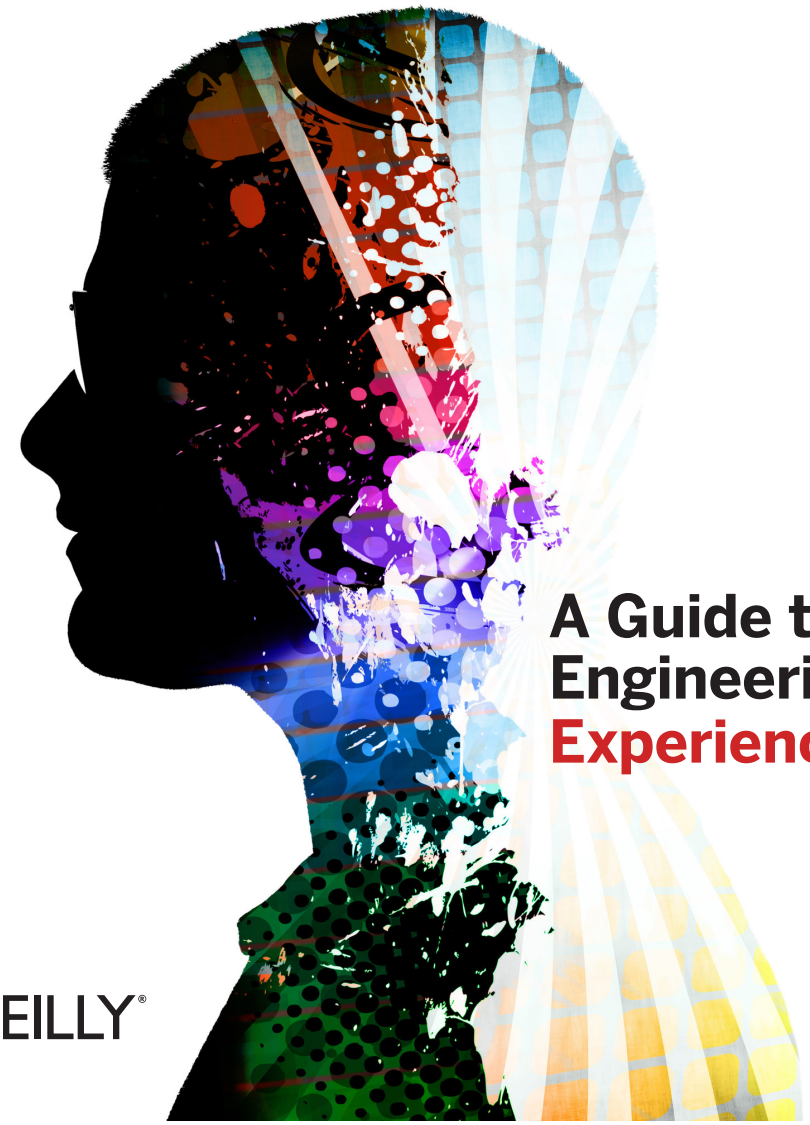
Tynan Sylvester

Designing Games



A Guide to Engineering Experiences

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Designing Games

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How do you design a video game that people *love* to play? In this practical guide, game designer Tynan Sylvester shows you how to create emotionally charged experiences through the right combination of game mechanics, fictional wrapping, and story. You'll learn design principles and practices used by top studios, backed by examples from today's most popular games.

This book also takes you through the day-to-day process necessary to keep your project on track: when to build and when to test, how to work with a team, and how to avoid creative dead ends.

Explore topics such as:

- **Integration: thread fictional elements and games rules together into a single system of meaning**
- **Emergence: generate plot, character, and theme in response to a player's decisions**
- **Compulsion: understand the difference between motivating players and fulfilling them, and how to do each**
- **Elegance: maximize a game's emotional power and variety of play experiences while minimizing the burden on players—and your team**
- **Iteration: plan, test, and analyze your design in stages instead of trying to decide everything up front**

Tynan Sylvester has been designing games for 12 years. During that time he has worked on everything from independently produced games to the big-studio blockbuster *BioShock Infinite*.

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A Guide to Engineering Experiences

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DESIGNING GAMES
by Tynan Sylvester

Published by O'Reilly Media, Inc., 1005 Gravenstein Highway North, Sebastopol, CA 95472.

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Editor: Rachel Roumeliotis
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Printing History:

January 2013 First Edition.

Revision History:

2012-12-18 First Release.

See *http://oreilly.com/catalog/errata.csp?isbn=0636920026624* for release details.

