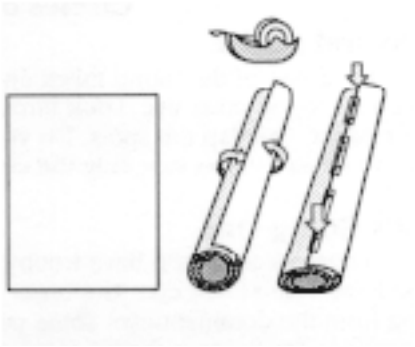
4 Cardboard Tube Illusions

You have two eyes, yet you see only one image when you look at an object. If your eyes receive conflicting information, what does your brain do? Do receptors in the eye act independently, or do they influence each other? By looking through some simple tubes made from paper towel tubes or rolled-up pieces of paper, you can explore how your two eyes influence each other.

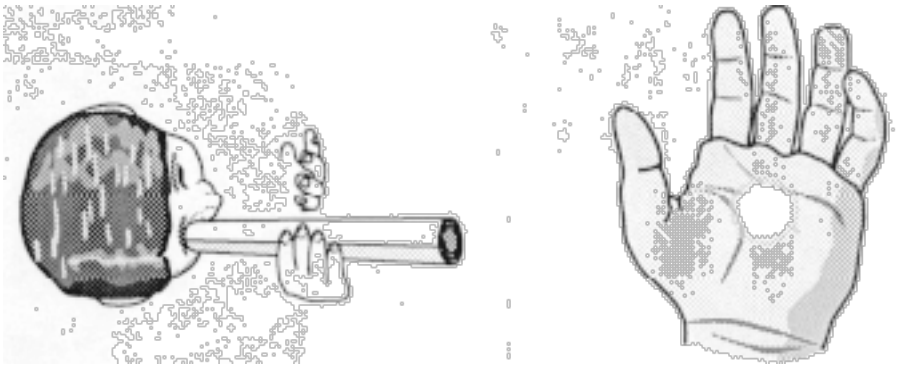
For these illusions, you'll first need to find 2 or 3 small tubes. A cardboard paper towel tube works great for this illusion, although if you can't find some, you can always roll up a sheet of paper into the same shape or find something else that is similar. Roll three of the sheets of paper into paper tubes that are 11 inches and about 1/2 inches inches diameter. It may help if you squash one of the tubes so that its cross-section is a flat oval.



Illusion 1
See The Hole In Your Hand

Take one of the tubes that you made from a full sheet of paper in your right hand. Hold it up to your **right eye** and look through the tube, **keeping both eyes open.** Now put your left hand, fingers up, palm toward your face, up against the left side of the tube, about two-thirds of the way down. Notice that you see a hole in your hand. f you don't, try moving your hand a little farther away until it comes into focus.

What's Going On?



Normally, both of your eyes see the same thing, just from slightly different angles. Your brain combines these two slightly different views to let you see in three dimensions and judge distances. The tube changes that. Your eyes are sending your brain two different images. One eye is seeing the palm of your left hand. The other eye is seeing the other side of the room, viewed through the tube. In combining the two images, your brain has to decide what is more important to see. Most of the view from your right eye is blocked by the dark sides of the tube, so you mostly see the view from your left eye. The one exception is the bright circle of image that your right eye sees through the tube. Since this is the one bright spot from your right eye, your brain pays extra attention to it. As your brain combines the two images, you end up seeing your hand with a hole through it. If you want to play games with your brain, try watching television this way. Even better, have someone stick their finger into the end of the tube. That is a strange site, indeed.

Illusion 2
Are 2 Spots Better Then 1

Take two round tubes up to your eyes and look through them at a white wall, or white sheet of paper. First close one eye, and then open it and close the other. Does the brightness of the spot appear the same for each eye?

Move the tubes to overlap the two spots. Notice that there is a brighter area where the two spots overlap. Overlap the spots completely. Does the combined spot look brighter than either spot alone? Find out by closing one eye.

Whats Going On?

When you partly overlap the two spots, your open eye and brain conclude that the sum of the two spots of light should be brighter than one spot alone. If the spots overlap completely, the brain seems to ignore one of them.

Another Topic to Read About

Monocular Vision.

Cows and some birds and many fish have eyes on opposite sides of their heads. Their brains have two distinct fields of vision. This is called Monocular Vision. This allows them to see a much wider range which is better for seeing predators and dangers. What their brains do with the two images is much different from what our brains and other binocular animals do.

