

Excerpt from

# Lenses of Perception

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*A Surprising New Look  
at the Origin of Life,  
the Laws of Nature,  
and Our Universe*

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# Introduction

**T**HE STORY OF THIS BOOK began when I was eleven years old. I found myself in bed, recovering from a broken jaw—the results of a classic boyhood accident with a skateboard. My head was wrapped in a wire frame to hold my jaw in place while it healed. My teeth were wired shut to prevent any movement and I was forced to eat everything through a straw.

I couldn't go to school for a month, which felt like a vacation for the first few days, but soon became a bore, since there was no one to share it with. Having nothing else to do, I found myself developing a love for books. My mother, a librarian, kept me well supplied.

That's when my interest in science began. I ran across Isaac Newton's book, *Opticks*, where he describes his experiments with light. I was transfixed. It wasn't just his experiments using prisms to separate colors in a ray of light, or his curiosity about lenses and how they focus and spread sunbeams, or his interest in the way light diffracts as it passes through water and glass, or even the amazing conclusions he arrived at. It was the depth of his insights.

He brought clarity to a field that had been muddled by vague and misleading ideas. He set aside the guesses and assumptions of others and focused on his own observations and experiences. He literally found his way in the dark to a deeper understanding. His confidence

and the precision of his explanations showed a level of awareness I had never seen before.

A year later, I read Newton's most famous book, where he reveals his laws of motion, including his explanation for gravity and the mathematics of calculus he devised. I was hooked and began reading other books, especially about electromagnetism, astronomy, and antimatter.

However, I didn't find another scientist with Newton's deep sense of understanding until I ran across Albert Einstein's Special Theory of Relativity. By that time, I was in eighth grade. It was a bit of a struggle, but I followed Einstein's equations and could see how he arrived at his conclusions. But where did his ideas come from? His comprehension seemed broader than the scientists of his day.

Looking back, it was Newton and Einstein, among others, who showed me how science can open up new areas of knowledge about reality and change the way we see the world.

In high school, I had the fortune of having some of the best physics teachers in the US: Richard Mihm and Marilyn Milsop. Their classes were structured as self-directed experiments. The lab equipment we used was better than that at many universities. It was the perfect way to learn a deeper sense of how things work.

Unfortunately, college was a disappointment. I ran into the same mindset that Lee Smolin describes in his book, *The Trouble with Physics* (see Chapter 14 for quotes from Smolin). Physics professors were no longer teaching science as a way of comprehending nature. But that's what I was looking for. I wanted to find the understanding that inspired Newton and Einstein. The professors discouraged my questions. "Just read the textbooks and learn the math," they told me.

After talking to a number of teachers, and finally meeting the head of the physics department, I realized the problem was systemic. Not one of them was interested in really understanding. At the time, I couldn't see why they were ignoring my questions. In fact, only while writing this book did it become clear to me why physics teachers stopped encouraging the type of discovery I was looking for.

As a student it didn't make sense, but I saw the writing on the wall. It was the end of a childhood dream. I wasn't interested in physics if I

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couldn't understand it. Fortunately, as one door closed, another opened. That's when my study of consciousness began.

I soon found that this new field was filled with the same kind of misinformation and vagueness that Newton faced when he studied light and gravity. Rather than discouraging me, Newton's example inspired me to continue. I knew I could find my way, even in the dark.

There's a huge gap between science and the study of consciousness. Science gains its credibility through experiments that are repeatable. It validates its theories empirically. Consciousness, on the other hand, can't be studied objectively, no matter what people might say. Therefore, it seems impossible to verify what is true when everything is subjective.

However, a robust study of consciousness is possible, and it uses many of the same principles that we find in a rigorous study of science. For example, we need to test our ideas. We should consider alternate perspectives and points of view before arriving at conclusions. We must be honest about what we know and what we don't know. No single source of information, by itself, gives us the whole truth. In the case of consciousness, this means we need not only our physical senses and our mental senses of logic and reason. We also need our intuitive senses and our emotional senses. And most important, we need to wait until we can see how all the elements fit together as a cohesive whole. Then, and only then, do we find a deeper understanding.

