikhail Chkhenkeli, approached me and said, “I like my deck. I have the most
powerful card in the game. When I play it, I win on the next turn.” I tried to figure out what this could be; I couldn’t think of anything that would win the game with any assurance the turn after casting. I asked him about it and he showed me a card that would make his opponent skip a turn. I was confused until I read exactly what was written: “Opponent loses next turn.” It was my first real lesson in how difficult it was going to be to word the cards so that no two people would interpret the same card in a different way.

The Magic Marketplace
Another thing I realized in the second year of playtesting really surprised me. Magic turned out to be one of the best economic simulations I had ever seen. We had a free-market economy and all of the ingredients for interesting dynamics. People valued different cards in different ways—sometimes because they simply weren’t evaluating accurately, but much more often because the cards really have different value to different players. For example, the value of a powerful green spell was lower for a person who specializes in black and red magic than for one who was building a deck that was primarily green. This gives a lot of opportunity for arbitrage. I would frequently find cards that one group of players wasn’t using but another group were treating like chunks of gold. If I was fast enough, I could altruistically benefit both parties and only have to suffer a little profit in the process.

Sometimes the value of a card would fluctuate based on a new use (or even a suspected new use). For example, when Charlie was collecting all the available spells that produced black mana, we began to get concerned—those cards were demanding higher and higher prices, and people began to fear what he could need all that black mana for. And, prior to Dave’s “Land Destruction Deck,” land destruction spells like Stone Rain and Ice Storm were not high-demand spells. This of course allowed him to assemble the deck cheaply, and after winning the first Magic tournament, sell off the pieces for a mint.

Trade embargoes appeared. At one point a powerful faction of players would not trade with Skaff, or anyone who traded with Skaff. I actually heard conversations such as:

Player 1 to Player 2: “I’ll trade you card A for card B.”

Skaff, watching: “That’s a moronic trade. I’ll give you card B and cards C, D, E and F for card A.”

Players 1 and 2 together: “We are not trading with you, Skaff.”
Needless to say, Skaff was perhaps a bit too successful in his early duels and trades.

Another interesting economic event would occur when people would snatch up cards they had no intention of using. They would take them to remove them from the card pool, either because the card annoyed them [Chaos Orb, for example] or because it was too deadly against their particular decks.

I think my favorite profit was turned during an encounter with Ethan Lewis and Bit. Ethan had just received a pack of cards and Bit was interested in trading with Ethan. Bit noticed that Ethan had the Jayemdae Tome, began to drool, and made an offer for it. I looked at the offer and thought it was far too low, so I put the same thing on the table.

Bit looked at me and said, “You can’t offer that! If you want the Tome you have to bid higher than my bid.”

I said, “This isn’t an offer for the Tome. This is a gift for Ethan deigning to even discuss trading the Tome with me.”

Bit looked at me in disbelief, and then took me aside. He whispered, “Look, I’ll give you this wad of cards if you just leave the room for ten minutes.” I took his bribe, and he bought the Tome. It was just as well—he had a lot more buying power than I did. In retrospect, it was probably a dangerous ploy to use against Bit—at all, he was the person who was responsible for gluing poor Charlie’s deck together once, washing a different deck of Charlie’s in soap and water, and putting more cards of Charlie’s in the blender and hitting frappé.

Probably the most constant card-evaluation difference I had with anyone was over Lord of the Pit. I received it in just about every playtest release we had, and it was certainly hard to use. I didn’t agree with Skaff, though, that the only value of the card was that you might get your opponent to play with it. He maintained that blank cards would be better to play with because blank cards probably wouldn’t hurt you. I argued that if you knew what you were doing, you could profit from it.

Skaff asked me to cite a single case where it had saved me. I thought a bit and recalled the most flamboyant victory I had with it. My opponent knew he had me where he wanted me—he had something doing damage to me, and a Clone in hand, so even if I cast something to turn the tide, he would be able to match me. Well, of course, the next cast spell was a Lord of the Pit; he could Clone it or die from it, so he Cloned it. Then each time he attacked, I would heal both of the Lords, or cast Fog and nullify the assault, and refuse to attack. Eventually, he ran out of creatures to keep his Lord of the Pit sated and died a horrible death.
Skaff was highly amused by this story. He said, “So, when asked about a time the Lord of the Pit saved you, you can only think of a case where you were playing somebody stupid enough to clone it!”

**Dominia and the Role of Roleplaying**

Selecting a card mix that accommodated different evaluations of the cards wasn’t enough; we also had to develop an environment in which the cards could reasonably interact. Establishing the right setting for Magic proved to be a central design challenge. In fact, many of our design problems stemmed from an attempt to define the physics of a magical world in which duels take place and from building the cards around that, rather than letting the game define the physics. I was worried about the cards’ relationship to each other—I wanted them to seem part of a unified setting, but I didn’t want to restrict the creativity of the designers or to create all the cards myself. Everyone trying to jointly build a single fantasy world seemed difficult, because it would inevitably lack cohesion. I preferred the idea of a multiverse, a system of worlds that was incredibly large and permitted strange interactions between the universes in it. In this way, we could capture the other worldly aspects of fantasy that add such flavor to the game while preserving a coherent, playable game structure. Almost any card or concept would fit into a multiverse. Also, it would not be difficult to accommodate an ever-growing and diverse card pool—expansion sets with very different flavors could be used in the same game, for they could be seen as a creative mingling of elements from different universes. So I developed the idea of Dominia, an infinite system of planes through which wizards travel in search of resources to fuel their magic.

In its structured flexibility, this game environment is much like a roleplaying world. I don’t mean to suggest that this setting makes Magic a roleplaying game—far from it—but Magic is closer to roleplaying than any other card or board game I know of. I have always been singularly unimpressed by games that presumed to call themselves a cross between the two because roleplaying has too many characteristics that can’t be captured in a different format. In fact, in its restricted forms—as a tournament game or league game, for example—Magic has little in common with roleplaying. In those cases, it is a game in the traditional sense, with each player striving to achieve victory according to some finite set of rules. However, the more free-form game—dueling with friends using decks constructed at whim—embodies some interesting elements of roleplaying.
Each player’s deck is like a character. It has its own personality and quirks. These decks often even get their own names: “The Bruise,” “The Reanimator,” “Weenie Madness,” “Sooner-Than-Instant Death,” “Walk Into This Deck,” “The Great White Leftovers,” “Backyard Barbeque,” and “Gilligan’s Island,” to name a few. In one deck I maintained, each of the creatures had a name—one small advantage to crummy photocopied cardstock is the ease of writing on cards. The deck was called “Snow White and the Seven Dwarves,” containing a Wurm named Snow White and seven Mammoths: Doc, Grumpy, Sneezy, Dopey, Happy, Bashful, and Sleepy. After a while I got a few additional Mammoths, which I named Cheesy and Hungry. There was even a Prince Charming: my Veteran Bodyguard.

As in roleplaying, largely the players determine the object of the game in the unstructured mode of play. The object of the duel is usually to win, but the means to that end can vary tremendously. Most players find that the duel itself quickly becomes a fairly minor part of the game compared to trading and assembling decks.

Another characteristic of Magic, which is reminiscent of roleplaying, is the way players are exploring a world rather than knowing all the details to start. I view Magic as a vast game played among all the people who buy decks, rather than just a series of little duels. It is a game for tens of thousands in which the designer acts as a gamemaster. The gamemaster decides what the environment will be, and the players explore that environment. This is why there are no marketed lists of cards when the cards are first sold: discovering the cards and what they do is an integral part of the game.

And like a roleplaying game, the players contribute as much to an exciting adventure as the gamemaster. To all the supporters of Magic, and especially to my playtesters, I am extraordinarily grateful. Without them, if this product existed at all, it would certainly be inferior. Every one of them left a mark, if not on the game itself, then in the game’s lore. Any players today that have even a tenth of the fun I had playing the test versions with them will be amply pleased with Magic.

**Magic Design: A Decade Later (written 2003)**

Magic and the trading card game industry have undergone a lot of changes since the time I wrote those design notes. In the meantime Magic has grown stronger with each successive year—as the game itself is improved, and more people are brought into trading card games from products such as Pokemon and Yu-Gi-Oh.
It is difficult for people these days to appreciate how little we knew about the game design space we were entering in the early nineties. My design notes failed to mention what in my mind is the strongest sign of that—after describing the concept of a trading card game to Peter Adkison I concluded with the cautious statement “of course, such a game may not be possible to design.” It is hard for me to imagine that state of mind today, in a world where trading card games have reached every corner and are a part of almost every major entertainment property. This is a world where trading card games have left their mark on all areas of game design, from computer games to board games; and where trading card games have directly inspired games ranging from trading miniature games to trading tops games. This is a world where Jason Fox, from the comic strip Foxtrot, complained that a deck of cards coming with only 4 aces was some sort of ploy to get people to buy expansion kits.

That could be left as the end of the story; Magic was designed—as the design notes of a decade ago portray—and 10 years later it was still going strong. But this leaves out a large part of the story, since Magic was anything but a static game since then. The changes and improvements to Magic warrant design notes of their own.

First and Foremost: a Game

One thing that may look arcane in my notes to people, who know something about the game market, is my reference to the form of game that Magic launched as a “trading card game”, rather than a “collectible card game”. I still use TCG rather than CCG, which became the industry standard despite my efforts from its earliest days. I prefer “trading” rather than “collectible” because I feel it emphasizes the playing aspect rather than the speculation aspect of the game. The mindset of making collectables runs against that of making games—if you succeed in the collectable department then there is a tendency to keep new players out and to drive old ones away because of escalating prices. One of the major battles that Magic fought was to make it perceived principally as a game and secondarily as a collectable. Good games last forever—collectables come and go.

This was not merely theoretical speculation—Magic’s immense success as a collectable was severely threatening the entire game. Booster packs intended to be sold at a few bucks were marked up to 20 dollars in some places as soon as they hit the shelves. While many people view this time as the golden age of Magic the designers knew that it was the death of the game in the long run. Who is going to get into the game when it was immediately inflated in price so much? How many people would play the game if doing so was wearing
holes in some of their most valuable assets? We might be able to keep a speculation bubble going for a while, but the only way Magic was going to be a long term success—a classic game—was for it to stand on its game play merits, not on its worthiness as an investment.

During "Fallen Empires", the fifth Magic expansion, we finally produced enough cards that the speculative market collapsed. The long-term value of Magic could perhaps thrive—but it wouldn’t immediately price itself out of the reach of new players before they got a chance to try it. There was an inevitable negative patina that Magic got for a while, and “Fallen Empires” still has, but from this point on Magic was sinking or swimming on its game merits. Fortunately, Magic turned out to be a strong swimmer.

**Binding the Unbounded**
The part of my notes, which I believe, reveals my biggest change in thinking over the last decade is the statement that in the future we would publish other games with mechanics similar to Magic. What I was referring to is what became “Ice Age” and “Mirage”, two expansions for Magic. Why did I think these would be entirely new games, rather than what they ended up being—expansions for the main game?

We all realized from the start that we couldn’t just keep adding cards to Magic and expect it to stay popular. One reason for that is that each successive set of cards was a smaller and smaller percentage of the entire pool of cards, and so would necessarily have less and less impact on the whole of the game. This was illustrated vividly by players of “Ice Age” talking about how the entire set introduced two relevant cards to the game. One can imagine how the designers felt—working for years to make “Ice Age” a compelling game to have it boil down to a mere two cards. Another, perhaps more important reason, is that new players wouldn’t want to enter a game where they were thousands of cards behind, so our audience would inevitably erode.

Initially we saw two solutions to this problem: *Make cards ever more powerful.* This is a route many trading card game makers followed—and one I greatly dislike. It feels like strong-arming the players to buy more and more rather than really providing them more game value. But it would bring new players in, because they wouldn’t need the obsolete old cards.

*Eventually conclude Magic: The Gathering, and start a new game—Magic: Ice Age, for example.* I advocated this approach, because I believed we could make exciting new game environments indefinitely. When one set was finished, players wouldn’t be forced to buy into the
new game to keep competitive, they could move on if they wanted a change—and new players could begin on equal footing.

When it actually came time to do "Ice Age" it was absolutely clear that players would not stand for a new version of Magic, we had to think of something else. Additionally, we were also worried that fragmenting the player audience was a bad idea; if we made a lot of different games, people would have a harder and harder time finding players.

The solution we found was to promote different formats of game play—many of which involved only more recent sets of cards. Today there are popular formats of play which involve only the most recently published cards, cards published in the last 2 years, and cards published in the last 5 years, in addition to many others. While this does fragment the player base—since you may not be able to find players who play your format—it is less draconian than different games since you can apply your cards to many different formats over time. This was a far more flexible approach than the first—as it didn’t command players to start fresh—it allowed them to, and allowed new players to join the game without being overwhelmed.

**Trading Card Games Are not Board Games**

I used to believe that trading card games were far more like board games than they are. This is not surprising, since I had no trading card games before Magic to draw examples from, and so was forced to use the existing world of games to guide my thinking on TCGs. A lot of my design attitudes grew from this misconception. For example, my second trading card game was designed to be best with 4 or more people, and took several hours to play. These are not bad parameters for a board game, but trading card games really want to be much shorter—because so much of the game is about replaying with a modified, or entirely new deck.

In a similar vein I used what I saw board game standards to be when it came to rules clarifications. It was common in board games to find a different group played a slightly different way, or had house rules to suit their tastes. With board games different interpretations of the rules and ways of play were not a major problem because players tended to play with fairly isolated groups. This led me to be quite anti-authoritarian when it came to the "correct" way to play. It turned out that a universal standard for a trading card game was far more necessary than a board game, because the nature of the game form made the interconnectivity of the game audience was far greater.

This meant that we had to take more and more responsibility for defining the rules and standards of play. In some ways this is analogous to being forced to construct the tourna-
ment rules for a game. The rules to Bridge are not that complex but when you write out the official tournament rules—really try to cross the t’s and dot the i’s—you have a compendium.

I had also hoped that players could moderate their own deck restrictions. We knew that certain card combinations were fun to discover and surprise someone with, but not fun to play with on an ongoing basis. So we figured players would make house rules to cover those decks and the responsible cards. The highly interconnected nature of Magic made it unreasonable to expect that, however, since every playgroup came up with a vast number of restrictions and rules, and they all played with each other. This meant we had to take more responsibility in designing the cards and when necessary, banning cards that were making the game worse.

The Pro Tour

All this precision invested in the design of the rules and cards made Magic a surprisingly good game to play seriously. We began to entertain ideas of really supporting a tournament structure with big money behind it—big enough players could, if good enough—make a living off of playing Magic. This was a controversial subject at Wizards of the Coast for a while—the worry being that making the game too serious would make it less fun. I subscribed fully to the concept of a Pro Tour—thinking of how the NBA helped make basketball popular and didn’t keep the game from being played casually as well.

The Pro Tour had an almost immediate effect. Our players rapidly became much better as the top level ones devoted time to really analyzing the game and as that game tech filtered down through the ranks. Before the Pro Tour I am confident that I was one of the best players in the world, now I am mediocre at best.

Now there are thousands of tournaments each week, and many players have earned a lot of money playing Magic, some in the hundreds of thousands of dollars. At the last World Championship there were 56 countries competing. There is a never-ending buzz of Magic analysis and play as players attempt to master the ever-changing strategic ground of Magic. I believe this is a major part of Magic’s ongoing popularity. If even a small group of people takes a good game very seriously, there can be far reaching effects.

Magic Online

Online Magic didn’t come into its own until last year. For a long time I have wanted to see an online version of Magic that duplicated real life Magic as closely as possible. That is, the
online game would connect people, run the games and the tournaments, and adjudicate rules—but little else. At first we tried to form partnerships with computer game companies to do this—but our partners always had other ideas about how to do computer Magic. Eventually we hired a programming studio to do it our way and now we have Magic Online.

One of the striking things about Magic Online is that we use the same revenue model as in real life. Despite exhortations to use a subscription model, we chose to sell virtual cards, which you could trade with other players online. This allows players to buy some cards and then play them indefinitely with no further fee—as in real life.

It was important to us that we not make it a better deal playing online than off—we wanted it to be the same. That is because we feel the paper game contributes a lot to Magic’s ongoing popularity, and it could be threatened if many of its players go to the online game.

For this reason one of the prime targets for the online game was going to be lapsed players. Many studies had been done on how long people play Magic and why they leave the game, and for the most part they didn’t leave because they were bored with the game, they left because they had life changes which made it more difficult to play—for example getting jobs or having kids. These players would potentially rejoin the game if they could play from their own home on their own hours.

Magic Online is still a bit too young to be sure about—but it appears to have acquired a dedicated sizeable audience of players without hurting the paper game. Many of the players are formerly lapsed players as we had hoped.

**The Next 10 Years**

Who knows what the next decade will bring? Ten years ago I had no clue at all, it was an exciting time and we were riding a roller coaster. Now I am more confident—I believe that Magic is fairly stable, and that there is every reason to believe that it will be around and as strong in another 10 years. At this point it is clear that Magic is not a fad, and as many new players are coming in each year as are leaving the game.

Certainly Magic has stayed fresh for me. I get into the game every few months; joining a league, constructing a deck, or perhaps preparing for and participating in a tournament. Every time I return I find the game fresh and exciting, with enough different from the previous time to keep me on my toes, but enough the same that I can still exploit my modest skills at the game. I look forward to my next 10 years of the game.
Design Intuitively  

by Rob Davian

If there’s one person I know whose livelihood depends on people understanding his games right out of the box, it’s Hasbro designer Rob Davian. It is not unusual for him to be presented with two simple boats (“It’s Pizza’s ‘Cars’ meets Operation!”), and know that he has very little room for error in making his games intuitive. The cool thing about Rob is that when he tackles a more complex subject, such as Risk: Black Ops or Heroscape, you can see that intuitiveness beam through just as clearly.

A few years back I was at MIT (1) and I had a room of about 25 ridiculously smart people at my disposal. So, like anyone, I tried an audacious experiment. “Pair up,” I said, “and choose a game that looks fun but you know nothing about.” Eagerly they picked their games and returned to their seats, ready to open them and see what was in there.

“So the challenge is simple,” I continued. “You and your teammate have five minutes to learn this game and present it to the rest of us.

“Oh, I’ve also removed all the rulebooks.”

Take that, smart people.

But against every expectation I had, they did an amazing job. Now, granted, they spend most of their time inventing molecules or building cold fusion coffee makers, so they probably have a leg up on a lot of people. But the fact remains that people who’d never seen these games before could still intuit how to play them given nothing more than the bits, the box, and five minutes (2).

This episode changed my entire outlook on game rules. I had, as you will, an epiphany.
Rules should not explain a game; they should only confirm what the rest of the game tells you.

That is, if your game makes intuitive sense from the moment players crack open the box, then you've done far more work toward people learning the game than you think.

Because tabletop games, unlike videogames, require every player to understand the entire game system to play. You need to understand not only the components, the goal, the rules, and the flow of play, but also how to assemble all these into a comprehensive strategy that will lead you to victory (9).

We've all played games that make no sense at all, where every rule fights another and the pieces seem like an afterthought. Don't design one of those. Instead, design games that need the rulebook as little as possible.

If you are using the rulebook to fix an unintuitive game, you are making it very hard on your players to enjoy what you designed.

What, exactly, is a game?

A while back I came up with my definition of what a game is, which is sort of a milestone for game designers (4). We're going to use this definition to walk through different areas to focus on for intuitive design:

A game is an interactive mathematical system, made concrete, used to tell a story.

Just to clarify a bit:

- "interactive mathematical system" = mechanics and rules
- "made concrete" = pieces and graphics
- "story" = theme

Although all games have these three elements, the weighting of them varies
greatly from game to game. Roleplaying games, for example, consist almost entirely of story with enough of a mathematical system to make the story work (5); they can often play without pieces or graphics. Eurogames, on the other hand, are heavy on math systems, while the story is extraneous and the pieces are often reused from game to game. Abstract games ignore story entirely (6). Miniatures games are all about the pieces. And so on. There is no magic weighting to these components. If you want to design a Eurogame, just know that your mathematical system is going to have a lot of weight, so pay particular attention to making that intuitive. Your audience will not mind a light theme or generic cubes and meeples. If you are designing a wargame, you’re going to want elements more evenly weighted.

Let’s take a look at how to make each component of this definition intuitive, so that players will enjoy your work without a struggle.

The joys of an intuitive interactive math system

This is the nuts and bolts. The mechanics. The good stuff.

Every single game can be broken down into one ugly flowchart that defines everything players need to know about the order of play. I don’t know anyone who actually makes this flowchart, even when designing, but I’ll make an exception this time. Here is the flowchart to Jenga (7).
Pull out a block and put it on top of the tower.

Did the tower fall over?

Yes

You lose.

No

Even if you don't flowchart your design, it still helps to think about it, so you can see exactly what it is you intend your players to learn and understand. If your flowchart has a whole side branch sprawling out to explain/control/balance one little part, then rethink that part. The more intuitive the mental flowchart, the easier your game will be to learn and the better it will be to play. The rules are usually the flowchart cleverly disguised as words, so you will know, once you get to rules, how intuitive your design is. If you can't explain something easily or you can't figure out what to explain first, you might want to go back and change the mechanics rather than spend time making the rules clearer. Rules are a poor patch for clumsy design.

If you are reading this book [7], then probably you already can learn a game.
better than 99% of the people off the street. You read new rules and unconsciously figure out how this particular game fits your preconception of what a game is, based on hundreds of other games you’ve played in the past. But you’re not designing games for you. You’re designing for the other 99%.

