

# Engines of Experience

## Mechanics and Events

---

**Games are composed of MECHANICS, which define how the game works.**

---

A MECHANIC IS A rule about how a game works. *The A button makes Mario jump* is a mechanic. So are the rules *characters walk at one meter per second*, *pawns capture diagonally*, and *players alternate taking turns*.

In board games, mechanics are written in the rulebook. In video games, they're implemented in computer code. But whether the mechanics are executed ritualistically by a player or electronically by a computer, they're still mechanics because they define the game's behavior.

---

**During play, mechanics and players interact to generate EVENTS.**

---

An event is something that happens during play. *Mario hits a wall and bounces back*, *the pawn captures the rook*, and *the ball went in the net*, so *the other team gets a point* are events.

In nearly every other entertainment medium, events are authored directly. A screenwriter, novelist, or choreographer will decide every action, motion, and line of dialogue in the work. Their product is a long series of predefined events: first Luke meets Obi-Wan, then his parents die, then they hire Han Solo, and so on. And those events play out the exact same way every time.

Games are different. Instead of authoring events directly, we design mechanics. Those mechanics then generate events during play.

For example, while playing *Super Mario Galaxy*, I once tried to make Mario jump over a pit. I missed, and Mario touched lava. His backside burst into flames and he shot straight up like a bottle rocket, screaming in cartoon pain. As he flew through the air, I maneuvered him to a safe

ground landing. The events were Mario jumping, missing, hitting the lava, bursting into flames, flying into the air, screaming, and maneuvering back to safety. The mechanics behind these events were the jump button, gravity, physical collision, the explosive-butt lava reaction, and my ability to control Mario's motion in midair.

The disc of *Super Mario Galaxy* does not contain any of the events described here—it only contains the mechanics. The events emerged from the interaction between my play and the game mechanics. And those events will never play out exactly that way ever again.

Game designers don't design events. We design systems of mechanics that generate events. This layer of indirection is the fundamental difference between games and most other media. It is our greatest opportunity and our toughest challenge. It is also the key reason why modes of thought borrowed from other media break down so often in games.

## The Primacy of Emotion

---

**To be meaningful, an event must provoke emotion.**

---

A game can't just generate any old string of events, because most events aren't worth caring about. For a game to hold attention, those events must provoke blood-pumping human emotion. When the generated events provoke pride, hilarity, awe, or terror, the game works.

---

**The valuable emotions of play can be very subtle. Usually, they're subtle enough that players don't consciously detect them.**

---

Games must provoke emotion, but this doesn't mean that every game must make players laugh madly, scream with rage, or break down and cry. In everyday speech, people often use the word *emotion* to refer only to the most extreme forms of passion, like visible rage or grief. But most emotion is much subtler and more pervasive than this.

For example, as you sit and read this book, you may think you're not feeling anything. But you're actually experiencing a barrage of tiny pulses of emotion. Anything can cause them—a stray thought of lost love, a goofy word on a page (snartlebarf!), or a scowl on the face of a stranger walking by. These feelings only last a moment, and they're usually below the level of conscious awareness. But they're always there, rising and falling in response to every stimulus and thought.

Events in a game produce these small emotions. A minor setback creates a pulse of frustration, and makes you grit your teeth for an instant. A moment of indecision worries you, and your breath catches. Another player acknowledges you, so you feel a faint glow of acceptance.

These tiny feelings are painted with a very fine brush. It's not enough to say you're happy or sad or bored today. Those words describe giant shifts in the most obvious feelings. The tiny emotions—the ones that make up the tapestry of play—change constantly, every second. This is doubly true when playing a good game.

Imagine playing chess against a stranger. It's your turn, and you're losing. You don't see a good move, so you feel *stress* and *mental strain*. As you study the board, the tension mounts. Then, you see your opening: if you jump your knight backward, you can cover your king and threaten his at the same time! Silent *relief* floods in followed by a *sense of accomplishment* for solving the puzzle. You make the move, and your opponent grimaces as he realizes what you did. Seeing this, you feel a sense of *dominance*. Your opponent starts thinking. As you're enjoying your *satisfied glow*, you notice a weakness in your position. If he throws his bishop across the board, he can guarantee a capture on your knight. But it's not an obvious move. Will he see it? Your satisfaction transforms into *suspense*. Time stretches out as you try to hold your poker face. Finally, your opponent moves a pawn. *Relief* floods over you again, with even greater intensity than before, as you realize that you've got this one in the bag.

From the outside, this game doesn't look like much. Two people sat at a table, made strained facial expressions, and quietly moved plastic pieces across a board. Even the players didn't consciously sense everything they were feeling. But they were experiencing the roller-coaster emotions of competitive chess all the same. And they will come back to get that shifting cocktail of emotions again and again.

---

**Detecting and understanding subtle emotions is a designer skill.**

---

It's hard to sense such subtle feelings. It takes effort and practice. Can you pinpoint the exact second when you first feel bored with a game? Can you feel your involuntary smile at a joke you assumed wasn't funny? Most people can afford to ignore such feelings, but that's not good enough for a game designer. Just as a skilled chef can deconstruct a complex dish into individual flavors and a musician can pick out chords, time signatures, and rhythms from an orchestral composition, a game designer must be

able to sense a flicker of anger, a pulse of triumph, or a dash of disgust. Because those emotions are the reason the game exists. They are why players spend energy, time, and money to move tokens on a board or throw a ball through a hoop.

The primacy of emotion is one of the great unacknowledged secrets of game design. Ask anyone about a game and they'll tell you what they thought of it. They'll make some logical argument about the game being good or bad. But usually that logic is just an automatic rationalization for the emotions underneath. What really matters is how a game makes us feel.

---

**The emotions of play are not limited to "fun."**

---

Unfortunately, game design discussions are still often shackled to the word *fun*, as though there was some inherent connection between fun and game design. The link is there, but it's due to a quirk of history, not a fact of reality.

Fun is an emotion—that sense of frivolous, mirthful exhilaration you feel on a roller coaster or in a friendly game of pickup soccer. It's a pleasurable emotion, and a worthwhile design goal. But it's not nearly the only one. We only focus on it because of where games came from.

For most of history, there were no game designers, and games were pieces of folk culture passed down through generations and enjoyed mostly by children. When adults played, it was typically as a short reprieve from their harsh, bland lives. In such a primitive environment, nobody needed a better term than *fun* to describe good games.

Today, we have more technology, professional game designers, and game players with ever-diversifying emotional appetites. To do our jobs well, designers must use more than one global term. *Fun* can't possibly describe the diversity, power, and nuance of game-driven emotions. It would be like a chef describing every dish as either "tasty" or "tasteless."

Think of all the things games can do that are not mirthful or frivolous. Some games use violent competition to provoke feelings of chest-thumping triumph. Some use narrative to create empathy or wonder. Some pull us into dark contemplation of existence, or horrify us with needling psychological terror. *Doom*, *Super Mario 64*, *Street Fighter II*, *Half-Life*, *StarCraft*, *The Sims*, *DEFCON*, *System Shock 2*, *Deus Ex*, *World of Warcraft*, *Dwarf Fortress*, *Portal*, *Tetris*, *Braid*, *Katamari Damacy*, and *S.T.A.L.K.E.R.* all create powerful emotions, but each is unlike any of the others. The white-

knuckle action of competitive *Street Fighter II*, the starving dread of *System Shock 2*, and the contemplative mourning of *DEFCON* are all emotionally gripping—but none of them are fun.

## Emotional Triggers

Game mechanics interact to generate events, which in turn provoke emotions in players. But how, exactly, do events create emotion? What is the link between something happening in a game and that pulse of joy or sorrow that appears in response?

---

**Your unconscious mind constantly analyzes your situation. When certain conditions are met, the unconscious triggers an emotional response.**

---

For example, when you stand next to a cliff, a genetically encoded instinct senses the situation and triggers a fear response. When you look at a prospective mate, your unconscious mind analyzes everything about that person, from physical features to reputation to their history with you, and produces an appropriate feeling of attraction, neutrality, or disgust. Each of these emotion-causing aspects of a situation is an *emotional trigger*.

---

**An EMOTIONAL TRIGGER is some thing or observation that causes emotion.**

---

We have countless different emotional triggers. Physical danger, changes in relationship or social status, learning, strengthening, acquisition of possessions, signs of sexual opportunity, family and safety, and certain types of natural environments are the most obvious, but they're not the only ones. Humans also respond to music, philosophical ideas, humor and wit, and countless forms of art. Some of these triggers are fixed in our genes. Others can be learned. Most involve complex interactions between conditioning and human nature.