Consider physicians when they start their practice. Research shows that they often have the feeling that they're not real doctors. Their white lab coats remind them of the role they're playing and convey a sense of authority to others. But after eight years of scientific study, it's still common for new doctors to feel like imposters, until they've worked for a while. They need experience with real patients, on their own, to prove to themselves that they know how to use the tools they've learned. They only see themselves as true physicians after doing the job and helping others.

In other words, objective knowledge isn't enough to be a doctor. Experience is also needed.

This element, experience, is the distinguishing factor between science and the field of consciousness. It's generally overlooked in science



because it's subjective. However, if you want to understand states of consciousness, then experiences are your bedrock. The moment you discount your experiences, or reject them, you have nothing left to work with.

Therefore, we have two different ways of learning. First, we can study things from the outside, by reading, going to school, and using logical analysis and reason. This approach gives us objective knowledge.

Second, we can understand a field by working in it. We get to know our friends and the ways of the world the same way: We absorb it, you might say. Apprenticeship was once the main approach to learning a trade. This is also the path we take to find wisdom. It comes through experience.

I've had many good teachers. They've opened my eyes to new possibilities and started my search. However, depth of understanding requires experimentation, staying open to different perspectives, and learning from our successes and failures. Therefore, the path we walk to wisdom is largely on our own, and only we know when we've found the level of truth that satisfies us.

Childhood dreams are hard to forget, so thoughts about physics followed me down through the years. I began wondering if some of the lessons I've learned through the study of consciousness could fill a gap in science. Perhaps they can help explain, more deeply, the meaning of gravity and light, the emergence of life and multicellular creatures, the mysterious nature of the subconscious, and the strange relationship between the brain and consciousness. In other words, I wondered if they can help answer the questions I asked those professors at college, decades ago.

That's the story behind this book. And having just finished, I can now look back and see that what I was trying to do, without realizing it, was restore something that was lost from science a century ago, when relativity and quantum mechanics entered the scene. That's when many scientists began divorcing themselves from philosophy.

For thousands of years, even back to ancient Greece, natural philosophy and science were inseparable. What caused them to split? It wasn't just scientists spurning the efforts of philosophers. The breakup was mutual. And a similar divide has grown between the sciences and liberal arts, as well as between science and religion.

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The first third of this book explores the cause behind this fracturing of our world. It shows that lenses of perception created these divisions. In the process, something important was lost. In fact, many of the gaps in understanding that physicists, biologists, and neuroscientists face today are directly related to this issue. The last two-thirds of this book describes a new solution to these problems.

That raises the question: What are lenses of perception? Simply put, they're ways of seeing. We change lenses when looking at the world in different ways. Seems simple enough. We all do it, partially, when we relate to another person, dive into the artificial reality of a movie, or think outside the box.

However, if we want to be more than just a tourist and truly understand how life looks through a different lens, we need to first let go of everything holding us to our old worldview. Then we must pass through a zone of confusion and bewilderment. We feel lost until another lens makes sense. Only then can we fully adjust to a new perspective. Who wants to go that far?

This is why breakdowns in communication are so common. Without a strong desire to understand, other points of view seem wrong and confused. Thus, in our age of specialists, we're more like ships passing in the night. We rarely realize how different our perspectives are. It's easy to write everyone else off as fools. The problem is that we look just as foolish to them.

More importantly, learning to switch lenses is a vital necessity in a society changing as fast as ours. It's the only way our inner selves can adapt and keep up. If we avoid the path of wisdom and understanding and focus only on objective knowledge, modern culture soon seems alien and wrong to us. We see ourselves as outsiders and feel disconnected. Adjusting our lenses of perception allows us to connect at a deeper level, where we can see that things do make sense.

Here's an example: The first major earthquake I experienced registered 5.4 on the Richter scale. It was powerful enough to make the ground beneath the San Francisco Bay area move in long undulating waves, as if it were fluid. The illusion of solidity vanished. I felt more like a surfer than someone standing on firm land. My sense of location disappeared as the earth itself flowed beneath my feet.

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People around me screamed and froze, not knowing what to do. Others ran outside. However, a few old-timers smiled and calmly walked to the door. One of them said, “It’s nice to feel one once in a while.”

