

“A brilliant and original book by the deepest thinker about this topic since Darwin.”

—DANIEL GILBERT, author of *Stumbling on Happiness*

HOW EMOTIONS ARE MADE



The Secret Life of the Brain

LISA FELDMAN BARRETT

Praise for
How Emotions Are Made

“This meticulous, well-researched, and deeply thought out book provides information about our emotions — what they are, where they come from, why we have them. For anyone who has struggled to reconcile brain and heart, this book will be a treasure; it explains the science without short-changing the humanism of its topic.”

— **Andrew Solomon, best-selling author of *Far from the Tree* and *The Noonday Demon***

“A brilliant and original book on the science of emotion, by the deepest thinker about this topic since Darwin.”

— **Daniel Gilbert, best-selling author of *Stumbling on Happiness***

“Everything you thought you knew about what you feel and why you feel it turns out to be stunningly wrong. Lisa Barrett illuminates the fascinating new science of our emotions, offering real-world examples of why it matters in realms as diverse as health, parenting, romantic relationships, and national security.”

— **Peggy Orenstein, author of *Girls & Sex***

“After reading *How Emotions Are Made*, I will never think about emotions the same way again. Lisa Barrett opens up a whole new terrain for fighting gender stereotypes and making better policy.”

— **Anne-Marie Slaughter, author of *Unfinished Business***

“What if everything you thought you knew about lust, anger, grief, and joy was wrong? Lisa Barrett is one of the psychology’s wisest and most creative scientists and her theory of constructed emotion is radical and fascinating. Through vivid examples and sharp, clear prose, *How Emotions Are Made* defends a bold new vision of the most central aspects of human nature.”

— **Paul Bloom, author of *Against Empathy* and *How Pleasure Works***

“Lisa Barrett writes with great clarity about how your emotions are not merely about what you’re born with, but also about how your brain pieces your feelings together, and how you can contribute to the process. She tells a compelling story.”

— **Joseph LeDoux, author of *Anxious and Synaptic Self***

“*How Emotions Are Made* offers a grand new conception of emotions — what they are, where they come from, and (most importantly) what they aren’t. Brain science is the art of the counterintuitive and Lisa Barrett has a remarkable capacity to make the counterintuitive comprehensible. This book will have you smacking your forehead wondering why it took so long to think this way about the brain.”

— **Stuart Firestein, author of *Failure: Why Science Is So Successful and Ignorance: How It Drives Science***

“*How Emotions Are Made* is a provocative, insightful, and engaging analysis of the fascinating ways that our brains create our emotional lives, convincingly linking cutting-edge neuroscience studies with everyday emotions. You won’t think about emotions in the same way after you read this important book.”

— **Daniel L. Schacter, author of *The Seven Sins of Memory***

“Lisa Barrett masterfully integrates discoveries from affective science, neuroscience, social psychology, and philosophy to make sense of the many instances of emotion that you experience and witness each day. *How Emotions Are Made* will help you remake your life, giving you new lenses to see familiar feelings — from anxiety to love — anew.”

— **Barbara Fredrickson, author of *Positivity and Love 2.0***

“*How Emotions Are Made* chronicles a paradigm shift in the science of emotion. But more than that, this book brilliantly conveys the new neuroscience of emotion in an understandable, extraordinarily well-written way. The implications of Lisa Barrett’s work (which ‘only’ challenges two-thousand-year-old assumptions about the brain) are nothing short of stunning. Even more stunning is how extraordinarily well she succeeds.”

— **Nancy Gertner, senior lecturer on law, Harvard Law School, and former U.S. federal judge for the United States District Court of Massachusetts**

How Emotions Are Made

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The Secret Life of the Brain

Lisa Feldman Barrett, Ph.D.

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For Sophia

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Introduction:

The Two-Thousand-Year-Old Assumption

On December 14, 2012, the deadliest school shooting in U.S. history took place at Sandy Hook Elementary School in Newtown, Connecticut. Twenty-six people inside the school, including twenty children, were massacred by a lone gunman. Several weeks after this horror, I watched the governor of Connecticut, Dannel Malloy, give his annual “State of the State” speech on television. He spoke in a strong and animated voice for the first three minutes, thanking individuals for their service. And then he began to address the Newtown tragedy:

We have all walked a very long and very dark road together. What befell Newtown is not something we thought possible in any of Connecticut’s beautiful towns or cities. And yet, in the midst of one of the worst days in our history, we also saw the best of our state. Teachers and a therapist that sacrificed their lives protecting students.¹

As the governor spoke the last two words, “protecting students,” his voice caught in his throat ever so slightly. If you weren’t paying close attention, you might have missed it. But that tiny waver *devastated* me. My stomach instantly knotted into a ball. My eyes flooded. The TV camera panned to the crowd where other people had started to sob too. As for Governor Malloy, he stopped speaking and was gazing downward.