Emotional triggers can be extraordinarily complex. Consider, for example, a detective's hunch. A hunch happens when the emotional unconscious has solved the case and is desperately trying to signal its findings. On the surface, the detective is struck with a feeling that something is wrong, but he isn't sure why. Underneath that, his unconscious mind is working through a maddeningly complex set of inferences and associations—so complex that his unconscious understands the case better than

he does. Our emotional triggers can be so complex that we can't even understand them.

## Emotion and Change

The bedrock principle behind all emotional triggers is *change*. To cause emotion, an event must signal a meaningful change in the world. But not just any change will create emotion.

---

**To provoke emotion, an event must change some HUMAN VALUE.**

---

For example, an asteroid crashing into a distant planet is an astronomical curiosity. An asteroid crashing into Earth is the most wrenching event that could occur. The difference is in the implications to human beings. In one case, nothing human-relevant happened. The other represents a massive shift from life to death.

[life/death] is an example of a *human value*.

---

**A HUMAN VALUE is anything that is important to people that can shift through multiple states.**

---

Human values can be in positive, neutral, or negative states. Only changes that shift human values between these states are emotionally relevant.

Some examples of human values are [life/death], [victory/defeat], [friend/stranger/enemy], [wealth/poverty], [low status/high status], [together/alone], [love/ambivalence/hatred], [freedom/slavery], [danger/safety], [knowledge/ignorance], [skilled/unskilled], [healthy/sick], and [follower/leader]. Events in games can shift all these values and more.

In *Minecraft*, players are assaulted by zombies every night. When they finish constructing a fort to hide in, they feel relieved because their situation has shifted from danger to safety.

In *Street Fighter II*, a kid starts playing tournaments. At first, he is easily defeated by the local experts. But he doesn't stop. He keeps practicing, working his way up the ladder. Eventually he wins a regional tournament, then a national, then a world championship. These are life-changing events because they represent huge shifts from ignorance to knowledge, from low status to high status, and from defeat to victory.

In *World of Warcraft*, two players meet while defeating a monster together. One invites the other to join a guild. Stranger becomes friend, and alone becomes together.

In *Half-Life*, the player character is trapped in a giant underground laboratory full of monsters invading from another dimension. Occasionally, he meets other survivors—scientists and security guards—who may accompany him for a time. Finding these allies and losing them are both emotionally gripping events because of the shift from alone to together and back.

In some cases, the changing human value exists only inside the game. Other times, it can be real. For example, gambling games create emotion around changes in real wealth. The action of playing craps is fairly boring—players merely roll dice over and over. But when money is riding on the outcome, every roll becomes a nail-biter since it implies a shift between poverty and wealth.

Games can even provoke emotion by physically threatening players. The experimental video game *PainStation* plays exactly like *Pong*, but it's far more emotionally intense because every failure is followed by a mechanical slap on the hand or an electrical shock. The tiny moving ball on the screen carries a lot of emotional weight when it can physically punish you.

---

**What's emotionally relevant about an event is not the event itself, but the changes in human values implied by that event. The more important the human value and the more it changes, the greater the emotion.**

---

Consider the event of losing a pawn in chess. In the early game, this may be a minor concern. The implications of losing early pawns are that you have fewer pieces and your pawn structure may be weaker. But in the late game, one pawn may be the difference between victory and loss. If you unexpectedly lose the pawn that was guarding your king, you feel dismayed because the game was just lost. The event is the same in each case, but the implications are different because one represents a small nuisance, and the other is a shift from victory to defeat.

Even events that seem to be very minor in themselves can be emotional if they have important implications. Consider the act of scouting in strategy games. Scouting is no more than seeing an object. It creates nothing, destroys nothing, and moves nothing. By itself it is almost a

nonevent. But scouting a strategically important building can reverse a losing game because that one key piece of information can form the core of a new strategy that may lead to victory. So, in a game full of combat and bloodshed, the most emotionally gripping moment might be simply seeing a building.

There are countless ways to create important human value changes in response to even small events. For example, the *Modern Warfare* series of multiplayer shooters has a *kill streak* system that hands out special rewards to players who kill a certain number of enemies without dying. 3 kills in a row might give a useful radar scan, 7 a friendly jet airstrike, and 11 a powerful AC-130 gunship attack. This design works because it increases the implications of certain kills. The 11<sup>th</sup> kill is far more meaningful than the first because it changes the broader game state more than the first kill. The two kills themselves could be exactly the same—say, shooting an enemy as he runs around a corner—but their emotional charge is different because the implications are different.

---

**Emotions don't just appear in response to a change. They also appear in anticipation of change.**

---

The emotional unconscious doesn't just respond to what's happening. It constantly peers into the future, watching for human-relevant threats and opportunities. When it finds one, it signals it with emotion.

Imagine playing *Modern Warfare* again. You have counted 10 kills. You know that one more kill will get you the AC-130 bonus and that you'll likely win the game. In this situation, small local events such as your death or the killing of a single enemy may determine the outcome of the entire match. So you feel suspense because you sense that you are on the knife edge between two drastically different game outcomes. Everything rides on what happens in this moment. You're feeling an emotion not about something that has happened, but about something that might happen. This type of suspense is white-knuckle gaming at its finest.

But even this situation can sag into boredom if the unconscious senses that there is nothing hanging in the balance. Imagine the same situation where you are at 10 kills. This time, however, your team is already way ahead of the other team in score. The AC-130 itself will have the same effect, but the situation is much less suspenseful than before because your next kill or death won't actually determine the outcome of the game. The human value of [victory/defeat] is already locked at victory, so there is no

way for it to shift. If you make the kill and get the AC-130, your team wins. If you die, your team will win anyway.

The unconscious constantly balances these ledgers of consequence and directs our conscious attention to the ones that are most lopsided—that is, the ones with the greatest potential shift in human values. When the player's unconscious senses a potential shift in human values, he will feel it.

---

**A reveal of information is emotionally equivalent to change.**

---

In terms of emotional impact, there is little difference between learning a fact and a fact becoming true, because the implications and opportunities are the same. It is the emotional difference between losing a thousand dollars on a die roll and realizing you've lost a thousand dollars when the dealer turns over the last card. The die roll was an event, the card flip was a reveal, but the human value shift and the resulting emotions are the same.

Think of a horror game in which you must walk down a hallway flanked by several doors. You know the killer is behind one of the doors, but you don't know which one. This situation stereotypically creates suspense because there is a looming possibility that you will learn something with extremely important implications (possibly shifting life to death). Now imagine a sci-fi horror game in which you walk down a hallway flanked by teleporter pads on which the killer can appear. In one, the killer was always there and is revealed behind a door. In the other, he teleports in. But the two situations are emotionally equivalent.

This means that games can create human value shifts by denying and revealing information. In some games, it can be hard to constantly generate changes in human values. These situations can be kept more interesting by not telling players everything, and instead rationing out information in a structured way to create suspense.

## THE EMOTIONAL BLACK BOX

Emotion is the goal of game design. But this presents a challenge, because it's hard to track the precise origins of our emotions.

---

**We can't directly perceive the logic behind our emotional triggers.**

---

Emotion is not a choice. You don't see the edge of a cliff and decide to become afraid. You don't see a beautiful person and logically conclude that you should be attracted to them. Emotional triggers are automatic calculations handled by an unconscious part of the mind, similar to the ones that help you keep your balance while walking or recognize a familiar face. So even if you know what you feel, you can't ask the unconscious *why* it created that surge of attraction, disgust, serenity, or fear.

## THE BRIDGE

A classic research study demonstrates the psychological disconnect between emotions and their causes.

Imagine you're a young man in Vancouver. It's 1973. You're crossing the Capilano Canyon Suspension Bridge. The bridge is a 5-foot-wide, 450-foot-long death trap. It sways in the wind like a deadly wood-and-rope bridge from an old adventure film. Looking down over the edge, you can see the jagged rocks between the trees 230 feet below.

In the middle of the bridge, an attractive woman asks if you'll take a survey. She is doing a project for her psychology class on the effects of scenic settings on creative expression. The first page is filled with boring questions, like name and age. The second asks you to write a short story based on a picture. After you're done, the woman tears off a corner of the survey, writes her phone number and name on it, and tells you to call if you have any more questions.

The woman is a confederate of psychology researcher Arthur Aron. What Aron is really interested in is how much sexual content you wrote into your story, and how likely you are to call the woman back for a date, compared to control subjects on a safer bridge nearby. The bridge would make subjects' hearts race and their palms sweaty. The question was would they reinterpret these fear responses as sexual attraction toward the woman?

They did. Subjects on the scary bridge wrote significantly more sexual imagery in their story and were four times as likely to call the woman back later than those on the safe bridge. These results persisted even through further studies that eliminated factors like subject self-selection (the possibility that more adventurous men are both more likely to cross the scary bridge and more likely to call the woman).