They’d been through the experience before. They knew what earthquakes feel like, so it didn’t shake them to their core. They retained a sense of orientation because they learned another way of seeing.

We don’t like changing lenses. Most of us fight tooth and nail to avoid the feeling of nausea that comes from a new mindset. We build up our defenses to hang onto our picture of the world, whether philosophical, religious, or scientific.

If we can pry our fingernails free from our precious perspectives and let go of our death grip, we can discover new perceptions we’ve never seen before. These experiences alter our understanding in deep ways. They shine new lights on who we are.

Shifting perspectives not only broadens our understanding of other cultures; it also allows us to peer deeper into nature, solving mysteries that science has pondered for hundreds of years. When I first sat down to write this book, I had no answers to the questions of quantum physics. I didn’t know what was missing from Newton’s laws of motion. I sensed that the theory of evolution was incomplete, but I didn’t know why. I had no explanation for the mind-body problem or the scientific enigma known as “emergence.” The five unsolved problems of physics seemed inscrutable.

I only knew from experience that, when I changed lenses, I found an added level of comprehension. I learned this after making a practice of switching points of view, as an experiment, to explore the nature of consciousness. This doesn’t mean that a new perspective, by itself, gives us better insight. No, it’s the contrast. Seeing from another angle adds context.

While writing this book, I soon realized that I’d underestimated the importance of this simple tool of changing points of view. It’s far more powerful than I realized. It not only offers the key to seeing in the dark, you might say, and getting to know realms that are new and unknown to us, it also restores our sense of wholeness to life. It bridges the gap between science, philosophy, the arts, and the spiritual experience of being. This is what happens when we connect with nature at a deeper level.

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However, explaining lenses of perception isn't easy. It's hard wrapping our brains around the impact they have on us. Reading about them isn't enough to see how deeply they affect our connection with the world. If we want to understand—to truly understand—we need to experience changes in our way of seeing firsthand. That's what this book attempts to do.

Successful writers know the importance of “showing” rather than “telling.” A good story pulls us into a world where the scene unfolds as if we were there. Telling gives us only a clinical, literal description; it doesn't move us to a new perspective.

So, to explain lenses of perception properly, I'll be using words poetically at times to evoke new views of the world, even when talking about science. This is how we can find what is hidden in plain sight.

But words can't pull this off alone. The reader must do some heavy lifting. This book is more like a tour guide. We are, in a sense, going on a jungle safari to explore untamed points of view. Hopefully your mind will be boggled. That's the point of this journey.

I'll start with familiar views of the world. At first you can retain your normal way of seeing and thinking. Yet the quest soon takes us into dense underbrush where the most valuable treasures are hidden. If we want to unearth the gold, we must let go of the way we usually see reality. That's where we discover that lenses of perception are not just tools that help us understand the world, they're fundamental to reality itself. We'll see the scientific evidence that supports this.

To make such a leap requires a completely different mindset. It will probably feel unsettling at times when the ground starts shifting. New perspectives can shake us to our core. This is true for everyone. I experience the same thing.

If a section of this book leaves you feeling disturbed, even if in a subtle way, try setting it down for a while. Give the ideas a chance to percolate. Then go back and read the section again. You might be surprised. Remember, the goal here is to experience the uncomfortable feeling of confusion and then, breaking through that, to learn how we can change the way we see.

When writing this book, I didn't expect to be pulled into questions about the laws of nature. I was simply trying to understand the

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problems of our modern times and see where the story led. Each chapter took me by surprise, as if the sails of my ship were being blown onto a new course by powerful winds. The thread of the story kept leading to deeper and deeper insights. I found myself farther from shore than expected, facing a whole new view of the world and the meaning of human understanding.

If you're interested in a wild ride, buckle your seatbelt. Then join me on the path of discovery I took to find the dimension of life that scientists have been missing. We'll use new tools to guide us: lenses of perception.

