

Beau Lotto

**Deviate: The Science of Seeing  
Differently**

Made by Blinkist



These key insights in blinks were written by a team of experts at Blinkist. We screen the world of nonfiction to choose the very best books. Then, we read them deeply and transform them into this concise format that brings you the most inspiring ideas from the text.

Maybe these blinks will inspire you to dig deeper, or maybe they're enough to start you thinking and then on to something new. However you read blinks, we hope they help you become an even brighter you.

**What's in it for me? Discover a new way to see the world.**

Take a look at the world around you. Are you getting an accurate picture of reality? Most of the time, it seems that way. But what if the things we think are real are actually just an illusion?

It turns out our brains lie to us. Constantly. Thankfully, by delving into the messy science of human perception, these blinks can help us uncover how and why we get tricked by our brains.

This helpful guide draws on author Beau Lotto's three decades of experience in neuroscientific research, and lays out the many ways in which our minds bend and mold our conception of reality.

In these blinks, you'll discover the underlying reasons behind your brain's quirks. You'll also learn why understanding these counterintuitive

cognitive functions can help unlock new avenues of creativity.

In these blinks, you'll learn

- why a tapestry looks more vibrant in the store;
- how to attach a candle to a wall; and
- what happens when you unlearn the process of riding a bike.



**There's an objective reality, but our brains don't see it.**

It's February 2014 and the internet is, as usual, embroiled in a heated argument. All around the globe, people boldly declare their opinions, only to have family, friends, and complete strangers aggressively dismiss them as delusional.

So what's got the world all wound up? A simple picture of a blue-and-black dress. Or is it a gold-and-white dress? Well, that's exactly the issue. Everyone's looking at the same picture but seeing completely different things.

This optical illusion became a viral sensation because it revealed an uncomfortable truth about the human mind. It showed millions of people that what we think of as reality is just an interpretation.

**The key message here is: There's an objective reality, but our brains don't see it.**

The controversial color-changing dress isn't the only example of how our brains' interpretation of some circumstance or other can differ from reality. In fact, distortions like this are extremely common. Just think of all the different optical illusions you've encountered throughout your life.

One popular example shows two circles, each surrounded by a different field of color. At first glance, the two circles appear different, with one clearly being darker than the other. But when you hold the shapes side by side, their shade is exactly the same. The variation only appears because your brain is interpreting the visual stimulus differently, depending on the surrounding context.

Want another example? This time, imagine sitting in a stationary train. As you gaze out the window, the train on the next track starts to move forward. For a brief second, as you see it glide away, you may feel as if you're moving backward, even though you're not moving at all.

Clearly, it's not just your eyes that are vulnerable to deceit. All our senses can be tricked by the mind. But if all our senses are unreliable, how do we know what's really real? Well, a lot of the time, we don't. And that's okay.

For the most part, distortions of the outside world are harmless, or even beneficial, because they let us concentrate on more important sensations, like pain or fear. And, because our brains are the result of millions of years of evolution, the way they interpret reality doesn't have to be accurate. It just has to help us survive.



## **Information is meaningless without interpretation.**

Imagine you and a friend are having an argument over dinner. The details don't matter, but both of you are convinced that the other is misremembering a small fact.

Not that long ago, you'd agree to disagree. Nowadays, you can whip out your smartphone and look up the truth. Such are the wonders of the Information Age.

But does having all the world's knowledge at our fingertips really help us? Not on its own, it doesn't. Sure, you can access information for just about anything you want, but all that data is useless without your phone to process it into images and text.

**The key message here is: Information is meaningless without interpretation.**

The world is full of information. Every single day, we get bombarded by it in the form of photons, chemicals, and vibrations. But all this input is meaningless in its raw form. For it to have any value at all, it has to be divided and processed. Only then do the photons become colors, the chemicals become tastes, and the vibrations become sounds.

To help this interpretation process, our bodies and brains have evolved to filter out unnecessary information. As a result, we sense only the information we absolutely need. That's why we only hear certain frequencies, smell certain chemicals, and see what we call "visible light," which is a narrow slice of the full electromagnetic spectrum.

So our human view of reality is partial from the start. But even with this limited window onto the world, the information we take in isn't always clear. In fact, it's

often mixed together in confusing bundles.

Just think of what happens when you look at a landscape at sunset. What exactly are you seeing? You may see a forest or a field, but those images are actually a complex interplay of three things – photons from the sun, the surfaces off which they reflect, and the air through which they move. All this information is tangled together in your sense of sight.

The work doesn't stop once the light hits your retina. At this point, there's still more required for you to create meaning from what you take in. But interpretation is no easy task, since even an ordinary sight like a smiling human face can take on an unlimited variety of meanings, depending on the context. How so? Find out in the next blink!