The men who called back the woman thought they were attracted to her because their hearts raced when they spoke to her. In reality, their hearts were racing because they were on a dangerous-looking bridge. But

they couldn't tell the difference, because our emotions do not report their true causes.

## EMOTIONAL MISATTRIBUTION

The men in Aron's study had no natural ability to track the true cause of their emotions, so they attributed them to the most salient thing in view: the attractive woman. This kind of emotional misattribution happens constantly. We think we feel a certain way for one reason, when the reason is completely different.

Some people use emotional misattribution to manipulate. For example, watch closely the next time a political documentary wants to characterize a politician as a bad guy. When his face appears on-screen, the music shifts into an evil-sounding drone, and the image is stripped of color, distorted, and slowed down. The director is hoping that the feelings of apprehensiveness that come from the music and visual effects will be misattributed to the politician, tricking people into being afraid of a person when they're actually afraid of a scary noise.

Entertainment producers do the same thing. For example, there is a trope in TV drama that I call the Leonard Cohen Gravitas Moment. It comes at the start of the third act of the show, when things are bad and it looks like all hope is lost. The dialogue stops, and a soulful or catchy song—often something Leonard Cohen-like—swells as the camera slides through a montage and a voiceover discusses the theme of the show. Viewers feel refreshed and contemplative. But they misattribute these feelings to the story when they actually come from the song.

---

**Even though we don't know why we feel as we do, we effortlessly assign logical causes to our emotions without realizing it. These assumed causes are often wrong.**

---

While one part of the mind is hard at work deciding what emotions to generate, another is hard at work inventing reasons why we're feeling those emotions. Sometimes those reasons are accurate, but often they are not. Yet no matter how wrong they are, we believe them instantly and wholeheartedly.

In one of the many studies examining this behavior, researchers set up a nylon display with four stockings in a department store and asked shoppers which was the highest quality. Eighty percent of them said the

one on the right. When asked why, they cited color or texture. But in reality, the stockings were identical. They chose that particular stocking because of how it was positioned, and rationalized why afterward. They weren't lying intentionally, and they had no idea that they were rationalizing. But they were.

This is why players almost always report game experiences by explaining the causes of their feelings, not the feelings themselves. They'll say, "I liked that it was fast," or "It wasn't fun because the wizard staff was boring." The true parts of these statements are the raw emotions behind "I liked it," and "It wasn't fun." But the players have automatically appended reasons why they felt these things. The players don't have a direct line to their emotional mechanisms, so they don't know why they felt what they did. But they do have the human ability to instantly rationalize nearly any behavior or opinion.

---

**Emotional misattribution makes it hard to understand how games affect us.**

---

A game presents a hundred different stimuli and decisions, and provokes a multilayered emotional response. But which parts of the game triggered which emotion? There's no easy way to know.

Imagine playing a fighting game against a friend in a local tournament. It's the last round and you're neck and neck. Your foe dodges your energy blasts as he advances toward you. Reaching striking distance, he feints, hoping you'll block. You call his bluff and knock him out with a devastating uppercut. It's obvious what you feel: a tapestry of exhilaration and suspense, heart pounding, white knuckles on the controller, shouting audience members, eyes widening, a rush of victory. But why? What, exactly, caused each of those feelings? Was it the exotic fighting characters? Cool-looking moves? Beautiful environmental art? Was it the the competition with your friend, changing your relationship with him? Was it the threat of losing face in front of him? Or perhaps it was just the raw sensory overload of incendiary light flashing on the screen. There was a fast techno song playing in the background—did that make a difference? Was the game's overwrought backstory a factor?

In fact, every aspect of that situation contributed something to the emotions it produced. But as humans, we don't have a mental circuit that tells us which cause led to which effect. It's just not something we can do.

The upside is: we must question off-the-cuff emotional reasoning. When someone says he disliked a game because of the visuals, or the story, or the controls, don't take him at face value. Don't expect to understand how a game is affecting players just by looking at it.

There are ways to partially decode the puzzle. We can use systematic methods like playtesting or statistical metrics analysis to observe some of the effects of small changes. But even with these evidence-based methods, we can never fully understand a game because we can never watch the internal workings of a human mind—even our own. Instead, we have to tease out the mind's emotional triggers by theorizing at a distance. We're like a group of priests trying to read the will of a capricious god from eclipses and chicken guts. And like such priests, we often get it wrong. This makes game design very difficult.

## The Basic Emotional Triggers

Let's take a look at some of the most common emotional triggers.

### EMOTION THROUGH LEARNING

Think back to a time when a hard concept finally clicked in your mind. Your eyes light up, your mouth curls into a smile, and the unmistakable expression of epiphany leaves your lips: "Ahhhhhhh!" Learning feels good.

---

**The more important a lesson is to a human value, the more we're driven to learn it.**

---

Puppies have an instinctive drive to play-fight. It looks playful, but the reason they're doing it is deadly serious. Prehistoric puppies that didn't play-fight grew up into unskilled fighters. They thus failed to reproduce as well as the play-fighters and were weeded out of the gene pool. For dogs, an early predisposition to mirthful play-fighting is a survival strategy in the heartless game of evolution.

The same applies to people. We have a natural desire to learn, but that desire isn't indiscriminate.

---

**The skills that we're instinctively driven to master are the ones that helped our ancestors reproduce.**

---

Think of the games kids play. They run and jump to master kinesthetic skills. They play house to learn social roles. They engage in mock



combat with sticks or pillows to learn fighting skills. They pretend to live adults' lives as soldiers, socialites, or builders. They're practicing to be grownups, and loving every minute of it because that's what helped their ancestors reproduce.

As we mature, we gain the capacity to develop more esoteric interests with less obvious reproductive purposes. For example, I've spent years studying game design, but I'm reasonably sure that none of my ancestors ever had caveman babies because they developed a better version of *Throw the Rock*. But no matter how old we are, the lessons that affect us most are still the ones that matter to human values—the ones that can shift loneliness to togetherness, or poverty to wealth. So games that teach players to build, socialize, and fight will always have the broadest impact.

---

**The more intricate and nonobvious a lesson is, the greater the pleasure of learning it.**

---

If a lesson is obvious, there's not much buzz in finally getting it because it was always fairly clear. If it's a subtle idea hidden in the folds of some complex system, learning it might be a life-changing experience because it represents a unique epiphany hidden to most people.

So the game designer's challenge is to create game systems with layers of nonobvious properties to decode. This means making a deep game that reveals lessons through layers, each one building on the one before it. Some classic games such as chess or poker are famous for the lifelong learning they can provide. Shallow games like tic-tac-toe are the opposite.

The best learning moments happen when we compress a pile of learning into a short time through the mechanism of *insight*.

---

**Players feel INSIGHT when they receive a new piece of information that causes many old pieces of information to suddenly make sense.**

---

Insight is the experience of getting a new piece of information that sets off a chain reaction of other lessons. It happens when we get the final piece of a logical puzzle that clicks into place and reveals the shape of the whole.

For example, in a strategy game, an enemy base is revealed at a spot where you saw some enemy constructors a few minutes earlier. You mentally kick yourself and say, "I should have known!" Or, in chess, your opponent makes a series of seemingly nonsensical moves which later turn

out to be a devilish trap that you walked right into. He smiles triumphantly as you say, "I should have known!"

These moments weren't just simple surprises. They were preceded by clues that the player senses and fails to interpret properly, but manages to interpret afterward. They matter to us because we think that perhaps next time, given similar circumstances, we'll be able to predict the surprise. We'll get the sniper when we see the flicker of motion, or send the counterattack against the enemy base when we see the constructors. We might turn death to life, or defeat to victory.

The greatest insights are revealed after an extended buildup of information that all falls into place at once.

Predefined stories can do this very well since they can control exactly what the player learns at every point. For example, in *Half-Life* the player inhabits Gordon Freeman, a bespectacled, shotgun-toting scientist trying to escape the giant Black Mesa research facility. While fighting through monsters and military kill teams, however, the player repeatedly glimpses a humorless man in a suit carrying a briefcase. The man always disappears around a corner just before the player can get to him, sometimes seeming to teleport away just out of sight. It's only after the final climactic battle that this G-man finally introduces himself and explains what really happened at Black Mesa.

This type of long insight buildup can appear in game mechanics as well. Puzzles are a classic example. In the best puzzle games, the player learns a huge amount of information about a puzzle before he understands it. He determines how all the pieces move, and all the relationships between them. He might struggle at the puzzle for 20 minutes or longer, trying to piece together a solution in his head. When it finally hits, the purpose of all those seemingly random components becomes clear all at once, and the player says, "Aha!"

