

Optical Illusions

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What is an Optical Illusion?

An optical illusion is an experience of seeming to see something that does not exist or that is other than it appears.

It is also defined as something that deceives the eye by appearing to be other than it is.

Key Idea!

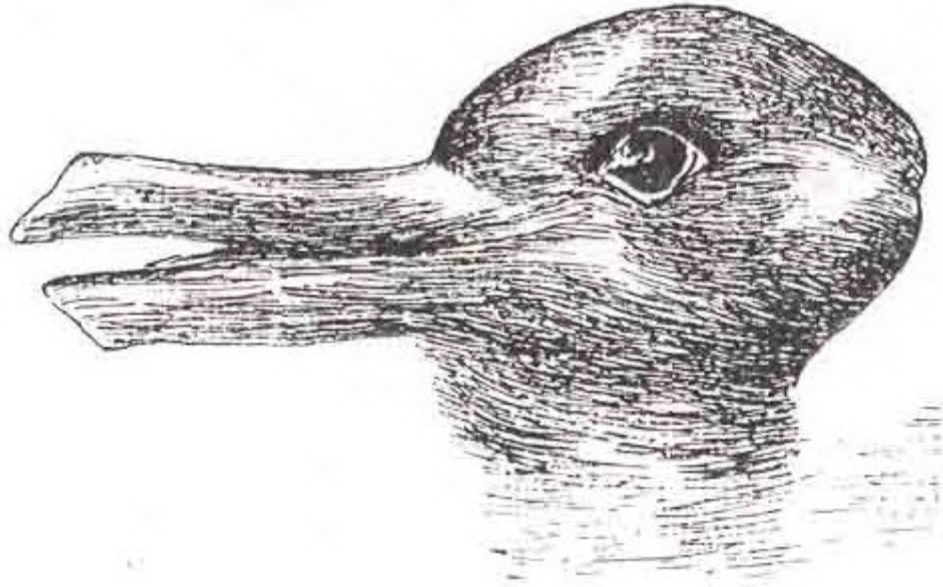
We need to make sure that the audience will view our visualizations the way the visualizations are intended to be, and that the visualizations are free from possible illusory interpretations

Understanding Optical Illusions: Top Down Processing Theory (Gregory 1970)

- A lot of information reaches the eye, but much is lost by the time it reaches the brain. Richard Gregory estimates about 90% is lost.
- Therefore, the brain has to guess what a person sees based on past experiences. We actively construct our perception of reality.
- Gregory proposed that perception involves a lot of hypothesis testing to make sense of the information presented to the sense organs.
- Our perceptions of the world are hypotheses based on past experiences and stored information.
- Sensory receptors receive information from the environment, which is then combined with previously stored information about the world which we have built up as a result of experience.
- The formation of incorrect hypotheses will lead to errors of perception (e.g. visual illusions like the Necker cube).