## Our brains learn by interacting with the world.

While growing up in Sacramento, California, Ben Anderson did all the typical things young boys do. He walked to school, played basketball, and rode his bike around the neighborhood. But what makes Ben so remarkable is that he did all this without his eyes.

At just three years old, Ben lost his sight to a rare form of cancer. Shortly after that, he began experimenting with new ways of navigating the world. He developed a strategy of clicking his tongue and listening carefully to the sounds reflecting off the surfaces around him. Essentially, he learned to see using echolocation, just like a bat.

This acoustic adaptation shows just how flexible the human brain can be. With a little effort, and lots of trial and error, we

can learn to perceive reality in brand-new ways.

**The key message here is: Our brains learn by interacting with the world.**

The human brain isn't static. In fact, it's just the opposite, and can become sharpened and refined over time, depending on how we use it. In the same way a professional athlete can train her muscles to move with precision, we can train our minds to be more sensitive, flexible, and creative by engaging with our environment. And the more we interact with the world, the more we learn.

A classic study shows just how important interacting with the world is to brain health. To begin, scientists divided rats into two groups. One group was given a dynamic environment full of objects, toys, and other stimuli, while the other group was kept in dull cages where nothing ever changed. After a month, the

groups showed clear differences in brain structure. The group that had more to play with had better-developed brains, with more cells and denser neural connections.

Just like those rats, if we continually expose ourselves to new stimuli, our brains will get stronger. We can even learn to incorporate new senses, as was shown in a study from the University of Osnabrück. Subjects were given special belts that vibrated toward magnetic north, mimicking the magnetic sensing some animals have. After wearing the belts for a few weeks, participants had better spatial perception and were more confident in their navigation skills.

Fortunately, you don't need fancy equipment to stimulate your brain. Just exposing yourself to novel experiences, art, and people throughout your life will do the trick.



## Our perception of reality depends on the context.

It's 1824, and Louis XVIII has a problem. People are complaining about his royal tapestry factory in Paris. The factory displays vibrant fabrics in its showroom. But whenever a nobleman buys thread to take home, something seems off about the colors. The greens aren't as verdant and the reds aren't as rich.

Michel Chevreul, the king's chemist, investigates the problem. At first, he suspects that the yarn is degrading over time, or that perhaps the factory is using cheap, low-quality dyes. But, after years of experiments, he presents a surprising finding: there's nothing wrong with the thread or the dye.

Instead, the problem is in the eye of the beholder. The colorful yarns simply appear more vivid when woven together in the showroom's tapestries. In

isolation, the lack of contrast makes them seem dull.

**The key message here is: Our perception of reality depends on the context.**

Chevreul stumbled upon a foundational truth about the science of perception – namely, that we never sense anything in isolation. What we perceive with our senses is always distorted. And our interpretation of the world can be affected by the context of present conditions, as with the case of the tapestries, or by context from the past.

To understand how past context informs present interpretation, consider the struggles some people have when learning foreign languages. In English, R and L sounds have separate meanings. Native speakers grow up learning to tell them apart. In contrast, Japanese doesn't make this phonetic distinction. So Japanese speakers can have difficulty hearing the difference at first, because in

their native context it simply wouldn't matter.

Essentially, our brains learn what types of information were meaningful in the past, and get better at recognizing that information in the future. But while this is a useful skill, it can also make it harder to perceive things accurately.

For instance, we often overlook even the most common typos because our brains automatically fix them. Based on past and present context, our minds know which letters are supposed to be where and adjust our perception accordingly.

Even though context is so influential, we do have control over how we interpret the world. In fact, we have the power to adjust our perception of reality consciously, as you'll find out in the next blink.



**We can use our minds to change how we perceive the world.**

In 1915, St. Petersburg was buzzing with excitement about a shocking new painting by Russian artist Kazimir Malevich. Some saw it as a daring gesture of the avant-garde. Others saw it as a crude insult to art itself. What did the controversial piece depict? A single black square.

Of course, gallery-goers perceived the painting as much more than its color and shape. They understood the work in context. They saw it in dialogue with other art movements, as a commentary on aesthetic theory, and as a strong personal statement.

But none of these meanings was physically on the canvas. After all, it was just a square of black paint. Instead, viewers created meaning through the power of their imaginations.

**The key message here is: We can use our minds to change how we perceive the world.**

Conscious thought is one of humanity's greatest strengths. Our brain's ability to think and imagine lets us dream up completely new worlds. This is the basis for much of what we consider art – whether it's fairy tales, Disney films, or Broadway plays.

Our skill in conscious thought doesn't just allow us to create meaning inside our heads. It also lets us change how we perceive the material world as well.