## EMOTION THROUGH CHARACTER ARCS

Humans are empathetic. See someone smiling, and you're likely to smile with him. See someone in pain, and you'll tense up. We mirror emotions we feel in others.

This emotional trigger is the stock-in-trade of screenwriters and novelists. And like these writers, game designers can predefine character arcs. We can write a story for our game and set it up to play out the same way each time. This is a well-understood and traditional method of provoking emotion, and it can work well.



But games have another way of creating character arcs: we can have the game generate them on the fly. For example, in a game of *Left 4 Dead*, three survivors of a zombie apocalypse watch an ally slowly bleed out within sight of the safe room as the monsters lurk nearby. In a game of *The Sims*, a husband cheats on his wife with a younger woman and gets caught in the act. In *Dwarf Fortress*, a dwarf frustrated by a lack of beer goes on a rampage, murdering three miners before being put down. All these events have occurred in these games, but none of them was authored directly by the designers. Rather, they emerged during play from interactions between game mechanics.

Character arcs also feed a special kind of learning hunger: we love learning about our peers. We're particularly interested in the struggles of others, because it is only during conflict that a person's inner values and abilities are revealed. The more intense the conflict they face, the deeper we see into their true nature. We snore as our hero is forced to choose between skim and whole milk. Force him to choose between his wife's life and his own, and we stare, wondering who this man will show himself to be.

### EMOTION THROUGH CHALLENGE

Tests of skill and strength create emotions in many ways. As we struggle at them, we enter a pleasurable state of focus. When we pass them, we feel energized, capable, and dominant. Even failure instills a sense of wanting to try again and do better, as long as the player senses the possibility of success.

Challenge is so closely associated with games that it's often assumed to be an essential aspect of the medium. It's part of many common definitions of games. But though it is a powerful and flexible method, challenge is still only one more emotional trigger, and not a necessary part of every game design. *The Sims*, *Minecraft*, *Snakes and Ladders*, *Dear Esther*, and roulette all create powerful emotions without players struggling toward a predefined objective.

That being said, challenge is still an important part of most game designs, so a large part of this book is devoted to understanding it.

### EMOTION THROUGH SOCIAL INTERACTION

Catch is a stupid game. At first glance, it's hard to see why anyone would bother. Players just toss the ball back and forth. No human values change, there are no characters, and nobody learns much. But we keep doing it. Why?

The answer lies outside the game itself. Think of the classic *Leave It to Beaver* moment where Dad takes his son out to toss a baseball back and forth. These two people are not playing catch because they love tossing a ball. They're playing catch to create a pretext that allows them to get together and talk one on one for a long time. They need the game because long one-on-one talks between a father and young son can be awkward. By providing a reason to get together and a mindless activity to perform, the game removes this barrier. The fact that the game of catch is simple and thoughtless is not a bug; it's a feature. More complexity would just get in the way of the conversation.

Catch is the most basic form of socially driven game, since it has almost no emotional content in itself. But most social interaction games use specific game events to drive social interactions. One player defeats another, or two players create something together, or learn something together, and social interactions are generated around these events. Winning a game of chess against a computer doesn't feel the same as winning a game against a person, even if the game plays out the same way, because defeating a person adds another layer of emotionally relevant social meaning.

Consider the experience of showing off. Some people's emotions reward them for showing off, even if the other people involved are strangers on the Internet. Imagine a game of *Counter-Strike* in which you are the last man alive on your team this round. All of your teammates are observing you, hoping you'll complete the objective and win the round for them. Any skillful action you take gains another layer of meaning because it reinforces the trust and reputation you've built among your teammates. Any mistake you make has the opposite implication. This situation creates knife-edge tension because your social status hangs in the balance.

Games can support a breathtaking variety of social interactions beyond showing off. Building trust and breaking it, joking around, defeating strangers, saving friends, and completing a challenge together are all common social experiences that have been designed into games. There are a thousand variations on game mechanics that generate social moments. In every case, the social interaction works when it shifts some social human value—stranger to friend, low status to high status, and so on.

*StarCraft* and *Halo: Reach* have replay recording systems that allow players to save, rewatch, and share their greatest victories. *Skate* has a system for sharing gameplay videos so that a community of players can rate them. Social network games like *Farmville* allow players to send one

another gifts or resources that help them achieve objectives. *The Sims* allowed players to share photo-album-like stories about their virtual people. *Super Mario Galaxy* allows one player to control Mario while another uses the pointing controller to help out by grabbing stars on the screen. *Kane & Lynch* allows two players to experience its grimy crime story together.

In a sense, playing a game is a move in the larger game of life. The father who offers to play catch hopes to connect with his son; the internal meaning of catch is less important to him than its use as a tool in life. We play drinking games to establish adulthood. We play chicken with trains to show fearlessness. The middle school boy plays spin the bottle not because he's interested in probability-based elimination mechanics, but because he knows he might get to kiss the cute girl.

### EMOTION THROUGH ACQUISITION

We feel a pulse of happiness when we find a dollar under the couch cushions. We chase high-paying jobs and freebies. People scream and cry when they win the lottery. Whatever form it takes, acquiring wealth is a bit of a rush.

Gambling games trigger this response with real wealth. But even games involving no real money can trigger this emotion by creating artificial systems of wealth and acquisition and then giving players wealth within that system. The fake reward still triggers the feeling of acquisition.

Action role-playing games such as *Diablo III* are a good example of this. The player wanders around randomly generated dungeons, killing an endless stream of monsters. Defeated demons, zombies, and skeletons spew out little piles of gold, magical weapons, or pieces of armor. Every gold piece and sword contributes to the increasing power of the player's character. These rewards come so often and so continuously that the player stays on a permanent high of rewards acquisition. The game has narrative, audiovisuals, characters, and challenges, but none of these is its primary emotional driver. At its core, *Diablo III* is about the feeling of getting rich.

### EMOTION THROUGH MUSIC

Music is a powerful and flexible tool for generating emotion. Since it's so easy to mix into an experience, it's used liberally across many media. Films play exciting music during action scenes, nightclubs play sexy music late at night, and daytime talk shows play sad or triumphant songs to emphasize whatever narrative they're trying to create. Games do the same thing with action, ambient, or scary music.

And music is wonderfully subtle—even more than most emotional triggers. Nobody ever gives it the credit it deserves because nobody consciously pays attention to it during play. But even though the conscious mind is oblivious, the unconscious is still processing the music into a continuous flow of feeling. You can tell because music is easily separable from the rest of the experience. Listen to a game soundtrack by itself, and you'll feel much of what you felt during play. Play the game in silence, and you'll be surprised at how hollow it feels.

Nonmusical sounds also create emotion. Screeching metal shoots us full of tension and discomfort. A heartbeat accentuates anticipation. Rain sounds serene. Party whistles are goofy. Squishing fluid suggests disgust. Laying these sounds over other events can accentuate or contrast an emotion. But be careful—when overused, such tricks can easily tip into cheesiness and end up having the opposite effect.

### EMOTION THROUGH SPECTACLE

A Star Destroyer crashes into the Death Star! A super-soldier does a slow-motion dive to dodge an incoming rocket! A tanker truck jackknives, splits in two, and explodes!

Razzle-dazzle spectacle can bring a quick emotional rise. Unfortunately, the payoff is shallow and unsustainable. Though these effects are expensive to produce, they're also creatively easy. Other emotional mechanisms like character arcs, socializing, and learning require that we construct interrelated networks of mechanics or characters. Spectacle only requires that something big blow up. As a result, spectacle is often overused by studios long on money and short on creative vigor. In the worst cases, it is used so gratuitously that it crowds out the subtler but more profound sources of emotion.

Spectacle works when it reinforces what's already there. When the player has fought through a thicket of fast-moving threats and reached his goal with knuckles white on the controller, it's probably appropriate that something blow up nice and good. That spectacle works because it accentuates the player's preexisting sense of relief and accomplishment at winning the battle. The same explosion dispensed again and again outside the context of any challenge leaves players numb.

## EMOTION THROUGH BEAUTY

A sunset over the ocean. A healthy, giggling baby. A masterpiece painting. On the surface, these things have nothing in common. But all of them are beautiful. Because beauty isn't in any particular feature of a thing—it is in how something affects us. Something is beautiful when just perceiving it is pleasurable.

Games are full of opportunities for beauty. A character can be rendered in perfect detail and move with preternatural grace. A world can be painted in just the right color composition. And beauty isn't limited to video games either—think of the beauty of a well-made chess set, or the painted illustrations on *Magic* cards.

But like spectacle, beauty isn't free, and not just because of the time and artistic skill it requires. The emotions of beauty don't always fit with the rest of the game. Especially in game about ugly things—depression, horror, or unease—beauty will clash with the rest of the aesthetic. And beautiful art can add audiovisual noise that makes a game harder to understand and interact with.