So make your design as “clean” as possible, meaning all the mechanics are related and necessary. If your game requires players to roll a pool of dice and look for matches, then don’t introduce a special case where players must roll one die and look for a number lower than four (4). Likewise, don’t make play go counter-clockwise simply because you are bored of clockwise. Keep it simple and sensible: An elegant, easy-to-understand concept or mechanic that accomplishes 95% of what you want is much better than a clunky, obtuse mechanic that gets you 100%.

Similarly, if you have mechanics in there that come up extremely infrequently, try to hard to close the loophole so you don’t need the “patch.” When I was finishing up work on The Buffy the Vampire Slayer Game in 2000 (most of the design is someone else’s and I don’t want to take credit for his brilliant work), we ran into the issue of Oz, who is sometimes human and sometimes a werewolf, possibly getting sired by a vampire. We had a full page of rules regarding werewolf vampires. The rules worked, had nice examples, and would be relevant so infrequently as to be useless. The entire page was changed to “Due to his werewolf blood, Oz cannot be sired.” Is it more “realistic”? Probably not. More fun? Probably not, because werewolf vampires sound cool. Is it much easier to learn and play and teach new people? Yes, a thousand times yes (40). Don’t fall in love with a fringe element to your game.

Of course, no design starts clean and elegant and intuitive; what’s important is that it ends up there. Some designers (like me) are sculptors: We cram everything we possibly can into our early game designs, and then, through testing, pare away everything that doesn’t work. Other designers are more like painters, starting with a blank page and adding one mechanic at a time until they complete their design.
But keep in mind that even an elegant, intuitive system can be explained poorly, if you’re not careful. For example, *Tigris & Euphrates’s* scoring system always gives new players pause. During the game, you earn four different colored cubes; your final score is your number of cubes in the color you have the least of. If you’ve never played T&R, then you probably stopped and reread the sentence; it certainly seems counterintuitive to focus on your weakest color for scoring, but if we change the wording to be “your final score equals the number of complete color sets you have,” then suddenly, scoring makes a lot more sense. New players find it more obvious to group four colors into one set and think “that’s one point,” even though the scoring is exactly the same.

While playtesting your game, you will immediately notice which mechanics people forget or stumble over. If you find yourself constantly needing to remind players to roll a certain die at the end of their turns, for example, then you might want to find a different way to achieve the same effect in your design.

Making it concrete: graphics and pieces

Mechanics may be the wizard behind the curtain, but no one plays a flowchart. The flowchart is ever-present—an invisible, abstract set of what-hows and if-then statements floating in the players’ minds. But the math must be transformed into something the players can see and touch and move: pieces, cards, dice. These parts dress up your math and make it real.

It’s easy to overlook the physical bits and graphics, but you should put as much thought into these as you do the mechanics. The way a game looks and feels informs how the game will play, and serves as an unconscious reminder of the rules. Remember: the first thing players do when they open a new game is not pore over 50 pages of rules. No, the first thing they do is remove all the bits and pieces from the box, enjoying, even savoring, that magic moment of unknown about what they’re going to play.
Physical pieces offer all sorts of opportunities to make your design as intuitive as possible:

- **Color**: If a player sees certain colors again and again, he will assume they go together in some way. If you give him four colors, and he knows it’s a four-player game, then rightly or wrongly, he’ll assume that each player takes pieces of that color. If this is not the case, you’ll want to use another distinguishing characteristic—like shape—instead of color. And if your game uses colors in two different ways (e.g., use two different color systems), Alhambra makes the mistake of using the same colors two different ways. It’s something players have to unlearn and gets in the way of just playing. Also, while we’re at it: white means good and black means bad, if you have gold as money use yellow, and if you have wounds use red.

- **Form**: If it looks like a gun, it should shoot. If it looks like a boat, it should go on water. These are overly obvious examples, but consider how each of your pieces should look to best convey their function. If your boat moves three spaces, give it three oars. If it can attack twice, put two cannons on it. If it has a capacity of five cargo cubes, make sure five cargo cubes fit on it or it has a 5 printed on it.

- **Size**: Bigger means “more,” “stronger,” “elite,” or “better.” Small means the opposite.

- **Integration**: All the game pieces should work as a whole. If color plays a significant role in the game, then make sure the dice and card backs reflect the game’s color scheme. Likewise, if your game includes round tokens, and your board has round spots on it, then players will naturally try to put the tokens on the spots.

- **Game Board**: If your game has a board, look at it from many angles, not just right-side-up. Does it still make sense when viewed upside down (as players sitting across the table will see it)? Likewise, we’ve all been trained that certain places on the board correspond to certain gameplay elements; e.g., a numerical
track circumscribing the board means “scoring track.” So if certain areas on the board relate to specific pieces or rules, mark them clearly, preferably with a ghosted (i.e., faded) symbol. And don’t get complex with your symbols; if you’re going to use one, make sure it still makes sense when faded on the board. And viewed upside-down. In low lighting.

- **Reference**: Don’t clutter your board with useless information, but do make sure you use your real estate to provide reminders of key rule moments. If there’s a space on the board that says “bank,” and on the bank space is a “<3 coins” icon, then it’s pretty intuitive what happens on that space. And while reference cards may seem redundant to you, to a new player they can be a godsend. Don’t be ashamed to throw in reminders and reference cards.

The best way to test the physicality of your prototype is to do what I did at MIT: lay out the game without the rules and have someone try to figure out how to play. Listen in. Ask questions. Have your tester tell you what she has assumed about the gameplay. Chances are, she won’t be able to figure it out entirely, but if you listen to the assumptions she makes, you’ll learn much about what is (and is not) intuitive in your game.

**Tell a story**

Obviously story matters more to some games than others, but only designers of the most abstract games will ignore theme entirely. If you design Eurogames, theme often comes later—but still take the time to find one that makes the game instinctive.

A game’s name and theme set the stage for the play more than you might think, and players can often experience mental whiplash on games that set certain expectations, only to veer in a different direction. The name *Galaxy Tracker* suggests that players will drive an interstellar truck, probably laden with cargo. Guess what? That’s mostly what you do. *Race for the Galaxy,* on the other hand,
suggests a racing game, or at least a contest to be the first to achieve something in the galaxy. In this case, not so much; the game is really about civilization building, which is a race. Sort of. Immediately, players have to unlearn their misconceptions before they can learn the game. It's still a very good game.

So if you call your game “Pirate Adventures: Mutiny on the High Seas,” but it’s actually a Eurogame about cargo loading and worker allocation, I’m taking a lot of time trying to figure out where my cannons and gold and plunder and buried treasure should be. But if you call it “Dockworkers and Cargo,” I understand what I'm getting into. It’s not nearly as exciting a name but, intuitively, I get it (12). Great names should definitely be thematic and inspiring, yet capture exactly what the game is going to be about.

At the same time, be careful not to get so carried away with the theme that it creates obstacles for players learning the game. We all understand the concept of turns and rounds (13), or victory points and phases. So stick with the common terminology unless new words and phrases would make your game substantially easier to understand.

For example, if a scoring event occurs in your game at the end of four rounds, then you can write, “After four rounds, there is a scoring event to gain VPs.” Predictable, but we all get it.

If your theme could bear “Four seasons make up a year, and there is a scoring event at the end of each year,” then even better. It makes logical sense, and people instinctively expect something to occur after each winter passes.

But writing a rule like “There are four convocations, and after that there will be redouting to gain Prestige points” is flirting, heavily, with confusion. Maybe it adds thematic drama, but explaining it requires so much unclear terminology that you’ll only end up getting in the way of, you know, playing the game.

What the hell does all this mean?
Designing games is not just about crafting rules that makes sense. It's about crafting an experience that makes so much sense that players become utterly immersed in the play.

Most people believe rules are the only thing standing between a designer's vision and the players' enjoyment. But the mechanics, the pieces, and the theme all work together to set the stage and emphasize what the player needs to absorb. Make all these components logical and cohesive—and intuitive—and you'll create a game that transcends the math and cardboard; a game where players aren't just crunching through a set of rules, but enjoying an experience, and telling a story. That game will have a life of its own, even before that rulebook is cracked open.

The views expressed are those of the author and do not necessarily represent the views of Hasbro, Inc.

**Rob Daviau** started in the game industry by writing an article for Dragon magazine in 1996. This turned into a design job at Hasbro, where he has worked on all sorts of games for all ages. During this time he also designed or co-designed Risk 2010 A.D., Axis & Allies: Pacific, Risk Star Wars, Heroclix, and Risk Legacy.

**Endnotes**

1. Many good stories start out with this phrase. Other good ways to start a story include “I was in a bar in Amsterdam.” “It was about this time that the motorcycle lost control.” “I don’t remember actually getting the tattoo,” and “An old man in robes sits down with your party and says I’m looking for some adventurers.” (1)

2. You should try this sometime with a new game. Makes you see new games in a new way. (2)
3. And they should be fun, too. This may seem obvious, but I swear I’ve played some games that have missed this vital point and come across like graphics vomited onto a math problem. (3)

4. As is clinging to some design that you just love but everyone knows is awful. (4)

5. Honestly, you can ignore at least half the rules of any RPG system. RPGs don’t have rules; they have guidelines. And so foot poles. (3)

6. Have you ever really felt like you’re on a medieval battlefield while playing chess? Has it even crossed your mind? (6)

7. I used to use Candy Land as an example of an easy flowchart only to discover that it isn’t. It’s not hard, mind you, but I looked like an idiot at a whiteboard getting the flowchart to Candy Land messed up. (2)

8. As if there were any other possibility. (2)

9. In fact, high should be good, and low should be bad, unless you really can’t do it any other way. Yes, I would say—and have said—this to Larry Harris about Axis & Allies. (9)

10. Eight years later, I did the same thing to Cine. There used to be a whole block of rules about blocking people in a room, something that would be hard to do if you tried, let alone by accident. By changing the design to allow movement through other characters, I removed about two paragraphs of rules that shouldn’t have been there in the first place. (10)

11. For example, one to track player identification, and another to track resources. (11)

12. “Dockworkers and Cargo” is actually an awful, awful name and would never, ever be bought by anyone who wants to have a fun time. But this is an article about design intuition, not naming games that sell. (12)

13. Although surprisingly, those two words are used interchangeably in different
Can we create a convention right now? A player takes a turn. All the players taking one turn is a round. Who do I talk to about codifying this?
Writing Precise Rules
by Mike Selinker

I've redesigned, expanded, adapted, and creatively directed a lot of very big games: Axis & Allies, Dungeons & Dragons, Attack!, Risk, and the like. Their rule sets are often similarly gigantic, which means they need special attention paid to clarity and purpose. Otherwise, I might get a game whose FAQ is longer than other games' entire rulebooks. Here, I'll go into what makes a rule set good, and what makes one not so good.

I play games for a living. Writing rules is what I do for fun. Of all the things I like about being a game designer, the ability to craft something elegant is the one I enjoy most, because it's a difficult thing to do well.

I have a few writing maxims that I've never put in one place. They're about what you write when your game has made it out of the development phase and now needs to be played by people who aren't you. If you'd like to try them out, have a go.

I'll also introduce each of the ten maxims with a game rule that deserved some extra attention, but didn't get it.

Use no intermediary terminology

A hexagonal grid has been printed on the board to determine movement. Hereafter, these hexagons will be called "squares."

—Afrika Korps

I just made my geometry teacher roll over in his irregular hexahedron. Hexagons can be called many things—hexes, spaces, zones—but they cannot, under any circumstances, be called squares.

Call the thing what it is, and people will remember it just by looking at it. Those things in your dice bag are named by their number of faces: this is a 12-sided (or
that is a 20-sider (or d20). The first designers to use polyhedrals didn’t call one the “breaker” and one the “thunderstriker.” Placing intermediary names for things in the way of comprehension only obscures comprehension.

My design partner James Ernest and I were required by our publisher to convert a board game written in English to an internationally usable form. So the cards for Gloria Mundi were renamed into Latin, a language that everyone fails to speak equally. I went through and picked Latin names you could associate with English terms, for example, the Fish Market became the Piscatorium. But a much harder task was taking phrases such as “At the end of your turn, you may discard one Building card on the table (including the Marketplace) and replace it with the Shock Troops” and turning them into symbols. Eventually we cut all the complex cards to avoid requiring too much symbolic translation. The game got worse because of it, and now we’re playing the game in English again.

Properly used, symbols can be fine, but one symbol cannot do the work of ten. The excellent game Bang! took a character’s way out that I would not advise. It put on many cards a little book symbol that just meant “See the rulebook.” Yuck.

Use real words

2.4.00 GUN DUEL: A non-concealed, non-Aerial DEFENDER’s declared Defensive Fire attack, if a vehicle may attempt to Bounding First Fire (BFF) its MA (other-HP, including Passenger HP/SP) at the DEFENDER first, provided the vehicle need not change CA, is not conducting OVR (D), if its total Gun Duel DRM (i.e., its total Fire-Based [5], Aircraft [6], and Acquisition [6,6]) TH DRM for the potential shot is < than the DEFENDER’s, and the DEFENDER’s TH is not Reaction Fire (DF 2). Neither the GDRM for a Gun Duel nor the doubling of the lower DR for other ordnance in TH Case C (5,6) included in the Gun Duel DRM calculation. The order of fire for non-ordnance/SW is determined as if were ordnance [EXC]. TH Case C can apply only if this unit/weapon is mounted-on-board a vehicle that is changing CA; all such non-turreted mounted fire is considered NT for purposes of TH Case C, and A. Supplies are any type of FUL. If the ATTACKER’s and DEFENDER’s total Gun Duel DRM are equal, the lower Final TH (or non-ordnance IF) TH first—and voids the opponent’s return shot by eliminating, breaking, stunning, or shocking it. If those two Final DR are equal, both shots are resolved normally. Any CA change the DEFENDER requires in order to look (5,6) is made before the ATTACKER’s
shot if the DEFENDERS' total Gun Deal "IRM."

—Advanced Squad Leader

If you’re selling a game to English-speaking customers, there’s no excuse for writing it in anything but English. Advanced Squad Leader is one of the greatest games of all time, but only if you have a Rosetta stone for the damn thing. Since it’s my favorite wargame, I understand how to play it, and I also understand I would never let a new player try to learn from the rules.

The rule above isn’t a bad rule. It’s actually a pretty good rule. It says, translated, that when a vehicle is attacked, it gets to return fire beforehand, but under some more limited circumstances and without all the bells and whistles. But the rule writers forgot that most people don’t read rule books in order, and so they might not know what “attempt to bounding first fire (Dg 3) its MA (/other-F, including Passenger FP/SW)” means. They also believed that a phrase such as “bounding first fire” makes a good verb.

Once you have a real word for something, don’t use any other word for it. Uber-designer Jonathan Tweet has a maxim of his own: “Things are the same, or they are different.” If you have called your attack a “salvo,” it must always be a “salvo,” and never an “attack.” If that bothers you, maybe you should have just called it an “attack.”

Make no more work than necessary

Fate (the gamemaster) then makes a percentile die roll to determine whether the enemy ship will be safe or not. The first roll is a 33. This indicates there is only a 33% chance of the boat remaining safe. Fate then rolls again. The resulting roll of 40 indicates that their ship won’t be there upon return. How and when the ship is lost is up to Fate.

—The World of Symbaroum

Yes, I know this is a board and card game design book, and I just quoted an RPG—and not just any RPG, but what some people believe is the worst RPG.
product ever. (It isn't. But it's close) The Symibarr rule commits a cardinal sin that bears noting for card games and board games too. It requires the person administering the game to do more work than she needs to.

Let's say you're "Fate." (Cringe.) You need to know whether the ship is safe. The rules tell you to roll dice to establish the percentage chance of the ship being safe. Then the rules tell you to roll again, and if you roll equal to or under that percentage, the ship is lost. What is the chance the ship is safe? Your first roll will be between 1 and 100. Your second roll will be the same thing. So adding up the 1% chance you'll roll equal to or under a 1, and the 2% chance you'll roll equal to or under a 2, and so on up to the 100% you'll roll equal to or under a 100, then divide by 100...and you get 50.5%. In other words, it's a coin flip. So just tell the GM--I'm sorry, Fate—that there's a 50% chance the ship is gone, and she'll have to roll only once.

It's not just bad games that have this problem. When I helped reboot Axis & Allies, I looked at every rule to see how much effect the player was required to expend. In the 1986 version, there were two combat sequences: land combat and naval combat. That was just too burdensome. After weeks of rewriting and testing, we got it down to one sequence that included everything from anti-aircraft guns blasting Stukas out of the London sky, to submarines sinking merchant fleets off the coast of Japan. (See "Axis & Allies Terms")

<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>an action</td>
<td>a phase</td>
</tr>
<tr>
<td>a battle</td>
<td>a combat</td>
</tr>
<tr>
<td>land (or naval) combat sequence</td>
<td>combat sequence</td>
</tr>
<tr>
<td>combat sphere action</td>
<td>combat action</td>
</tr>
<tr>
<td>naval combat</td>
<td>sea combat</td>
</tr>
<tr>
<td>attack capability or attack factor</td>
<td>attack</td>
</tr>
<tr>
<td>----------------------------------</td>
<td>--------</td>
</tr>
<tr>
<td>defense capability or defense factor</td>
<td>defense</td>
</tr>
<tr>
<td>counterattack</td>
<td>defend</td>
</tr>
<tr>
<td>enemy-controlled or enemy-occupied</td>
<td>hostile</td>
</tr>
<tr>
<td>allied</td>
<td>friendly</td>
</tr>
<tr>
<td>naval unit</td>
<td>sea unit</td>
</tr>
<tr>
<td>an infantry unit</td>
<td>an infantry</td>
</tr>
<tr>
<td>an artillery unit</td>
<td>an artillery</td>
</tr>
<tr>
<td>an armor unit</td>
<td>a tank</td>
</tr>
<tr>
<td>armor</td>
<td>tanks</td>
</tr>
<tr>
<td>plane</td>
<td>air unit</td>
</tr>
<tr>
<td>fighter plane</td>
<td>fighter</td>
</tr>
<tr>
<td>round of combat</td>
<td>cycle</td>
</tr>
<tr>
<td>first-shot attack</td>
<td>sneak attack</td>
</tr>
<tr>
<td>support attack</td>
<td>bombard</td>
</tr>
<tr>
<td>make a support attack</td>
<td>bomb and mens</td>
</tr>
<tr>
<td>National Control Market (NCM)</td>
<td>control marker</td>
</tr>
<tr>
<td>casualty line</td>
<td>casualty lane</td>
</tr>
<tr>
<td>I.P.C</td>
<td>IPC</td>
</tr>
<tr>
<td>penalty</td>
<td>IPC loss</td>
</tr>
</tbody>
</table>
### Table

<table>
<thead>
<tr>
<th>term (a die)</th>
<th>roll</th>
</tr>
</thead>
<tbody>
<tr>
<td>withdraw (a submarine)</td>
<td>submerge</td>
</tr>
<tr>
<td>island group</td>
<td>island</td>
</tr>
<tr>
<td>country or world power</td>
<td>power</td>
</tr>
<tr>
<td>capital territory</td>
<td>capital</td>
</tr>
<tr>
<td>take over</td>
<td>capture</td>
</tr>
<tr>
<td>item</td>
<td>unit</td>
</tr>
<tr>
<td>place on the board</td>
<td>mobilize</td>
</tr>
<tr>
<td>multi-player force</td>
<td>multinational force</td>
</tr>
<tr>
<td>kill</td>
<td>destroy</td>
</tr>
</tbody>
</table>

Look, administering rules is work. When a player is learning a game, she wants the simplest possible set of actions to figure out how to play. Cut out all the rules that require her to learn more.

**Add flavor (but not too much flavor)**

NATO has rules covering the use of tactical nuclear weapons. To simulate the use of strategic nuclear weapons simply soak the map with lighter fluid and apply a flame.

—NATO: *Operational Combat in Europe in the 1970s*

Jim Dunnigan felt comfortable writing that rule in 1973. I might not be able to get away with it now. That's something that looks like rules text, meaning a player might actually do. (I know: only if they're dumb. Some players are dumb.)

Flavor text is usually kept outside the rules, often by italicizing it or boxing it or putting it into word balloons issuing from the mouths of cartoon characters. It's
generally short and pithy, and often funny. In trading card games, it’s usually found in italics below the card rules. For example, in the cyberpunk TCG Netrunner, there was a program card called Sphinx 2.0. I wrote, “What runs on four megs in the morning, two megs in the afternoon, and three megs in the evening?” When I stopped typing that, I knew that all work on that card’s flavor text had ceased. I didn’t need any more flavor than that, and the rest of the card could be culled to the all-important rules.

Things get tricky when your flavor commingles with your rules. I once had an editor tell me that flavor and rules were like oil and water; they shouldn’t be mixed. That editor was wrong. They’re more like a Reese’s Peanut Butter Cup, you can put them together, but you’d better know what you’re doing first. For example, the game Hatfields & McCoys—a true-to-life simulation of Ozark bumptious infighting—is written entirely in the following style:

If one of the other player’s ill-behaved in the river, all your Bees within four spaces gotta move on over to her space and stab her with her. Any Bees who gets to her hurts right while the rest of the Bees thereby is jus ’goin’ to a ghostin’.

That’s completely comprehensible, once you get yourself a muckin’... I mean, once you get into the right mindset. But you have to be there. It wouldn’t be a good style for simulating the Battle of Thermopylae.