Emotions like Governor Malloy’s and mine seem primal — hardwired into us, reflexively deployed, shared with all our fellow humans. When triggered, they seem to unleash themselves in each of us in basically the same

way. My sadness was like Governor Malloy's sadness was like the crowd's sadness.

Humanity has understood sadness and other emotions in this way for over two thousand years. But at the same time, if humanity has learned anything from centuries of scientific discovery, it's that things aren't always what they appear to be.

The time-honored story of emotion goes something like this: We all have emotions built-in from birth. They are distinct, recognizable phenomena inside us. When something happens in the world, whether it's a gunshot or a flirtatious glance, our emotions come on quickly and automatically, as if someone has flipped a switch. We broadcast emotions on our faces by way of smiles, frowns, scowls, and other characteristic expressions that anyone can easily recognize. Our voices reveal our emotions through laughter, shouts, and cries. Our body posture betrays our feelings with every gesture and slouch.

Modern science has an account that fits this story, which I call the *classical view of emotion*. According to this view, the waver in Governor Malloy's voice launched a chain reaction that began in my brain. A particular set of neurons — call it the “sadness circuit” — leaped into action and caused my face and body to respond in a certain, specific way. My brow furrowed, I frowned, my shoulders stooped, and I cried. This proposed circuit also triggered physical changes inside my body, causing my heart rate and breathing to speed up, my sweat glands to activate, and my blood vessels to constrict.* This collection of movements on the inside and outside of my body are said to be like a “fingerprint” that uniquely identifies sadness, much like your own fingerprints uniquely identify you.

The classical view of emotion holds that we have many such emotion circuits in our brains, and each is said to cause a distinct set of changes, that is, a fingerprint. Perhaps an annoying coworker triggers your “anger neurons,” so your blood pressure rises; you scowl, yell, and feel the heat of fury. Or an alarming news story triggers your “fear neurons,” so your heart races; you freeze and feel a flash of dread. Because we experience anger, happiness, surprise, and other emotions as clear and identifiable states of being,

* When I use the word “body” in this book, I am excluding the brain, as in the sentence, “Your brain tells your body to move.” To refer to the entire body including the brain, I write “the anatomical body.”

it seems reasonable to assume that each emotion has a defining underlying pattern in the brain and body.

Our emotions, according to the classical view, are artifacts of evolution, having long ago been advantageous for survival, and are now a fixed component of our biological nature. As such, they are universal: people of every age, in every culture, in every part of the world should experience sadness more or less as you do — and more or less as did our hominin ancestors who roamed the African savanna a million years ago. I say “more or less” because no one believes that faces, bodies, and brain activity look *exactly* the same each time someone is sad. Your heart rate and breathing and blood flow won’t always change by the same amount. Your brow might furrow slightly less by chance or by custom.²

Emotions are thus thought to be a kind of brute reflex, very often at odds with our rationality. The primitive part of your brain wants you to tell your boss he’s an idiot, but your deliberative side knows that doing so would get you fired, so you restrain yourself. This kind of internal battle between emotion and reason is one of the great narratives of Western civilization. It helps define you as human. Without rationality, you are merely an emotional beast.

This view of emotions has been around for millennia in various forms. Plato believed a version of it. So did Hippocrates, Aristotle, the Buddha, René Descartes, Sigmund Freud, and Charles Darwin. Today, prominent thinkers such as Steven Pinker, Paul Ekman, and the Dalai Lama also offer up descriptions of emotions rooted in the classical view. The classical view is found in virtually every introductory college textbook on psychology, and in most magazine and newspaper articles that discuss emotion. Preschools throughout America hang posters displaying the smiles, frowns, and pouts that are supposed to be the universal language of the face for recognizing emotions. Facebook even commissioned a set of emoticons inspired by Darwin’s writings.³

The classical view is also entrenched in our culture. Television shows like *Lie to Me* and *Daredevil* are predicated on the assumption that your innermost feelings are exposed by your heart rate or facial movements. *Sesame Street* teaches children that emotions are distinct things inside us seeking expression in the face and body, as does the Pixar movie *Inside Out*. Companies like Affectiva and Realeyes offer to help businesses detect their customers’ feelings through “emotion analytics.” In the NBA draft, the Milwaukee Bucks evaluate a player’s “psychological, character and personality

issues” and assess “team chemistry” from facial expressions. And for several decades, the U.S. Federal Bureau of Investigation (FBI) based some of its advanced agent training on the classical view.⁴