As with spectacle, there is a tendency in modern game design to reflexively inject as much beauty into every situation as possible. But usually, beauty works best when it is channeled toward a specific purpose, not when it is thoughtlessly larded over everything.

## EMOTION THROUGH ENVIRONMENT

Lightly wooded grassland feels different from steamy, claustrophobic jungle, which feels different from arctic tundra. And these feelings shift with time and season—winter feels different from summer, night different from day, rain different from shine.

There's evidence that these responses are partly innate. Psychology researchers have found that American children shown photographs of various environments say they would prefer to live in savannas, even though they've never been to one. These emotions may reflect an evolutionary imperative to seek out places where a tribe can thrive: fertile, not too hot or cold, not too open or overgrown. The perfect environment for prehistoric humans is open grassland with patches of woods and running water. So when we find a place like this, we feel satisfied and at ease. This emotional reaction draws us into these places where we can reproduce best.

People also have acquired environmental preferences. We prefer the landscape we grew up in. So, while American children like savannas, American adults also like coniferous and deciduous forests, because those

landscapes resemble much of the United States. And no American in any group wants to live in a desert or rainforest.

Environmentally driven emotions are diverse and strong. Games have used environments, weather, and season to accentuate feelings ranging from depression to giddy triumph.

*Heavy Rain*: This puzzle adventure game is about a man losing his son. In the first few scenes, the world is bright and sunny. But after the boy vanishes, the rest of the game plays out under a downpour, and mostly at night. That endless rain gives every sequence a morose undertone, accentuating the themes of loss, crime, and depression.

*Half-Life*: Gameplay begins with the player trapped in the giant underground Black Mesa facility, so there is no natural light for the first 15 hours of play. When the player finally bursts through the door and onto the sun-drenched New Mexico desert, there's a palpable sense of freedom and accomplishment.

*Metro 2033*: Two decades after the nuclear holocaust, a community of survivors ekes out an existence in the Moscow metro system. It's dark down there, but people have still made a home. They work, trade, listen to music, drink, and laugh. But the surface is a different story. The vision of Moscow in *Metro 2033* may be the least friendly landscape imaginable. Shattered buildings lay frozen in giant chunks of ice. The air itself is toxic, so the player must carry a constantly dwindling supply of gas mask filters. Thousands of icicles menace like spike traps, pulled out sideways by the lashing wind. Everything about the place is endless: the sun never shines, the wind never stops, the ice never melts, and nothing ever grows. I'll never forget how it felt to pick my way through that rubble. Though most would call *Metro 2033* a shooter or a role-playing game, I wouldn't, because I don't think it's about shooting or role-playing. I think it's about discovering how a place like that makes you feel.

## EMOTION THROUGH NEWFANGLED TECHNOLOGY

Shiny new tech is cool. The first few games with any new graphics, animation, or physics technology get an emotional rise from certain players just because of the technology itself.

But this bonus often comes at a cost. Paradoxically, technological advances often lead to a temporary reduction in the design quality of games. This is partially because developers haven't yet learned how to best use the new technology. More importantly, though, the promise of an easy tech-driven emotional return takes the creative pressure off. So the game

becomes a technology demo because it doesn't need to be anything else to get players excited. The game will still work, for a while. But technological excitement doesn't last long, and a game that depends on it will not look very good a few years down the road.

For example, in the mid-1990s it became possible to encode full-motion video on a CD-ROM and play it back on a PC. This technological leap led to some of the worst games in history. These games managed to utterly fail at being movies while simultaneously failing at being games. Although this disaster was driven by many other factors besides tech fetishism (such as the blind theft of creative ideas from film), it was enabled by misplaced trust in technology.

To achieve sustained success, a game must use its new technology to unlock interactions and situations that couldn't have been experienced before. For example, *Doom* is often cited as a technology-driven game because it was the first first-person shooter with varying heights and non-right-angled walls. But *Doom* did not become a mega-hit just because of its technology. It also took that new technology and used it to unlock a new spectrum of design-driven experiences. *Doom* wasn't just the first game with arbitrarily angled walls and changing light levels. It was the first game where demons shut off the lights and charged into the room when you grabbed an item. It was the first immersive horror game where you would hear monsters groaning in the dark and turn in circles, trying to find them. It was the first multiplayer first-person shooter. These elements depended on technology to work, but they are actually advances in game design, and the technology alone did not create them.

### EMOTION THROUGH PRIMAL THREATS

Some things have threatened our species for so long that our fear of them is imprinted directly into our genes. Rotten food and disease-ridden filth make us feel revolted to help us avoid food poisoning. Venomous spiders and snakes make us recoil because they're more dangerous than their size suggests. Visibly diseased people drive us away so that we won't catch their sickness ourselves. The sight of ghastly wounds kicks off an adrenaline response to prepare us to deal with a dangerous situation. And games can trigger these responses. Just throw gore or spiders on a screen. It's easy.

In fact, it's too easy. The adrenaline rush of these primal threats has been cheapened by decades of overuse by lazy filmmakers and game designers. People are just too used to these cheeseball frights by now. Many

of us automatically tune them out, or even laugh at them. To create genuine horror and revulsion in a modern audience, it's no longer enough to splash guts thoughtlessly about the screen. These things can scare people, but to really horrify players, we must craft threats that disturb them on a deeper level.

### EMOTION THROUGH SEXUAL SIGNALS

A game can show some bare skin, a pretty face, an alluring expression, and people will notice because we're genetically programmed to pay attention to these things. Since these sexual signals are so effective and easy to use, game designers, advertisers, and filmmakers alike have ruthlessly abused them. You can put a mostly naked, attractive character in a game, and some players will respond. As with primal threats, it's easy.

But the use of cheap sexual signals has downsides. Gratuitous sexuality harms the atmosphere and believability of a serious narrative, and it irritates large classes of potential players (typically the ones not interested in the signals presented). In a certain kind of game made for a certain audience, this is fine. For more serious or broadly targeted games, it's often not worth being tasteless.

### The Fiction Layer

There are some games that are just mechanics and nothing more. Poker, soccer, checkers, and video games such as *Geometry Wars* or *Bejeweled* are examples of this. In checkers, the pieces are just that: pieces. They move based on arbitrary rules that don't relate to anything outside themselves. A soccer ball is just a ball, and an enemy in *Geometry Wars* is just a piece of data in computer memory, represented by an abstract shape on a screen.

These kinds of games can work very well. Pure game mechanics with abstract representations can provoke tension, doubt, puzzlement, and triumph. They can shift values between victory and defeat, poverty and wealth, ignorance and knowledge.

But most real games don't limit themselves to the abstract. They use graphics and sounds to help players make believe that the mechanics are more than an artificial system of rules.

---

**Mechanics gain another layer of emotional meaning when they are wrapped in FICTION.**

---

At one point in the first *Austin Powers* movie, Dr. Evil creates a troupe of sexy fembots. The fembots looked exactly like tall, blonde women in silver catsuits. But under the skin, they were actually robots (with guns in their nipples). We all know that the fembots are no more than cleverly arranged hunks of moving matter, like a car engine or a toaster. But wrapping them in a human-looking skin triggers a different psychological viewpoint. They become more than robots dressed up to look like women. They become women who also happen to be robots.

This may seem to be a meaningless distinction. But in the mind, and in our emotional responses, it makes a huge difference. Given a human appearance, the fembots become characters with minds, desires, and plans. Now, when the fembots attack it isn't because of a programming switch, it's because they're *angry*. When they retreat it's not due to a coded stimulus response, it's because they're *afraid*. When they pursue something we don't say they're executing a pursuit algorithm, we say it's because they *want* that thing. Everything they do takes on a human emotional resonance because of the skin wrapped around their robotic skeletons. The fact that we know that this skin is just a few millimeters of rubber doesn't matter.

At their core, all games are no more than mechanics, just as Dr. Evil's fembots are no more than metal and rubber. Mario isn't a cartoon Italian plumber—he's a collision cylinder that slides around and bumps into things. That teenager falling in love in *The Sims* really didn't—the game software just flipped a few bits in a data structure somewhere.

By wrapping the mechanics in a fictional dressing, we imbue them with a second layer of emotional meaning. That's why when a game character is running out of food, we don't just say that our resources are low and the game will end soon. We say we're *starving*. When an ally is defeated, we don't just quietly remove his token from the board. We grieve for our murdered friend. We know it's fake, but the make-believe still creates some emotional echo of real hunger, grief, or love.