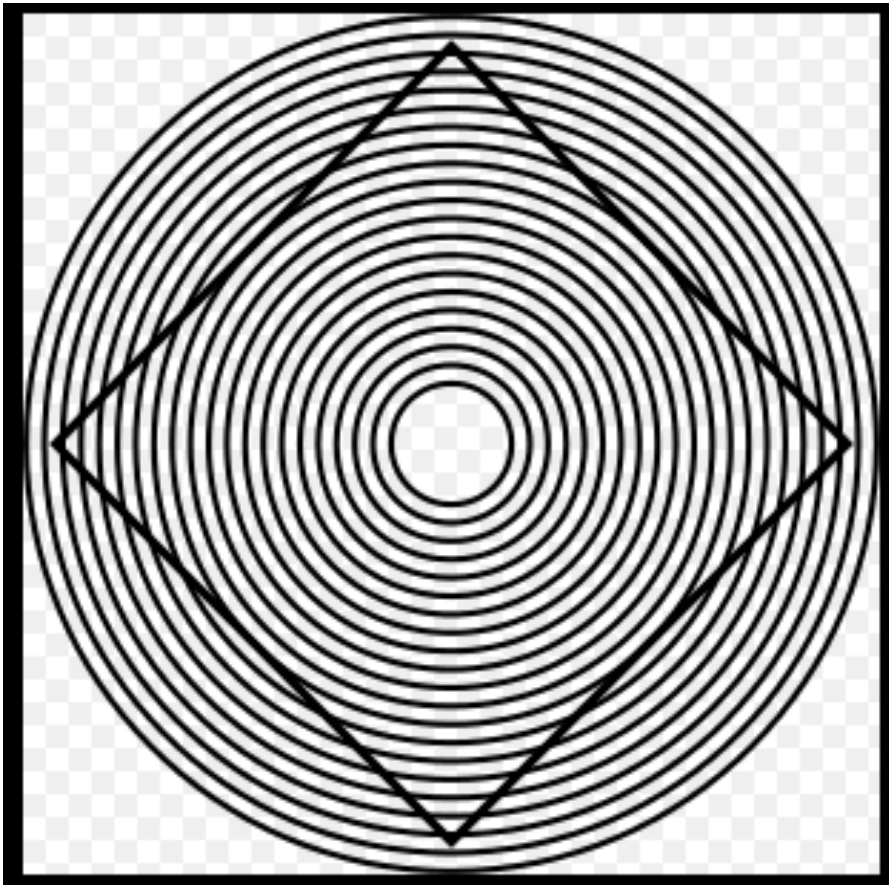
Some Examples

Ambiguous Image



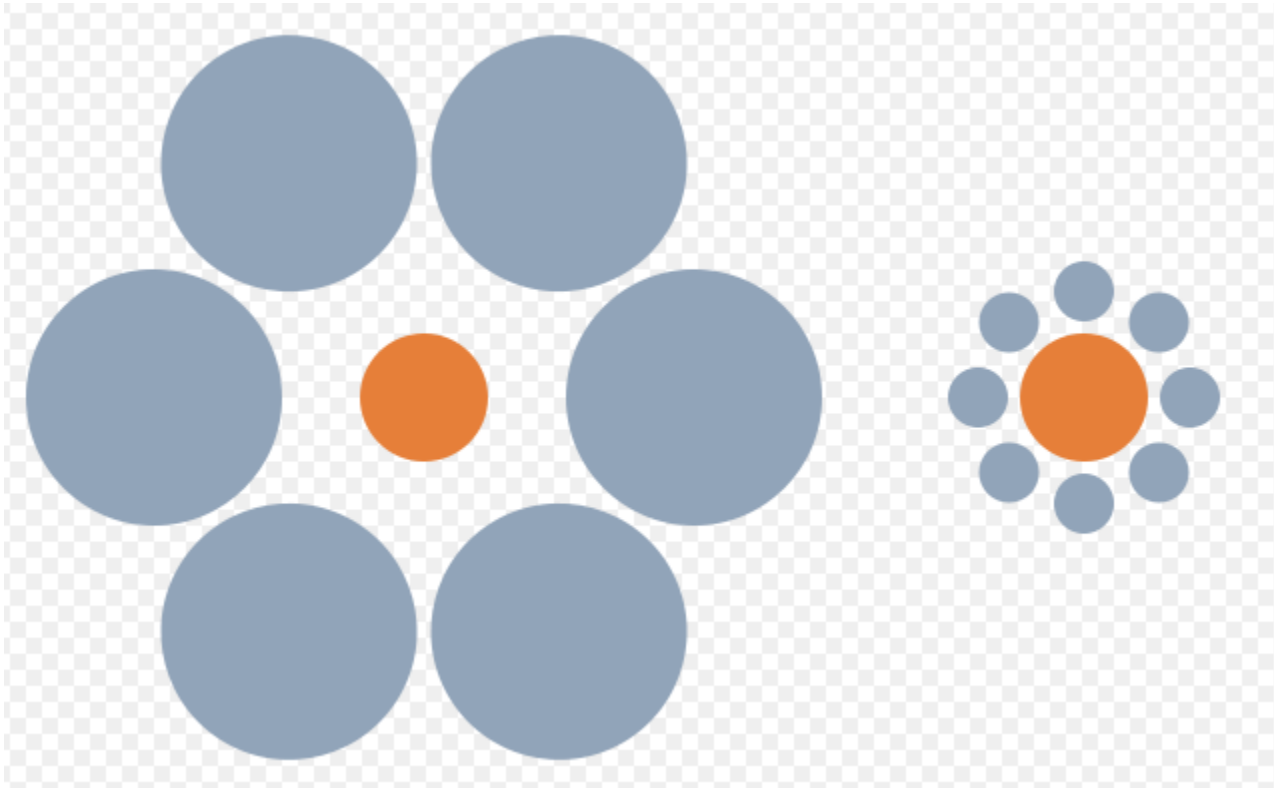
The same picture can be viewed as a duck or as a rabbit.

Ehrenstein Illusion



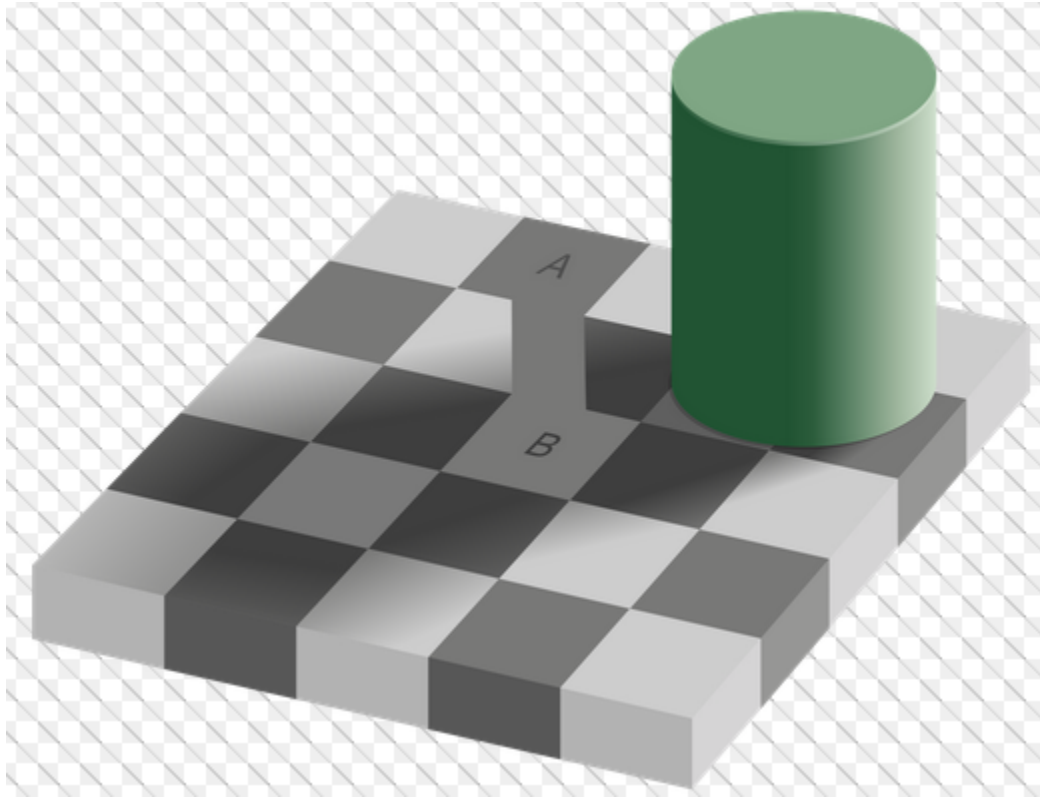
Here the sides of a square placed inside a pattern of concentric circles take an apparent curved shape.