# 1

## Forces That Shape Our Beliefs

**I** CAMPED ONE NIGHT in the high country of the Yellowstone area,” said Jim Bridger, nineteenth century mountain man, guide, and explorer of the American frontier. He continued:

*When I woke next morning, I saw a bull elk grazing not twenty feet away. What luck, I thought. Grabbing my rifle, I took aim and fired.*

*The critter just kept chomping the grass. Never even looked up. I rubbed my eyes. Was I dreaming?*

*Quietly, I reloaded and took another shot. He didn't budge. I couldn't figure it. Never missed such an easy target. My rifle, or my eyes, must be goin' bad. How could such a fine animal not hear the blast? Was he deaf?*

*When a third shot failed, my only chance was to rush him. So, grabbing my knife, I sprung for the creature.*

*Four steps away I hit a wall of glass, not twenty feet from camp. I spent the rest of the day riding around the glass mountain. When I got to the other side, I saw it was a perfect magnifying lens. That bull elk wasn't twenty feet away; it was twenty miles, on another mountain.<sup>1</sup>*

Jim Bridger loved telling tales, and he told some wild ones. The problem, he said, was getting people to believe his real discoveries. They gulped down his tallest fables but couldn't swallow the truth.

Bridger was the first white man to see the Yellowstone area. People had a hard time believing him when he first described geysers of water spouting from the ground as regular as clockwork and hot steam beds of bubbling earth in the middle of winter. He was also the first to discover the Great Salt Lake. This raised doubts further, since it was hundreds of miles from the nearest ocean. His descriptions of the Grand Canyon seemed impossible, a clear sign of exaggeration. And when he talked about a land of petrified trees, solid as rock, they were sure he'd been living too long on his own.

However, when he added that he also found petrified birds in that forest, and those birds had petrified songs, well now, people were interested. And when he said the Grand Canyon was so deep that, if you shouted into it at night, the echo would wake you up next morning, they lapped it up and wanted more.

Whenever exploring new territory, we face a similar issue. If others haven't experienced anything like it before, it sounds unreal, like a pipe dream.

It's the same with this book. I'd like to explain up front the new insights into physics and biology that I've discovered. However, the words keep falling short. I've come to the conclusion that it isn't fair to make claims about lenses of perception before you've seen them for yourself. To make it as clear as possible, I have to start with experiences.

This goes against the grain of how we typically learn. To become a medical doctor, for example, we expect years of studying physiology, respiration, circulatory systems, and digesting volumes of detailed facts about the human body. We need to master this knowledge before practicing medicine.

To understand lenses of perception, however, we must start with experiences. This may seem odd for a discussion about science, but this is the only way to see what we are up against.

Soldiers, for example, watch comrades die in battle. They live through the devastation of war. This changes them. They can never see life the

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same way. After returning home, they try to resume old friendships and pick up where they left off, but it's hard to connect with others the way they did before. It's as if a wall, an impenetrable communication barrier, stands in the way. They try to explain what their tour of duty was like, but soon realize that others can't understand how deeply it affects them. This isolates them. They feel like strangers in their own homes. Only fellow soldiers can understand.

Life-changing injuries can also alter the way we see. If you were born with normal sight and woke up blind one day, your world would be turned upside down. Serious illnesses force people to abandon careers and dreams. Our very purpose for living changes when we find out that we can't have children or need a wheelchair. It isn't possible to fully explain this to those who haven't experienced it. Words aren't enough.

Teenagers realize that the last day of high school spells the end of life as they know it. Whether they go to college or find a job, their world won't be the same. Friends head off in different directions. Teenagers expect all of this, but it doesn't prepare them for what they face. They feel like outsiders in a new world. The depth of confusion and feeling of disorientation surprises us when we're teenagers. Why couldn't anyone have prepared us better? Does it have to be such a shock?

Yes, it does, because dramatic changes alter our lenses of perception. No one can prepare us for radically new experiences. No teachers, books, theories, or logic can eliminate the bewilderment.

Primitive cultures in the past had rituals for honoring the rite of passage. It was a way of welcoming youth into the experience of adulthood, helping them make the leap into a new life with new responsibilities. "You must leave your old life behind," the teenagers were told. "Everything you experienced as children was only preparing you for your true purpose in the world."

But is this true? Do we really stop being children? If this is a rite of passage, what are we passing from and where are we going to?