Make your text no smarter than your reader

The battlefield is usually produced by placing separate terrain features on a flat board or cloth representing flat, gently sloping terrain such as pasture, open arable fields, sparse grassland or smooth desert. Alternatively, the player can provide permanent terrain boards or blocks incorporating equivalent features. The battlefield is 32x32, and is bisected twice at right angles to the edge to produce a equal quarters.

—De Bellis Antiquitatis
“Notionally bisected twice at right angles to its edge to produce 4 equal quarters? Did DRA’s authors believe that if they’d said “cut into fourths,” people would cut it into four triangles? The added specificity makes the game read like James’s game Pontifuse, whose rules section begins:

To Begin: Create a playing field as follows: From any point in the upper left-hand (northwest) quadrant of a sheet of paper, proceed one inch east and create a three-inch line bearing due north three inches. Duplicate this line one inch further east. These are the “Lines of Versailles.” Then, from the terminus of the second Line of Versailles, proceed 1 1/2 inches northeast and create a three-inch line bearing due west. Duplicate this line one inch further north. These are the “Lines of the Commonwealth.”

But you see, the thing is that James is kidding, because Pontifuse is an “alternate rules set” for the game tic-tac-toe.

There are books that tell you what words are at what reading levels. The Flesch-Kincaid Grade Level Formula is as complicated as the NFL quarterback rating, but if you learn it, you can apply it to your own text. The formula is:

\[ \text{grade level} = 0.39 (\text{words/sentences}) + 11.8 (\text{syllables/words}) - 15.59 \]

That’ll tell you the grade level of the text you’re writing. For example, that De Bellis Antiquitatis paragraph has a grade level of 13.22, meaning you’d need to be at least a sophomore in college to have a chance of understanding it.

You don’t need a reading score test to know that obfuscation for obfuscation’s sake is a bad idea. Write what people can read, and they might even play your game.

**Discard rules that can’t be written**

Destroy two target nonblack creatures unless either one is a color the other isn’t.

—Magic: The Gathering
That's the rules text from the Magic card Dead Ringers. It's about the only way it could have been written given the constraints of Magic's rules. Here's why: Cards in Magic have one or more colors (white, blue, black, red, green). The key bit in there is "one or more." So Draconplasm is a blue and red creature, and Horned Kavu is a green and red creature. Are they both red cards? Sure. But they're not both blue cards, and so when both are present, they're invulnerable to an effect like the one Dead Ringers has, because Draconplasm is blue and Horned Kavu isn't. Of course, if either of them is black...

At this point, you're probably asking whether the developers of that Magic set ever thought, "Seriously, this is gonna make peoples' heads hurt." They did. One response to that might have been to throw out the card entirely. They didn't take that opportunity. And now James keeps a copy of Dead Ringers in his wallet to whip out at cocktail parties.

The rules you select should be chosen not on the basis of whether you like how they play, but whether you can explain how they play. If you can't, find some other way to play.

Take a break

Three important rules about industrial complexes have already been stated: (1) newly purchased units you bought at the beginning of your turn in Action 1 can be placed only in territories with industrial complexes that you have owned since the beginning of your turn; (2) newly purchased industrial complexes can be placed only in territories that you have owned since the beginning of your turn; and (3) original industrial complexes (those you started the game with) have unlimited production — that is, you can place any number of newly purchased units on a territory with an original complex; and that new industrial complexes (those that you purchased and placed or captured during the game) have limited production per-turn — that is, the number of newly purchased items that can be placed in a territory with a new complex is EQUAL to the income value of that territory.

That’s one sentence. A&L designer Larry Harris is a genius, but that’s not something I’d ever like to read again. While doing the reboot, I read that sentence over and over, and then decided that our new version of it would be fewer than 147 words.

When you write your rules, keep in mind how much your reader can read in one swoop. There’s a reason why the sections of this essay are so short. I’ve trained myself to break up major passages into smaller sections.

It’s not just comprehension that’s at stake. Players often need to find a rule in a hurry, and giant blocks of text impede their ability to do so. Subheads, illustrations, occasional use of boldface, and well-timed page breaks will keep your readers on track.

Go easy on the eyes

Some Treasure cards also have a NOTORIETY value and a FAME value or FAME price...The six cards labeled "Pr" to "Ps" in red are TREASURES WITHIN TREASURES cards (or "T-W-T"

cards) that contain other treasures. The CHEST (Pr) is an item, but the REMAINS OF THIEF and MOULDED SKELETON are exchanged for items, while TOADS/TOOL CIRCLE, CRIPIT THE KNIGHT and ENCHANTED MEADOW are "Site cards"—places where treasures are located.

—Magic Realm

At some point, Magic Realm’s designers decided to put all the items and locations in all caps. And all the spell effects. And all the values. And all the actions. And all the encounter headings. And just about everything else. And so they made the rulebook as irritating as a paragraph that begins most of its sentences with "And."

Reading is harder than you think. Your eyes don’t stay still; they dart about, catching little bits here and there until, in a split second, you command them to focus. Having all these emphasized phrases is like trying to watch six TVs at once. You lose any sense of meaning when everything in the paragraph is designated as THE MOST IMPORTANT THING. If it would annoy you in an email, don’t do it in
your rules.

It’s not just all-caps. In games I revise, I take a hard look at any term whose first letter is capitalized. For the game Balance of Power, I lowercased just about everything the designer uppercased. The term “Bonus Action” doesn’t need its capitalization; if you’re taking a “bonus action,” you know what it is without the extra emphasis. But I did keep the capitalization on the names of the pieces: Noble, King, and General. That’s because it did matter to me whether you understood the term “General action” was not the same thing as a “general action”—that is, any old action at all.

Get your final version playtested

During Step 6 of your turn, you may perform these actions in order to manage your holdings. These actions are: build, spread, remodel, reorganize, and gamble. You may perform any of these actions in any order, and all of the actions other than gamble may be performed multiple times.

—Lords of Vegas

When James finished the final design draft of the rules for Lords of Vegas, we thought we had a tight set of rules. Then they went to editing, and after a lot of back and forth with Mayfair, we settled on a ready-to-print version. We somehow missed the problem with the above rules paragraph, though. It’s fairly subtle, but it’s also fairly disastrous.

The rules say, “you may perform these actions in order to manage your casinos.” The phrase “in order to” means “so that you may”—at least that’s what the people preparing the rules all thought. But “in order” also means “in the following sequence,” and so after the game was released we heard from players who first built, then sprawled, then remodelled, then reorganized, then gambled. If you miss that third sentence, you’re going to play the game very differently than we intended.

When you’re done, get your game in the hands of a great editor. Ask Miranda
Horner to help. Ask Michelle Nephew, or Gwendolyn Kestrel, or Kim Mohan, or Sue Cook, or Dashi Kenterud, or Tim O'Connor, or any one of a dozen more brilliant game editors I can recommend. They'll help you avoid a dawizard (3) that will haunt you forever. If you ever want to win an award for best rules, remember that editors like chocolate.

Also, note that the header doesn't say "Playtest your final version." By "get it playtested," I mean you should get someone who has never seen your game to play it straight from the rules. If they screw it up, you don't have a final version anymore.

The most pathetic cry for help you'll ever see is the word "final" in the file name of a rules draft. This means two things: first, it isn't, and second, the designer knows it isn't but really doesn't want you to notice. Sorry, designer. It's final when it's in the box.

Fix it in the FAQ

Q: Why is the Underground Lake on the upper floor?
A: See, it's a special kind of levitating lake, and... All right, it's a misprint.

—FAQ for Betrayal at House on the Hill

Hey, if a game with my name listed as lead developer has a colossal proofreading error like this, you can forgive yourself a typo or two. Just clean it up online and in the reprint, and try not to make a habit of it. Otherwise, on this book's next printing, your game might make this list.

Endnotes

1. See also the great game Race for the Galaxy, where my friend Wei-Hwa Huang laid out the cards in bizarre symbols I'm sure he completely understood. This does not mean that I do. That said, I have not asked him whether he understands Gloria Mund's symbols.
2. They're really busy, and some of them have noncompete agreements that say they can't work on your game. But maybe one of them has a friend you could ask.

3. A dawizard is the ultimate taboo in game editing. In a 16-page section of the 1994 D&D supplement *Encyclopedia Magica, Volume 1*, an editor haplessly and globally replaced all occurrences of "mage" with "wizard," leading to such epic passages as "The user may look into the ball, concentrate on any place or object, and cause the wizard of the place or object to appear." and "The tower can absorb 200 points of dawizard before collapsing. Dawizard sustained is cumulative, and the fortress cannot be repaired (although a wish restores 10 points of dawizard sustained)." I gleefully used this story to terrify my young editors into straightening up and flying right. I never said I was a nice creative director, just a good one.
Conflict arises naturally from the interaction in a game. The player is actively pursuing some goal. Obstacles prevent him from easily achieving this goal. Conflict is an intrinsic element of all games. It can be direct or indirect, violent or nonviolent, but it is always present in every game.—Chris Crawford, The Art of Computer Game Design
Introducing Conflict

What does it mean to consider games as Systems of Conflict? First of all, we agree with Chris Crawford. Conflict is an intrinsic element of every game. Conflict, a game as a contest of powers, is a core component of our very definition of the term “game.” While conflict outside of games can sometimes be destructive, in games we find the wonderful paradox of a staged conflict, resulting in meaningful play.

Game conflict emerges from the unique circumstances of a game. The magic circle imbues games with special meanings. One of the most important meanings to emerge is the game’s victory conditions. Winning the game might only have value within the magic circle, yet players pursue it. By virtue of their participation in the game, they have taken on as meaningful the game’s presumptions and prescriptions, including everything associated with winning. The struggle among the players to achieve the goal of a game and become winners is the competitive activity that drives a game’s system of conflict.

The fact that this activity is a struggle derives from the intrinsic challenge presented by the conflict of a game. As we know from our study of the lusory attitude, games are constructed so that their goals are difficult to achieve. The conflict of a game arises as the game players struggle toward achieving the goal, often in opposition to each other, sometimes struggling together or in parallel.

What are the shapes of conflict that occur in games? Struggle in a game can take many forms:

- **Single player vs. single player:** a Chess game or Boxing match
- **Group vs group:** Basketball, Soccer, and other team sports
- **One against many:** Tag or Mother May I?
- **Every player for themselves:** a footrace or the strategic board game Risk
- **Single player competing against a game system:** Solitaire or Tetris
- **Individual players competing side by side against the game:** casino Blackjack
- **A group of players cooperating against a game:** Lord of the Rings Board Game

Many games mix and match these forms, such as a wrestling meet, in which individuals compete against each other in pairs, but whose scores are added up and applied to the team as a whole. Some games can accommodate more than one of these game modes, such as the arcade game Double Dragon, in which one player can compete against the program, or two players can cooperate against it. Still others have competitive structures that change over time, such as the television show Survivor, in which players are initially divided into two competitive teams, eventually becoming a single group from which a single winner emerges.

Conflict in a game can be direct or indirect. In an arm wrestling match, players are pitted directly against each other, trying to pin the other player’s arm while avoiding being pinned themselves. The back and forth movements of the players’ locked hands is a direct meter of the struggle, indicating how near or far each one of them is from achieving the winning conditions of the conflict. In a figure skating contest, the conflict is indirect. Competitors each have their own turn to perform and be judged. They cannot directly interfere with each other’s success, and winning the competition means receiving the highest score from the judges.

Still other games mix direct and indirect conflict. In a real-time strategy game such as multiplayer Starcraft, players compete against each other, though they are not always directly interacting. Players have to think offensively and defensively, building their resources and defenses, anticipating the actions of other players. As a game proceeds, the solo activities of each player evolve into direct conflict, as the units controlled by the players come into contact. Further, there is more than one way
to configure the conflict in Starcraft: the game lets players set up team vs. team games, one player vs. many players, human players vs. computer opponents, and so on.

Conflict Case Studies
As these examples illustrate, more than one form of conflict can exist within the scope of a single game design. Next we take a detailed look at three different games, focusing on the ways each one configures competition and cooperation between players. All three games are arcade games from the 1980s: Centipede, Joust, and Gauntlet. Each game weaves its own surprisingly complex fabric of player conflict.

Centipede
Our first example is the arcade game Centipede, in which the player uses a trackball controller and fire button to move a character at the bottom of the screen and shoot at objects coming down from the top. Centipede might seem at first glance to have a simple and straightforward structure of conflict. But in fact, the formal system provides many ways for players to struggle and pursue goals.

- As a single-player experience, you compete against the program. The game compiles an ongoing "score" based on your performance, and the presumed goal of the game is to achieve the highest score.

- There are many ways that you might pursue goals related to the high score goal of the game. You might have a general idea of what constitutes a "good score," which you try to achieve. Or you might try to surpass your previous game's score, or attain a new personal best score.

- You might set other goals besides those involving your score. For example, you might try to play for a certain amount of time, get to a certain level in the game, or destroy every enemy of a particular type that appears. Several of these goals might co-exist with each other and with the score-oriented goals.

Centipede can be played as a two-player game. Both players alternate play, switching places when the current player loses a life. If you compete against another player in this way, the quantifiable outcome of the game (your score) has new meaning. It is no longer only an indicator of your personal success but becomes a way to compare your performance to that of the other player. Two-player Centipede is a zero-sum competition, where one player wins and the other player loses. In this sense, the actual game scores are important only insofar as they are used to determine the winner. The numeric scores of the players are translated into binary win/lose values.

- Aspects of the single-player competition can be combined with aspects of the two-player competition. You might have lost to your opponent, but you might also have gotten your best score ever, in which case you won in your own self-competition, even while losing to the other player in the zero-sum conflict of the two-player game.

The fact that players can enter their initials into a high score list creates a different kind of competition: you compete against previous players, whom you probably have never met. This competition is more indirect: you compare your score with their scores, and if you are one of the top eight players, you get to enter your initials into the game for other players to see, bumping off the player at the bottom of the list. However, you might later be bumped off as well. Here, your numeric score is translated into a scaled rank: either your score wasn't high enough to put you on the list, or you entered the list at a specific rank.

- There are other competition scenarios as well. For example, you might play as a single player and set the goal of making it onto the high score list. In this case, you turn the game into a system of competition with a binary win/loss condition: either you make it onto the high score list or you don't.
- You might have an ongoing rivalry with a friend about who can achieve the higher score on Centipede. The two of you are not good enough to get on the high score list, but you can still keep track of your relative scores. Your score in this scenario is translated into a rank between you and your friend, a rank that changes as one of you bests the other's higher score.

**Joust**
Who knew so many different forms of conflict were lurking under the surface of a simple arcade game? Our next example adds even more. In Joust, two players maneuver bird-mounted knights, attacking enemies controlled by the program. Both players can play the game simultaneously, instead of alternating turns. This structure opens up whole new forms of competition.

- Joust can be a single-player game. Individual players receive a score and there is a list of player high scores, including separate rankings for daily high scores and "all time" high scores. Most of the forms of competition in Centipede also occur in Joust.
- Two players could compete to see who gains the higher score over the course of a game. Because players do not alternate turns but compete simultaneously, the scores of both players are visible at all times, heightening the drama of this form of competition.
- The simultaneous two-player structure opens other possibilities for conflict. Two Joust players can attack each other if they wish. One way to play the game is as a fighting game, where players directly attack each other, killing their opponent with a successful attack. The goal of the competition in this case is to kill your opponent more times than you are killed. Playing the game in this way turns Joust into a zero-sum game. Numerical scores do not matter, only who is left alive at the end.

- It is also possible for two players to refrain from attacking each other and instead work together to defeat the computer-generated enemies, strategically coordinating their actions. In this case, the two players compete together against the computer. They might set a goal of reaching the highest level or for playing as long as possible.
- Even if players cooperate, they might still compete in other ways. For example, two players coordinating their actions against the computer might compete to get the higher score.
- Often, these different kinds of competition overlap. The game design of Joust makes it easy for a player to kill another player: if they collide, the one that is in a higher position destroys the other one. Even cooperating players sometimes accidentally kill each other, an event that usually affects the competitive flow of the game. After an accidental killing, one player might become resentful and aggressive and the game might transition into the "fighting game" version of Joust. Or the accidental killer might let his opponent kill him one time, just to balance things out. The game might also just continue as usual.
Competitive tensions persist throughout the game. Because both players are operating on the screen at the same time, there may be competition about where and how they should play, even if they are not actively trying to kill each other. For example, two players might both wish to occupy a certain section of the screen or attack a specific group of enemy characters. An accidental player-killing (or the threat of one) can enter the game as a result, opening up additional competitive complexities.

**Gauntlet**

In Joust, the two-player simultaneous structure adds new layers to the possibilities of game conflict. In Gauntlet, our third arcade game example, up to four players can play at once. The players take fixed roles (Warrior, Valkerie, Thief, or Wizard) as members of a team. Together the team explores the game spaces, fights computer-generated enemies, and gathers resources that boost their abilities to let them explore further.

- Like Joust and Centipede, Gauntlet can be played by a single player. Gauntlet players also receive a score; if the score is high enough, players record high scores and player initials. All of the single-player and high score list forms of competition apply to Gauntlet as well.

- Unlike Joust, Gauntlet players can only attack computer-generated opponents—their attacks do not affect the other players. As a result, Gauntlet lacks the "fighting game" as a possible form of conflict. Instead, the players consistently work together, usually with the goal of seeing how many levels of the game they can explore.

- Because Gauntlet players receive a score, players might also compete to see who has the highest score at the end of the game. As with Joust, the scores are displayed throughout the game, allowing players to constantly check their relative scores.

- Whenever players clear a level of the game, the game pauses to display the relative points of each player and their overall performance in the game, showing, for example, which player received the most treasure in the last level. These moments highlight score-based and statistic-based competition between players, encouraging them to compare their performances against each other and invent competition around the many kinds of statistics in the game.

During the actual play of a game, another form of competition takes place over in-game resources. As players progress in the game, a number representing their health is slowly reduced. When a character touches an enemy, health is lowered even more. However, there are many "food" items scattered throughout the game that raise a character's health. Players sometimes compete directly for food, trying to be first to reach the item. Players might also discuss who among them needs the food most and let that player acquire the item. The same is true for other special objects in the game, such as keys and magic potions. These forms of resource-based competition are heightened by the statistic comparisons between levels: at these moments, players take stock of how resources have been distributed among the group and can accuse each other of being "unfair" or "greedy."
A final form of competition unique to Gauntlet involves players spending money on a game. In many arcade games, prestige comes from being able to play for a long time on a single quarter. But unlike Joust and Centipede, Gauntlet lets players extend their current game via cash additions. Players can put quarters into the game during play to add to their characters' health or to resurrect their characters after they have died. This means that as long as players want to continue spending money, they can keep on playing, exploring more game levels. The escalating difficulty of the game ensures that players will need to spend more and more money as they play. This can turn Gauntlet into a completely different kind of conflict, one in which players compete to demonstrate their tolerance for putting money into the game, a form of conspicuous consumption much like high-stakes gambling. Conversely, players might compete to see who can play the longest before having to spend more money to continue, because skillful players will avoid being killed. In this case, spending less money for the same amount of time would be the goal.

There are obviously many, many more models of competition in games. However, even within these three similar examples there is a wealth of ways that conflict can manifest. The point of these examples is to demonstrate how the design of a game leads to forms of conflict. In each case, formal decisions about the game's structure directly shape the nature of conflict emerging from the game. For each game, the following kinds of questions determine the essential formal structures:

- How many players can play?
- Do they play simultaneously or do they alternate playing the game?
- Is there a high score list?
- Are players given constant feedback about their relative scores?
- Does the game pause to allow players to directly compare their scores and other game statistics?
- Are there computer-generated opponents and obstacles that players face together or do the players serve as opponents for each other?
- Does the structure of the game allow players to have direct conflict with each other?
- Are there resources for which players can compete?
- Can players spend money to continue the game or enhance their play?

The forms of conflict we observed follow directly from the way that each game answers these design questions. Take Gauntlet: if players were allowed to damage each other through attacks, the game would lose its enforced cooperative spirit, and inter-player fighting might become common. If players could not continue their game by paying another quarter, competition for in-game resources would be much fiercer, as players would vie against each other to stay alive until the game ended. What is surprising in all three examples is just how rich and multi-layered conflict can be in a game. This richness comes from the fact that players can derive and construct their own forms of conflict in a game. Some of the goals we outlined are explicitly defined by the game rules. Others are emergent forms of competition that arise from the player's active engagement with and manipulation of the game structure.

Back in Defining Games, in discussing whether or not Sim City was a game, we concluded that it was a borderline case. Although Sim City does not formally define goals with quantitative outcomes, it does provide a space within which players form their own goals and arrive at their own outcomes. As the investigation of Centipede, Joust, and Gauntlet demonstrates, in many ways all games can function like Sim City, with players inventing their own goals and layering these goals on top of those defined directly by the rules of a game.
A game's space of possibility is a space of possible conflict. Part of playing a game involves selecting game goals as a means of navigating and exploring forms and degrees of conflict. What is the best form of conflict to provide your players? As with other aspects of games, there is no single formula that will work best for all players in all contexts. However, providing a rich space of possibility that supports a range of conflict increases the potential variety of players and the ways that they might find your game meaningful.

**Competition and Cooperation**

So far, we have spoken somewhat loosely about competition and cooperation as they relate to the conflict in a game. But what do these terms really mean? Competition occurs when players struggle against each other within the artificial conflict of a game. Perhaps our clearest model of competition comes from game theory—the zero-sum game. In a zero-sum game, one player's winnings equal another player's losses. If one player is the victor in a two-player zero-sum game, the other player will necessarily lose. Winning is always equally balanced by losing, making the end sum zero.