Ebbinghaus Illusion



The **Ebbinghaus illusion**, or Titchener circles, is an optical illusion of relative size perception. The two orange circles are exactly the same size; however, the one on the right appears larger.

Checker Shadow Illusion



The **checker shadow illusion** shows that when a shadow is cast onto a checked board, the colors of squares A and B in the photos appear to be different, when in fact they are the same.

Rubin Vase



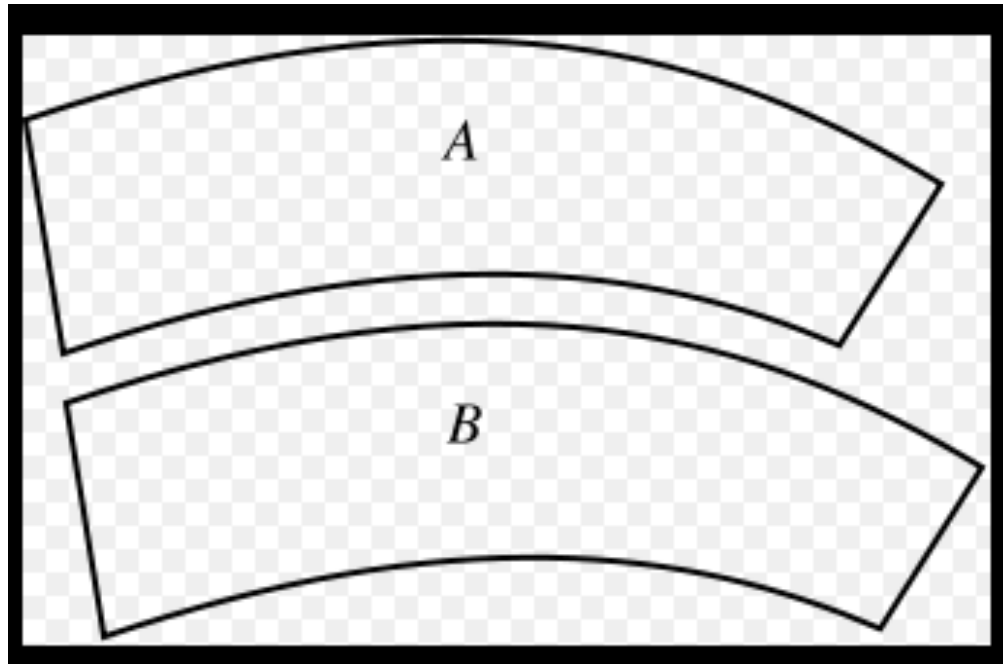
Rubin vase (1915): an ambiguous or bi-stable (i.e., reversing) two-dimensional form.

Hybrid Image



A **Hybrid image** is an optical illusion developed at MIT in which an image can be interpreted in one of two different ways depending on viewing distance.

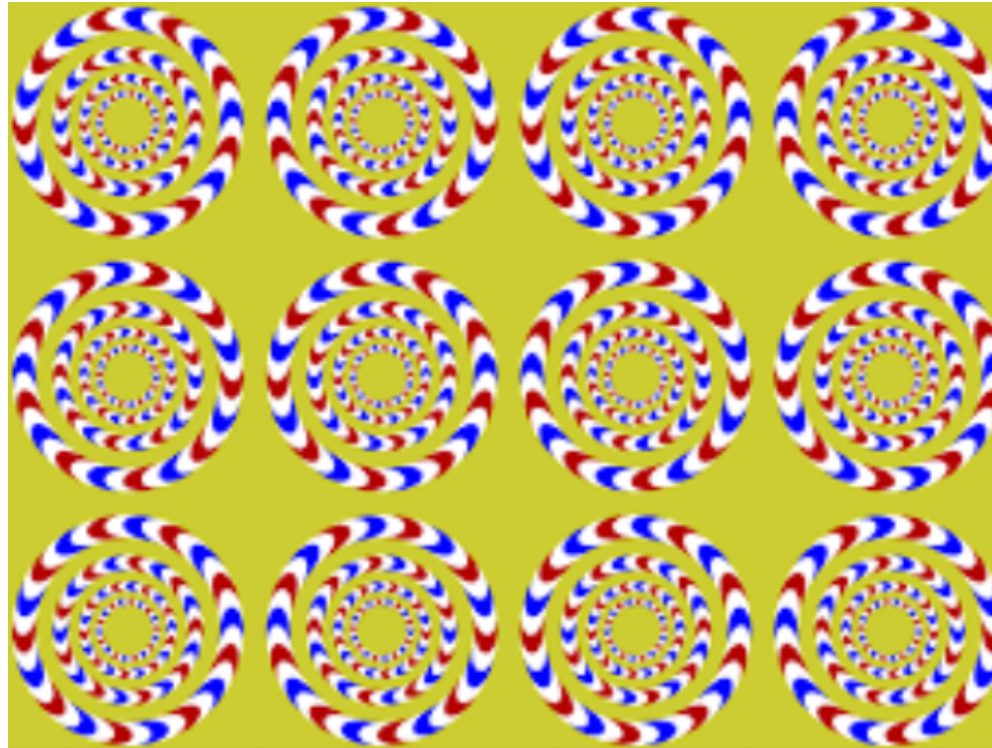
Jastrow Illusion



The **Jastrow illusion** is an [optical illusion](#) discovered by the American psychologist [Joseph Jastrow](#) in 1889.