We've made a big mistake. Belief is not the most significant force shaping our perceptions. Philosophers, religious leaders, and scientists came to the wrong conclusion because they were thinking too much about ideas.



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We got it backwards: Our beliefs are shaped by lenses of perception. These lenses, the ways we see, come from experiences. This is how our worldview is fashioned at its deepest levels.

Every major shift in human consciousness occurred for the same reason: new experiences. Our thinking today is different from our ancestors' because the world we live in is different. Even changes from generation to generation create gaps in our ways of seeing. This is the natural order because we learn from the life we live. Ideas are secondary.

Once you see petrified trees and geysers, you know they're real. You don't have to believe in them. You don't doubt them, either. You just know. But it's hard to describe an experience. That was Jim Bridger's problem.

What does it feel like to run your hand across a petrified tree? Well, it feels like a rock, right? But isn't there more to it than that? Doesn't it change the way you see rocks? Don't you wonder how living trees became frozen in stone? Aren't you moved to awe standing in the silence of redwoods that once were alive, their bodies now lying intact where they fell hundreds of millions of years ago?

Describing the experience is impossible. We don't even try. We just say to our friends, "Wow. Unbelievable. You gotta see this."

Unfortunately, lenses of perception are harder to explain because there's nothing objective about them. We can't run our hands across a point of view or snap its picture with a camera. We excel at observing the world objectively; however, that skill is no good to us here. You can't understand lenses of perception through thoughts alone.

Another problem is that shifting to see through a new lens means giving up our old map of the world. This is usually a traumatic event. Our mind fights against such a move. In fact, intellectuals find it the hardest because they construct more elaborate models for how they see. Imagining a new perspective isn't enough. The transition is more difficult than we realize as our lenses are largely unconscious.

Try letting go of your worldview for a moment. Hold no point of view at all. Can you do it?

I don't think it's possible. As long as we're conscious, we have a perspective. We have to. Otherwise, we wouldn't be aware of anything. Even a blank mind is an experience. Or, if we run into a situation that makes no sense, confusion is the thing we see.

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Lenses allow us to focus on our experiences. They give us context. They frame everything we see and feel.

Whenever we face the unknown, we start searching for a perspective to make sense of it. We generally don't notice the process. We only know that it feels uncomfortable before we understand. Then, one day, a clear picture snaps into view.

The transition is so disturbing that most people cut the process short. They don't allow themselves the time needed to adjust to unfamiliar lenses. Instead, they try explaining new experiences from old points of view. They tell themselves: This is nothing different. I've got it figured out.

Not knowing is unnerving. That's why we stamp labels on whatever we see. We try to make everything fit our map of the world. Teacher, politician, salesman, doctor—we label everyone. We do it unconsciously. However, it colors the way we see people.

September 11, 2001: Millions around the world watched as a plane flew straight into the World Trade Center in New York City, one of the largest buildings in the world. It was bizarre. How could this have happened?

Seventeen minutes later, a second jet buried itself into the second tower. Then, an hour later, we watched as both of the twin towers collapsed into a pile of rubble with thousands of people trapped inside. What just happened?

The confusion was so upsetting that many lost their bearings. I heard people say that life as we knew it would never be the same. Others thought it was the end of the world. Some imagined we were being invaded by aliens. And an alien invasion would have produced the same surreal sense, hanging over everyone like a cloud, because we didn't know what we were seeing.

At the same time, everyone began racing to figure it out. This wasn't an accident. Someone must have planned this. We needed an explanation.

Soon, a story emerged. Terrorists had seized control of planes and flew them, filled with fuel and passengers, into the buildings. Another plane crashed into the Pentagon, and a fourth failed to reach its destination as the people aboard fought to regain control. Can you see how we searched for a lens?

Now, compare this to the way people, thousands of years ago, would have dealt with it. The differences are dramatic.

We knew there was a rational cause, a reason behind what happened. We knew that, by analyzing the facts and thinking it through, we could determine the chain of events.

TV broadcasts, radio discussions, listeners calling in, people talking with each other while watching the scene unfold—all were focused on setting aside the unreality of the experience to find a concept that could bring it into focus. We were looking for truth, but a particular kind of truth: We wanted to know what happened.