A common criticism leveled against games is that they are all competitive, and that competition is somehow undesirable. Framed in this way, competition is something to avoid in order to ensure a positive play experience. Bernard DeKoven, game designer and author of *The Well-Played Game*, states this position eloquently:

> It is clear to me now, that the result of such a union [playing to win] is separation, always separation. It divides us into winners and losers, those who have achieved and those who have failed. The division then leads us into further division. It becomes difficult, now that some of us have won and some of us have lost, to find a game that we are all willing to play well together. It was never our focus at all. Though what we have always cherished most is the game in which we are playing well together, winning takes precedence.¹

DeKoven's point is that when the winning and losing of competition enters into the conflict of a game, it becomes the paramount concern of the game's participants, eclipsing everything else the game has to offer. With all due respect, we disagree. It seems quite clear to us that competitive games can offer genuinely meaningful experiences. Sometimes that meaning can stem from the joy of play itself (DeKoven's "playing well together"), but certainly much meaning derives from the competitive struggle of a game, from trying to become a winner while avoiding a loss.

The competitive striving toward a goal is fundamental in giving shape to the structure of a game and the way that the game creates meaning. The idea, for example, that in meaningful play a player's actions are integrated into the larger context of a game is dependent on the competitive nature of games. Without a goal toward which players strive, it is very difficult for a player to measure his or her progress through the system of a game. Without a measure of progress to give a player feedback on the meaning of his or her decisions, meaningful play is not possible. Remember the "horrible" game *The Grid* in *Games as Emergent Systems*? That game had no goal, and no way for players to compete with each other. There was nothing to motivate players to move their pieces this way instead of that way. Meaningful play was impossible.

Our opinion is that all games are competitive. All games involve a conflict, whether that conflict occurs directly between players or whether players work together against the challenging activity presented by the game system. Without a clearly defined goal, games generally become less formalized play activities. However, just because all games are competitive does not mean that they are not cooperative as well. Although we can assert with confidence that *all games are competitive*, it is equally true that *all games are cooperative*. Are these two statements contradictory? Can all games be both competitive and cooperative? The idea that games are both competitive and coop-
operative is only contradictory if the two terms are mutually exclusive, which they are not. The root of the word “compete” is the Latin con petere, which means “to seek together.”

In what ways are all games cooperative? Recall the magic circle and the lusory attitude, and the way that these aspects of a game create meaning. To play a game is to submit your behavior to the rules of the game, to enter into the time and space that the game demarcates, to traffic in the special meanings that the game offers up. To play a game is to participate in the discourse of the game with the other players. Players can play Basketball together because they both speak the “language” of Basketball. When two players hit the courts for a game of one-on-one, that is exactly what they are doing.

Therefore, to play a game is to cooperatively take on the artificial meanings of the game, to communicate to the other players through the artificial discourse that the game makes possible.

In this sense, the very act of playing a game is an act of cooperation. It is only through the shared efforts of the players that a game’s fragile magic circle takes shape and is sustained over the course of play. There is a wonderful paradox here. Within the magic circle set aside for the game, within the arena spelled out by the rules, a conflict takes place. The players cooperatively form the space of the game, in order to create a competition for their own amusement. Game conflict is like a duel between actors in a play: it is an elaborately staged competitive artifice, enjoyed in part because of its artificiality. There is genuine conflict in a game, but only within a larger cooperative frame sustained by the participation of the players.

New Games

In the earlier critique of Bernard DeKoven’s ideas about the negative aspects of competition, we were not quite playing fair. It is true that DeKoven questions traditional forms of competitive play. It is also true that we do not agree with all of his ideas on the subject. But DeKoven’s concepts have to be understood within the larger context of his important work on games. In his book The Well-Played Game, DeKoven argues for a new understanding of play, governed by a shift in emphasis away from competition. Instead, DeKoven is an advocate for more improvisational games in which players take on the role of game designers.

DeKoven was not alone in his ideas. He was one of the early members of the New Games Movement, a group of game designers and play advocates that had a tremendous impact on the culture of games. Founded by Stewart Brand (the same man who started The Whole Earth Catalog) in the late 1960s, the New Games Movement was an organization dedicated to the promotion of play and its positive impact on society. During the late 1960s and 1970s, the New Games Movement organized a number of large-scale public game “tournaments” in the San Francisco Bay Area and other parts of the world. Part art happening, part community action, and part playground carnival,
New Games Movement Tournaments embodied a uniquely game-centric, community-based politics of a scale that has not been seen since.

The New Games Movement had a large impact on physical education and the integration of games and play into schools. If you grew up playing with a parachute or huge rubber “Earth Ball” in your elementary school gym class, it is probably due to the direct or indirect influence of the New Games Movement.

The New Games Movement published two books (The New Games Book and More New Games) that catalogued their playful game designs. How does the New Games Movement fit into an understanding of games as systems of conflict? The New Games Movement confronted the idea of competition and cooperation head on, creating games and ways of thinking about game design that challenged conventional notions of games as conflict.

Many people think of New Games as non-competitive. Of course this isn’t the case. Most of the games in this book involve competition—it’s what gives New Games its vitality…. The effort each player makes to overcome the resistance and achieve the goal is the heart of the game and what makes it enjoyable and gratifying. In the majority of games, the resistance is supplied by your opponent trying to achieve her goal. Your opponent is therefore your partner in the game. The best games are those in which you can play your hardest and still count on your opponent to meet your effort—to compete with you.3

Although DeKoven may rail against competition in some of his writings, he also helped instill in New Games the more balanced notions of competition embodied in the quote above, taken from an essay he wrote for the New Games Book. DeKoven’s main point is that in the context of a game, the struggle of players against each other is also a struggle with each other, as players meet the challenges that they provide for one another. In this way, New Games affirms the interdependent relationship between competition and cooperation, the systemic cooperation that is part of all games.

But the central focus of New Games wasn’t game philosophy: it was the design and play of games themselves. The movement produced some extraordinary game designs. Take, for example, a game called Catch the Dragon’s Tail:

You’ll need a good-sized area for this event, clear of sudden pits and immovable oaks. About eight to ten people line up, one behind the other. Now, everyone puts their arms around the waist of the person in front of them. (You can’t be ticklish around dragons.) The last person in line tucks a handkerchief in the back of his belt. To work up steam, the dragon might let out a few roars—fearsome enough, we wager, to put Hydra to shame.

At the signal, the dragon begins chasing its own tail, the object being for the person at the head of the line to snatch the handkerchief. The tricky part of this epic struggle is that the people at the front and the people at the back are clearly competing—but the folks in the middle aren’t sure which way to go. When the head finally captures the tail, who’s the defeated and who’s the victor? Everyone! The head dons the handkerchief and becomes the new tail, while second from the front becomes the new head.4

Catch the Dragon’s Tail purposefully blurs the lines between competition and cooperation. On the one hand, all of the players are cooperating to hold on to each other to become a single dragon. But at the same time, the front part of the dragon is chasing the rear part, with the people in the middle not given a clear role to play in the conflict. Catch the Dragon’s Tail makes the struggle explicit in ways that players must work together even as they compete within the limited space of a game. Catch the Dragon’s Tail also embodies an important lesson for game design: all of our preconceptions about games can be questioned. Normally we might think that all players of a game must have a clearly defined goal, or that lines of competition must be sharply defined, or that a game with player coopera-
tion cannot also have vigorous competition—but Catch the Dragon’s Tail debunks all of these assumptions. If nothing else, game design is about playing with ideas, and even seemingly fundamental ideas about competition in games are subject to playful intervention.

The Goal of a Game
In addition to competition and cooperation, another essential component of a game as a system of conflict is a goal. Goals are fundamental to games. In the explication of Centipede, Joust, and Gauntlet, goals figured into each form of conflict. At the outcome of a game, the goals are either reached or not reached, and this quantifiable outcome is part of our definition of games. Very often, it is a clear and quantifiable goal and outcome that distinguishes games from other play activities. Add a goal to informal play and usually you will have a game. Casual skiing for fun is a leisure play activity. But race your friend to the bottom of the mountain and suddenly you’re taking part in a game.

A game’s goal is defined by its rules and is tightly interwoven into the formal structure of the game as a whole. A game’s goal is a central feature of its formal structure. When players come together to play a game, the goal is at the center of the magic circle, the pole that holds aloft the circular tent of the game while the players are inside the structure, at play with one another. The goal sustains their interest, their engagement, and their desire. Without a clear goal, meaningful game play is not possible; if players cannot judge how their actions are bringing them closer to or farther away from winning the game, they cannot properly understand the significance of their actions, and the game collapses into a jumbled heap of ambiguity.

A game’s goal defines its endpoint; once it is reached, the game is over. In this sense, a game’s goal is the death of play, the mark of the end, foretelling the moment the magic circle will disappear. There is a curious poetic quality to the struggle of game players as they make their way through the system of a game, playing to no end but the one provided by the game itself, even as their joyful pursuit of that end means the death of their pleasure. Until, of course, the next game begins.

Most games have an end in which one or more players achieve victory. However, in games such as Space Invaders, in which the game structure repeats itself with increasing challenge to the player, there is no single victorious endpoint. In this form of game, the goal is to play as long as possible or achieve the highest score. This formal structure heightens the sense of inevitable death. The player is living on borrowed time, staving off the inevitable end of a game that occurs when conditions of failure are met.

The space of possibility of a game is a plane stretched between two anchorage points: the beginning and the end of the game. The players journey from one end to another, making their way from the start to the finish. In a well-designed game that supports meaningful play, this journey between points should be taut and efficient, with every element contributing directly or indirectly to the larger experience.

In case this all sounds too goal-oriented, we must acknowledge that goals are not the only reason people play games. Play can be an end in itself, or a way to achieve social interaction, or affect cultural change. We address each of these motivations for play in later chapters. But seen as a formal system, the goal of a game needs to be recognized as a primary structure that shapes the game as a whole.
[The rules that players verbalize] are an idealized set of rules—they are the rules by which people should play rather than the ones by which they do play....we may have to know two sets of rules: the ideal ones and those by which the ideal rules are applied, misapplied, or subverted.—Kenneth Goldstein, “Strategies in Counting Out”

When you have to win, you’re willing to break whatever rules you can if that would help you get closer to the goal. When you have to win, you’re not concerned with fairness, feeling, the community, or even play. When you have to win you can’t leave the game until you have finally, ultimately won.

What’s amazing to me about all this is that the game itself doesn’t change. The rules and the conventions are the same. But the manner of playing the game is completely different.—Bernard DeKoven, The Well-Played Game
Introducing Rule-Breaking

This schema opens with a pair of quotes from two thinkers we have heard from before. Folklorist Kenneth Goldstein first appeared in the schema on Uncertainty, where he looked at the ways that children subvert the ritual of counting-out through a number of subtle and devious strategies, such as adding an extra "eenie-meenie-minie-moe" in order to avoid becoming "it." We introduced Bernard DeKoven in the previous schema on Conflict as a leading figure in the New Games Movement.

Goldstein points out that although games have rules, they should be considered to have two sets of rules: the ideal rules of play and the actual rules of play, which sometimes misapply and subvert the ideal rules. DeKoven comes at the same set of issues from a different point of view. He points out that some players are so motivated to win that they disregard usual notions of fairness. What seems to intrigue DeKoven the most is that such opposing styles of play can occur alongside normal play within the same game structure.

Whether we are talking about ideal rules versus actual rules or honest players versus cheating players, both writers point to an important game phenomenon. So far in this book, we have described game players in an almost naïve way; we have assumed that every player is an earnest player, carefully and honestly playing by the rules. Although this does describe many game players, it is certainly not true of every single one.

Take the children that Goldstein studied in his analysis of counting-out games. In manipulating rhymes in order to achieve certain desired results (he is going to be "It," not me!), what were these players actually doing? Were they stretching and altering the rules of counting-out in order to win? Were they cheating at the game? Or were they simply playing the game very well? This final formal schema, Breaking the Rules, takes a direct look at how players bend, cheat, and break those carefully crafted systems of rules that we have so thoroughly investigated in the last several chapters.

In so many different ways, breaking the rules seems to be part of playing games. Whether it is trying to sneak in a foul while the referee isn't looking, altering a board game to play with a special set of "home rules," or making use of an ace of spades hidden up your sleeve, reconfiguring, breaking, and ignoring the rules seems to be an intrinsic part of games themselves. But what guides a player to break the rules? What is the effect of rule-breaking on game play? How does a game's design either encourage or discourage players from breaking the rules? Lastly, can rule-breaking be used as a creative strategy for game design? We investigate these questions in the following pages.

Kinds of Rule-Breaking

Rule-bending and rule-breaking manipulate the structure of a game. To cheat or transgress in a game means to break the rules, to have a relationship to the formal system that is different than the relationship that the formal system itself presupposes and endorses. In considering the ways that game rules are broken, we can divide players into different player "types." Each type of player is defined by his or her relation to the formal systems of a game, along three related axes of behavior and attitude:

- The rule-breaking player's adherence to the rules
- The rule-breaking player's interest in winning
- The rule-breaking player's degree of lusory attitude

Player Types

The Standard Player: This player type is a "standard" and honest game player that plays the game as it was designed to be played, following the rules and respecting their authority.

The Dedicated Player: This close cousin of the standard player studies the formal systems of a game in order to master and perfect his or her play of the game, often finding and exploiting unusual strategies in order to win. Examples: professional athletes, hardcore gamers.
The Unsportsmanlike Player: This third type of player follows the rules of a game, but does so in a way that violates the spirit of the lusory attitude. Examples: The older sibling that never lets the younger sibling win, or the baseball catcher that tries to distract the batter’s concentration at the plate.

The Cheat: The cheater, unlike the other kinds of game-players, actually violates the formal rules of the game, but does so in order to win the game. Example: The hide-and-seek player that peeks while the other players are hiding.

The Spoil-Sport: This kind of game player is hardly a player at all. Unlike the cheat, the spoil-sport refuses to acknowledge the magic circle of the game and does not care about winning or about following the rules. Example: The frustrated Twister player that ruins a game by pushing over the other players.

In the sections that follow, we describe each kind of player in more detail. But before moving on, it is important to recognize that these categories are neither fixed nor mutually exclusive. The boundaries between them are quite fuzzy, and often contextual. A player that is a dedicated hardcore gamer among gamer friends might be seen as an unsportsmanlike, overly competitive “power gamer” when playing a game with more casual players. Likewise, a player might shift between categories over time, or even within the course of a single game. Despite the fluid boundaries between them, however, these categories provide a useful typology for understanding the ways players stretch, bend, and break game rules.

Standard Players
The standard player is the test case against which all other types of players are contrasted. The standard game player attempts to follow the rules as best he or she can, respecting their authority and honoring the limits they set. In terms of rules, goals, and possession of the lusory attitude, the standard player is a most law-abiding citizen.

Do most players fit this description? Actually, they do. The magic circle is fluid, but when most players play a game, especially a game with other players that can be seen face-to-face, they respect the rules and play the game from beginning to end. Why is face-to-face interaction important? A game is a kind of social contract. The presence of other players is important to maintaining the authority of the magic circle, because if a group of players are all obeying the rules, they implicitly police and enforce proper play. Why? Because if they have decided to invest the game with meaning in order to play, they all have a vested interest in maintaining the level playing field of conflict created by the rules. This does not mean that most players are mindless slaves to the rules of a game, but generally speaking, looking across all phenomena of games, players do follow the rules. If this were not the case, then cheating at games would be the rule and not the exception.

You may well disagree with our contention that most players do not break the rules. One could also take the position, for example, that cheating exists in all players, that the force of game-playing desire that drives a player to win contains the seeds of cheating. Cheating, in this view, would be an intrinsic aspect of game-playing, even if it did not always rise to the surface in the form of genuine rule-breaking. But whether the “standard player” is really the majority case or a fiction that doesn’t exist in the real world, the notion of the “standard player” is still important. The idea that there is a standard player, a game player that earnestly follows the rules without trying to bend and break them, provides the backdrop against which less rule-governed styles of play can be understood.

Dedicated Players
The next type of game player is the dedicated player. The dedicated player is really more of a special case of the standard player than a completely different player type. The dedicated player desires to become an expert at a game, and diligently studies the rules of play in an attempt to maximize the chances
of winning. Whereas standard game players exhibit a desire to win and an interest in the rules of a game, dedicated players apply themselves to this task with a certain kind of zeal, to a degree that more casual players might not find enjoyable. If the game permits, dedicated players tend to practice their play, testing out strategies and perfecting their knowledge of the game.

A typical Las Vegas tourist who wants to enjoy Blackjack might play a few games here and there, browsing different casinos and tables, relying on intuition to guide him as he plays. A dedicated Blackjack player, on the other hand, won’t merely play a few casual rounds of the game, but is likely to study a Blackjack “system” or two and implement it diligently in play, finding tables with advantageous rule variants, counting cards during play, and spending long hours at the Blackjack table in order to balance out his odds of winning. The difference between dedicated and standard players is a matter of degree, not kind.

Recall that the differences between types of players is drawn along three axes: their relationship to the luxurious attitude, their respect for the authority of the rules, and their interest in attaining the goal of the game. Within each of these categories, dedicated players resemble standard players. But dedicated players have a deeper engagement with the game, a greater zeal for play. It is more important for dedicated players to win, and in order to do so, they will generally learn and master the rules of a game. At the same time, dedicated players tend to invest the magic circle with more authority, because of the value of their investment in the game as a whole. They possess extra amounts of the luxurious attitude, relishing the inefficiencies of games as important challenges to overcome as proficiently as possible.

Who are dedicated players? Professional athletes and professional gamblers—those that make their living as game players. So are so-called “hardcore gamers,” from grognard historical wargamers to deathmatch clan leaders with tricked-out custom PCs. In general, dedicated players require more depth and complexity, a richer space of possibility in their games. This is why non-gamers often find the gaming fare of hardcore gamers bafflingly complex and unapproachable.

Dedicated players tend to play with a zeal that often puts off less dedicated players, who sometimes wonder if dedicated players are taking the game just a bit too seriously. The dedicated Blackjack player we described, who might spend most of a Las Vegas vacation at the Blackjack tables, might seem incomprehensible to the casual, standard player, who looks at games as a form of relaxation and leisure. A casual player does not wish to spend so many waking hours inside the magic circle of a game.

There is a very fuzzy line between dedicated game players and standard game players, and the difference is often contextual. Among your dedicated bowling buddies, you might fit in just fine as a standard player, scoffing at the league players that wear matching shirts and play the game “too seriously” to have fun. But when you end up in a game with a group of beginners who want to abandon a match in the middle to go see a movie, you might find yourself being accused of playing “too seriously” when you demand that they stay to the tenth frame and finish what they started.

As game designers, it is important to understand the range of player types that encounter your game, and the kinds of relationships they have to the rules, goals, and magic circle that your game delineates. Some games clearly appeal to both standard and dedicated players, such as Scrabble. Scrabble is often played as casual family fare, but it also supports an international tournament culture of hardcore players. Other kinds of games tend to attract one kind of player over another. The players that enjoy the low-pressure, exploratory pacing of Myst are generally not the same kind of dedicated player audience that would spend the many hours required to understand and
master Myth: The Fallen Lords. There is a similar divide off the computer between players of party games such as Pictionary and fans of complex wargames and role-playing games.

The first two categories of game-players—standard and dedicated players—are not ultimately rule-breakers. They are "classical" game players, the kinds of players for whom designers usually design games, loyal functionaries of the rules. Like standard players, dedicated players are indeed rule-abiding. But as we'll see soon enough, even though they seem more invested in the magic circle of a game, their dedication takes them one step closer to actual rule-breaking.

Unsportsmanlike Players
The third type is the unsportsmanlike player. Unsportsmanlike players do anything they can to win. They try to find shortcuts to victory, exploiting the rigidity of the rules to locate holes that they can slip through to end up ahead. An unsportsmanlike boxer, for example, might constantly grab at the ropes or go into a clinch whenever the opponent advances aggressively. Note that the boxer stops short of actually violating the rules of the game. In fact, some might consider this approach a valid strategy for Boxing. But somehow, the unsportsmanlike boxer violates the spirit of the contest of Boxing, marring the purity of the battle between the athletic skills of the two players.

Unlike standard and dedicated players who generally engage openly with the "fun" quality of play, there is something negative about unsportsmanlike behavior. The unsportsmanlike player turns the special zeal of dedicated players into something that seems to run counter to the joyful nature of play and games. An unsportsmanlike player is not a cheat. The unsportsmanlike player does follow the rules of a game, but in a way that violates the spirit of the game. By attempting to shortcut the challenges of a game, the unsportsmanlike player refuses to surrender completely to the lusory attitude, in which the inefficiencies of play are readily accepted.

Unsportsmanlike behavior is a violation of the "unwritten" rules of a game, the implicit rules that are not actually written out, but are observed by all players. This is how the unsportsmanlike player "technically" avoids designation as a cheater, while still failing to completely respect the lusory attitude. One of the implicit rules of Tic-Tac-Toe we discussed in Rules on Three Levels is the implied time limit between turns. Even though the operational rules do not mention a time limit, the idea that a player must take a turn in a "reasonable" amount of time is an implicit rule of the game. Imagine an unsportsmanlike player that is about to lose a game of Tic-Tac-Toe, but refuses to take a turn. The player might state that he is "thinking" about his next move, and claim that because the rules do not state a time limit, he can take as long as he wants, even years, before he has to move. This kind of behavior, although not violating the operational rules, clearly violates the spirit of the game.