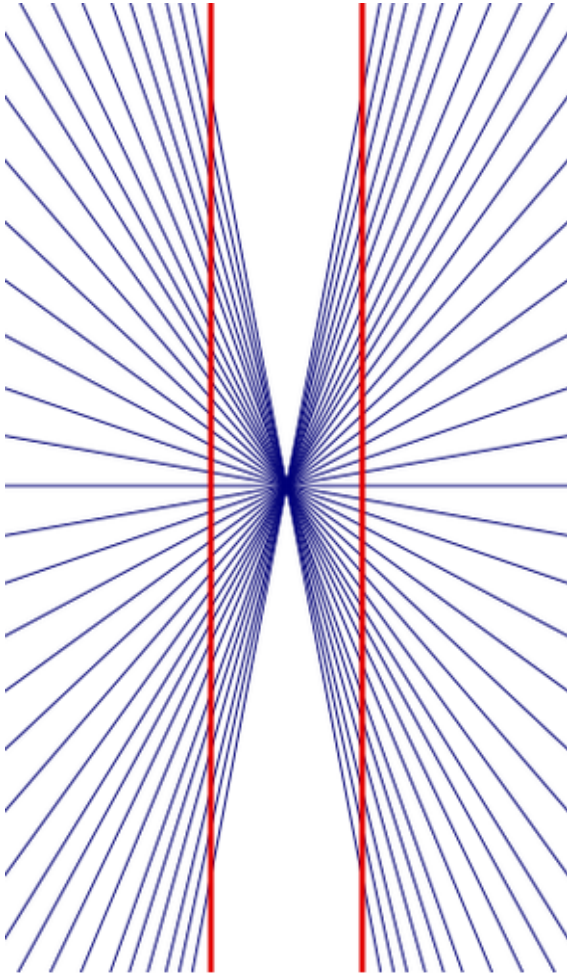
[Jastrow illusion](#). The two figures are identical, though the lower one appears larger.

Barber Poles



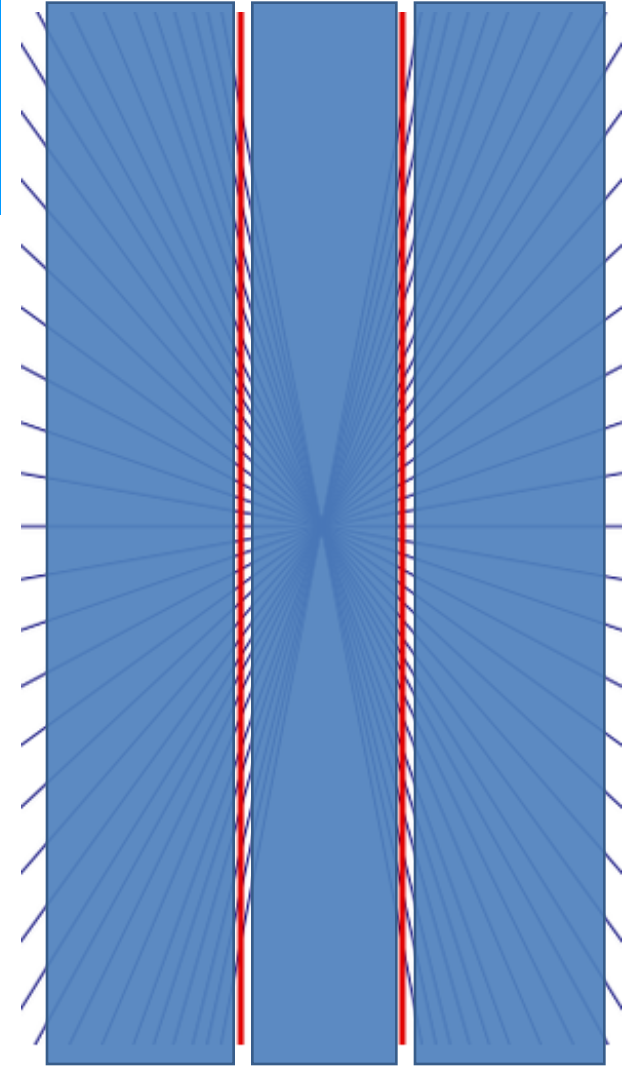
The [barber pole](#) illusion is a visual illusion that reveals biases in the processing of visual motion in the human brain.

Hering Illusion



Two straight and parallel red lines appear as if they bend outwards. This illusion was discovered by German Physiologist Ewald Hering in 1861.