Naïve observers often assume that *all* the meaning of a game comes from the fiction. In this view, games make emotion by drawing the player into a simulated experience until the mental distinction between the game world and the real world disappears. The designer Eric Zimmerman named this view the *immersive fallacy*. It's a fallacy because no game player ever forgets they're playing a game. The fictional wrapping doesn't replace or conceal the game mechanics; it adds a second layer of meaning to the emotions generated by mechanics alone.

## FICTION VERSUS MECHANICS

---

### Fiction and mechanics each create different kinds of emotions.

---

Mechanics can generate tension, relief, triumph, and loss. They can bring the pleasure of learning or the pride of solving a puzzle. They can create social rewards by allowing us to defeat strangers or make friends. But mechanics alone are also limited in their emotional range. It's hard to do humor, awe, or immersion with mechanics alone. And without characters, the entire emotional spectrum that flows through empathy is almost inaccessible.

The fiction layer creates emotion through character, plot, and world. We laugh and cry as characters frolic or struggle, and feel shocked or fascinated while exploring a fictional universe. But like mechanics, fiction alone is limited in its range. It can't do competition, triumph, and loss. And it can't give us the pleasure of mastering a skill, or create social interactions with real people.

Combining fiction and mechanics together allows us to combine emotions from both sides. But there's a catch.

---

### Fiction and mechanics can easily interfere with each other.

---

Games narratives are laden with clichés. The player character is an amnesiac. Or he's a super-soldier capable of murdering thousands of foes. Enemies are monsters or evil soldiers, and they feel neither fear nor remorse. Princesses are captured over and over like it's going out of style. A barrel will explode if struck. And nobody ever goes to the bathroom.

One of the worst clichés is the crate. It seems like every game you see, whether it's a modern military shooter or a fantasy role-playing game, takes place in a world scattered with pointless crates. The problem is so bad that back in 2000, the humor site Old Man Murray created a game review score system measured in *Start to Crate* (StC), the idea being that the longer it took a game to show you a crate, the less lazy the developers had been in avoiding cliché, and the better the game probably was. Of 26 games tested, only five had StC times of more than 10 seconds. A full 10 games managed StC times of zero seconds by starting the player with a crate in view.

That was more than a decade ago. But the crates haven't gone away. Why? Have we learned nothing? No, it's not because game designers are all fools. The reason that crates and other such clichés appear over and over is that they cleanly justify good mechanics.

For example, I once designed a shooter level set in an old-timey theater, with rows of chairs facing a stage at the front. Upon playtesting, I noticed players were becoming frustrated due to enemy snipers. The theater was so open that players would get a bullet in the brain the moment they peeked out from cover. The theater's fictional design made perfect sense, but its mechanics didn't. To be balanced against snipers, it needed a minivan-sized object in the middle of the audience to block the snipers' sightlines. Faced with that kind of problem, under story and time constraints, there aren't any easy answers. So I did what I had to. I hung my head in shame and put a couple of crates in the middle of the theater. People mocked the crates, and deservedly so. But the fight worked.

Almost all game fiction clichés are similarly mechanics-driven. A player character with amnesia justifies other characters explaining obvious things about the world. Player characters are often super-soldiers because it's hard to make shooter enemies who are entertaining to fight for more than a few seconds. When enemies last five seconds before death, the game has to throw hundreds or thousands of them at the player over the course of the game. A super-soldier player character can justifiably defeat battalions of enemies alone. And these enemies never have complex emotions because fear and remorse are fuzzy, unpredictable, and hard to represent. Games are simpler and more mechanically elegant when everyone mindlessly fights to the death.

Consider one basic game design cliché: physical violence. So many games are about physical conflict. It can be tiring. I once tried to break out of this pattern with a real-time strategy game called *Player League*. The player controlled a team of pickup artists in a nightclub. The goal was to pick up more chicks than the opposing teams of players. This meant blocking them out of conversations, promoting yourself in various ways, and using neutral characters to your advantage.

The game did not work. A chief reason the design failed was because there was no clear way to express most of what was going on. Every game event was a human interaction, causing one person to feel one of several possible emotions toward another. A simple camera view of what was going on would show nothing—just people talking. I couldn't very well give the text of their speech because these events could happen hundreds

of times in infinite combinations, far too many to create actual speech for every situation. I eventually settled on a solution of abstracting relationships out into colored lines and shapes that appeared around people. It worked, after a fashion, but the representation was arbitrary and had to be learned by rote, and the in-game events often didn't make intuitive sense because the system couldn't express most of the concepts that exist in a real social interaction.

These sorts of problems are why so many games are about physical conflict. A strategy game about war has none of the problems of *Player League*. An image of one unit shooting at another is clear and visceral, and requires no abstract interpretive symbols. People just get physical violence. It supports mechanics well because it's easy to learn and understand, so it gets used over and over.

Also, wars have lots of crates.

---

**Because fiction and mechanics so easily interfere with each other, many games choose to emphasize one while mostly ignoring the other.**

---

There's a natural trade-off between focusing on mechanics and focusing on fiction. Focusing on mechanics allows the designer to create a perfectly balanced, clear, and deep challenge. But it'll probably be very hard to find a fictional wrapping that resembles these perfect mechanics. For example, imagine trying to wrap chess or poker in a fiction. This is tough because these games don't much resemble anything besides themselves. Chess has a fiction, but it is thin and nonsensical—real knights don't always move two squares forward and one square sideways. Poker resembles nothing in reality or story. These two games are great systems of mechanics, but they don't naturally support good fiction.

Alternatively, a designer can focus on fiction, creating a beautiful, history-charged world full of flawed characters and fantastic locales. But all these story details make it hard to change the mechanics under the surface. They mean that instead of being able to change any mechanic any way he likes, the designer is required to fix mechanical problems by only making changes that don't contradict the fiction. For example, in a game set in the real world, the designer can't reduce gravity or make fire not burn certain characters, even if it would make a challenge more balanced. So the mechanics suffer.

This fiction-mechanics conflict is why some see a great debate between mechanics and fiction. The *ludologists* (from the Latin *ludus*, for “play”)

argue that games draw their most important properties from mechanical systems and interactions. The *narratologists* argue that the mechanics are just a framework on which to hang the fictional elements players actually care about. This debate is the game designer's nature versus nurture, our plot versus character, our individualism versus collectivism.

But like all such debates, the conflict exists only on the surface.

---

**The pinnacle of game design craft is combining perfect mechanics and compelling fiction into one seamless system of meaning.**

---

Fiction and mechanics need not fight (though they easily can), and neither one need be given primacy (though one often is). Used together, they can enhance and extend each other in ways that each cannot do alone. Consummately great game design cannot be done by dropping a great fiction on top of excellent mechanics. It is done by threading them together into a single system of emotion. That's why so much of game design isn't just about crafting a well-balanced challenge or a beautiful world. It's about doing each in such a way that it integrates seamlessly with the other.

## Constructing Experiences

The emotions of play don't stand alone. They merge together into an integrated *experience*.

---

**An EXPERIENCE is an arc of emotions, thoughts, and decisions inside the player's mind.**

---

An experience is the combined expression of every effect the game has upon the player's psychology, stretching from the beginning of play to the end. It transforms itself through setup and payoff, expectation and result. A thought leads to an emotion, which sparks an idea, which causes a reaction, which brings feedback, leading to another thought. And just as a well-made meal is more than the sum of its ingredients, an experience is more than the sum of its psychological components.

Game experiences are always mixed. A soccer player up 2-1 near the end of a game feels hopeful for a win, but worried about a penalty. A kid playing *Super Mario Galaxy* feels happy because of the upbeat music, while gritting his teeth through a hard jumping challenge.

Game experiences are also marvelously diverse. One might be short and pure, as in a fighting game that maximizes excitement for 60 seconds.

Another might be long and complex, like an open-world narrative role-playing game that shifts from awed exploration to narrative intrigue to combat excitement through 100 hours of play.

Different emotions put together can enhance one another, transform one another, or even destroy one another. Let's look at some of the ways games can mix emotion to create experiences.

## PURE EMOTION

To maximize a single feeling, we can combine several different emotional triggers that drive the exact same emotion. Each trigger is like another booster rocket that pushes the experience further toward one pure emotional peak.

For example, traditional action arcade games combine fast-paced music, risky situations, violent fiction, and testosterone-driven social competition to make the game as exciting as possible. Any one of these triggers could work on its own to create excitement. Together they boost the experience to levels none of them could achieve separately.

## JUXTAPOSITION

Juxtaposition is the combination of different, seemingly incompatible feelings. Ramming together feelings that don't ordinarily mix can produce strange and sometimes valuable results.