Our ancestors would have cared little about that. They would have asked why. Not how or what actions caused it, but the significance behind it. What did it mean?

They would have focused on subjective impressions more than objective facts. They would have disagreed with our truth of the event. Our analysis would seem fictional to them, creations of our imagination. What happened wasn't an external thing, they would say. Everyone experienced it differently. No outer point of view is able to capture the meaning of events with worldwide significance.

For example, the experiences of those with friends and family working in the World Trade Center when it collapsed were completely different from what firemen saw, rushing in to help survivors. People living in the Middle East, thousands of miles away, witnessed the crumbling of the superiority of the United States before their eyes, while most of them also felt pangs of sympathy for the lives lost. American soldiers around the globe knew this was going to change their lives. Everyone's story was unique and personal. There were millions of viewpoints. That's how people thousands of years ago would have seen it: As an event too complicated to pull apart. They would have tried to understand it as a whole.

Today we set aside our subjective feelings and emotions to find an objective picture. Our ancestors accepted their experiences as real. They didn't have the scientific tools we take for granted. We know how to track down and determine causes. It's second nature to us. They were blind to what is clearly visible to us.

On the other hand, they saw things we no longer accept. They searched for and found global meanings that went beyond the personal

intentions of those involved to explain big events. This is what they talked about and tried to resolve. Not the how, but the why: Why did this happen to them in their time? What should they learn from this?

We live in an age where we look for scientific explanations without even realizing it. That is the lens we see through. It is the lens of our age. It's so pervasive that it is invisible to us.

On 9/11, when the story was unfolding, few people stopped to think that objective reasoning could only answer how it happened, not why. Objectivity can't show us the meaning. Science can't tell us how we should respond. How many of us considered that when going through the experience?

Historians face the same problem. Looking back through thousands of years of recorded history, they find that people rarely see the full significance of the changes taking place during their lifetimes. We live too close to the trees. We rarely step back to see the forest.

How will people in the future, two or three hundred years from now, interpret the attack on the World Trade Center? I believe they will see something we missed. The event shocked us because it marked a turning point, but not the one we thought.

The terrorist attack was not a sign of mankind sliding backwards into superstitious religious thinking, as many have claimed. There was a message in the event, which is why it disturbed us, but we missed it because we were so focused on *what* happened that we couldn't see *why*.

As you'll see later, there are techniques we can use to help understand the meaning of events. Lenses of perception are tools that can reveal hidden contexts behind the patterns of life.

If you are a physicist and you hear the word "meaning," you'll be thinking, "Uh oh, here we go into the squishy world of philosophy and religion." However, the discoveries we are about to explore come from the equations of physics. There will be no invoking of higher powers in this book. We won't be using complicated mental gymnastics, since philosophy and religion also overlook the perspectives we are hunting.

If I was going to describe ahead of time what you might learn from this book, I would include an explanation for why our modern world has been fracturing into special interest groups, and why we've lost the "common sense" that once bonded neighbors together. You'll learn an

answer to the riddle that has puzzled scientists for centuries: How do our thoughts move our muscles? You will find a new solution to the mystery known as “emergence,” when a higher-level system, such as an organism, acts as more than the sum of its parts—a theory pragmatically accepted by most biologists, yet widely rejected by physicists—and you’ll see the connection between emergence and the dark matter that astronomers have detected in galaxies. You’ll see why the behavior of individual quantum particles can’t be predicted and how this is directly related to the herd behavior of animals. You will also resolve questions about what causes dramatic evolutionary leaps in biological complexity, such as the first living cell and the first multicellular organism.

What is most amazing is that all of these mysteries are resolved by a simple set of principles.

If I tried to say that understanding lenses of perception could untangle these centuries-old enigmas, as well as resolve questions in philosophy, religion, and psychology, you’d think I was telling you a story of glass mountains and petrified bird songs. So I won’t claim any of these things. I’m just going to take you with me on an exploration, one step at a time, and let you decide for yourself what it means.

If you’re open to trying on different lenses to learn something new, I believe you can catch the significance of what we’ve been missing. All these years it has been right before our eyes.