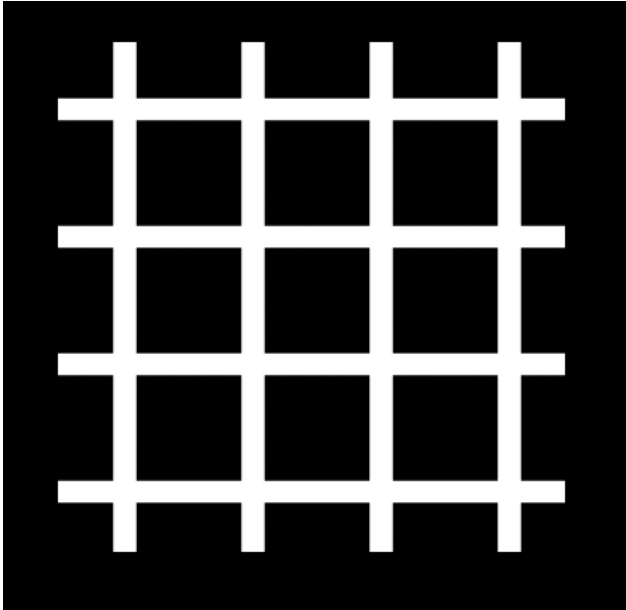
https://commons.wikimedia.org/wiki/File:Hering_illusion.svg



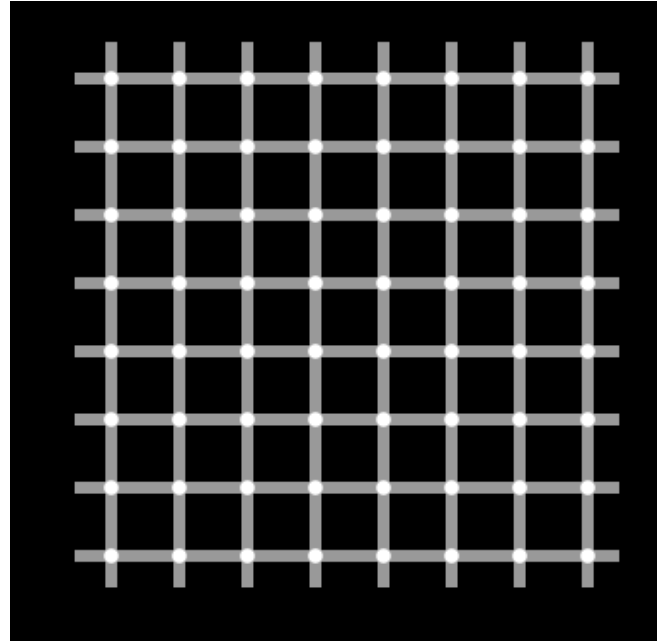
Researcher Mark Changizi of Rensselaer Polytechnic Institute in New York believes it has to do with the human tendency to visually predict the near future. Because there's a lag between the time that light hits the retina and the time when the brain perceives that light, Changizi thinks the human visual system has evolved to compensate for the neural delay by generating images of what will occur one-tenth of a second into the future. He explained the Hering illusion in a 2008 [article on LiveScience](#), a sister site to Life's Little Mysteries:

Grid Illusion

Any kind of grid that deceives a person's vision. The two most common types of grid illusions are the Hermann grid illusion (1870) and the scintillating grid illusion (1994).



The **Hermann grid illusion** is characterized by "ghostlike" grey blobs perceived at the intersections of a white (or light-colored) grid on a black background. The grey blobs disappear when looking directly at an intersection.



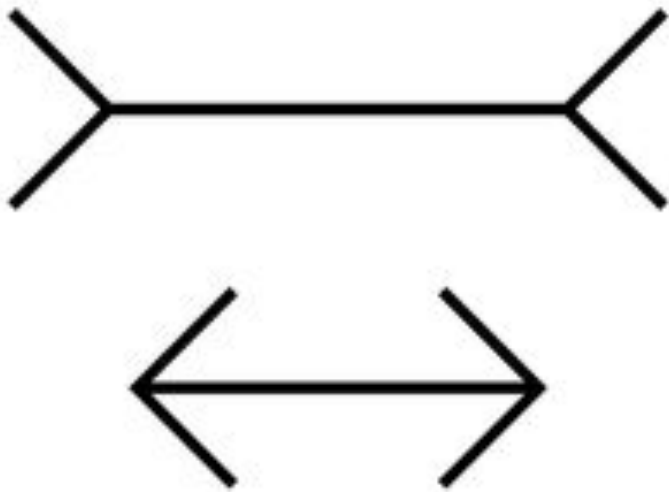
The **scintillating grid illusion** is constructed by superimposing white discs on the intersections of orthogonal gray bars on a black background. Dark dots seem to appear and disappear rapidly at random intersections, hence the label "scintillating". When a person keeps his or her eyes directly on a single intersection, the dark dot does not appear. The dark dots disappear if one is too close to or too far from the image.