ISBN: 978-1-449-33793-3
[LSI]

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Preface

A Note on the Text

Unfortunately, the English language does not provide us with a perfect gender-neutral solution to the pronoun problem. I've chosen to use "he" throughout the book to refer to nonspecific people. This is for reasons of readability and conciseness only; unless otherwise specified, masculine pronouns do not refer exclusively to men.

We'd Like to Hear from You

I love talking about game design. If you have comments or questions about the book, please email me at *tynan.sylvester@gmail.com* or contact me through my website at *tynansylvester.com*.

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O'Reilly Media, Inc.
1005 Gravenstein Highway North
Sebastopol, CA 95472
(800) 998-9938 (in the United States or Canada)
(707) 829-0515 (international or local)
(707) 829-0104 (fax)

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Engines of Experience

The Inventor had given them wonderful things—machines for grinding corn, for weaving cloth, and countless others. The townspeople loved him.

But he was getting old, and there was only time for only one more invention. So he decided that his last work would be a very special kind of machine. This one would not be for moving or heating or calculating, but for making happiness itself.

The townspeople didn't understand, but they trusted him. He'd never let them down before. So the Inventor retreated into his castle and worked.

Years passed. At first the townspeople waited patiently. Then they doubted. Then they became angry.

"Where is it?" they asked.

"It's taking too long."

"It's costing too much."

"He's tricking us."

"We must destroy him."

Just as the mob arrived at the castle, the gates opened and the Inventor came out. "It is accomplished!" he declared. The mob quieted for a moment and he led them inside.

But there was no great engine—only a roomful of tables littered with cards, booklets, and tiny pieces of wood. "Where is the machine?" asked the leader of the mob, readying his club. "Where is the machine of happiness?"

"It is here," said the Inventor, motioning to the dice, rulebooks, and game boards. "Have a seat, and let's play."

GAME DESIGN isn't in code, art, or sound. It's not in sculpting game pieces or painting game boards. Game design means crafting the rules that make those pieces come alive.

By themselves, chess pieces are just tiny decorative sculptures. But when we move those pieces around according to a special set of rules, those little statues come alive. They will create a nail-biting finish at a high-stakes tournament. They will generate a world of puzzles in the newspaper. They will spark friendships, tell stories, and teach lessons found nowhere else in the universe.

But not just any set of rules will do. In fact, most sets of rules for pieces on a board won't do any of these wonderful things. Many will collapse into simple, repetitive patterns as players use the same winning strategies over and over. Others are nightmarishly difficult to learn. Still others are so hard to follow that the game becomes a plodding number-crunching exercise.

The unique value of chess is in how it generates a perfect rhythm of puzzle and solution, tension and release. That value isn't in the pieces or the board. It's in the game design—the system of rules that drives the game's behavior. A game designer's job is to craft systems of rules that create these kinds of results.

It's not easy to know how to achieve game design goals. How would you change chess to make it easier to learn? What would you modify to make it a better spectator sport, or to eliminate the often-repetitive opening moves? Would you add a piece, or remove one? Change how one moves? Reshape the board, add special abilities, change the art, add a story, or make the game play in real time?

The answers to these questions are found in the craft of game design. Game design craft shows how to make games that are hard, easy, or both. It helps us teach players without smothering them. It tells us how to thread stories and rules together into a single system of meaning. The first half of this book is dedicated to this craft.

But even with the best craft in the world, no designer can magically know the answer to every question (though there are those who try). That's why the second half of this book is about the day-to-day process of design. Real game designers don't just know the answers—they know how to find them using testing, planning, and analysis. Process knowledge shows when to test and how, when to plan and when not to, how to work with others and avoid creative dead ends.

Design craft does not define the purpose of a game. It only shows us how to achieve it.

Some people worry that analyzing game design removes its soul—that understanding the principles of the craft takes away the creativity of the work. But knowing game design craft doesn't mean slavishly following rules to get the same result over and over. It means understanding the trade-offs in every design decision. When games go wrong it's rarely because the designer made the wrong choices within their own understanding. It's because they just didn't know the trade-offs they were making. So a designer understanding craft is kind of like an engineer understanding the laws of physics: Newton's laws don't determine whether we build a boat motor or a Saturn V rocket, but they are essential to perfecting either.

Imagine the best game you have ever played—except crafted even better, every emotion more potent, the pacing even more perfect, the fiction more cohesive and nuanced. There is no game that could not have been made better with the same resources. We will never make a perfect game, but through study of craft, we can push every game as close to its full potential as humanly possible.

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 11th 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