# 2

## The Origin of Perceptual Lenses

**W**HERE DO LENSES OF PERCEPTION COME FROM? They come from the tools we use. This was a surprise when it first hit me. The more a tool transforms our lives, the more it changes the way we see. Tools alter our experiences, opening us to new insights that subtly shift our beliefs. The process is so gradual that we miss it.

Think back to the first *Homo sapiens* who learned to speak. Imagine how it altered their relationship with nature. Calling out names for eagles, snakes, and stars brought those images to their mind's eye. It was like discovering a new power. Words are creative.

They also deepen our understanding. Returning from journeys, early hunters told stories of their experiences. These tales took on a life of their own and a sense of meaning. Parents passed these lessons on to their children through songs, creating a history for their tribe.

Words may only be tools, but they shape our thoughts. When we name and describe things, we connect with them. Toddlers experience the same sense of discovery.

I'm fortunate to have two one-year old grandchildren, Everett and Lena, as I write this. They're twins, just learning to talk. First, they picked up hand signs, then simple words. It's easy to see the leaps in confidence and understanding when children begin to speak.

Our ancestors made another dramatic shift thousands of years later when they learned to write. Written inscriptions allowed them to

record events. “Look here, Ug, you gave me four sheep last month, not five. See?”

People could etch pictures, numbers, and names onto stone and paper. These were symbolic marks representing ideas. Writing may have started simply as a tool for recording, but it taught people to think conceptually. Using symbols for numbers and words taught them how to see abstractions. Writing laid the groundwork for linear thought. Our culture was transformed.

Today we explore the heavens with telescopes. We can see other galaxies. How do we ever go back? Tools change our perceptions forever. Seeing the distant reaches of our universe, or microscopic organisms swimming in a drop of water, or the skeletal bones left from ancient dinosaurs, changes our philosophy and our beliefs.

Think of how your life was altered after buying your first cell phone, passing your driving test and getting a car, landing your first job, or moving into a new home. New tools transform our view of the world. We only understand the power of lenses after we experience the way they shape our ways of seeing. Talking about this isn't enough. We need to become aware of the shift in our perceptions.

This book explores the impact that lenses have on our lives by looking at the most significant lens of our age: science. Scientific tools have revolutionized our lives. However, there is a major flaw in our modern thinking that springs from these tools.

Technology has created a world with so many innovations and incredible breakthroughs that we live lives that ancient kings couldn't dream of. We use technical marvels to call friends who are thousands of miles away. Our wireless phones convert messages into pulses of light that travel down fiber optic cables stretched across the ocean floor. We sit down at a computer, connect to the Internet, and look at pictures of Earth taken by Neil Armstrong on the moon. We go to doctors for cures to diseases that once plagued mankind.

Our ancestors never experienced the world we know but they saw something that we've lost along the way. Something important is missing. Our perception is flawed in a peculiar way that prevents us from seeing the problem.

What is the flaw?

Let's go back to the dawn of our scientific age, over 300 years ago. In particular, the discoveries of Isaac Newton launched a new age for physics. His tools were so successful in untangling the mysteries of planetary movements that they were soon adopted by almost every field.

His principles fueled the Age of Reason when a new approach to rational thought took central place in our beliefs. The same tools fanned the flames of the industrial revolution, democracy, and our modern understanding of economics. Does this seem hard to believe?

Two hundred years after he first published his laws of motion, these same principles helped crack the mysteries of electricity, magnetism, and light, while also laying the groundwork for sociology and psychology. Physics makes sense, but did he really influence sociology and psychology?

His discoveries shaped the fundamental ways we see the world and what we know. Newton would be amazed by how far his ideas reached. But he would also have seen the flaw.

Isaac knew that his methods were limited. It's clear from his writings that he realized these tools could not explain all of life, for a good reason.

Let's take the "Wayback Machine," as Sherman and Mr. Peabody call it, and journey to 1687, when Isaac first published his *Mathematical Principles of Natural Philosophy*, commonly known as his *Principia*, where he revealed his laws of motion. One century later, as one writer put it, "No one could deny that... a science had emerged that... so far exceeded anything that had ever gone before that it stood alone as the ultimate exemplar of science."<sup>2</sup>

Let's explore the lens of perception at the root of our modern beliefs.