Delboeuf Illusion

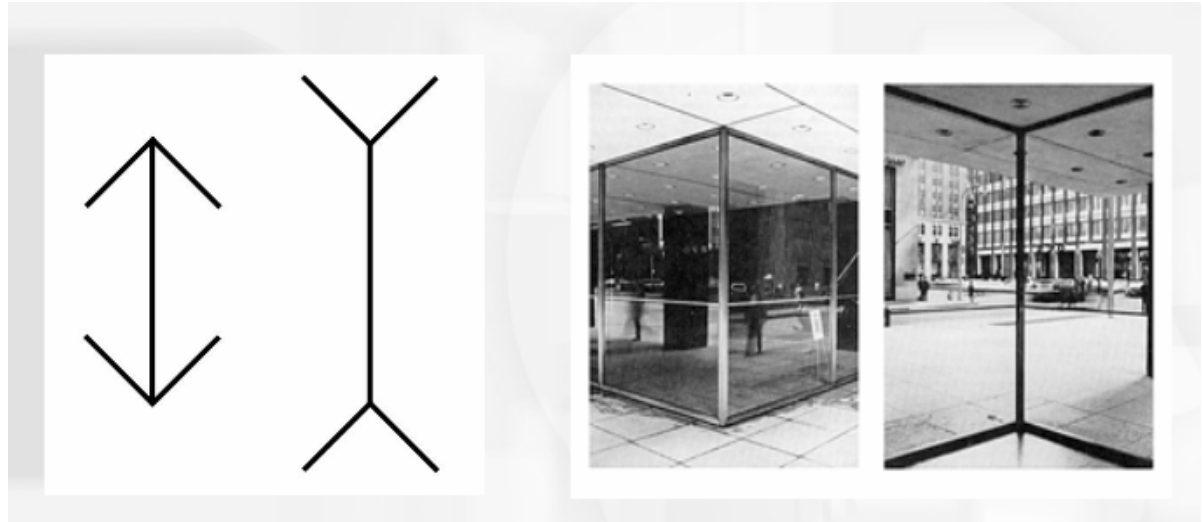


An optical illusion of relative size perception. The two black circles are exactly the same size; however, the one on the left seems larger.

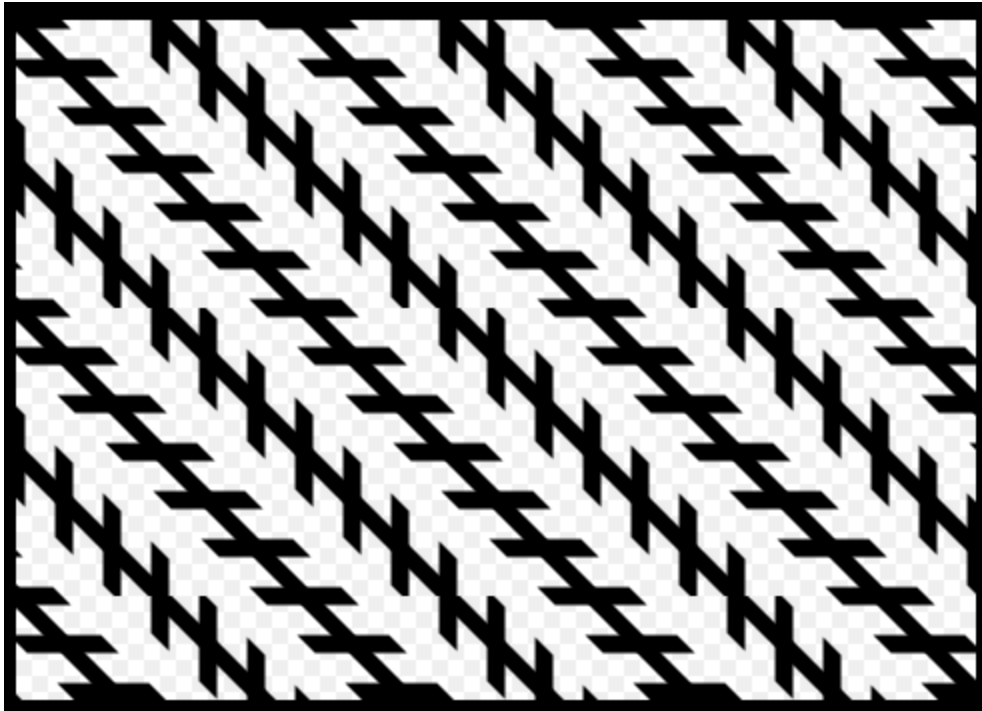
Müller Illusion



The top line appears longer than the bottom one but is actually the same length.