There's a famous optical illusion that demonstrates this power. It's a simple flip-book that depicts a spinning diamond. Flip the book once, and you'll see the diamond spinning toward the right. But if you pause for a moment and imagine the gem is spinning toward the left, the diamond will appear to spin in *that* direction when you flip the book

again. The images are the same. The only difference is how you decide to see them.

As this illusion shows, what we perceive in the world is really up to us. Sometimes this happens consciously, like when interpreting art. But often it's an unconscious process.

Research has shown that many of our perceptions are subtly influenced by our past experiences and emotional states. For instance, coins appear bigger and more valuable to poor children than to rich ones, and hills appear steeper and more daunting to tired people than to those who are well-rested.

So what we view as reality “out there” may really just be a reflection of what's inside our heads. And, as we'll explore in the next blink, these internal assumptions shape our perception of the world.



**Our assumptions about the world both help – and hinder – our thinking.**

In the summer of 2014, a Liberian man arrived at a hospital in Nigeria. He was sick. Very sick. So Dr Ameyo Adadevoh tested him for Ebola. Before the results were available, the Liberian government demanded that Adadevoh release the patient. Against everyone's advice, she kept him in quarantine.

Her defiant choice was controversial, but it ultimately saved thousands of lives when the results showed that the man did in fact have Ebola. So how did Adadevoh arrive at her decision? And why was it different from everyone else's?

We can't say exactly. But we can be sure that her stubborn course of action was influenced by her unique understanding of the world. She correctly perceived the

situation as dangerous, and acted on that belief.

**The key message here is: Our assumptions about the world both help – and hinder – our thinking.**

So far, we've learned that our perception of reality isn't always accurate. Instead, it's highly influenced by what happens in our minds. We've also established that, to some extent, our imagination gives us control over this process of interpretation.

Still, that's only half the picture. The fact is that our imagination has limitations of its own, most of which come from our unconscious assumptions about the world.

Every experience we have creates an arrangement of connections in the brain. When facing new situations, we rely on those previously built connections to make sense of the world. So, instead of

approaching reality with a fresh mind every single day, our thoughts follow certain patterns.

This can sometimes be useful. For example, if a certain set of stimuli caused a negative experience in the past, our brains will draw on that experience and be quick to recognize similar experiences in the future. The problem is that following the same thought patterns all the time trains our brains not to pursue novel ones. It's in this way that our assumptions limit our ability to perceive the world in new ways.

Luckily, these assumptions are not set in stone. Through introspection, we can reflect on our thought patterns, uncover our hidden beliefs, and consciously deviate from them. It's not an easy process, but it's an extremely valuable skill that allows us to be more flexible in navigating our complex, ever-changing world.

“Seeing differently . . . begins with knowing that some of those often invisible assumptions that maintained your survival in the past may no longer be useful.”

**To think creatively, cast aside your established assumptions.**

In 1799, French soldiers campaigning through Egypt made an amazing find – an ancient stone with engraved writing in three scripts. It was dubbed the Rosetta Stone, and featured writing in ancient Greek, demotic Egyptian, and Egyptian hieroglyphics.

Since linguists already knew ancient Greek, they were confident that deciphering the other two languages would be a breeze. But it wasn't.

Researchers struggled to make sense of the hieroglyphs. Since the glyphs were small pictures, translators assumed they were symbols that stood for whole words. Still, they couldn't crack the code.

Then a young linguist named Jean-François Champollion had an idea: what if hieroglyphics were phonetic and stood for sounds instead of words? In an

instant, everything became clear. By questioning one underlying premise, Champollion opened up a new way to see the world.

**The key message here is: To think creatively, cast aside your established assumptions.**

As the story of the Rosetta Stone shows, often the first step in developing new ideas is questioning old ones. It sounds straightforward enough, but it can be surprisingly difficult.

Because our established ways of perceiving the world can be so ingrained, they're practically invisible. That's why it takes conscious effort to make even small logical leaps, even if, in retrospect, the ideas we come up with seem obvious.

Consider a famous brainteaser like Dunker's Candle. You're given a candle, some matches, and a box of tacks. Your

job is to stick the candle to the wall and light it. At first, it seems impossible. The tacks aren't long enough to pin the candle up. But then you change your assumption about the box of tacks. Couldn't that box be pinned to the wall? Well, now you have a shelf for the candle. Problem solved.

Ditching assumptions opens new paths forward, and the best way to start shaking things up is with lots of trial and error. By constantly interacting with the world in new ways, you'll find that many of your old beliefs don't hold up in every situation. Even things that seem completely settled can be turned upside down when put in a new context.

Educator Destin Sandlin demonstrates this with a stunt called the Backwards Brain Cycle. He built a custom bike with inverted steering so that turning the handlebars left turns the bike right, and turning the handlebars right makes the

bike go left. This change seems tiny, but riding it requires a whole new way of balancing your body. Even experienced cyclists who “know” how to ride a bike struggle. It just goes to show that their assumed knowledge, like everyone else’s, is always incomplete.