Degenerate Strategies
Dedicated and unsportsmanlike players have particular ways of engaging with the system of a game. One common behavior these player types exhibit is to make use of degenerate strategies or exploits. We first encountered degenerate strategies in Games as Game Theory Systems. A degenerate strategy is a way of playing a game that takes advantage of a weakness in the game design, so that the play strategy guarantees success.

Degenerate strategies often appear in complex games, where the numerous permutations of play sometimes afford shortcuts in the space of possibility. For example, you are playing a real-time strategy game against the computer and you realize that the program's AI does not handle pathfinding well. (Pathfinding refers to the aspects of the program that plot navigational paths for the computer-controlled characters through obstacle-filled terrain.) Whenever the computer-controlled troops move around obstacles, they begin the march in formation but end up disorganized, with individual units trapped in irregularly
shaped pockets of the terrain. It is not difficult for you, however, to make the small corrections necessary to keep your units together. If you decided to take advantage of this weakness by strategically leading the computer-controlled opponents into obstacle-filled parts of the map, you would be using a degenerate strategy.

Taking advantage of the game’s weakness in this way would not exactly constitute cheating, but it does exploit the game’s structure as a means of winning. Although games are not designed to be exploited by players, what makes a degenerate strategy degenerate is not just that it goes against the intentions of the designers. Using an exploit is a way of playing that violates the spirit of the game, similar to taking advantage of the implicit rule governing time between Tic-Tac-Toe turns.

Degenerate strategies appear in non-digital games as well. In early editions of Magic: The Gathering, certain card combinations were simply too powerful and could destroy a player on the first turn, before a match had a chance to develop. Wizards of the Coast, the publishers of the game, declared certain cards “officially” illegal, most notoriously the Black Lotus card, in order to keep this kind of play experience in check. In regulated tournament play, the outlawed cards were not used. But in more casual games, players continued to include them in their decks for years.

Why isn’t using a degenerate strategy considered cheating? Degenerate strategies take advantage of weaknesses in the rules of a game, but do not actually violate the rules. What kind of player would play in this way? The answer is both a dedicated player, who is overzealously seeking the perfect strategy, and an unsportsmanlike player, who has found a hole in the rules to exploit, even though he understands that he is not playing the game the way it was intended. These two kinds of players can both make use of degenerate strategies, depending on the context.

The difference between a dedicated player and an unsportsmanlike player is the degree to which the player subscribes to the lusory attitude. Dedicated players follow rules on all levels. Unsportsmanlike players follow the operational rules, but they do not follow all of the implicit ones. Dedicated players loyally uphold the magic circle of a game, but unsportsmanlike players fail to do so, occasionally stepping just outside its borders in order to bend the rules.

Often, whether or not a degenerate strategy is a "proper" way to play depends on how the game experience is framed. When it was discovered that Pac-Man could be played by memorizing patterns of movement instead of through improvisational moment-to-moment tactics, player reaction fell into two camps. Some frowned on using memorized play patterns as a violation of the spirit of the game. Other players, however, capitalized on patterns in order to get higher scores. These pattern players did not consider themselves to be unsportsmanlike at all: they saw themselves as dedicated players who had simply found a better (and more demanding) way to play the game.

One more example: remember the hypothetical fighting game from our earlier investigation of degenerate strategies? The game could be beaten by using one technique over and over, rather than exploring the carefully orchestrated system of fighting moves created by the game’s designers. It could be said that the player making use of this degenerate strategy is behaving in an unsportsmanlike manner, improperly playing the game, sacrificing “fun” in exchange for a shortcut to victory. It could also be said, however, that the exploit was being used by a dedicated player who had “solved” the fighting game like a puzzle. As with the Pac-Man pattern players, instead of playing the game the way it was designed to be played, the dedicated player simply invented a new method of interaction. This is arguably an example of transformative play, an important game phenomena we will investigate in chapters to come.
Whether or not a particular degenerate strategy is considered proper is often contextual. For example, the use of the single-technique exploit to beat all of the computer opponents in our hypothetical fighting game might be admired by a group of players for its elegance. On the other hand, if the degenerate strategy were used against other human players, fighting bouts would devolve into uninteresting games, with both players relying on the one exploitable technique again and again. In this social context, the exploit would be frowned upon as unsportsmanlike behavior, a violation of the implicit rules and the enjoyable spirit of the game. The meaning of a game action, even if the action is the selection of a general strategy, is always influenced by the context in which it occurs. In a social context, the exploit unbalances the level playing field of conflict and shrinks the space of possibility to a very narrow range, threatening the meaningful play of the game.

Degenerate Strategy Ecosystems
As a rule of thumb, you want to be on the lookout for degenerate strategies and keep them out of your game. The ability to win a game by playing in a singular way demonstrates a poor game design, a space of possibility with an unintended, limiting short-circuit. There is, however, an extremely fuzzy line between degenerate strategies and imaginative ways to play a game. There is something exciting about having players explore the space of possibility of your game, rooting around for new strategies and new ways to play. If the game is complex enough and the community of players is large enough, degenerate strategies that do emerge can be countered by new strategies created specifically to oppose the exploits. An ecosystem emerges from the community, in which different styles of play compete for dominance.

In real-time strategy (RTS) game player communities, for example, players constantly look for ways to get ahead on the rankings boards. Command and Conquer, like most RTS games, was intended to emphasize steady planning and gradual development. But over time a degenerate strategy evolved called the "tank rush." Instead of slowly building up forces, a player using the "tank rush" strategy could quickly create a group of tanks and wipe out his opponent's base camp in the early game, before his opponent had a chance to prepare his defenses. Although the tank rush degenerate strategy ruined the games of many players that desired a more typical long-term conflict, it also spawned new kinds of defensive strategies. The introduction of a degenerate strategy enlarged the overall space of possibility of the game.

Although some player communities are resourceful enough to create their own antidotes to degenerate strategies, it is often necessary for the designers to step in and correct the breach themselves, as in the case of Magic's Black Lotus card. With popular games, play strategies sometimes evolve in a way that necessitates a refinement of the formal structure, like a gardener pruning branches of a tree to improve the overall health of the plant. The process of degenerate strategy correction is ultimately part of the iterative process of game design. One game that has undergone constant refinement is professional Basketball in the U.S.

Over the last several decades, Basketball has undergone a number of rule changes. For example, in the 1960s and 1970s, most of the action took place right under the basket, where the chance of scoring was greatest. Play was dominated by tall players that could control this space with the greater offensive and defensive capabilities their height provided. Two rules were introduced that shook up the play of the game and defused degenerate strategies that were beginning to crop up. The three-point line incentivized players to play away from the basket, daring them to risk a longer shot in order to gain an extra point. At the same time, the three-second rule, which kept offensive players from spending more than three seconds
parked in the paint under the basket, helped unclog the scoring zone traffic jam. The end result of these two rules is that quick players who could weave into the zone and out from under the basket, perhaps darting back to the three-point line to take a shot, became more important than static, towering giants. The space of possibility of the game expanded to include not just more diverse strategies of play but more diverse physical types of players to implement them.

Basketball has plenty of other rules that have been modified over time as well, from the introduction of dribbling near the beginning of the century to the more recent innovation of the shot clock and the back-and-forth controversies over zone defense. In his essay “The Heresy of Zone Defense,” cultural critic Dave Hickey eloquently addresses this process of rule iteration:

The “illegal-defense rule” which banned zone defenses, however, did more than save the game. It moved professional basketball into fluid complexity...leaving the college game with its zoned parcels of real estate behind. Initially, it was feared that this legislated man-to-man defense would resolve competition in terms of “natural comparative advantage” (as an economist might call it), since if each player is matched up with a player on the other team, the player with the most height, bulk, speed, or quickness would seem to have a permanent advantage. But you don’t have to guard the same man all the time; you can switch, and this permission has created the beautiful “match-up game” in which both teams run patterns, picks, and switches in order to create advantageous situations for the offense or the defense—to generate shifting interplay.¹

Degenerate strategies can lead to iterative design. It is beautiful to think of a game design as a design in process, which can grow and evolve over time, remaining fresh in response to changing needs and invented strategies. As the athletic abilities of players and the strategic acumen of coaches tested the limits of the system, the rules of Basketball were refined. Changes in rules maintained the tautness of the space of possibility while allowing players to move freely within it. Even today, regular changes in the rules continue to keep the game fresh. The act of rule-modification itself—by game designers, players, or administrative bodies—is an important kind of game design which will be addressed further in the pages to come.

Cheats and Spoil-Sports

The player who trespasses against the rules or ignores them is a “spoil-sport.” The spoil-sport is not the same as the false player, the cheat; for the latter pretends to be playing the game and, on the face of it, still acknowledges the magic circle...the spoil-sport shatters the play-world itself. By withdrawing from the game he reveals the relativity and fragility of the play-world in which he had temporarily shut himself with others.—Johann Huizinga, Homo Ludens

The final two categories of players are the cheater and the spoil-sport. Up to this point, we have had to look very carefully at the players’ behavior to decide whether or not they are violating the formal system of the game and are actually breaking the rules. With these final two categories of players, things become more explicit.

What defines the cheating player? The cheater breaks rules. Unlike the unsportsmanlike player, who merely violates the implicit, unspoken rules of a game, the cheater transgresses the operational rules, the actual rules of play. The cheater is the player that secretly moves a piece when her opponent looks away from the board, the player that steals Monopoly money from the bank and hides it for future use, the player that uses a non-regulation golf ball in a tournament in order to gain a little more distance. The cheater surreptitiously takes actions that are not proscribed by the rules, in order to gain an advantage.

Does cheating destroy a game? The unexpected paradox of cheating is that, as Huizinga points out, the cheater is still in
some way playing the game. The cheater breaks rules, but only to further the act of winning. So while the cheater sheds enough of the lusory attitude to disrespect the authority of the rules, the cheater still has faith in the sanctioned conflict of the game: being the victor still has meaning to the cheater. This may seem like bizarre behavior. What is the point of hanging onto the authority of the quantifiable outcome when the prescribed steps for getting there are thrown out the window?

It turns out that the cheater is only one step removed from the dedicated player. It is possible to sympathize with a cheat, for he or she too has a passion for winning. A cheater craves winning, but too much, committing crimes in order to attain the object of desire. Of course, the motivations for cheating are many. Cheating might grow from a desire to beat the game system itself, to show up other players, or to reap rewards of glory external to the game. But no matter what the psychological motivation for cheating, all cheating behavior shares a particular set of formal relationships to rules, goals, and the magic circle.

The spoil-sport is the category of player furthest from the standard player. As game designer Mark Prensky explains, "What spoils a game is not so much the cheater who accepts the rules but doesn't play by them (we can deal with him or her), but the nihilist who denies them altogether." The cheater breaks the rules but remains within the space of play. The spoil-sport is more destructive, refusing to acknowledge the game altogether. The spoil-sport is the frustrated player that knocks all of the pieces off the Chess board, the player that reveals the hidden information of Charades, the player that answers when it isn't his turn, the player that hacks into the game database to erase all of the player records. The cheater is a conniving actor, a spy within the magic circle, carefully pretending to obey all of its regulations even as he breaks them. But the spoil-sport has no such compunction. His destruction of the game does not require concealment, because the rule structure that would condemn his action as illegal is exactly the authority the spoil-sport wishes to undermine.

When a set of Chess pieces are placed in their proper positions on the board and a game begins, the pieces gain meaning. But if, during a game, the action of a spoil-sport wipes the Chess pieces from the board, meaning is violently erased. Removed from their grid positions, the Chess pieces merely represent a collection of scattered figurines. The spoil-sport returns the game to its pre-game state as a collection of parts, no longer the embodiment of the space of possibility set out by the rules of the game.

The spoil-sport, more than any other kind of player, demonstrates the fragility of the magic circle. Not bound by a faith in the game, an interest in the lusory attitude, a respect for the rules, or even a concern for the outcome, the spoil-sport is the representative of the world outside the game. Armed with a powerful lack of belief, the spoil-sport has no qualms about ruining the play of others. The cheat may hack into a multipayer deathmatch to up his ping time and secretly improve his play performance. But the spoil-sport will unleash a virus that brings the game servers to a halt, making play impossible for all players.

**Five Player Types Compared**

On the following page is table that summarizes the five kinds of players discussed in this schema. Several fascinating patterns arise when we compare player types in this way. The slippery slope between the dedicated player and the cheat becomes particularly clear. An enthusiasm for playing a game can quickly become a zealous winning-for-its-own-sake, which can lead to unsportsmanlike behavior and outright cheating. In their shared investment in the outcome of the game, players and cheaters have a great deal in common.
<table>
<thead>
<tr>
<th></th>
<th>Degree of lusory attitude</th>
<th>Relationship to rules</th>
<th>Interest in winning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard Player</strong></td>
<td>Possesses lusory attitude</td>
<td>Acknowledges authority of rules</td>
<td>Typical interest in winning</td>
</tr>
<tr>
<td><strong>Dedicated Player</strong></td>
<td>Extra-zealous lusory attitude</td>
<td>Special interest in mastering rules</td>
<td>Intense interest in winning</td>
</tr>
<tr>
<td><strong>Unsportsmanlike Player</strong></td>
<td>Sometimes resembles the Dedicated player, sometimes resembles the Cheat</td>
<td>Adherence to operational rules, but violates implicit rules</td>
<td>Intense interest in winning</td>
</tr>
<tr>
<td><strong>Cheat</strong></td>
<td>Pretends to possess lusory attitude</td>
<td>Violates operational rules in secret</td>
<td>Intense interest in winning</td>
</tr>
<tr>
<td><strong>Spoil-Sport</strong></td>
<td>No pretense about lack of lusory attitude</td>
<td>No interest in adhering to rules</td>
<td>No interest in winning</td>
</tr>
</tbody>
</table>

It is sometimes difficult to identify exactly when an instance of cheating is a true transgression of the magic circle or merely part of the play of a game. Is hacking into an online server to inflate a high score on a public ranking board cheating? The transgression is not taking place within the magic circle of a particular game, but it certainly demonstrates an overly serious interest in the act of winning. How about fouls in sports? And what about games that encourage rule-breaking as part of their play? Where do they fit into our understanding of formal transgressions? We end this chapter by looking at a series of games that incorporate rule-breaking into the game design itself.

**Sanctioned Violations: Professional Sports**

In most games, rule violations threaten to destroy the magic circle. However, there is one category of game in which rule-breaking by players and punishments for violations of the rules are an important part of the overall game structure: professional sports. Double-dribbling in Basketball, icing in Hockey, using hands in Soccer—these are all rule-violations, but they are violations that are punished within the game itself, in ways that let the play continue. It is expected, and even anticipated that these kinds of events will occur in a sports game. It would be extremely unusual for an entire Basketball game to occur without a single foul being committed.

What is interesting about the way that sports handle rule-breaking is that there is always a sliding scale of severity for different rule violations, and often extra punishment for repeated offenses, as when a basketball player "fouls out" and cannot play in a game after committing six personal fouls. A single foul might be the result of an "honest mistake" and is therefore treated somewhat lightly. Six fouls, on the other hand, creates a pattern of rule-breaking behavior, and the player is ejected from the magic circle entirely. Sports referees, as extensions of the formal system of a game, have authority to decide when violations occur and how to interpret the rules to mete out punishment. For example, referees generally have the authority to throw players and coaches out of games if their behavior becomes too extreme.
When rule-breaking becomes sanctioned, as it is in sports, a whole new layer of implicit rules enters into the space of play. Whereas it is considered aggressive play (and a foul) to elbow an opponent on a Basketball court, it is truly bad sportsmanship to punch that same opponent in the face. As rule-breaking is integrated into a game, it is incorporated into the space of possibility. Depending on the particular game, players may strategically transgress rules, accepting a short-term punishment for a long-term strategic or psychological advantage.

This intentional brokering of rule-breaking can be quite complex. In Basketball, the players can attempt to “draw fouls” from opponents. This risky practice can result in the player who is attempting to draw a foul committing a foul himself. Players who charge the basket on offense hoping to be fouled on their way to the hoop are often called for “charging,” an offensive foul that results in the loss of the ball for the offensive team.

In professional sports, the complex system of violations and punishments within a game is also reflected in the professional legislative bodies which can sanction penalties for larger violations. Outside the scope of an individual game, these organizations govern more serious offenses. If a professional athlete is found to be fixing games or is convicted of a criminal act, he can be banned from the sport for life by the game’s professional body.

Why is there so much attention to breaking the rules in sports, particularly professional sports? One answer is the nature of athletic game play. On a Chess grid, there is little or no ambiguity about which square a piece occupies; a Chess player will not gain an advantage by having a little corner of his Rook peek into an adjacent square. But in the infinitely granular space of the real world, milliseconds and millimeters can mean the difference between winning and losing. The runner does not want to start running before the starting gun fires, but springing forward as close to that moment as humanly possible will certainly offer an advantage. As a result, many false starts occur in races. Most sports fouls are motivated by an attempt to maximize an offensive or defensive advantage.

In looking for a motivation behind the prominence of rule-breaking in sports, we must also acknowledge the economic component of the games. A great deal of capital is connected to professional sports, from player salaries to ticket sales to network advertising. When the external stakes of a game are high, it is especially important to maintain and enforce the level playing field of conflict. The premise of a professional sport, even more than with most games, is that it is being played fairly. This emphasis on fairness extends naturally to its opposite: an emphasis on breaking the rules.

Sanctioned Cheating: Illuminati
For a different approach to the integration of rule-breaking into a game, we turn to Illuminati, a humorous strategic tabletop game based on the Illuminatus books by Robert Anton Wilson. In the game, players take on the role of all-powerful Illuminati, the shadowy power brokers pulling the strings behind world governments. The original edition of Illuminati contained an optional set of rules for cheating:

Cheating:
Some fiendish people think Illuminati is even more fun when nothing, not even the bank, is sacred. In this variant of the game, most forms of cheating are permitted.

Exceptions:
- You may not tip over the table or disarrange opposing power structures.
- You may not bring in counterfeit money or money from other sets.
- You may not cheat on the amount of money drawn from the bank during setup or the income phase (this would slow things down too much).
- Anything else goes. Anyone caught in the act must undo that cheat. There is no other penalty.

Suggested methods for cheating include:
- Accidentally misread the dice.
- Steal from the bank (other than during the income phase).
- Lie about the amount of power or resistance your groups have.
- Stack the deck or peek ahead.
- If anyone leaves the table, anything goes!
- We recommend you play the cheating game only with very good friends or with people you will never see again.3

These “rules” for cheating in Illuminati provide a fascinating example of the relationship between rule-following and rule-breaking. Normally, cheating is considered something that runs counter to the spirit of the game rules. But in Illuminati, the sanctioned formal system of the game actually contains rules for cheating.

Illuminati’s rules for cheating are different than rule-breaking in professional sports. In sports rule violations, most fouls are committed by players performing as close as possible to the limits of what the rules allow. In the real-world context of athletic performance, sometimes players miscalculate and end up breaking a rule. But in Illuminati, the suggested modes of cheating focus explicitly on player deception. The rules above directly suggest out-and-out, down-and-dirty cheating. The rules are not descriptions of penalties for fouls: they are proscriptions for different ways to cheat! In fact, there is no explicit penalty for being caught cheating, other than undoing the effect of the cheat.

Sanctioned cheating can easily destroy a game. Are Illuminati’s “cheating rules” a recipe for anarchy, or are they a well-designed extension of the rest of the rulebook? It seems like a contradiction that the rules themselves contain suggestions for transgressive play. But a close look at the rules reveals the care taken in crafting this section of Illuminati’s formal structure.

Illuminati places numerous formal restrictions on the scope of possible cheating. Forbidding players from tipping over the table (a classic spoil-sport action) lets players know that they cannot completely disrupt the game for the other players. Keeping players from inflating their income ensures that the game will not get too bogged down in mathematical squabbling. Permitted cheating focuses on keeping the rule-breaking play constrained, so that things do not swing too wildly outside the magic circle. For example, the rule that keeps players from smuggling money in from other sets of the game performs a number of regulatory functions. It keeps the designed economy of the game intact, while not letting players with “outside” resources (such as their own copy of the game) from gaining an unfair advantage. The result is that even with cheating, the game is contained within the magic circle, so that all of the players have an equal chance of being skillful cheats. The magic circle is such a strong focus of the cheating rules that when a player actually leaves the physical space of the game by getting up from the table, the rules state that “anything goes.” Players are clearly discouraged from exiting a game in progress.

In addition to formal restrictions, the cheating rules go so far as to shape the lusory attitude of the players that might want to use them. The statements that begin and end the cheating rules place it within a particular context. The opening statement, which implies that only “fiendish” players would play this game variation, and the suggestions at the end, which imply that only good friends or near-strangers play this version of the game, are revealing. By removing the artificial nature of the game conflict, cheating can destroy the implicit camaraderie of the magic circle, letting its conflict leak out to infect the real-world relationships of players. Only friendships strong enough to weather such an experience or more disposable relationships in which further contact is not desired are appropriate.
The very notion that the rules could sanction cheating is a bit outrageous, but it ultimately fits the spirit of the game and its narrative world quite well. Illuminati is a parodic game about hidden organizations that rule the world, where the players are secret power brokers manipulating governments, media, and culture to their own devious ends. Seen in this light, the idea that the rules themselves are also subject to manipulation fits within the overall narrative trajectory of the game. Rule-breaking is a way of expressing the humorous critique of power that Illuminati the game embodies.

In the right context, sanctioned cheating can be an innovative way to enrich a game design. But it must be done with great care. Beneath the light-hearted tone of Illuminati’s rules is a careful design allowing only those forms of cheating that leave the game intact, playable, and meaningful. Cheating in Illuminati does not remove all rules and boundaries from the game: it serves to re-draw them. Although the new boundaries might be drawn in lines that are considerably more fuzzy, a clear formal system remains. Even cheating is something that can be intentionally designed to facilitate meaningful play.