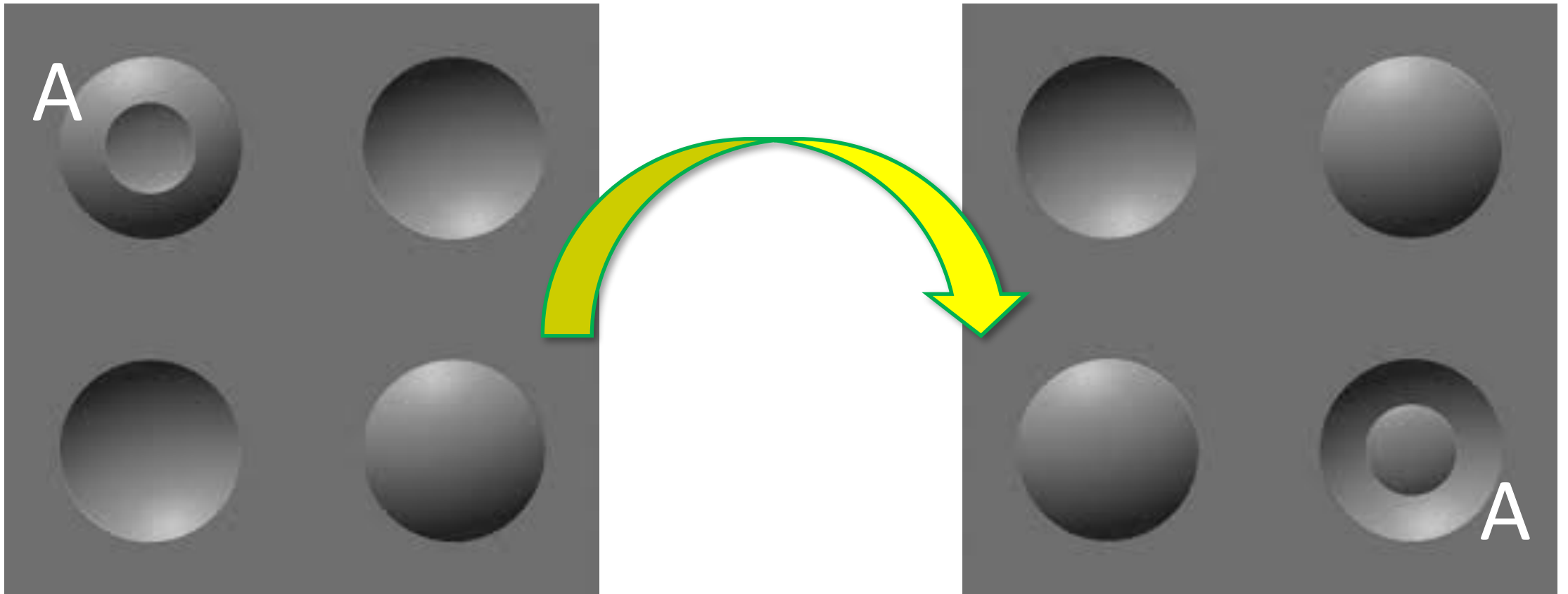


Zollner Illusion

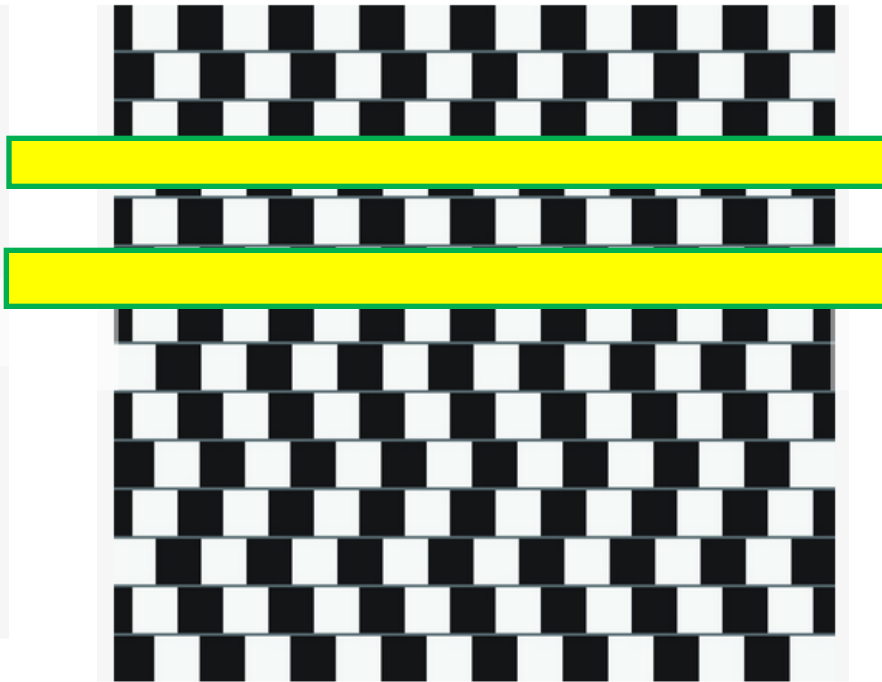
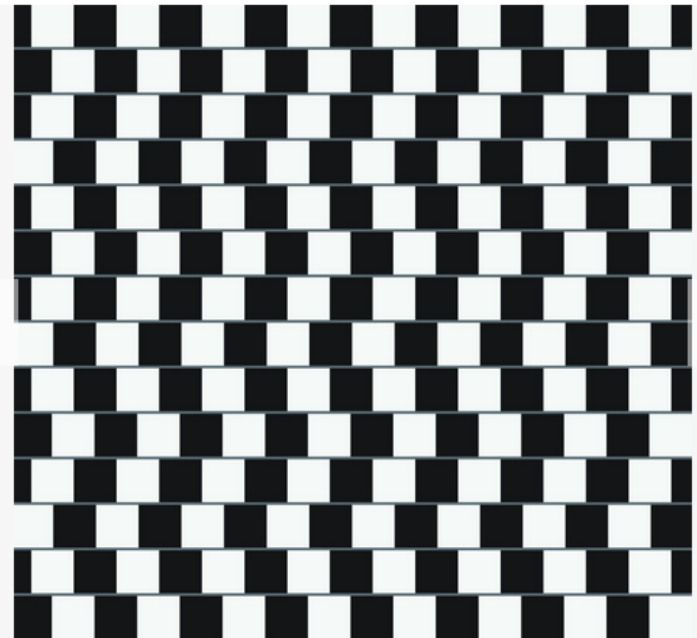


[Zollner illusion](#): the diagonal lines are parallel, even if they seem otherwise.