## **Discover new ways of seeing the world by embracing uncertainty.**

Imagine it's two million years ago. You're an early human ancestor, living with your fellow apes on the African savanna. You mostly spend your days foraging for food within the same area. Now, you could wander off and explore what's over the next hill, but you don't. Why not?

Well, for one, you don't know what's over there. Sure, there could be delicious berries, but it could also be a barren landscape filled with dangerous predators. Essentially, why risk the unknown when you're safe and secure where you are?

This is the environment we evolved in. Those who played it safe generally stuck around to pass on their genes. As a result, humans have a profound appreciation for certainty. But there's a

trade-off. If we never explore, we'll never discover those juicy berries – or anything else.

**The key message here is: Discover new ways of seeing the world by embracing uncertainty.**

It's no secret that humans avoid the unknown. Just think of how common it is for children to be afraid of the dark. This instinctual phobia comes from a problem of perception – or really, a lack of perception. Because we can't see what's out there, we assume that there could be predators lurking in the shadows.

By the time we're adults, we learn that most dark rooms are actually quite safe. But still, our desire for certainty doesn't disappear, as one study from University College London demonstrates. Participants were either told they might get an electric shock or that they definitely would get an electric shock. Those who knew the pain was coming

reported less stress than those left unsure.

Unfortunately, this aversion to uncertainty often keeps us clinging to old assumptions about what is true. The only way to move forward is to embrace uncertainty. And a great way to accomplish this is to pause between your experience and your reaction.

For example, imagine a stranger bumps into you roughly. Your first reaction might be to think, “What a jerk!” This may feel correct or certain, but it’s only a narrow interpretation. If you stop for a moment and embrace uncertainty, you’ll realize that you don’t know the whole story. The stranger might not be a jerk at all, and could be rushing to do a good deed or suffering from issues with balance.

Either way, by acknowledging that you don’t know, you can embrace alternative

interpretations of the world. That open-minded attitude is the key to creativity.



## **An ecology of innovation balances play and efficiency.**

Deep within the Valley Life Sciences building at the University of California, Berkeley, a team of scientists is hard at work. They watch their subject – a tiny cockroach – skittering back and forth across a table. Strange as it may seem, this little critter has a lot to teach.

The researchers want to know how this bug moves with such agility. It's mostly out of curiosity, but the discoveries they make will be put to valuable use down the line. In fact, cockroach locomotion has already inspired this lab's most notable creation: RHex, a bionic robot designed to crawl through combat zones.

This lab is successful because it's created the ideal ecology of innovation – one that asks questions first and refines answers later.

**Here's the key message: An ecology of innovation balances play and efficiency.**

Many people have a fundamental misunderstanding of innovation. They think that new ideas are generated when there's a specific goal in mind. But, in reality, the opposite is true. Aiming for a predetermined outcome means you've already made numerous assumptions about the world. And, as we've learned, assumptions limit our creativity.

Innovation works a lot better when it's treated like play. So, rather than approaching the tasks of learning, thinking, and doing with a specific objective, it's better just to enjoy them as activities for their own sake. With this mindset, sometimes called "blue-sky thinking," you're more likely to follow your curiosity, try out new approaches, and come up with original ideas.

Once you have a lot of original concepts to work with, you can start refining them

to see which ones are useful. This is similar to the process of evolution in nature. First, species will mutate and change in a variety of unpredictable ways. Then the process of natural selection will take over. Bad changes will be eliminated and good ones will stick around, resulting in new creatures perfectly adapted to their habitat.

This cycle of creation and refinement works in any field. Whether you're a scientist experimenting in a lab or an artist crafting your own personal style, it's always best to start with unrestrained thought. In other words, when it comes to innovation, it's best to deviate from the norm now, and worry about the details later.



## Final summary

The key message in these blinks:

What we think of as objective reality is actually a distorted picture of our surroundings. We perceive the world through the limited window of our five senses. More than that, the way our brains interpret and understand sensory signals is limited by our internal illusions and past assumptions. To think creatively, you must learn to recognize these processes, consciously work to break free of established thought patterns, and learn to live with uncertainty.

## Got feedback?

We'd love to hear what you think about our content! Just drop an email to [remember@blinkist.com](mailto:remember@blinkist.com) with *Deviate* as the subject line and share your thoughts!

## What to read next: *Uncertainty*, by Jonathan Fields

You just learned how our distorted perception of reality unconsciously makes us cling to our previously established thought patterns. Now continue learning to break free of this narrow worldview with our blinks to *Uncertainty*, by Jonathan Fields. Drawing on the world of cognitive science and Field's own tumultuous life trajectory, *Uncertainty* shows how embracing the unknown is actually one of the key skills to success in the modern world.



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