Hacks, Cheats, and Mods: Digital Rule-Breaking
When it comes to forms of rule-breaking incorporated into the design and experience of games, computer and video games offer a cornucopia of examples. Following are some sample instances of digital game rule-breaking, ranging from the timidly transgressive to the truly unlawful.

Easter Eggs
Easter eggs are secrets hidden in a game that players can discover. The first Easter egg was created by game designer and programmer Warren Robinett for the Atari 2600 game Adventure. In defiance of Atari’s refusal to give credit to the creators of their games, Robinett programmed a secret room that could only be found with great difficulty. When players reached it, his initials were displayed. Hidden messages, images, and spaces are now a standard feature of digital gaming. In a mild kind of way, Easter eggs break a game’s rules because they violate the otherwise internally consistent world of a game. Part of the pleasure of finding an Easter egg is a sense of transgressive discovery: by bending the rules of the game in just the right way, the player gets to see or experience something that more lawful players would not.

Cheat Codes
Although Easter eggs usually do not impact the strategic play of a game, cheat codes do. Like Easter eggs, developers design cheat codes into a game. Some of the best-known instances of cheat codes come from the first-person shooter DOOM, where a player can type special key combinations to gain weapons, health, and invulnerability. Sometimes a cheat code is a leftover tool from the game’s development process, but often they are added just for the benefit of players. Although the name “cheat code” implies that these shortcuts to power are rule infringements, cheat codes frequently appear in game magazines and on official game websites, making them a form of officially sanctioned “cheating.” The result is a rich culture of insider game knowledge, with fans scouring magazines and websites for the latest, coolest cheats.

Game Guides and Walkthroughs
Related to cheat codes are the sources of information that players turn to for help with a difficult or lengthy game. These resources appear on the web and in print, and range from elaborate color maps and strategy guides to fan-generated text files that cover every conceivable aspect of a game. Game walkthroughs are step-by-step instructions for finishing a game, particularly useful to players of adventure games and role-playing games that have a more linear structure. Some players view these resources as unfair techniques that breach the spirit of a game. At the same time, walkthroughs have raised the bar of difficulty and complexity in certain game genres. Many digital games are so challenging that they seem designed to require a guide.
Workarounds
The complexity of digital games often makes it impossible for designers to test or anticipate every possible permutation of play before releasing a title to the public. Furthermore, players are infinitely creative in finding ways of "legally" working around game structures. In "The Future of Game Design," Harvey Smith writes about how players discovered new ways to play Deus Ex. For example, the proximity mine object is an explosive device that can be "stuck" onto walls in the game space. After the game's release, players realized something that the game's developers did not anticipate. Exploiting the game's physics and interactivity, players learned to climb up on proximity mines, and using (or misusing) a series of these objects like a ladder, they could ascend the game's vertical surfaces, ruining many of the carefully designed levels. Workarounds are on the borderline between dedicated play and unsportsmanlike play, and include degenerate strategies. Is it cheating to purchase game power by buying an EverQuest character on eBay, or is it simply a workaround that converts labor to capital?

True Cheating
In addition to fuzzier types of "cheating" behavior, there is plenty of bona fide cheating in digital games. More than clever workarounds or sanctioned cheat codes, true cheating breaks the rules of the game. In a multiplayer environment, guidelines for what constitutes cheating are generally made known to all players; cheaters are usually removed immediately and permanently from a game. In SiSSYFIGHT 2000, the most common form of cheating is multi-sessioning, in which a single player opens up two game windows on two different computers, playing two characters at once and gaining very strong play advantages. Although it is difficult to spot, multi-sessioning is outlawed in the game, and there are vigilante fan websites devoted to maintaining lists of known game cheaters.

Hacks
Hacking into a digital game goes beyond simply breaking the rules—it does so through intervention at the level of code. A player might hack a high score list, for example, to place her name at the top. Or she might modify the code of a first-person shooter to gain an unfair advantage in a deathmatch. If too many players hack a game, all sense of fairness can be destroyed. Therefore, the administrators of commercial multiplayer games put great effort into eliminating cheating and hacks from their games. According to massively multiplayer online game designer Ralph Koster, tracking down cheaters and hackers can occupy approximately half of all the resources spent on maintaining and improving an online game.

Spoil-Sport Hacking
Most hacking is done in the spirit of the cheat: players want to do well in a game and do not mind breaking the rules in order to get ahead. Occasionally, game hackers can take the role of a spoil-sport as well, bringing down an entire game or game network. In this case, the aim is to dispel the magic circle for all players involved, not to better one's own performance.

Why are digital games so fertile a ground for these varieties of rule-breaking? First and foremost, code is a plastic and pliable medium. The complex processes that give digital games their uniquely automated quality leave gaps for hacking into the system, whether it is through officially distributed cheat codes, clever workarounds, or genuine code-breaking. The anonymous nature of digital game play, where computers and networks mediate players, encourages rule-breaking as well. The reduced physical presence of other players permits a greater sense of social autonomy, which can facilitate the surreptitious activities of rule-breaking. Lastly, digital games are pop culture with a rich fan base: game fans deconstruct and reconstruct the codes and structures of the works that interest them. Cheating and hacking in this sense is similar to the ways that Star Trek fans re-mix the narrative universe of the television show to invent new stories and characters.
The blessing and curse of digital gaming media is that they provide a pliable space in which to play. With so many ways to gently bend and forcefully break the rules of a game, in playing a computer or video game players must decide what constitutes proper game behavior, navigating the space of possible rule violations. Is it acceptable to download a walkthrough guide? Do you use cheat codes to short-circuit your way through tough game levels? If you were offered a cracked version of the game that let you cheat, would you use it? As a digital game designer, you need to decide what kinds of rule-breaking you want to engender and what kinds you want to outlaw. Can you foster fan communities by offering sanctioned ways to violate the game without letting things get out of hand altogether? Ethics and game design collide in this rich space of rule-breaking possibility.

Rule-Breaking as a Game Design Practice
Our discussion of rule-breaking is not just an explication of the ways in which players break the rules of a game. It is a game design schema, a way of looking at all games that offers a framework for solving particular game design problems. However, it is a different kind of chapter than the other formal schema we encountered in our investigation of RULES. Framing games as systems of rule-breaking questions many of the unspoken assumptions of earlier schemas. We did not, in considering games as emergent systems, information, or cybernetic feedback loops, ever consider that players might disrespect or transgress the authority of the rules and the magic circle.

Player behavior is not universally law-abiding. Given any particular game, there are many ways to play it and many ways to bend and break its rules. For game designers, this means that you should never take players’ behavior for granted. You need to assume that your game will be played not just by earnest rule-followers, but by zealously dedicated players, inappropriately unsportsmanlike players, brilliantly secretive cheaters, and uncaringly nihilistic spoil-sports. Some of these player types can help expand your game’s space of possibility, whereas others can wreck the game for everyone involved. How do you take these possibilities into account in your game design? As always, there is no single solution. But framing your game as a system of rule-breaking lets you formulate your own answers.

There is yet another way to frame rule-breaking: as an attitude toward playing and designing games. We have seen a number of examples of how rule-breaking can enhance meaningful play. In professional sports, digital games, and in the cheating variant of Illuminati, breaking rules is part of the game itself. In all of these cases, through rule-breaking the space of possibility fills with alternative modes of play. What is the lesson here? Perhaps it suggests a shift in the way that we think about game design. In The Well-Played Game, Bernard DeKoven advocates a fundamental adjustment in players’ attitudes towards the rules of a game:

You’re not changing the game for the sake of changing it. You’re changing it for the sake of finding a game that works.

Once this freedom is established, once we have established why we want to change a game and how we go about it, a remarkable thing happens to us: We become the authorities.

No matter what game we create, no matter how well we are able to play it, it is our game, and we can change it when we need to. We don’t need permission or approval from anyone outside our community. We play our games as we see fit. Which means that now we have at our disposal the means whereby we can always fit the game to the way we want to play.

This is an incredible freedom, a freedom that does more than any game can, a freedom with which we nurture the play community. The search for the well-played game is what holds the community together. But the freedom to change the game is what gives the community its power.4
Rather than obeying game rules as an ultimate authority, DeKoven would like players to assume authority over the rules. Once they feel confident and in control of the rules, players can break them and modify them in the course of playing a game. They do so not out of a mischievous desire to disrupt the authority of the rules, but out of a directed attempt to create a deeper experience of play. This beautiful vision for games does not describe the way that most people normally play. However, there is one type of game player that already has this attitude: game designers. Game designers, particularly those that design through an iterative process, already possess a methodology in which playing a game means breaking, tweaking, and modifying rules. In a sense, DeKoven is advocating that game players become more like game designers.

How are game designers rule-breakers? Being a game designer means that you are constantly testing the limits of a game you are creating. Which aspects of the rules are working and which are not? Do you need to add a feedback loop, or modify the amount of randomness in the game? Are players being faced with meaningful decisions at every moment? The best way to answer these game design questions is by changing the rules of your game, trying out new variations, and seeing what happens.

Of course, DeKoven’s vision for dethroning the authority of a game extends beyond just professional game designers. He would like to see all game players adopt this attitude toward play. What would it mean if all players felt free to break the rules of a game, to play not just inside the space of a game, but to modify and change the shape of that space itself? One answer to this important question is that it would require a fundamental alteration in the attitudes of game players and game designers. If players regularly break the rules, are they really rules at all? If players no longer stay inside the magic circle, are they really playing a game? Making this shift might be liberating, but it would certainly change the way we conceive games, game play, and game design.

Yet another answer to DeKoven’s challenge is that perhaps the phenomenon he describes already exists. Perhaps all players already play, not just inside the frame of a game, but with the frame of a game itself. If this is indeed the case, then all the varieties of rule-breaking players, from dedicated and unsportsmanlike players to cheaters and spoil-sports, are natural extensions of the flexibility of game structures. Rule-breaking is simply one of the ways that we play.

Lastly, rule-breaking can be considered not just a way to play or design games, but a more general attitude about game design itself. If the conventions and genres of game design are the rules by which most designers “play,” then the innovators are those designers that manage to break the rules. Games hold great promise, but only if we are bold enough to truly break the rules of our field. This is harder than it seems. We know that to skillfully break rules requires an intimate knowledge of the rules themselves. And our hope is that this book provides some of those “rules of play”—rules that you will mercilessly and playfully violate in order to expand the space of game design’s possibilities.

With this chapter, we finish our first Primary Schema. In RULES, we consciously limited our gaze to the strictly formal boundaries of the magic circle, generally ignoring the player experience and the larger contexts in which a game takes place. But as we move forward, we will slowly widen the scope of our investigation, as we include those aspects of games that have been left out. How stable is the authority of a game’s rules? How permeable is the boundary of the magic circle? How is it possible to not just play a game but play with the very structures of gaming? We directly address these questions and many more in the PLAY and CULTURE schemas to come.
Unwritten Rules

Stephen Sniderman

Context

"Unwritten Rules" is the feature article in the first issue of The Life of Games (October, 1999), the online journal at www.gamepuzzles.com/tlog/tlog.htm, which I co-edit with Kate Jones, founder of Kadon Gamepuzzles. This article is an attempt to clear the ground for discussing games by challenging the widely held assumption that a game is fundamentally different from other human activities (such as the law or business) because we can know all its rules. Games are thus invoked as a model of a fully describable closed system, but I try to show that a game played by humans cannot be a closed system and therefore cannot be fully described.

The Rules of a Game
Gaming the Game
Speaking of Games

Stephen Sniderman has been teaching American literature and creative writing at Youngstown State University since 1969. He has published two books (Language Lovers' Word Puzzles; Stanley Newman Presents Grid Play), a game system (Flying Colors) with Kadon Gamepuzzles, and dozens of puzzles and games in GAMES Magazine and English Journal.
Regardless of what game you’re playing, you cannot know all the rules.
Whether the "game" is tic-tac-toe, chess, baseball, language, etiquette, education, science, religion, law, business, politics or war, the entire set of rules governing the system cannot be spelled out. No matter how hard we try to indicate what is required, allowed, and proscribed, some of the most fundamental principles of playing the game will always elude us. And yet, paradoxically, we can still play the game—some deeper rules are always operating (i.e., affecting the players’ behavior) without the players’ being aware of them.

What do we mean by a game?
A game is a play activity that consists of an object (a goal or goals that the players are trying to accomplish) and constraints on the players’ behavior (what they must do and/or what they may not do in attempting to achieve the game’s object). To play a game is to pursue that game’s object while adhering (more or less) to its constraints. Some of these constraints (the "recorded rules") are explicitly spelled out and are what we generally understand to be "the rules of the game," but every game is also governed by constraints that are rarely if ever made explicit. Some of these "unrecorded rules" are literally unstatable.

An example with tic-tac-toe
Suppose I challenge you to a game of tic-tac-toe. Could anything be more straightforward? But just to be sure, we review the rules. We’ll play on a 3x3 grid, we’ll alternate turns, we’ll play only in empty squares, I’ll play X’s, you play O’s, I’ll play first, and the first player to get three of his/her symbol in a row, column, or diagonal wins the game. Aren’t these all the rules of tic-tac-toe?

Well, for one thing, nothing has been said about time. Is there a time limit between moves? Normally, we both "understand" that there is, and we both "know" that our moves should be made within a "reasonable" time, say 20 seconds. If one of us takes longer, the other starts to fidget or act bored, may even make not-so-subtle comments, and eventually threaten to quit. Without having stated it, we have accepted a tacit time limit. And because we haven’t stated it, it is fairly flexible and very functional.

Is it a rule, or isn’t it?
Suppose it is my turn and, no matter what I do, you will win on your next move. Couldn’t I prevent that from happening, within the rules stated, by simply refusing to play? Nothing in the
rules forces me to move within a particular amount of time, so I simply do not make my next
move. Haven’t I followed the rules and avoided losing? And yet, if you’ve ever played a game,
you know that this strategy is almost never employed and would be completely unacceptable.
Anybody who seriously resorted to such a tactic would be considered childish, unsportsman-
like, or socially undesirable and would probably not be asked to play in the future. This behavior
seems to violate some fundamental but rarely stated principle of the game without any of us
ever having to discuss it.

Self-defeating rules
But can’t we state the principle it violates? Can’t we just make that principle one of the rules
of tic-tac-toe and other games? The answer is—yes, of course we can, but we will not eliminate
the problem. Suppose we add the following rule: Players will make their moves within a reason-
able amount of time. Have we solved anything? What is a “reasonable” amount of time? One
minute? Five? 30? A million? And who determines what is reasonable—the player whose turn
it is or the other player?

Such a rule is actually self-defeating because it calls attention to the fact that we
cannot spell out what “reasonable” means.

So why not just specify a time limit for each move? Because we would just create
even more perplexing problems for ourselves. For one thing, we would have to indicate when
a player’s time is running and when it is not. If one player had to answer the phone, for ex-
ample, would we count that time or wouldn’t we? To state the rule fully, we would have to list
every life situation that could possibly interrupt a player’s turn and state whether it should
count against that player’s time limit. Obviously, we could never complete such a list.

Practical solutions
A far more practical “solution,” the one most of us have used all our lives in “friendly” games,
is to say nothing about time limits and rely on our opponent’s intuitive understanding of a
“reasonable” time for a move and his/her desire to keep the game moving and therefore
enjoyable. In other words, we depend on unstated—and probably unstateable—“rules” (really
just expectations) when we play a game for fun.

In tournament or professional games, of course, we cannot leave things so loose,
and various methods have been employed to solve the time dilemma. Generally, specific time
limits are spelled out, as are specific penalties, including forfeit, for exceeding them. Official
devices are employed for timing moves—chess clocks, the shot-clock in college and pro basketball, stopwatches in baseball games and tennis tournaments, and so on. But once we move beyond “reasonable” to “official” time, we create a whole new set of problems, problems that can no longer be solved with a simple agreement between or among players.

**Rulings versus rules**

As any sports fan knows, the difficulties that arise with “official” rules and “officials” to interpret them are often more intractable than those we face in friendly games. Since no set of rules can list every possible situation that might come up during tournament play, someone in charge, rather than the players themselves, must decide if a player has violated a rule (such as exceeding a time limit) and what penalty should be invoked.

Suppose, for instance, that a fire alarm sounds during a chess tournament and players are forced to evacuate the room. Someone in charge of the tournament must determine whether or not the time spent out of the room should be counted against the players whose clocks were running. It is doubtful that the tournament rules will help them. Or suppose the shot clock in an NBA game stops functioning temporarily. When it is fixed, the officials must decide how much time to put on the clock. How could any rule specify the precise amount of time that would be appropriate? Or suppose a professional tennis player complains of cramps. A human being, not a rulebook, must determine whether the player’s complaint is legitimate and decide whether to grant the player additional time to recover.

Presumably, the officials’ decisions in these situations would be based on the notions of fairness, sportsmanship, and practicality, notions that have never been—and almost certainly cannot be—fully codified and agreed upon. Therefore, no matter how exhaustive and specific we try to make the rules about time limits (or anything else) in a game, we will always have to rely on other people’s acceptance of a set of principles that neither they nor we can put into words. That’s the nature of any human system—the most important aspects of it are unstatable and unknowable.

In *The Celebrant*, Eric Rolfe Greenberg cogently illustrates this little-recognized truth. He depicts the famous incident in baseball lore that got Bonehead Merkle his nickname. With two outs in the bottom of the ninth inning and the score tied, Merkle is on first and a teammate is on third. The next batter hits the ball cleanly into right field for a single, which drives in the apparent game-winning run. Fans pour out onto the field in celebration. Merkle, afraid for his safety, heads directly to the dugout without touching second base. The fielding
team calls for an appeal play at second and attempts to retrieve the ball and touch second for the third out, ending the inning and negating the tie-breaking run.

But where is the ball? No one is sure because the field is swarming with fans. Nevertheless, one of the fielders, holding a ball, touches second base and claims that Merkle has been forced out and that the game is still tied. The question arises, is the ball he retrieved the one that was actually hit? By this time, the umpire has left the field and must be summoned from his dressing room, which he adamantly refuses to leave—until his life is threatened. When he does finally stick his head out, he refuses to change his ruling. Naturally, the losing team appeals to the commissioner of baseball to settle the matter. This worthy stalls as long as he can and finally declares the game null and void and orders that it be replayed.

Greenberg makes it clear that the commissioner's decision is influenced by political and social considerations that have little to do with any rulebook. The game of baseball has spilled over into real life and the depth of the "rules" governing the sport can be glimpsed.

No game is an island
As this example reminds us, no game or sport is played in a vacuum. All play activities exist in a "real-world" context, so to play the game is to immerse yourself in that context, whether you want to or not. In fact, it is impossible to determine where the "game" ends and "real life" begins. As a result, knowing only the recorded rules of a game is never enough to allow you to play the game.

Think of the constraints that do not ordinarily get included as part of the recorded rules of tic-tac-toe but which nevertheless influence the behavior of almost all players. Some of these involve the conventions, "etiquette," or "ethos" of this particular game and may vary from region to region or even family to family.

For example, I would guess that few tic-tac-toe players talk trash to each other [an acceptable and even expected behavior in some games and sports, like basketball].

Similarly, I’m willing to bet that few people play tic-tac-toe for money [in contrast to Poker] or prizes [as is sometimes true with Scrabble] or masters points [as with Tournament Bridge] or glory [as in Central Park chess].

Also, most people, I suspect, would probably allow their opponent, especially an inexperienced player or a young child, the opportunity to "take back" an obviously unwise move.
Playing fair
Other unwritten rules are associated with being “a good sport” and would apply to virtually all games in our culture. For example, you may not attempt to coerce your opponent, through physical force or threats or bribery or blackmail, into putting a symbol on a particular square. You may not attempt to cause your opponent physical, mental, or emotional harm to keep him or her from competing effectively. You may not attempt to distract your opponent while he or she is contemplating the next move. On the other hand, you must make your moves in a “reasonable” time. You must take the game seriously and attempt to win. You must play “fair” at all times.

To understand the difficulty—or, more accurately, the impossibility—of spelling out every rule governing the behavior of tic-tac-toe players, try to imagine programming a computer to “understand” what is meant by the sentences in the previous paragraph. For instance, think about the notion of “distracting” an opponent. What counts and what doesn’t? Suppose you are chewing gum or smoking or wearing perfume and your opponent claims to be bothered by the sounds or aromas you are producing. What would we tell Deep Blue about this situation? Can we really list every behavior that qualifies as distracting?

The human factor
Or for that matter, can we ever be sure (in the sense that we could program a computer to determine) that a player is “really” distracted? In his famous match with Boris Spassky in Reykjavik, Iceland, in 1972, Bobby Fischer claimed to be “distracted” by negative vibes that were emanating from his opponent’s camp. Officials could hardly appeal to the recorded rules, as “complete” as those might have been, to determine how to handle Fischer’s complaints. They had to use their experience with people, including Fischer and Spassky, their understanding of human psychology, their awareness of the political and social implications of the situation, and their diplomatic skills to arrive at a satisfactory compromise. Which of these notions is programmable?

Even Deep Blue, the most sophisticated chess program ever devised, cannot distinguish between a game played for blood (or money) and one played for fun; cannot recognize when a move should count and when politeness or common sense or common courtesy or compassion or medical emergency dictates that it shouldn’t; cannot take into account the emotional needs of its opponent; cannot know when it’s appropriate to abandon the game
or suspend play; cannot, in short, understand the social, political, moral, psychological, and philosophical context in which the game occurs.

