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Illusion Chasers

Illusions, Delusions, and Everyday Deceptions

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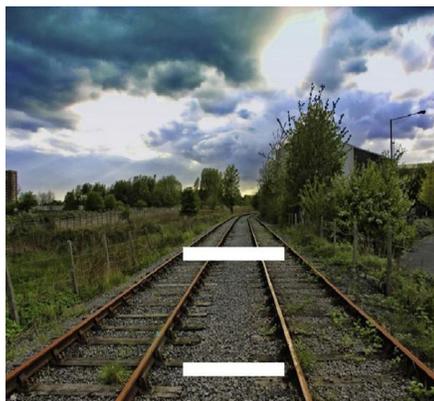
Illusions in the Formerly Blind

By [Susana Martinez-Conde](#) | May 24, 2015 |

Are illusions (the phenomena where subjective perception differs from objective reality) the exception or the rule in everyday vision? Do they represent visual processing errors or provide us with an evolutionary advantage? Are such misperceptions innate or something we learn? Not merely party tricks, visual illusions raise a myriad of questions—from the theoretical to the empirical—about the workings of the visual system. Illusions are also often the very tools to answer these questions.



In the nature versus nurture debate, some of the dominant thinking has been that illusions arise through learning. According to such theories, classical geometrical illusions, such as the [Müller-Lyer illusion](#) and the [Ponzo illusion](#), occur because we learn, over time, that certain two-dimensional arrangements indicate specific three-dimensional configurations. In other words, the acquisition of visual experience leads to, and explains, perceptual illusions.



Left: Ponzo Illusion. Two identical horizontal lines, overlaid on a background of converging lines, appear to have different lengths. Right: Müller-Lyer illusion. Two identical vertical lines, bracketed by open and closed

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arrowheads, appear to have different lengths. The two illusions are superimposed on real-world images to illustrate how the experience of learning about perspective in natural visual environments could theoretically originate visual illusions. The findings by Gandhi and his colleagues indicate that this is not the case: illusions arise even without previous visual experience.

The difficulty in validating or refuting either hypothesis lies in the fact that the acquisition of visual experience, and our ability to communicate our perception to others, tends to go hand-in-hand. For example, neonates without visual experience can't describe their perception, whereas older children and adults who are able to communicate can no longer discount their visual experience to date from their current perception.

Yet, there is a singular group of people who lack visual experience yet have the ability to report their perception: congenitally blind individuals who gain sight many years after being born.

In a [paper](#) published earlier this month in *Current Biology*, Tapan Gandhi and his colleagues Amy Kalia, Suma Ganesh, and Pawan Sinha quantified the perception of illusions in children who gained sight after prolonged early-onset blindness, as part of [Project Prakash](#). All the children, who were between 8 and 16 years old at the time of the study, were born with dense bilateral cataracts, which limited their vision to the perception of hand motions close to their faces.

The children received cataract removal surgery and implantation of intraocular lenses. Forty-eight hours after the surgery, the researchers tested their vision, and asked them to indicate whether two lines—presented in various configurations of the Ponzio illusion and Müller-Lyer illusion—had the same length. If not, they were asked which line was longest. The children were susceptible to the illusions, just like the life-long sighted of equivalent ages and socio-economic status.

The research team concluded that illusions do not arise from empirical associations about the visual environment learned over time, but are present even at the very outset of visual experience.



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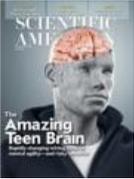
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