More significantly, the classical view of emotion is embedded in our social institutions. The American legal system assumes that emotions are part of an inherent animal nature and cause us to perform foolish and even violent acts unless we control them with our rational thoughts. In medicine, researchers study the health effects of anger, supposing that there is a single pattern of changes in the body that goes by that name. People suffering from a variety of mental illnesses, including children and adults diagnosed with autism spectrum disorder, are taught how to recognize facial configurations for specific emotions, ostensibly to help them communicate and relate to others.

And yet . . . despite the distinguished intellectual pedigree of the classical view of emotion, and despite its immense influence in our culture and society, there is abundant scientific evidence that this view cannot possibly be true. Even after a century of effort, scientific research has not revealed a consistent, physical fingerprint for even a single emotion. When scientists attach electrodes to a person’s face and measure how facial muscles actually move during the experience of an emotion, they find tremendous variety, not uniformity. They find the same variety—the same absence of fingerprints—when they study the body and the brain. You can experience anger with or without a spike in blood pressure. You can experience fear with or without an amygdala, the brain region historically tagged as the home of fear.

To be sure, hundreds of experiments offer some evidence for the classical view. But *hundreds more* cast that evidence into doubt. The only reasonable scientific conclusion, in my opinion, is that emotions are not what we typically think they are.

So what are they, really? When scientists set aside the classical view and just look at the data, a radically different explanation for emotion comes to light. In short, we find that your emotions are not built-in but made from more basic parts. They are not universal but vary from culture to culture. They are not triggered; you create them. They emerge as a combination of the physical properties of your body, a flexible brain that wires itself to whatever environment it develops in, and your culture and upbringing, which provide that environment. Emotions are real, but not in the objec-

tive sense that molecules or neurons are real. They are real in the same sense that money is real — that is, hardly an illusion, but a product of human agreement.⁵

This view, which I call the *theory of constructed emotion*, offers a very different interpretation of the events during Governor Malloy's speech. When Malloy's voice caught in his throat, it did not trigger a brain circuit for sadness inside me, causing a distinctive set of bodily changes. Rather, I felt sadness in that moment because, having been raised in a certain culture, I learned long ago that "sadness" is something that may occur when certain bodily feelings coincide with terrible loss. Using bits and pieces of past experience, such as my knowledge of shootings and my previous sadness about them, my brain rapidly predicted what my body should do to cope with such tragedy. Its predictions caused my thumping heart, my flushed face, and the knots in my stomach. They directed me to cry, an action that would calm my nervous system. And they made the resulting sensations meaningful as an instance of sadness.

In this manner, my brain *constructed* my experience of emotion. My particular movements and sensations were not a fingerprint for sadness. With different predictions, my skin would cool rather than flush and my stomach would remain unknotted, yet my brain could still transform the resulting sensations into sadness. Not only that, but my original thumping heart, flushed face, knotted stomach, and tears could become meaningful as a different emotion, such as anger or fear, instead of sadness. Or in a very different situation, like a wedding celebration, those same sensations could become joy or gratitude.

If this explanation doesn't make complete sense or even sounds counterintuitive so far, believe me, I am right there with you. After Governor Malloy's speech, as I came back to myself, wiping my tears, I was reminded that no matter what I *know* about emotions as a scientist, I *experience* them much as the classical view conceives them. My sadness felt like an instantly recognizable wave of bodily changes and feelings that overwhelmed me as a reaction to tragedy and loss. If I were not a scientist using experiments to reveal that emotions are in fact made and not triggered, I too would trust my immediate experience.

The classical view of emotion remains compelling, despite the evidence against it, precisely because it's intuitive. The classical view also provides reassuring answers to deep, fundamental questions like: Where do you come

from, evolutionarily speaking? Are you responsible for your actions when you get emotional? Do your experiences accurately reveal the world outside you?

The theory of constructed emotion answers such questions differently. It's a different theory of human nature that helps you see yourself and others in a new and more scientifically justified light. The theory of constructed emotion might not fit the way you typically experience emotion and, in fact, may well violate your deepest beliefs about how the mind works, where humans come from, and why we act and feel as we do. But the theory consistently predicts and explains the scientific evidence on emotion, including plenty of evidence that the classical view struggles to make sense of.