**Unspoken basics**

Obviously, our ability to participate in a particular game is dependent on our knowledge of many “rules” which no one has ever spelled out to us. Yet it is easy to overlook this simple fact. In *When Elephants Weep*, the authors tell about a group of scientists who attempted to teach dolphins to play water polo. Although the dolphins were able to learn how to put the ball in the net (and seemed to derive pleasure from doing so), when the trainers tried to get them to stop the other team from “scoring,” the dolphins launched an all-out war on the other team’s players, using methods that no person steeped in the concepts of sportspeopleship would ever use.

After this experience, the trainers gave up their effort, apparently concluding that their task was hopeless, that dolphins couldn’t be taught to play the sport. My guess is that they assumed that all the dolphins needed to be taught were the recorded rules of water polo and the creatures would be able to play the game like adult human beings. These scientists evidently did not realize how much of our knowledge of proper game behavior precedes the learning of the stateable constraints of a particular sport.

But suppose these trainers had recognized, after their initial failure, that they had to provide their trainees with some more fundamental “rules” of game playing. Would they ever have been able to teach dolphins all they need to know to play a single “human” game? Are dolphins capable of understanding fairness and sportscreatureship, “time in” vs. “time out,” practice vs. competition, winning and losing? And even if they were, how would we go about teaching these concepts to them? Wouldn’t we have to teach them much of our culture in order for them to play the game as we do?

**Sportsmanship 101**

To grasp the immensity of the trainers’ task, let us look more closely at what we must know and do to play the simplest game in our culture. We must:

1. intuitively understand what is meant by *play* in our culture, recognize how it differs from other activities, and be able to tell when someone is involved in the behaviors associated with play in general and games in particular;
2. intuitively understand what game/sport is being played, which behaviors constitute part of that activity and which do not. when the activity is underway, when it is in suspension, and when it is concluded;
3. consciously understand and pursue the object(s) of the game (i.e., what we must accomplish to be “successful”);
4. consciously understand and follow all [or at least a large majority of] the defining prescriptions and proscriptions of the game, the “written,” statable rules—i.e., what we must and must not do in the course of pursuing the object or objects;
5. consciously understand and follow the etiquette of the game—i.e., the unwritten but sometimes stated traditions associated with the game that do not necessarily affect the play itself (e.g., appropriateness of talking, gloating, taunting, celebrating, stalling, replaying a point, giving advice to your opponent or teammates, letting players take back moves, etc.);
6. intuitively understand and follow the ethos of that particular game—i.e., the unwritten and rarely expressed assumptions about how to interpret and enforce the “written” rules (e.g., palming in basketball; the strike zone in American and National Leagues; the foot-fault in tennis);
7. intuitively understand and follow the conventions of playing any game according to the culture of the participants—i.e., the unwritten and generally unstatable customs related to playing, competing, winning/losing, etc. (e.g., taking the game with the appropriate seriousness, knowing what takes priority over winning and over playing, not taking injury or personal obligation to avoid losing; playing “hard” regardless of the score; not claiming that previous points didn’t “count”);
8. intuitively understand and respond to the “real-life” context in which the game is being played—i.e. the social, cultural, economic, political, and moral consequences of the result (e.g., whether someone’s livelihood or self-esteem depends on the outcome).

Going through the motions
Obviously, we are never merely playing a game. Or, to say it another way, we are never playing only one game. We are always conscious of the game’s relation to the world in which we live, the world in which that game is one small part.
How much of this context could a non-human “understand?” Is a racehorse “playing the game” of horse racing or merely responding to the urgings of the jockey? Is Deep Blue “playing” chess or merely making moves on a chessboard according to a particular algorithm? Is either trying to win?

If not, they are not playing the game in any meaningful sense. As I see it, to perform the skills and behaviors associated with the game without consciously pursuing the object[s] of the game is not equivalent to playing the game. We might be practicing the game, pretending to play [as with pro wrestlers or actors in a movie about a sport], or exercising our muscles, but there is no game without the attempt, on the part of at least one of the players, to achieve the stable object of that game. [Could dolphins ever be taught to pursue such an object, or would they merely go through the motions of play? And how would we know?]

In addition, it is not possible to pursue the object of the game independent of the key prescriptions and proscriptions. Built into the object[s] of any game is the manner in which it/they must and must not be pursued.

The primary object of a football game, for example, is not to cross your opponents’ goal line while carrying a football; it is to score a touchdown. An equipment manager carrying a bag of footballs through the end zone of a football field has not scored a touchdown. These are profoundly different events, and perceiving the difference between them is a key to understanding the game. Thus, not understanding the difference between them is tantamount to not understanding the game of football. Could any non-human ever make this distinction?

“Time in”

Perhaps the single most important “rules” that are literally unstatable, then, are those that define the context of the game and answer the question, “When is the game being played?” None of us can say how we know that we are in fact playing a particular game [rather than, say, just practicing], but we generally have no trouble knowing that we are. That suggests that there are many subtle cues we give and receive about what play activity we are engaged in, what “counts,” when time is “in,” when the game has started, when play is suspended, and when the game has ended.

Let me offer a personal example. When my buddies and I play tennis, we meet each other at the court at a prearranged time, take out our tennis racquets and some balls, warm up for 15-20 minutes [hitting ground strokes, volleys, overheads, and serves], and eventually
someone asks, "Ready?" or perhaps "Ready to play?" If anyone says no, we continue to warm up. If everybody says Yes [or nobody says No], we toss away all but three balls. At this point, I [and presumably the others] understand that the actual game is going to begin with the next serve. There is never a formal announcement that play is about to begin. At most, the server will hold up a ball and the others will nod or wave.

None of us has ever acknowledged that this is our practice, none of us has stated any of these behaviors, as "rules," none of us would be able to say how we arrived at these customs, yet none of us, I assume, would have any doubt when the game has started.

Could I program a computer or teach a dolphin to operate with the same certainty? Could I specify all the variations in our ritual so that non-humans [or non-sports fans] could identify the boundary line between warm-up and play?

**On your mark... get set...**

Players, fans, and officials of any game or sport develop an acute awareness of the game's "frame" or context, but we would be hard pressed to explain in writing, even after careful thought, exactly what the signs are. After all, even an umpire's yelling of "Play Ball" is not the exact moment the game starts. [And think how confused a new fan of baseball would be when some dignitary threw out "the first pitch"!] We must rely on our intuition, based on our experience with a particular culture, to recognize when a game has begun.

We cannot, in other words, program a computer to understand all the conditions that must be satisfied for humans in a particular culture to say that a game is underway. If the computer is turned on and the software for that game booted up, the computer is, by necessity, playing the game, even if its "opponent" is a two-year-old, a monkey, or an accidental jiggling of the keyboard.

In addition, the computer will go on "playing" until it is turned off, even if its opponent moves on to other activities or drops dead. This phenomenon is the premise of the movie, *Wargames*, in which a supercomputer, WOPR, cannot distinguish between a "game" of Thermo-nuclear War and the real thing. When told it is involved in an actual battle, not a simulation, WOPR's reply is, "What's the difference?"

By contrast, a human being is constantly noticing if the conditions for playing the game are still being met, continuously monitoring the "frame," the circumstances surrounding play, to determine that the game is still in progress, always aware [if only unconsciously] that the other participants are acting as if the game is "on."
For example, in our tennis game, a player will occasionally say, after failing to return a serve, "I wasn't ready." If the others decide that the player is serious in that announcement, the point is usually replayed. How we determine whether or not the player is joking is beyond my understanding [although I'm perfectly capable of making such a determination] and certainly not in my power to express in words.

"Time out"
But there are other reasons, still more difficult to explain, why a particular serve in our game does not "count," i.e., is [usually] replayed. If the players on the receiving team decide that the server's concentration has been "unfairly" disrupted after serving a fault [because, for example, someone from another court has asked us to retrieve their ball or something else has caused "too much" time to elapse], they generally tell the server to "take two," that is, to try his/her first serve again. In effect, they have made a ruling that the server has been inappropriately distracted between the first and second serve and "deserves" a second chance at two serves for that point.

But what exactly is an "unfair" disruption of play according to the etiquette of our game? Can any one of us spell out precisely what situations warrant a second chance and which do not? After all, we are making no effort here to follow the practices of some official tennis game, so we have no rulebook to appeal to, even if we wished to. [Actually, I would feel silly consulting one for such a petty matter.]

I assume that we are all just following a tradition of hackers' tennis that has been passed down over the generations, almost always by imitation rather than by any explicit explanation.

I also assume that our behavior is based on our own notions of "fairness," not on something we could explain in detail.

As a result, I'm not even certain that the other players in my game have the same reasons for telling someone to "take two" as I do, but I have noticed a reasonable consistency over the years.

Occasionally, we facetiously [I assume] debate about whether we should give the opposing player another first serve, but our discussion itself is usually seen as a sufficient distraction to settle the matter in the server's favor. Incidentally, I have never heard the server request a second chance, except in jest [I have assumed], regardless of the circumstances, and some servers will not accept the receiving team's ruling unless it is insisted upon.
Below the surface: Who's the best sport?
A kind of sub-game is going on "underneath" the more obvious one called tennis. Many hackers, myself included, try to one-up each other in politeness and thoughtfulness, so this aspect of our tennis matches can be thought of as a kind of game-within-the-game in which the object is to come off as the best sport.

Of course, no one ever acknowledges this game and no winner is ever announced. My guess is that this practice gives us hackers a chance to feel successful on some level, regardless of the outcome of the match.

Keep in mind that I have never discussed any of these customs with my tennis buddies and probably never will, but I can say that almost every hacker I've ever played tennis with (including those who are fierce competitors and those who are impolite and inconsiderate in other ways) has practiced this non-professional courtesy, and I'm confident that if I played in a friendly game in Oklahoma or Maine or Florida or Arizona, I would see this same tradition being followed.

Yet what chance does a computer, a dolphin, a non-native speaker, or even a non-player have of understanding this game of "Who's the best sport?" It's the kind of thing you have to learn from experience, observation, and inference, not from a set of statable rules.

How can you tell?
Distinguishing between counting and not counting, between "time in" and "time out," is probably the single most basic skill a game player, fan, or official must possess. Without it, a participant or observer could not tell the difference between the preliminaries (such as a warm-up), the breaks in the action (such as a time-out), the aftermath (such as a handshake or a victory lap) and the game itself, could not know when to expend energy and when to relax, could not keep score accurately, could not determine what behavior was affecting the outcome, and so on.

Obviously, we learn to make these distinctions, but we learn them without being aware, for the most part, that we are learning anything. As a result, the process by which we decide that a game is being played is generally hidden from us and therefore seems perfectly natural, not something that has to be learned.

We forget that children, people from other cultures, and adults in our own culture who are unfamiliar with the game cannot automatically tell which actions are part of the game and which are not.
But even if someone understands the notions of play (#1 in our list above), recognizes when a particular game/sport is being played (#2) and is familiar with its object and “official” (written) rules (#3 and #4), such a person would have difficulty participating in the game/sport at any level without a great deal of additional information (or “rules”) about the activity.

The outsider
To illustrate this notion, let us imagine a person named Leslie who has taken extensive tennis lessons, memorized an official USTA rule book, and watched professional tennis on television but never actually played a match at any level and never played or watched or read about any other games (which presumably share some of the unstated rules of tennis).

One day, let’s suppose further, someone invites Leslie to substitute in one of our doubles games. Even assuming his skills were similar to ours, I would venture to say that Leslie would not have much fun and would make the rest of us very unhappy. He would almost certainly get very confused and frustrated at the way my friends and I play “tennis.”

In fact, Leslie might not even recognize it as tennis at all and might conclude that we are playing some bastardized form of the game.

And in a sense, he would be absolutely right.

By the book
For one thing, as Leslie would be dismayed to discover, none of our rules are “official,” in the sense that they are written down or formally agreed upon.

We all seem to assume that we are following the most important rules of professional tennis, except where that is not possible. So, for example, when the ATP adopted a tiebreaker rule for deciding a set, most (but not all) of the games I was involved with also adopted that practice.

In general, the only rules we discuss are those we are uncertain about, such as whether it is legal to touch the net during a point or hit the ball before it crosses the net. Otherwise, we have never spelled out the “rules” we are using, have never stated which set of “official” laws we will abide by, have never established an authority to settle disputes, and have never ever consulted a rule book (at least not at the court) to determine the “correct” way to play. When we disagree about the rules, which rarely happens, we use our knowledge of pro tennis to defend our position.
Not by the book
But we certainly don’t do everything as they do on the ATP tour. As I have already indicated, we give people a second chance at a first serve according to our own lights, not what we see happening at Wimbledon.

To save money, we do not open a new can of balls every seven games, and when we play indoors (where we have to pay for court time), we switch ends of the court after each set, not after every odd game.

In addition, we never assess penalty points for swearing, racquet abuse, exceeding time limits, or foot-faulting. We might grumble about these violations, especially if we think a player is getting an unfair advantage, but we tolerate them, apparently because we perceive them as too trivial to worry about.

Yet some of the people I play with are fanatical about the height of the net. They use a tape measure to make sure the middle of the net is exactly 36 inches high and raise or lower it as needed. They even bring “doubles sticks” to raise the net to the appropriate height at the sides. Wouldn’t our “inconsistency” drive Leslie crazy?

Obviously, one of the most crucial (and rarely stated) meta-rules of games that someone like Leslie (or a computer or a dolphin) would not understand is that we can play them any way we wish, as long as we have (apparent) agreement among the participants. If we want to play tennis with a racquetball or without a net, what’s to stop us?

Tradition-bound
And yet, in my experience, few people choose to play games or sports in innovative ways. Although they are willing to eliminate “trivial” or inessential rules, most people evidently want to feel connected to the tradition of “real” games (i.e., professional sports), even when the rules of the pro version are inappropriate for the local circumstances.

So, for instance, almost all junior high school basketball hoops are 10 feet high, just as they are for the Chicago Bulls, even though the kids are two or three feet shorter than players in the NBA. I guess we like to create the illusion for ourselves that these youngsters are playing the same game as Michael Jordan.

House rules
Even if Leslie finally figured out exactly how our “rules” differed from the ATP’s, he would undoubtedly still be very uncomfortable in our doubles game. For one thing, we play a relatively “casual” game.
We often talk to each other between points, jokingly insult one another, compliment a particularly good shot, ask what the score is, predict what is going to happen next, and so on. Between games, we might exchange personal information or tell jokes.

None of this, of course, happens in professional level tennis, at least not the matches shown on television.

My guess is that Leslie would be disconcerted by our apparent lack of decorum. He would probably perceive us as being remarkably uninterested in the outcome of the game, when in fact we play to win almost as "seriously" as the pros. If he was used to silence between points and games, his concentration might be seriously upset.

**Banter protocols**

Perhaps he would eventually be able to shrug off our casualness as a trivial idiosyncrasy that doesn’t affect the game in any significant way, but it is doubtful that he would be able to participate in the banter. In that case, our "rules" would accommodate his silence. No one is required by our etiquette to talk if s/he doesn’t want to, although we [at least I] tend to prefer those with "personality." The game is just not as much fun [for me] with duds or robots.

If Leslie did start to talk, though, he might find himself violating other aspects of our etiquette. Certain subjects are taboo, or at least frowned upon or rarely mentioned. Business, for example, is almost never discussed between points and rarely between games. (Perhaps this is merely because the people I play with don’t share work experience.)

More significantly, politics and religion are strictly avoided. At most, someone will make a passing comment about the president or some interesting current event, but I can’t remember a single remark about abortion or gun control or any other such controversial topic, even when I have played with other academics. It’s as if we do not want to acknowledge that we might have serious disagreements outside the tennis court.

Would Leslie recognize that we are limiting our comments to certain topics? Until I wrote these last sentences, I had never articulated this “rule” even to myself [though I’ve been playing for over 40 years].

**Our own language**

Leslie would almost certainly have more difficulty getting used to our line-calling practices. Since we don’t have officials, we [like most hackers, I assume] have devised a fairly elaborate system for deciding if a ball is in or out.
Keep in mind that we have never discussed this system, never written it down, never spelled it out in any way, yet our entire game depends on each player's following a fairly rigid, if unstated, set of behaviors. (I'm willing to bet that is generally the case with most amateurs, including those in tournaments, which rarely have official line-callers.)

First, we sometimes use hand signals to indicate "in" (a palm down) or "out" (a finger point), and sometimes, when we think the call is obvious, we say nothing at all. As far as I can tell, we use hand signals only when the ball is not returnable and say "out" when a player has hit the ball back and we wish to indicate that the point is over.

Second, we have a set of "rules" governing which player makes which call. Generally, players on the team about to hit the ball are expected to call the lines, even if a player from the opposing team is closer to the ball when it hits near the line. For example, on a serve, the partner of the player receiving the ball is supposed to announce an out ball.

Of course, there are exceptions (which I can only hint at). Sometimes, for example, the player that hit the ball (or his/her partner) has an unobstructed view of the situation and makes the call. Sometimes, more than one player makes the call. Occasionally two players disagree and a discussion ensues.

To settle a disputed line call, some players like to look for the impression (called a "spot") the ball has left on the playing surface. If they cannot find a spot, they generally assume the ball hit the line (and the point is awarded to the hitter).

Fuzzy boundaries
For the most part, in keeping with the game of "Who's the best sport?", players try to appear calm, rational, polite, and objective about line-calling, but occasionally someone will get upset over another's call, and a new game, whose rules are even harder to describe, breaks out. In this game ("I'm Right and You're Wrong"), the object is to get the other player to back down and agree with your perception.

What players under these circumstances are allowed or not allowed to say depends partly on the social rules that are in operation—the power relations among the players off the court—so once again we see the fuzziness of the boundary between game and non-game.

In most cases, the desire to continue play or to win the sportsmanship game ends an argument fairly quickly (but I remember once when a player and his grandson argued for over 15 minutes about a particular line call). Usually, when an impasse is reached, players will agree to take the point over.
As should be clear by now, I would never get all our practices down on paper, no matter how long I stayed at it. In fact, I haven't even finished explaining our system for calling lines, or the "rules" related to the length of time it's appropriate to debate a particular line call.

In addition, in my attempt to codify our game for "outsiders" (those who have never seen us, or other hackers, play), I have found myself distorting the reality for the sake of convenience. In many cases, I ignored what I knew to be clear exceptions to avoid getting bogged down in impossibly complicated nuances that I'm only dimly aware of.

For instance, one friend, John, and I always discussed controversial issues when we played singles but never when we played doubles! I also ignored the fact that the various groups I play tennis with do not play by identical rules (e.g., normally we spin a racket to determine which team serves first, but when we play at Nazim's house, the player who opens a can of balls serves the first game); only hinted at the effect a change in circumstances (outdoor vs. indoor, free vs. fee) can have on our game; and oversimplified the modifications in our game over the years.

Thus, as I've tried to show, the "casual" game of tennis that my buddies and I play is really based on an enormously complex set of "rules"—assumptions, traditions, and conventions—that govern our behavior on the court (whether we are consciously aware of it or not).

My contention is that no one could ever "fully" describe those rules or those governing the players of any other game.

**The infinite-regress trap**

It is time to see exactly why a complete listing of a game's rules is impossible. There are several reasons:

1. Game rules, like any rules, must be stated in some language, and all language is subject to interpretation. But the rules for interpreting any language would also have to be stated in some language, and these rules would likewise have to be interpreted. We are trapped in an infinite regress. Thus, the question "What are the rules?" can never be answered fully.

2. Each individual player could have his or her own personal conception of a game which would differ (if only slightly) from all other players' versions, and each player's understanding of that game's rules could change over time. No finite list of rules could include an infinite number of possible variations.
3. Since any two players could be playing the same game with different interpretations, there would have to be a set of meta-rules for reconciling these differences when they surface.

   Of course, these meta-rules are, in effect, the rules to another game and are therefore subject to the same interpretive variations as the rules of any other game. Again, we run into an infinite regression. There is no bottom line, no point when we can accurately say, "These are the ultimate meta-rules for settling disputes."

   Thus, the questions, "How do we settle disputes about the rules themselves, about whether a player has violated a rule, and about the appropriate penalties for a rule violation?" can never have a final answer.

4. Even if two players agree on certain rules and how to interpret them, disputes about what actually occurred (such as whether a ball landed on the back line or just beyond it) can still arise, and the players will need to abide by meta-rules in settling these disputes as well. These meta-rules, like those in #3 above, are also part of an infinite regression, so the question "How do we settle disputes about what really happened?" has no ultimate resolution either.

5. Since there are various "levels" of rules, "higher" rules (such as a real-world crisis) might have to take precedence over "lower" rules (such as time constraints); there must be a set of meta-rules for determining when this is appropriate. As with the other meta-rules we've looked at, there is no "final" set for ending disputes, so the question, "When is it appropriate to suspend certain rules?" cannot be given a full answer.

6. Since all games begin and end and may be interrupted by "outside" events (such as a TV ad), we must have a set of meta-rules for determining when the constraints apply and when they don't. Again, these meta-rules are susceptible to interpretation and dispute, leading to yet another unendable regression.

   "Simons" often take advantage of this fact by tricking players into thinking play hasn't begun and then saying something like, "Before we start, say hi to your neighbor. Ah, I didn't say 'Simon says.'" Therefore, the question, "When do the rules apply?" cannot be fully answered.
We can see now why it is impossible to spell out a complete set of rules for any game. Now, we need to ask why we have no trouble playing a wide variety of games.

