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Optical Illusions

by [Alex Rogala](#)

Fifteen years ago, my family packed our bags and moved from the crowded streets of Philadelphia to Doylestown, a quieter suburban area of Pennsylvania. Exhausted from the new move and first major change of my life, I laid in my new room staring at the ceiling, letting the sounds of late June surround me. Our furniture and the moving van still hadn't arrived, so the room was completely empty, a blank white box.

After a few minutes something happened. As a 4-year-old, everything seems large, but as I laid there, the whiteness of the ceiling overtook my field of vision in a way I'd never experienced before, as though it were the end-all and be-all of existence. Panicking and looking away, I tentatively peered back seconds later to see the ceiling had, in fact, not swallowed me. I had merely experienced a phenomenon known as the Ganzfeld effect, an effect first described by Arctic explorers where the presence of a large, uniform wall of color in one's vision results in the eye filtering out this signal, resulting in a form of temporary blindness.

This could perhaps be described as my first foray into the world of optical illusions, the so-called "tricks" the mind plays when presented to certain stimuli. Dating back to the Tromp L'oeil paintings of the ancient Greeks, illusions have always played an interesting and unique role in the artistic world and society in general.

Turn on, Tune in, Drop Out

Perhaps what people most commonly associate with the concept of optical illusions are physiological illusions. The most common of these illusions play off of the limitations of human senses, overloading the mind in a way that the image almost appears to be "moving" or changing somehow.

A textbook example of a physiological illusion is the "Hermann Grid Illusion," a grid of white lines against a black background (or the inverse). When staring at any of the points where the lines intersect, these points lead to a dot that seems to change color.

The most common contemporary instance of these illusions is Op Art from the 1960s, commonly monochromatic art that utilized simple lines and patterns to create powerful and complex illusions.

Not All Smoke and Mirrors

Not all optical illusions share the flashy bravado of physiological illusions. Cognitive illusions tend to be subtler, relying on the mind rather than the eye to deliver their trickery. Often, such illusions may seem normal until observed more closely. Common examples of this include impossible objects, such as Penrose stairs, which appear to ascend or descend infinitely, or the impossible cube, which seemingly joins multiple ways, which aren't theoretically possible.

Cognitive illusions have an immense past, and date back to ancient Greece and the aforementioned art of Tromp L'oeil, a type of painting which blurs the line between art and life; it is artwork that almost seems to escape its frame. Although it fell out of style in the Dark Ages, Tromp L'oeil enjoyed resurgence during the Renaissance, and is still seen even occasionally today.

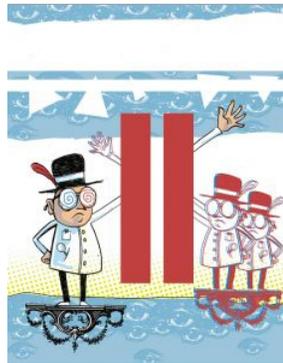
Another lesser-seen type of cognitive illusion is anamorphosis, a technique developed heavily during the Renaissance. In anamorphic paintings, viewing a painting from another angle might unearth features that cannot be seen head-on. Hans Holbein the Younger's "The Ambassadors" demonstrates this with a normal painting containing a hidden skull when viewed from a sharp angle to the side.

In older times, techniques such as these were important, not only because they showed merely an artistic development, but also a means for hiding messages. Through techniques such as anamorphosis, dangerous political messages could be hidden, allowing an artist to maintain expression with less threat of prosecution.

In the realm of contemporary art, M.C. Escher has been one of the more notable artists to toy with

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the idea of cognitive illusions. Considering himself more a mathematician than an artist, he has penned dozens of works that have entered the public consciousness and left a lasting impression. His notable works include “Ascending and Descending,” a lithograph of monks climbing a set of impossible stairs, and “Drawing Hands,” which contains two hands drawing each other, from paper to real life.

Gestalt Psychology

Yet, optical illusions are not merely an isolated phenomena — they’re part of a larger picture. Specifically, they are an extension of something known as Gestalt psychology, a theory that deals with the brain’s grouping habits.

In short, Gestalt psychology states that humans tend to emphasize the sum of parts (or whole), over the individual parts. What this means is that if someone were to design a drawing made of tiny lines, people would tend to notice the whole (the drawing) rather than the parts (each individual line).

And Gestalt psychology plays into optical illusions in a very large way, especially physical illusions. Rather than seeing each of the lines, patterns, or shapes that make up the certain illusions, the sum of the image (however bizarre its effect) is seen.

Behind the Science

Despite their prevalence in daily life, there still remains a sort of a mystique around optical illusions. Contrary to what many think, optical illusions are thought to form not in the eye, but rather in the visual pathway. The commonly accepted idea is that when a certain stimulus is evoked too strongly, it leads to an imbalance in the neural pathways, leading to some of the effects associated with optical illusions.

Additionally, a recent study by Rensselaer Polytechnic Institute researcher Mark Changizi has led to another possible explanation. Changizi’s research claims that optical illusions are the result of a 1/10 second neural lag natural in vision. As it takes 1/10 of a second for light to hit the retina, he proposes that the body tries to foretell what will happen 1/10 of a second into the future. Due to the way these illusions are structured, they could be the result of an incorrect guess.

However, one of the mysteries is that many otherwise normal people just don’t see some of these illusions. This has been researched, and, although there have been believable speculations, it is for currently unknown reasons.

Optical illusions still play a role everywhere, even here at RIT. Right in the infinity quad is Construction #105, a sculpture of a Möbius strip, which is rotated slowly by a motor, giving the illusion that it is standing still, yet never in the same place. Even though they no longer serve as much of a role for hidden messages or seem as strange as they may have been to the ancient Greeks, they’re still a significant part of art that won’t be forgotten. People may debate whether there is more to this world than can be seen in a glance, even though what we can see is perhaps bizarre enough on its own.

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