For a long time, I thought Epic Games' *Gears of War* series was no more than a mindless monster-bashing space marine romp. And the louder part of its presentation is exactly that. Characters rip monsters apart with gun-mounted chainsaws, curb-stomp downed enemies, and fill the air with endless testosterone-marinated declarations of personal awesomeness. But as I became more familiar with the series, I realized that the hyper-violent surface concealed a second, very different emotional ingredient, like a subtle flavor you don't notice until halfway through a meal. *Gears of War* is mournful. It's set in the ruins of a civilization of extraordinary beauty. Most of the character arcs are about coming to terms with loss, whether of a loved one or a glorious former life. Even the game's advertisements became famous because of the fascinatingly unsettling juxtaposition of Gary Jules's *Mad World* and visuals of computer-generated carnage. By juxtaposing mourning with violent excitement, *Gears of War* becomes more than just an industrial-strength gore-fest.

There is an easy way to experiment with juxtaposition. Just replace the music in a game with music that creates a very different feeling. Replace



fighting game music with Mozart's *Lacrimosa*. Play the *Happy Days* theme song over *Doom*. Drop Britney Spears over a survival horror game like *Dead Space 2*. The results can be weird, unsettling, or funny.

### ANTAGONISTIC EMOTIONS

Ice cream and pizza are both great, but they're not so great together. In the same way, some kinds of emotions that work individually don't coexist easily because they're *antagonistic* toward each other.

For example, shared social enjoyment is often harmed by adding ruthless skill-based competition. Intense competition draws all of a player's attention as he struggles as hard as he can to win, but laughing with friends requires us to relax. This conflict is why friends playing skill-based games will often agree to play only "for fun," thus turning down the skill intensity of the game to make room for the social experience they really want.

There's a fine line between juxtaposition and antagonistic emotions. Sometimes attempts at juxtaposition fall flat when the two feelings just end up annihilating each other. Other times, what seems like an antagonistic combination can squirt out an entirely different feeling.

For example, a friend of mine had this experience in a shooter: near the end of the game was a key cutscene of the death of a major character. It was a tragic moment that obviously attempted to pull at the player's heartstrings. The game transitioned back into gameplay. Upon picking up some ammunition, the character exclaimed, "Sweet!" My friend burst out laughing because the emotion of tragedy was inadvertently forced too close to the emotion of manly confidence. The result was a ridiculous mixture that turned into laughter—an unintended but oddly entertaining result.

### ATMOSPHERE

The word *atmosphere* is used when the emotions of the experience aren't focused around specific events, but rather permeate the whole experience in a spread-out haze. It is the emotional background that we only notice when nothing more salient is happening. Stop and wait in a game and just feel for a minute. You'll discover the game's atmosphere.

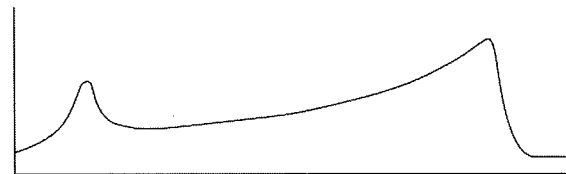
Some games de-emphasize the emotional punches of individual events and instead focus on growing a thick atmosphere and letting the player sink into it. For example, *LIMBO*, *DEFCON*, and *Flower* are atmosphere games. Usually the atmosphere in such games is serene and contemplative, though it can be given either a positive or negative flavor: *Flower* is about drifting through fluffy clouds in a dreamscape, while *DEFCON* is

about watching nuclear missiles vaporize millions on a world map. Each uses music and slow-paced interaction to create atmosphere, then applies a different fiction to flavor the experience.

### EMOTIONAL VARIATION

Any single emotion gets tiring if sustained too long. To retain power and freshness, an experience must transform over time.

One classic way of doing this is *pacing variation*. This method has been used and studied for years by traditional storytellers, to the point where they've developed a specific pacing formula that they reuse over and over. The classic pacing curve starts with the hook, settles into a rising action, builds up, and then finally peaks at its climax before resolving with a denouement. Graphed out, it looks like this:

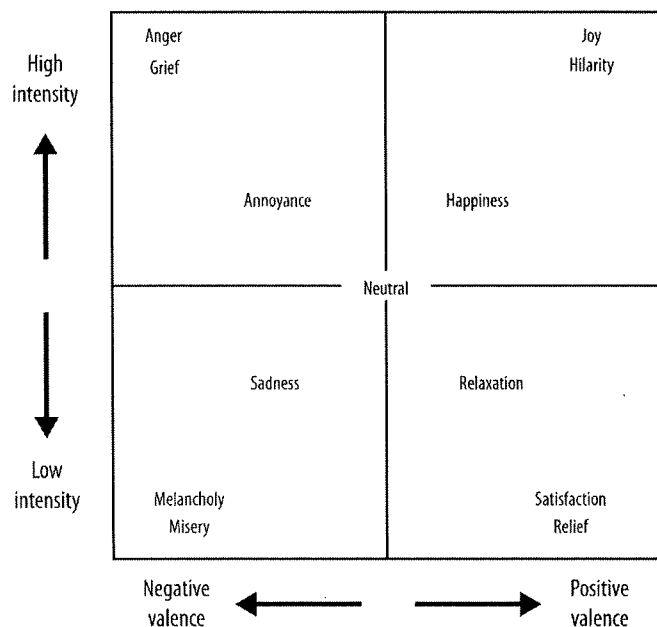


This curve can be found in countless media—films, books, comedy routines, infomercials, operas, and songs—because it is incredibly effective. It hooks people, holds attention, and leaves the audience satisfied without ever exhausting them.

Games can exhibit this pacing curve as well. And not just by writing it in a predefined story—we can create game mechanics which generate it on the fly.

For example, take a multiplayer match of capture the flag in any shooter. As the game starts, each team is bunched up at opposite ends of the map. The team members approach one another with a sense of building anticipation. At the center of the map, they crash into one another, and a pitched battle takes place. Then they settle into an attack-and-defense rhythm. As the timer runs low, the stakes increase, and with them the tension. At the end of the match, the game approaches a climax of intensity as the players try to capture their last flag and turn the game in their favor. Afterward, the players have a few moments to cool off at the score screen. The pacing curve they experienced follows the classic three-act story formula, but instead of being predefined, it's generated a little bit differently every game.

In addition to varying intensity with changes in pace, we can also vary the flavor of emotions. Psychologists call this aspect of emotion *valence*. For example, fury, grief, and terror are all high in intensity, but their valences are different. Satisfaction, relief, and depression are all low-intensity emotions with different valences. We can even plot emotions on a graph by valence and intensity:



We don't just have to limit ourselves to sending the player up and down the graph as we change intensity. To keep the experience even fresher, a game can generate experiences that send the player on a winding path to every corner of their emotional spectrum, from joy to anger to depression and relief.

## FLOW

*Flow* is a popular concept in psychology that is particularly applicable to game design. It was originally described by the Hungarian psychologist Mihály Csikszentmihályi. He described it this way:

---

**FLOW is a state of concentration so focused that it amounts to total absorption in an activity.**

---

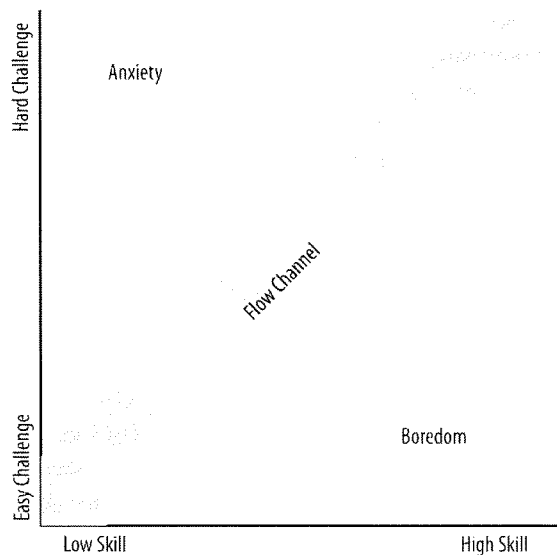
Back in university, I spent some time in the Canadian Army Reserves. One special thing about the army is that it is absolutely unacceptable to show up even seconds late for anything.

I had drill at 7:00 on a Saturday one evening. I also made the mistake of playing the fantasy strategy classic *Heroes of Might and Magic III* on the same day. I had lots of time. Looking at the clock, it was 5:00 p.m. If I started getting ready by 6:15 I could make it to the parade ground in good time to change into uniform.

But *Heroes III* is very good at pulling you into flow. I moved my hero, fought some gryphons and troglodytes, captured a city and grabbed some treasure. Seemingly a few minutes later, I looked over at the clock. It was 6:37. It was a long sprint to the drill hall.