Illusion 3
Are 2 Spots Better Then 1

Hold one of the r**ound tubes** up to one eye and a flattened oval shaped tube p to the other eye. Look through both tubes one with each eye at the white wall, or paper. Move the ends of the tube so the spots now overlap. Do you see a circle or an oval? Switch the tubes and repeat. If you saw only the circle before, you may see the oval now.

Your eyes and brain have trouble merging the different shapes. Most people have a dominant eye. The brain will choose to see the image that is coming from the dominant eye. Some people do not have a dominant eye, and therefore see the two shapes overlapped. The best baseball hitters do not have a dominant eye.

Binocular Rivalry
When faced with ambiguous visual information you normally don't experience a combination of the different interpretations. Instead, you will see only one interpretation. After time, your perception will begin to switch between each of the competing between each of the competing alternatives.

Binocular Rivalry is a type of perceptual rivalry. When two different images are presented to the two eyes two different images are presented to the two eyes simultaneously, you are only conscious of one of the two images at a time. One is dominant, the other is , the other is suppressed. Every few seconds the perceptual every few seconds the perceptual dominance will switch.

Illusion 4
Are 2 Spots Better Then 1

Materials:

This effect requires 2 tubes made of white copy paper. One tube is made by rolling the paper so the walls are 3 or 4 layers think. Tape the paper tube so it does not unroll. A second tube all be made by cutting the paper lengthwise so it is a long marrow strip. Roll this tube os it is only 1 layer think and tape it together. You now have 2 tubes each 11 inches long but one tube has 3 or 4 layers of thickness and the other tube is only one layer t=hick.

With both eyes open, look at a white wall, or paper through one of the tubes you made from a full sheet of paper. Notice that the spot of light that you see through the tube appears brighter than the wall of the tube.

Do the same thing using the tube that you made from a narrow strip of paper. Notice that the spot appears darker than the wall of the tube.

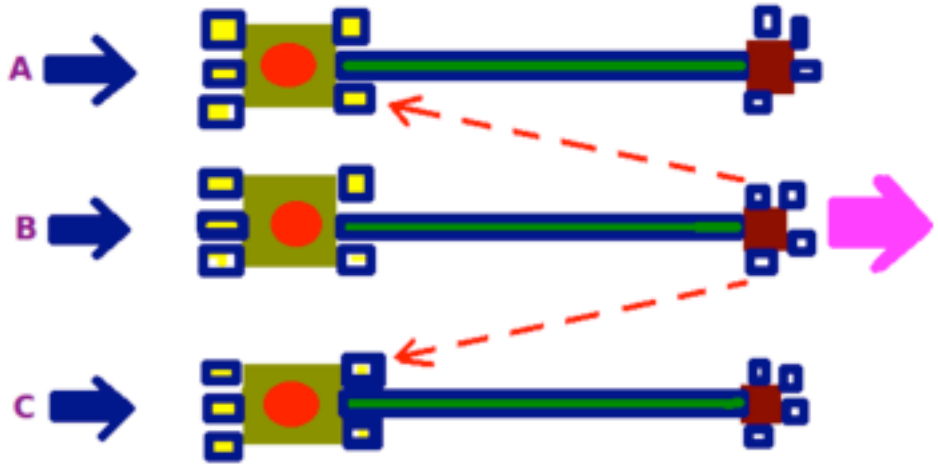
When light receptors in your eyes receive light, they send a signal to your brain. A receptor receiving light also sends signals to neighboring receptors, telling them to turn down their own sensitivity to light. When you look at the white wall without a tube, you see a uniform field of brightness because all the receptors are equally inhibited. When you look through the tube that you made from a full sheet of paper, the spot of light is surrounded by the dark ring of the tube. The spot appears brighter because the receptors in the center of your retina are not inhibited by signals from the surrounding dark ring.

In contrast, light shines through the walls of the tube that you made from a strip of paper. When you look through this thin walled tube, the spot appears darker because light comes through the wall of the tube, causing the receptors at the center of your retina to be inhibited. T

This is known as **lateral inhibition.**

Lateral inhibition.

Lateral inhibition increases the contrast and sharpness in visual response. This phenomenon occurs in the mammalian retina, for example. In the dark, a small light stimulus will be enhanced by the different photoreceptors (rod cells). The rods in the center of the stimulus will transduce the "light" signal to the brain, whereas different rods on the outside of the stimulus will send a "dark" signal to the brain. This contrast between the light and dark creates a sharper image.



A stimulus affecting all three neurons, but which affects B strongest or first, can be sharpened if B sends lateral signals to neighbors A and C not to fire, thereby inhibiting them. Lateral inhibition is used in vision to sharpen signals to