Turn the Image Upside Down




Café Wall Illusion

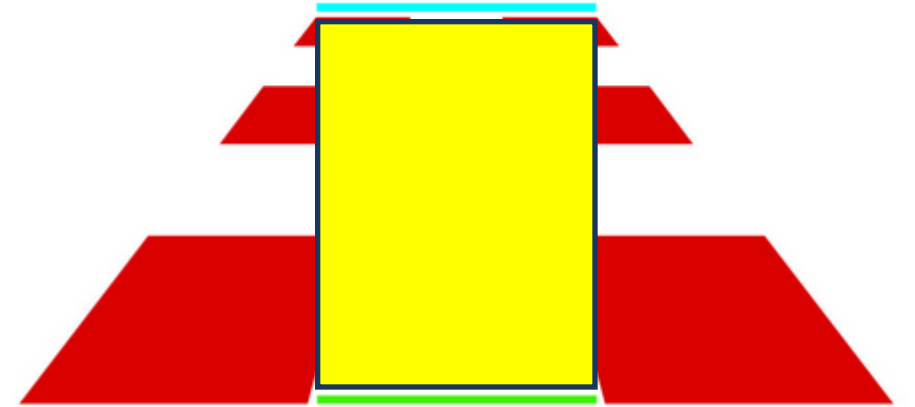
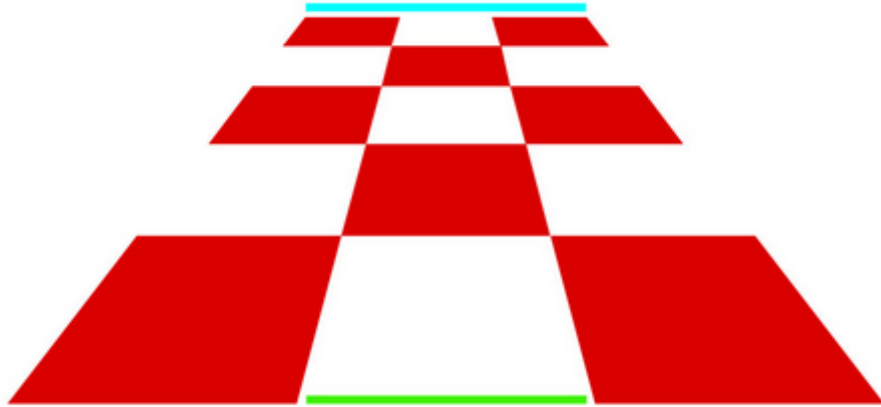


The gray lines in between the rows of white and black squares seem to converge, but they are actually parallel.

Coffeehouse

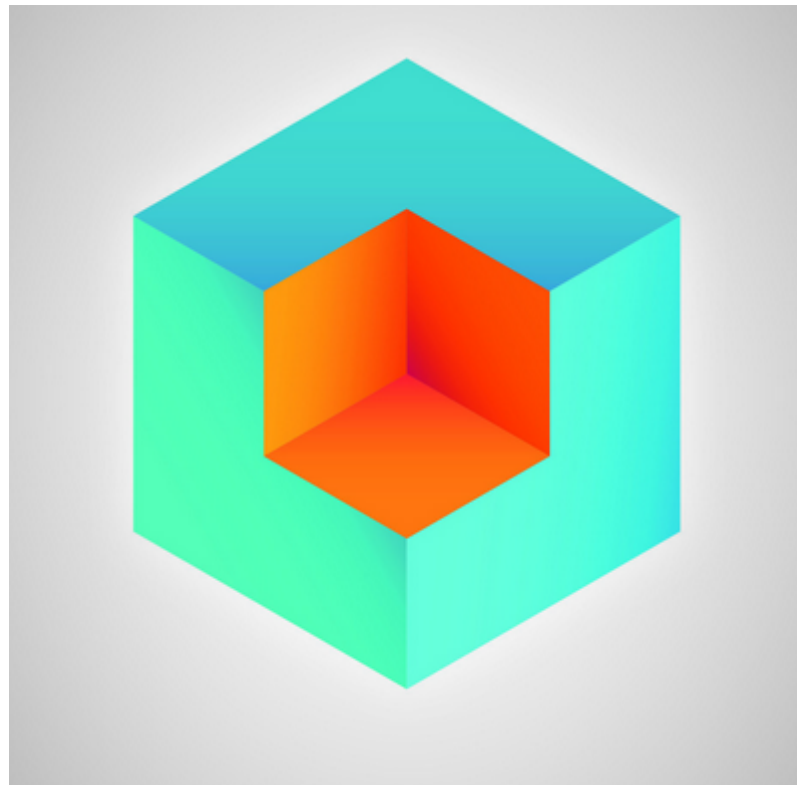
University of Bristol researchers discovered this illusion in the early 1970s while looking at the tiled wall of a café. Hence the name, Café Wall Illusion. The gray lines in between the rows of white and black squares seem to converge, but they are actually parallel. Your brain, overwhelmed by the intense and closely-spaced black-and-white contrasts, sees the gray lines as part of the tile either above or below it. The lines end up appearing higher on alternating sides, creating the trapezoidal illusion.  THOMAS HUNT

The blue line at the far back seems to be longer than the green line at the front.



**Wehn reandig it deos not meattr
in what odrer the letertes in a wrod
are, as lnog as the fsrit and the lsat
ltteer are at the crecort psiotoin.
Tihs is so besacue we do not raed
ecah leettr iivinddually, but the
wrod as a wlohe.**

Depth Perception



Is the orange cube inside the blue cube, or is floating in front of it?

Explore Further!

- <http://www.michaelbach.de/ot/>
- https://en.wikipedia.org/wiki/Optical_illusion
- <http://www.sciencealert.com/10-mind-melting-optical-illusions-that-will-make-you-question-reality>
- https://www.washingtonpost.com/news/wonk/wp/2015/02/27/12-fascinating-optical-illusions-show-how-color-can-trick-the-eye/?utm_term=.f484b083229a



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