Why should you care which theory of emotion is correct? Because belief in the classical view affects your life in ways you might not realize. Think about the last time you went through airport security, where taciturn agents of the Transportation Security Administration (TSA) X-rayed your shoes and evaluated your likelihood as a terrorist threat. Not long ago, a training program called SPOT (Screening Passengers by Observation Techniques) taught those TSA agents to detect deception and assess risk based on facial and bodily movements, on the theory that such movements reveal your innermost feelings. It didn't work, and the program cost taxpayers \$900 million. We need to understand emotion scientifically so government agents won't detain us — or overlook those who actually do pose a threat — based on an incorrect view of emotion.⁶

Now imagine that you're in a doctor's office, complaining of chest pressure and shortness of breath, which may be heart attack symptoms. If you're a woman, you're more likely to be diagnosed with anxiety and sent home, whereas if you're a man, you're more likely to be diagnosed with heart disease and receive lifesaving preventive treatment. As a result, women over age sixty-five die more frequently of heart attacks than men do. The perceptions of doctors, nurses, and the female patients themselves are shaped by classical view beliefs that they can detect emotions like anxiety, and that women are inherently more emotional than men . . . with fatal consequences.⁷

Belief in the classical view can even start wars. The Gulf War in Iraq was launched, in part, because Saddam Hussein's half-brother thought he could read the emotions of the American negotiators and informed Saddam that the United States wasn't serious about attacking. The subsequent war claimed the lives of 175,000 Iraqis and hundreds of coalition forces.⁸

We are, I believe, in the midst of a revolution in our understanding of emotion, the mind, and the brain — a revolution that may compel us to radically rethink such central tenets of our society as our treatments for mental and physical illness, our understanding of personal relationships, our approaches to raising children, and ultimately our view of ourselves. Other scientific disciplines have seen revolutions of this kind, each one a momentous shift away from centuries of common sense. Physics moved from Isaac Newton's intuitive ideas about time and space to Albert Einstein's more relative ideas, and eventually to quantum mechanics. In biology, scientists carved up the natural world into fixed species, each having an ideal form, until Charles Darwin introduced the concept of natural selection.

Scientific revolutions tend to emerge not from a sudden discovery but by asking better questions. How are emotions made, if they aren't simply triggered reactions? Why do they vary so much, and why have we believed for so long that they have distinctive fingerprints? These questions in and of themselves can be delightfully interesting to ponder. But taking pleasure in the unknown is more than just a scientific indulgence. It's part of the spirit of adventure that makes us human.

In the pages that follow, I invite you to share that adventure with me. Chapters 1–3 introduce the new science of emotion: how psychology, neuroscience, and related disciplines are moving away from the search for emotion fingerprints and instead asking how emotions are constructed. Chapters 4–7 explain how, exactly, emotions are made. And chapters 8–12 explore the practical, real-world implications of this new theory of emotions on our approaches to health, emotional intelligence, child-rearing, personal relationships, systems of law, and even human nature itself. To close the book, chapter 13 reveals how the science of emotion illuminates the age-old mystery of how a human brain creates a human mind.

The Search for Emotion's "Fingerprints"

Once upon a time, in the 1980s, I thought I would be a clinical psychologist. I headed into a Ph.D. program at the University of Waterloo, expecting to learn the tools of the trade as a psychotherapist and one day treat patients in a stylish yet tasteful office. I was going to be a consumer of science, not a producer. I certainly had no intention of joining a revolution to unseat basic beliefs about the mind that have existed since the days of Plato. But life sometimes tosses little surprises in your direction.

It was in graduate school that I felt my first tug of doubt about the classical view of emotion. At the time, I was researching the roots of low self-esteem and how it leads to anxiety or depression. Numerous experiments showed that people feel depressed when they fail to live up to their own ideals, but when they fall short of a standard set by others, they feel anxious. My first experiment in grad school was simply to replicate this well-known phenomenon before building on it to test my own hypotheses. In the course of this experiment, I asked a large number of volunteers if they felt anxious or depressed using well-established checklists of symptoms.¹

I'd done more complicated experiments as an undergraduate student, so this one should have been a piece of cake. Instead, it crashed and burned. My volunteers did not report anxious or depressed feelings in the expected pattern. So I tried to replicate a second published experiment, and it failed too. I tried again, over and over, each experiment taking months. After three years, all I'd achieved was the same failure *eight times in a row*. In science, experiments often don't replicate, but eight consecutive failures is an