University of Rochester

APS New York State Section NYSS

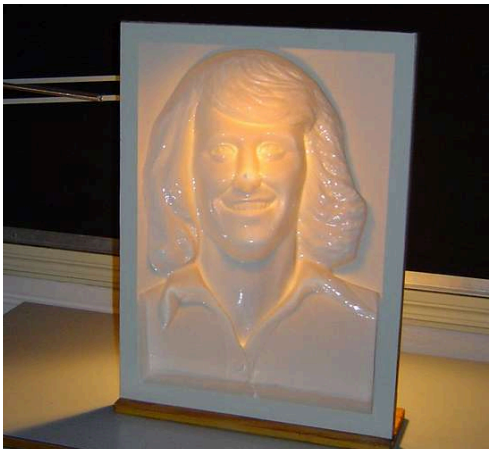
Perception

Understanding how vision works can be really complicated! **Vision is influenced by how the eye works as well as our brains** interpreting the signals from our eyes. Different types of illusions can fool different parts of the process, leading to interesting effects!

Try staring at the black x on the cat's nose. After a little time, you should notice that the cat starts to fade away. The effect works best on areas with low contrast, which is why the smile seems to remain. **Fuzzy surroundings disappearing while staring at a fixed spot is known as the Troxler effect**, after Iganz Troxler. Normally, even if our eye seems steady, it is making involuntary movements to fill in our surroundings. If we suppress those movements by focusing, the signal from the surroundings fades and our brain fills in the gaps with its best guess (in this case, the background) [1].

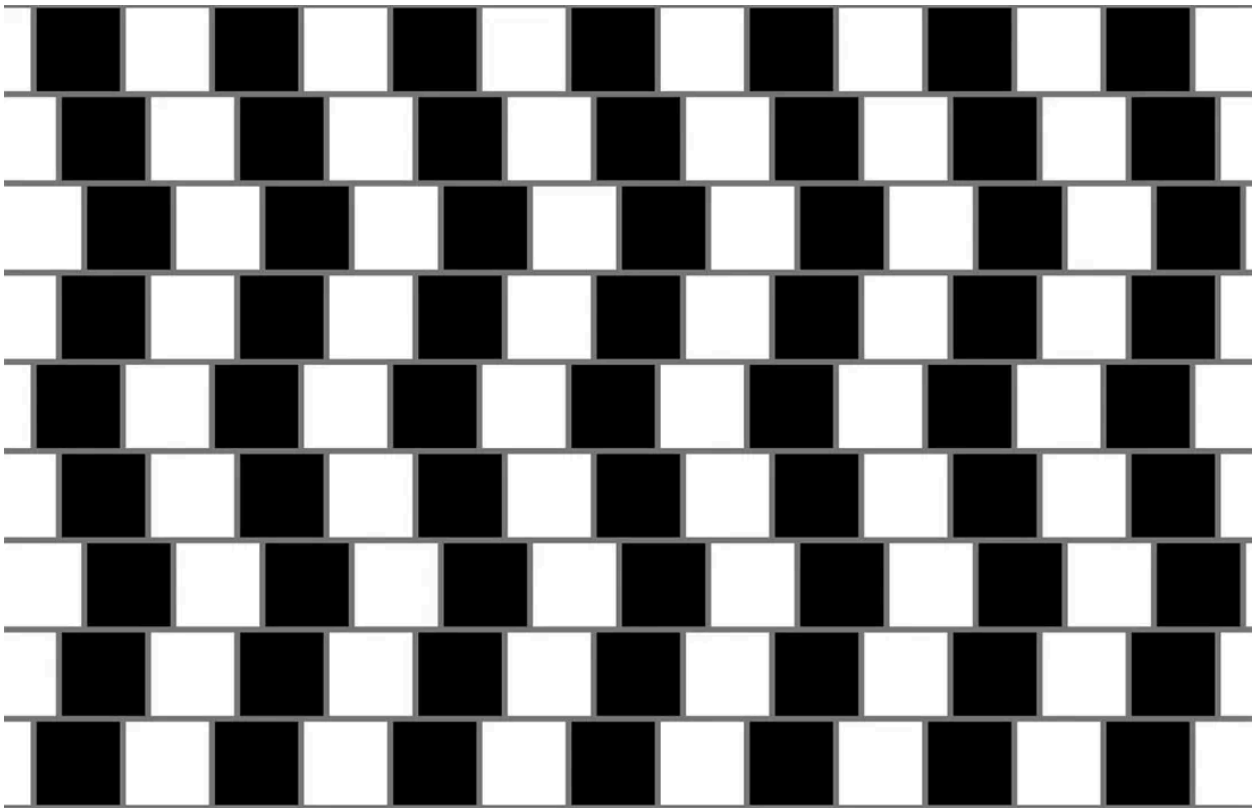
Next, take a look at the black and white pattern. This is known as the café wall illusion, after a member of psychologist Richard Gregory's lab noticed the illusion outside a café. It is rows of alternating black and white tiles, separated by gray mortar lines. The rows are offset by ¼ of a tile. The **rows appear to form wedges, but are actually straight lines**. Scientists still don't understand it well, but the illusions seem to be due to what is called **border locking**. Our eyes can tell the difference between the black and white tiles well, but have a harder time separating the gray lines from the tiles. We end up seeing the mortar as part of one of the tiles, and because the tile seems bigger than the one next to it, our brains assume it is wedge-shaped [2].

These illusions relied on how the eyes read information, while the next example is based on how our brains understand it. Our eyes can't see things like temperature, so our brain uses **context clues** to give us that information. When you look at the **hollow face**, your eye sees the shape of the face, but can't tell the depth. Your brain is used to faces sticking out, so that's what it tells you is happening, even though it is actually looking at a hole shaped like a face [3]. It works even better with one eye closed, as your brain is filling in more gaps. As you move your head, what your eye sees is not what you would expect from a still face, so your brain tells you that it is moving to follow you, despite it staying still.



[1] Thomson, G. and Macpherson, F. (July 2017), "Troxler Effect" in F. Macpherson (ed.), The Illusions Index. Retrieved from https://www.illusionsindex.org/i/troxler-effect.
[2] Gregory, R. L. and Heard, P. (1979). Border locking and the café wall illusion. *Perception, 8* 365-380.
[3] Gregory, R. L. (1997). Knowledge in perception and illusion. *Phil. Trans. R. Soc. Lond. B, 352* 1121-1128.

Thomson, G. and Macpherson, F. (July 2017), "Troxler Effect" in F. Macpherson (ed.), *The Illusions Index*. Retrieved from https://www.illusionsindex.org/i/troxler-effect.



Thomson, G. (July 2017), "The cafe wall illusion" in F. Macpherson (ed.), The Illusions Index. Retrieved from https://www.illusionsindex.org/i/cafe-wall-illusion.