**If we can't know all the rules, how can we play any game at all?**

Is it because participants rarely have to deal with "meta-rules" and so the infinite-regress problem almost never comes up?

To me, this is not a plausible explanation. There are simply too many occasions we can name—in virtually every game ever played—in which meta-rule questions arise. When a player accidentally rolls the dice off the table, argues a call, gives (or refuses to give) an opponent a handicap, calls for a do-over, takes a mulligan, asks for a director's ruling, warns an opponent about an unwise move, or encourages the other team to play faster, the players are facing situations that are not (and could not be) completely covered in the recorded rules. Meta-rules (and even meta-meta-rules) are an integral part of all rule-governed activities.

Is it because players don't take games seriously so it doesn't matter that they can't know all the rules?

Again, this doesn't work for me because it is clearly not true in all cases. Obviously, some players (myself included) care deeply about the game and the outcome.

Many of us are playing for high stakes—money, prestige, a trophy, pride, self-esteem, ego satisfaction, a feeling of control, etc. In fact, it's probably pretty rare for players to have no emotional involvement in the game they are playing. After all, why play unless the results "matter" in some important way?

My guess is that almost all players almost all of the time take almost all games very "seriously."

Is it because players mistakenly believe that there is a "bottom line," that the rules are clear, complete, and "final," and that somebody somewhere knows all of them?
This is getting closer to sounding right, but is still a half-truth at best. Having the misconception that a game’s rules are solid and statable can provide a player with a sense of confidence in the "reality" of a game, but my realization that no one can know (let alone state) the rules of our doubles game has not dampened my enthusiasm for tennis one iota. In fact, my recognition that games, like languages, can exist only because of an unspoken, almost mystical, agreement among the participants actually enhances my appreciation of them.

Although my attitude may be idiosyncratic, I seriously doubt that anyone else’s enjoyment of a game (or willingness or ability to play it) would be diminished by realizing that we can’t list all its rules.

"It’s only a game"

I believe we can go on playing games wholeheartedly even when we are aware of the incompleteness of their rules. Why? Because, on a gut level, we cannot distinguish between something fanciful—like a movie or a joke or a dream or a game—and something “real.”

Games feel like any life-event, so we can be immersed in them even though we may know intellectually that they are artificial constructions. Therefore, it makes no difference to us (emotionally) that a list of rules governing them cannot be completed, just as we can be profoundly affected by a joke or piece of fiction or nightmare that is not logical, realistic, or "complete."

We can suspend disbelief and rationality even when some part of our brain is telling us it’s only a story or it’s only a dream) and respond deeply to creations of the imagination—our own or others’.

We can do this because we have the wonderful (and perhaps unique) capacity to operate on the "as if" level; we can play a game as if we know all its rules, as if there is an ultimate set of meta-rules, as if all potential disputes can be settled. We can imagine a game in the abstract and in a vacuum and can project that Platonic ideal onto the one that must be played in the world of social and political reality.

In other words, we can operate on (at least) two distinct levels of cognition at once. We can play any game as if it had an autonomous existence, even though we know perfectly well that the players create the game each time they agree to play and that any player at any time can destroy the game by quitting, by arguing, by stalling, or by any number of other spoilsport tactics.
Similarly, we can play any game as if it is important (and genuinely feel that it is), even though we know that it is not very high on our list of life priorities. We can play any game as if it transcended our culture, even though we recognize that players can have “unfair” (dis)advantages as a result of their upbringing. We can play any game as if it transcended morality (so we might intentionally and unashamedly foul or fool an opponent) even though we know that players can cheat or violate the rules in inappropriate ways.

**Suspension of disbelief**

Without this ability to operate in the conditional universe of “Suppose...” and “What if ....,” game playing would be impossible, as would drama and fiction and, I suspect, language itself. We must be able to behave as if a game were not “merely” play, even though we are fully aware it is nothing else.

Like an actor, we must be able to take on a role but never give up our sense of self. We must be “in” the game to enjoy it but never so far in that we forget who we are. It is a delicate balance fraught with danger, which is perhaps why so many people (especially adults) shy away from games.

**Non-human game players?**

It is also, I believe, one more reason that computers (at least as they are today) will never play a game in the same sense that humans do. Computers have no conditional, no ability to create temporary self-delusions, no play mode, no sense of “as if.” To a computer (we must assume), a chess move is just another calculation, no different from finding the square root of pi.

To a human, a chess move is (usually) part of a carefully designed pretense, a system of orchestrated assumptions, an artificial structure that can bring stimulation, competition, camaraderie, fun, and a variety of other good feelings. In general, the chess-playing human voluntarily accepts a particular challenge that involves a specific goal and specific constraints and which s/he can abandon at any time. The chess-playing computer, on the other hand, does not choose to start and cannot stop on its own. The human is aware of the voluntary and “non-serious,” conditional nature of the activity, but the machine is not (and probably can never be).

What about animals? Does any non-human creature have the ability to suppose, to imagine something that doesn’t exist except as an agreement among participants? If not, they
will never play a game as we do. They will either take it too seriously or not seriously enough and, therefore, like any spoilsport, undermine the enjoyment of the game for any human participants or observers (as was the case with the water-polo-playing dolphins).

But even if animals (or computers) could think in the conditional, they still might not be able to play games as we do. They would also have to be able to trust other players to function in basically the same way. To play a game (or use a system) meaningfully without knowing all the rules requires the faith that others understand the game/system as you do or at least will behave in ways that seem consistent with such an understanding. Without that faith, a player would inevitably end up being the spoilsport.

**Meta-rules in other arenas**

By way of analogy, consider our (or any other) monetary system. Most people recognize that the currency we use has no inherent worth and that it gains its value from mutual (if tacit) agreement among its users, which means its value is subjective, symbolic, and subject to change.

Few people believe that there is an objective, stable method for determining how much milk a dollar should buy. Most of us understand that there are no "rules" or meta-rules we can refer to that would settle a dispute about the value of a dollar bill and that its purchasing power is dependent on consensus, on other people’s willingness to give us this much milk for this many dollars. And yet we can still use the coin of the realm and, for the most part, get our money’s worth (by our own standards).

The system works even though no one can explain it fully and even though we all know it could collapse at any moment if people stopped trusting each other or the system itself.

The same is true with another currency—language. Even though words have no inherent meaning and no one has been able to list all the rules governing the construction of sentences, we can still communicate reasonably effectively for most purposes.

We all know that anyone at any time can choose to destroy the process by acting on Humpty Dumpty’s premise that words can mean whatever we want them to mean. We know that there is no rulebook, no authority, no indisputable arbiter we can appeal to in such a case (since they would all have to use more words to settle the dispute).

Like any game, communication is dependent on the participants’ willingness to operate as if there were universal agreement about meanings and grammatical rules.
We need to remember, though, that games are not analogous to these two currencies in at least one crucial way. Both money and language, after all, serve obvious, vital functions in the world, whereas the value of games is not nearly as apparent. We can easily understand why people would almost always try to go along with a monetary or linguistic system, since they believe that both can benefit them and the community significantly. In addition, most people recognize that destroying either system could ultimately threaten their own well-being.

**Rule-preserving meta-rules**

But games? The common perception is that no one gets hurt if a game is spoiled. So why would anyone continue to submit to an arbitrary (and incomplete) set of rules that was causing him or her to lose face, patience, and/or money? Why do people continue to play "by the rules" when they are losing the game?

Since losing is undesirable, we need to explain why so few players take advantage of the fact that the rules are incomplete and therefore infinitely challengeable. We need to understand why people almost always play as if the rules were not only complete but knowable and statable, and rarely allow themselves to play the meta-game of arguing about the rules and the meta-rules, ad infinitum.

One possible answer, of course, is that players don't realize that this "strategy" exists, but I think that all of us have witnessed many examples of the kind of behavior I'm talking about. Almost everyone has seen images of managers and players, nose to nose with an umpire, arguing a call or an interpretation of the rules, and even non-sports fans have probably seen TV ads based on John McEnroe's antics on the court, so I have to assume that virtually everyone realizes that this option is theoretically available to any player.

So what are the real "meta-rules" that keep most of us from playing this particular meta-game? Here are a few of them:

1. A game is supposed to be for fun, and, playing the game itself is more fun than playing the meta-game of arguing. Except for young boys in the front yards of America (who will argue endlessly about a single play), most players have learned that the meta-game is boring, repetitive, and fruitless, often ending in a stand-off;

2. A game is supposed to test certain skills, and these do not usually include the skills of debate, sophistry, and intimidation tested by the meta-game;
3. A game is supposed to be for camaraderie, and arguing about the rules leads to antagonism rather than a spirit of friendly competition;

4. Players are supposed to be good sports [whatever that is], and rule challengers are perceived as poor sports or even spoilsports;

5. The "ideal" game, the game we all want to play, works fine as it is and does not include a discussion of rules or meta-rules;

6. A set of rules that has been tested is better than one that has not, so if it's not broken, don't fix it;

7. Doing things as others have done them in the past allows us to feel connected to our ancestors, our culture, and our traditions;

8. Following the rules that others follow allows us to compare ourselves to a wide spectrum of players, not just our immediate opponent[s];

9. Challenging long-standing traditions is inherently unwise because it creates the impression that nothing is sacred and could, if carried far enough, lead to anarchy.

For all these reasons, a player who argues about rules risks disapproval, sanctions, and even ostracism, so the vast majority of us choose to "leave well enough alone." Most people avoid and frown on the meta-game of arguing with rules and meta-rules because, without necessarily being aware of their reasons, they perceive it as a threat to pleasure, continuity, and stability. Thus, most games continue to be played "as they always have been." For the same reasons, many people are suspicious of new games.

To return to our central question, then, we can play a game even though we can't know all its rules because, for a variety of reasons, we tacitly conspire with our fellow players to act as if we know them all.

**The big picture**

In this way, games are no different from every system we use. In an important sense, all rule-governed systems—including law, politics, war, morality, education, economics, and language—are games, as many people have noted. Therefore, virtually all of the lessons we learn from "non-serious" games are directly transferable to the "real" world. What are those lessons? What follows from the acknowledgment that no human system has a completable set of "rules?" Let us spell out some of the implications.
1. Power and authority are arbitrary, not inevitable, depend on consensus (or at least acquiescence), and have no "divine" right to exist.

2. Rules for any system are not handed down from above, can exist only through the agreement of the participants, are always open to negotiation among the "players," and are continually evolving. As Robert McConville reminds us, if a game survives, "the rules for playing the game are constantly being changed as they are passed from tribe to tribe and generation to generation" [The History of Board Games, p. 8].

3. The most powerful rules, the ones least likely to be violated, are those that are not stated explicitly, those that people have to infer or intuit. To state a rule is to invite players to break it, but to leave a rule unstated is to make its violation almost literally "unthinkable."

4. We cannot accurately predict how any rule, stated or unstated, will be interpreted or enforced, so no rule, simply by its existence, will necessarily produce or prevent a desired behavior.

5. We cannot accurately predict or control what customs, norms, conventions, traditions, or expectations will evolve for a particular game or system of rules.

6. No set of rules is inherently superior to any other. In order to judge a set of rules, we must employ a set of meta-rules, which themselves would have to be judged by a set of meta-meta-rules, and so on ad infinitum.

7. An infinite number of sets of rules will "work," will allow us, individually or collectively, to function successfully (or at least to our own satisfaction).

8. The longer a system is followed and the more people who attempt to follow it, the more complex the recorded rules will become, and the more sets of meta-rules and meta-meta-rules, etc., will be recorded. Consider any legal system, religion, or professional sport as prime examples.

9. Every person operates according to an unlimited number of sets of rules, so it is almost inevitable that some of these sets (such as religion and business) will come in conflict with each other, which means that every person is also operating according to an unlimited number of sets of meta-rules for reconciling such conflicts, and an unlimited number of sets of meta-meta-rules and so on.
10. As humans, we have little choice but to act as though some of these sets of rules were absolute and indisputable. Otherwise, we would be trapped in an infinite regression and utterly unable to make meaningful choices.

11. Paradoxically, we cannot live according to any set of rules (because we can never know them all and because they will inevitably conflict with other sets we are trying to live by), so in order to continue to perceive ourselves as faithfully following a “complete” set of rules, we must learn to rationalize our deviations from it (or feel a great deal of guilt).

12. It is reasonable to say we are playing a game/living by a system even though we are not following all its rules. For this reason, following some of the rules in a system creates the expectation [in ourselves and others] that we will follow all the rules, including the unstated and the unstateable ones.

13. No one can tell for sure if someone [including oneself] is “really” playing a game/living by a system because it is not possible for anyone to follow all the rules in a game or system. Therefore, we can pretend to be playing any game/living by any system without others being able to detect that we are pretending. We can also pretend to be pretending and so on, and no one will be able to tell the difference.

14. No two people can possibly follow the same set of rules in exactly the same way.

Obviously, the recognition that we cannot know all the rules in a system can have a profound effect on how we approach the world. It can make us want to curl up in a corner with our thumb in our mouth or to go out and make sweeping changes in our most important institutions. It can destroy us or free us, depending on how we feel about a world in which there are no absolutes, no bottom lines, no final list of rules, a world in which all systems are “equal” and all meaning relational. Some [including myself] are comfortable with, even invigorated by, this notion, but others [perhaps a large majority] are enormously disturbed by it.

**Today Parcheesi, tomorrow the world**

Of course, there is nothing new about the relativist claim, but, to my knowledge, no one has applied the concept to games, those obviously artificial constructs. The argument has raged about more “important” human systems, like law and religion and language, so emotions, desires, and values always tend to cloud the issues. People understandably want to believe
that their beloved institutions are sacred, unchanging, and right, but (almost) no one feels that way about games.

So I have chosen to examine the reality of rules and meta-rules in this non-volatile, "safe" context of games, hoping I would not scare away those who tend to shun a relativistic argument. My goal has been to show convincingly that we cannot know all the rules but we can still play the game, so that I could suggest, through analogy, that

We can go on using (and revering) any system even if we acknowledge that it is as artificial, arbitrary, challengeable, and "incomplete" as any game.

Any system, no matter how long it has been around and no matter how complex its list of rules and meta-rules, is viable only as long as there are individuals who support it.

Conclusions
If my efforts have been successful, if people take away valuable lessons about "life" from this analysis of games, it will demonstrate, ironically, that games can indeed serve at least one vital social function: as abstractions of "real-world" situations, they can provide an analog to other, more "important" and more complicated, aspects of life and thus can help us see what otherwise might be invisible. If for no other reason, games should not be dismissed as trivial forms of entertainment. If we remember to use them wisely, they could be a profoundly important aspect of our culture. As the young would say, GAMES RULE!
Anyone else could have saved her: Life is Strange gave my personal tragedy a score

April 21, 2015 • 6 min read • original

This article contains frank descriptions of suicide, as well as spoilers for Life is Strange.

At the age of 15, I failed to prevent the suicide of a dear friend named Sarah.

I first met Sarah on a My Chemical Romance web forum. We bonded over a shared love of the band and ended up providing emotional support to each other over a period of around eight months. Having never physically met, I felt I could tell Sarah anything without fear of consequence or judgment. If I ever needed support, she was there. I tried to offer that same support to her.

One night, she came on MSN telling me that she couldn't face another day living. It wasn't that her life was particularly terrible as far as I could tell, but she felt a consistent emptiness somewhere within her. She had failed her exams, she had no plans for the future and she just couldn't see a reason to keep living.

We spoke for about six hours that night. I tried to keep her talking by breaking our time down into seconds and minutes. I tried to scare her into fearing oblivion more than she feared her present. I tried to tell her things would get better and I tried to make her see that I cared about her. I desperately clung to what was left, hoping that I could find a way to keep her with us just a little longer. I didn't know her real name, nor where she lived. I couldn't contact the authorities.

By the end of the night, Sarah had committed suicide.

Dealing with the aftermath

In the years since I failed to stop Sarah taking her own life, I've had to find ways to cope with what happened. I told myself she was the one who chose to take her life. I told myself that I did all I could. I told myself that no matter what I did, I could not
have changed how she felt. My actions alone could not have saved her life. Nothing I did or failed to do was the cause of her death. It was not my fault.

I told myself time and time again that my actions could not have affected the outcome of that day.

I’ve often heard it argued that video games should be treated the same as any other artistic medium when it comes to narrative design. If you can have a book feature a mass shooting, then you can do it in games. If movies can depict rape, then so can video games. Video games do not cause players to re-enact what they see on screen, so it’s often argued that there’s no harm in portraying emotionally difficult narratives where the consumer has agency within the situation.

The second episode of the video game *Life is Strange* is the experience that convinced me that agency over emotionally tense situations can not only be incredibly powerful, but that power puts a huge duty of care in the hands of creators. I think that video game creators need to treat difficult subject material with a greater degree of responsibility that creators in any other medium.

*Life is Strange*, which centers on the story of a teenage girl who discovers she has the ability to rewind time at will, spends the bulk of its second episode convincing the player to frivolously overuse their newfound power by goofing off all day with a close friend named Chloe.

Toward the end of the episode, the player is forced to face their friend Kate, who has spent the entire episode battling a traumatic series of events in her personal life and is now standing on the roof of her dorm planning to take her own life.

The player is made aware that they only have one chance to prevent their friend’s suicide; there are no do-overs if you fail. I did everything in my power to save Kate, much like I did with Sarah, but ultimately it wasn’t enough. I was forced to watch Kate fall to her death. I was powerless to stop her. It was my fault she was dead.

I initially assumed that there was nothing I could have done to save Kate. Maybe all answers eventually led to her taking her life? Perhaps the clues to save her just did not exist.
As it turns out, not only could I have prevented her from taking her own life, but almost 80 percent of players in my shoes managed to prevent her suicide. Presented with the same information, experiences, opportunities and options as me, only 20 percent of people failed to save Kate.

Where I had tried my best and not been able to save her, almost everybody else in my shoes managed to convince her that life was worth living. They paid enough attention. They found the clues. They understood her well enough to get through to her. Her suicide was preventable, and my actions could have saved her.

**Games and the responsibility of agency**

Having agency over that scene shook me to my very core. Being expected to relive one of the worst days of my life and experiencing the same outcome was tough. Being told five minutes later that the outcome was my fault? That was incredibly distressing. Years of convincing myself I couldn’t have saved Sarah suddenly came into question. Even worse, so many others did a better job.

If someone else had been in my shoes, would Sarah still be here today? If Sarah had gone to somebody else for support, would they have been able to convince her that things would be OK?

Am I responsible for the fact she took her life?

I think that agency is one of the key things that sets video games apart from any other creative medium. If a movie had its lead character fail to talk someone out of taking their own life, the majority of the emotional burden would be on the character, not the viewer. When you give a player control over that situation, a much larger portion of that burden ends up on the shoulders of the player. It’s not just the character who failed to save a life, it’s you, the player, who failed.

This is the power and beauty of games

To be clear, I’m not saying that video game creators cannot insert this kind of narrative thread into video games. There is no reason that my distressing, relatively rare experiences should prevent a creator from telling this story. Your responsibility as a creator is to your work, not the personal circumstances of everyone who may play the game.

What I do want to suggest, however, is that far more than any other form of media, creators of video games need to be aware that this medium not only increases engagement but also increases the emotional burden on affected players in a
unique way. I have watched films and read comics in the past that dealt with themes of unpreventable suicide and, while difficult for me to get through, passive forms of media have never left me this distraught.

By giving me control of the situation in *Life is Strange*, developer Dontnod Entertainment suddenly forced me to inspect my own agency in my life. That has an emotional price attached. This is the power and beauty of games; what feels like an echo of pain in other art forms feels like a punch in the gut when the same topic is explored in a well-made game.

**A feature, or a bug?**

So how do developers handle that kind of power?

Trigger warnings offer an opportunity for players to avoid narratives that contain very specific situations that trigger traumatic memories of past events, but they inherently remove an element of surprise for players wanting to experience stories fresh.

If a trigger warning isn’t for you specifically, you’ll likely regret having read it; what would have allowed me to avoid a situation that I found painful would just read like a spoiler for most people.

You could bring up a menu when these scenes are about to occur, allowing players to skip the scene or hand control to the game. But this breaks the flow of the game considerably, which can damage narrative tone and pacing for the majority of unaffected players. For an experience as cinematic as *Life is Strange* you’d be trading the welfare of a few very specific players for a less cohesively flowing experience for everyone else.

You could even offer detailed support to players after the scene is over, but doing so is predicated on the assumption that your player is able to get through the entire scene. If a player stops playing halfway through a segment, then they’re affected by the narrative you as a developer have created, but they don’t reach the point where support would have been offered to them.

Ultimately I do not know the right solution here. Video games have a unique ability to touch players and alter their emotional state, but that power comes with a duty to ensure that players whose emotions are affected are properly supported afterwards.
The second episode of *Life is Strange* put a huge emotional burden on my shoulders that caused me to walk away deeply distressed, and the game completely failed to understand the implications of what it had done. It gave me agency over a deeply tragic moment, then very quickly introduced traditional video game scoring elements that ranked my failure against other players. Tragedy had become gamified.

As a developer you can use agency to emotionally engage audiences. Just understand the burden you’re putting on players and be prepared for the consequences that come with that.

It’s one thing to show me a character fail to stop a suicide; that’s merely difficult and upsetting. It’s something very different to put that situation in my hands without warning before scoring me on how I perform.

You’re not always warned before you’re shown something that could cause you emotional distress in any art form, but this is an aspect of the game I wish I could have properly prepared myself for.

The views expressed in this article are those of the author and do not necessarily represent the views of, and should not be attributed to, Polygon as an organization.

---

**Original URL:**