Flow makes time seem to disappear. Hours can seem like minutes when a player is utterly engrossed in an activity. It is the perfect form of escapism because it strips everything else out of the mind. In flow, we don't worry about bills, relationships, money, or whether we're going to get screamed at by a drill instructor. And flow is pleasurable because it is built on a continuous stream of tiny successes.

Flow appears when a player is presented with a challenge that is perfectly balanced against his ability level. If the task is too hard, flow breaks as the player becomes confused and anxious. If it is too easy, the player gets bored. Graphed, it looks like this:



Flow is the foundation for most good game experiences. It works at all intensity levels and emotional valences. Heart-pumping action games, contemplative puzzlers, humorous social interaction games—all can create flow because each occupies the player's mind without a break, and without overfilling it.

And in any case, if flow is broken, the other parts of the experience fall apart. Nearly all games have to maintain flow to work, and many problems with bad games come down to nothing more than breaks in flow.

## IMMERSION

One of the most powerful game experiences is *immersion*.

---

**IMMERSION is when the mental division between the player's real self and his in-game avatar softens, so events happening to the avatar become meaningful as though they were happening to the player himself.**

---

Everybody agrees that immersion is valuable, but there is little agreement on where it comes from. Everything from fictional believability, to graphical fidelity, to relatable or silent protagonists and even lowering the lights in the room while playing have been called out as contributors. Yet,

there are games with all of these things that aren't immersive, and there are immersive games that lack these things.

---

**Immersion occurs when the player's experience mirrors the character's experience.**

---

The best way to describe immersion itself is as the player's experience mirroring the character's experience. Obviously this means the player sees and hears the same things as the character. But more importantly, it also means the player thinks and feels what the character thinks and feels. When the character is afraid, so is the player. When the character is angry, curious, or dumbfounded, so is the player. When the player thinks and feels the same as the character, he feels he is the player, and the game is immersive.

This internal psychological mirroring is the missing piece in most failed attempts at immersion. But how do we create it? One possible answer lies in a concept from psychology called the *two-factor theory of emotion*.

---

**The TWO-FACTOR THEORY OF EMOTION says that emotions are composed of two parts: physiological arousal and a cognitive label.**

---

*Arousal* is the state of being amped up and ready to act. Your heart beats faster, your palms sweat, and your eyes widen. Your body is getting ready to do something drastic, right now. This arousal state can happen for many different reasons. Fear induces a state of high arousal, but so do anger, intense music, and sexual tension.

The two-factor theory of emotion says that all of our different intense emotions are physiologically the same—that they're all the same basic arousal state. According to the theory, the only difference between these feelings is the *cognitive label* we put on them.

A cognitive label is a conscious mental explanation for what is causing the arousal state. Depending on what seems to be happening, your brain will relabel an arousal state as any of a wide variety of intense emotions. For example, if you feel aroused while a bear is chasing you, you'll label your emotional state as fear. The same arousal appearing a moment after being insulted will be labeled as anger. The key of the two-factor theory is that the arousal state is actually the same thing in every case—that there is no physiological difference between, say, anger and fear. We just label them differently.

In a 1962 experiment, researchers gave subjects injections of a mystery drug. The drug was actually adrenaline, which causes sweaty palms, increased heart rate, and rapid breathing. These subjects were put in a room with another subject who had also apparently received the injection. What they weren't told was that the other subject was an actor. In some trials, the actor acted euphoric. In others, he acted angry. In all cases, the experimental subjects reported experiencing the same feelings as the actor was faking. In truth, all they felt was chemically induced arousal. But the social cues from the actor caused them to relabel this state as fear, anger, or euphoria. If subjects were told what the injection was, they reported no emotional state because they had labeled their body's reaction as a meaningless response to the chemical.

The two-factor theory illuminates a lot of emotional paradoxes. We cry from both grief and happiness. Nightclubs create sexual attraction by getting the heart rate up with loud music and dancing. Horror movies are popular with couples. Dirty jokes work by using offensive or disturbing ideas to create an emotional response, then relabeling the response as comedic delight. We even have make-up sex, transmuting anger into lust. In every case, we're misattributing arousal to something besides its real cause. And this misattribution turns out to be the key to immersion.

---

**To create an experience that mirrors that of a character, we construct it out of three parts. First, we create flow to strip the real world out of the player's mind. Second, we create an arousal state using threats and challenges in the game mechanics. Finally, we use the fiction layer to label the player's arousal to match the character's feelings.**

---

Let's break this down.

The first ingredient is flow. The role of flow is to get the real world off the player's mind so that he can sink into the game. It's created mostly in the game mechanics, when the challenge is perfectly balanced against the player's skill level. It is a prerequisite for immersion; without flow, stray thoughts of bills or homework constantly intrude on the experience, destroying any chance that it might mirror that of the character.

The second ingredient is raw arousal. We can invoke pure, unlabeled arousal with nothing but game mechanics. For example, *Pong*, *Geometry Wars*, and checkers can be arousing when play is hard and fast, decisions are tough, and the stakes are high.

The last ingredient is fiction. Without fiction, the arousal generated by the mechanics is labeled as a generalized kind of excitement, like what you feel when playing *Geometry Wars*. But with fiction, we can relabel the raw arousal state however we like. For example, arousal might be relabeled as terror in a horror game full of scary zombies. Or it might become gritty determination in a military game. Even if the game mechanics creating those experiences are very similar, the cognitive label suggested by the fiction changes how players perceive their experience.

With that delicate mix in place, the experience transcends simple engagement and transports the player into another time and place. The mechanics-driven experience of flow peels away the player's self-consciousness, erases his awareness of the real world, and creates a basic state of physiological arousal. The fictional experience draws his identity into a character in a make-believe world. The player sees and hears what the character sees and hears, and feels what the character feels. The player is the character.

For example, one of the most popular early immersive games was *Doom*. The game has very well-crafted action game mechanics. During an intense fight, the player tenses up, his palms sweat, his mind forgets the outside world. By themselves, these things aren't exceptional. They would happen even if the game had no fiction at all—*Geometry Wars* players show these same symptoms.

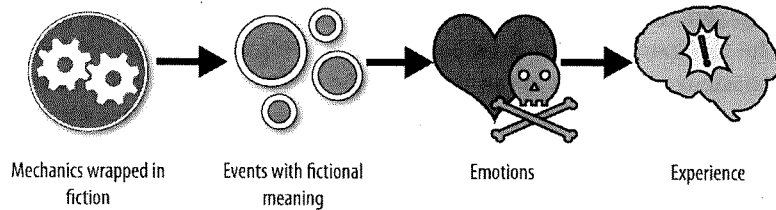
But in *Doom*, the player sees through the eyes of a space marine trapped in a demon-infested colony on a Martian moon. The moaning zombies and bloodstained world signal the player's mind that the arousal he is feeling isn't just excitement—it's fear. And that changes everything.

The fact that the marine is aroused because demons are trying to kill him, and the player is aroused because of *Doom*'s well-designed combat, doesn't matter. In the two-factor theory of emotion, one source of arousal is interchangeable with another.

Now *Doom* isn't just about exciting shooting. It's about the experience of being a space marine fighting zombies in a Martian base, because the player's experience mirrors that of the character. Fictionally, the marine is terrified since he is fighting for his life. In real life, the player feels aroused because of *Doom*'s fast action mechanics, and labels that arousal as terror because of the fiction. Those separate experiences merge into one in the player's mind. The player and the marine see, hear, and feel the same, so the player feels he is the marine, and the game is immersive.

## Engines of Experience

The experience is the last link in the conceptual chain by which games work. To recap: first, designers create a set of *mechanics*. They wrap these mechanics in a layer of representative *fiction*. During play, those mechanics interact to produce a long sequence of *events*. Those events tickle triggers in the player's unconscious mind, provoking *emotions*. Finally, those emotions merge together into an integrated *experience* which lasts minutes, days, or years.



We also may have just stumbled on a definition for games.

---

**A GAME is an artificial system for generating experiences.**

---

Sometimes I think of games as a special kind of machine. Machines are made of carefully designed metal shapes that fit together perfectly, while games are made of carefully designed mechanics that fit together perfectly. When used, a machine's parts move against one another in intricate patterns, while game mechanics interact in specific complex ways. The greatest fundamental difference between games and machines is in the nature of that result that the system is supposed to create. Physical machines are made to propel vehicles, heat houses, or assemble widgets. Games are made to provoke emotion.

If you want a metaphor to use while thinking about games, don't think of stories or movies. Those metaphors don't capture key aspects of the power of games since they lack dynamic interaction between game mechanics. They send us down the beaten path of predefined media experiences, and away from the rich virgin land of on-the-fly, explorative, generated interactivity.

Instead, think of a game as a strange kind of machine—an engine of experience.

# Game Crafting