What You Perceive Is What You Get…Right?

How do you know what to believe?

Monocular and Binocular Vision

1. Predict what happens when one eye looks through a piece of paper and the other eye looks at your hand next to the paper?

2. Cheshire Cat: Predict what happens when one eye looked into the reflective part of the CD and the other looked at your friend?

3. Why do you think this is happening?

Our eyes are separated only by a short distance, but when our brain interprets what we see out of each eye, it puts them together. This is binocular vision. When we separate our vision into different views (monocular vision) our brain tries to put them back together. Thus, we see a hole in our hand or our friends faces mixed with our hands erasing them.

Depth Spinner and Falling through the Floor

1. Predict what will happen when you look away from the depth spinner to your hand?

(What would have happened if we'd have done this was that our hand would seem to swirl in the opposite direction of what the spinner was doing. Pretty crazy looking…find one online if you can.)

2. What really happened?

3. Why do you think this is the case?

Our nerves have the ability to adjust. We can adjust to colors, sounds, tastes, sensations, and smells. Our brains become used to the constant sensations they are perceiving. When that sensation changes, the nerves continue firing as if it were still occurring. With the activity where it felt like you were falling through the floor, your brain became accustomed to the sensation of having your arms raised, and it interpreted your body position as horizontal. As your arms were lowered, your brain, assuming that you were already horizontal, interpreted that you were actually falling through the floor. Our ability to become accustomed to sensations helps us to filter out all the 'noise' that we don't need and focus on the stuff that matters. It's why you can hear a rattlesnake while walking through crunching leaves and why you can hear the soft footsteps of a panther among noisy rainforest birds.

What?!

1. What is this a picture of?_____

2. Who is this a picture of?_____

Spinning house: http://www.youtube.com/watch?v=jIpdajUHVtI.

3. Explain the pattern behind these three illusions?

In each of these cases, our brain interprets what we see based on patterns that we are used to seeing. Much of what we perceive is us actually our brains interpreting images from our memories. We are used to seeing Mona Lisa, Elephants, and square rooms, but really, we have projected that pattern on these images. Patterns are often culturally defined. People who are not used to seeing a box may see the crazy hallway and house for what they truly are.

Willy Wonka's Crazy Hallway

4. How did the producers do this?
http://www.youtube.com/watch?v=Ttd0YjXF0no

The Ames room is not a square room, but our brain interprets it that way. The floor and ceiling are slanted, and the walls are not parallel. However, because we are accustomed to the pattern of a box shaped room, that is how our brain perceives what our eyes are seeing.

Black + White = Color

Benham's Disk

Let's explore how this is possible.

1. What in our eye helps us to see color? **cones**
2. We have three types of these. They are for seeing **blue, green, and red light**
3. **Latency response time** is how long it takes to respond to a color
4. **Persistence of response time** is how long it keeps responding after the stimulus has passed.
5. Take a look at the pattern of the disk. Spin it again, noting where each color occurs. Compare the length of lines (and white spaces) that occur in the region for each color.
6. Which color have the longest black lines?_____ Shortest?_____
7. What conclusions can we draw about the latency and persistence of response for each cone type?

This illusion is not completely understood, but one possible/partial explanation is that each type of cone has a different latency response and persistence of response time. Blue cones have the longest latency and persistence of response times. This means that it takes longer for blue to be seen, but it lasts longer too. When we see white, we are using all cones equally. When that white is interrupted by black, our cones stop working in order of how long their persistence of response time is. Since blue has the longest persistence time, we will see it after our red and green cones stop seeing their colors. When our use of different cone types overlap, we may see other colors such as yellow, orange, and pink.

Besides understanding how the brain works with our senses, how else does perception matter in science? We cannot know or study what we cannot perceive.

Think of what the world would be like if people didn't question what they believed:
The world would still be flat
We would be the center of the universe and the sun would rotate around us as we stood still.
In the summer, the sun would move closer to us as in the winter it would move further away.
Once in a while the Sun and Moon would turn off partially or fully
Light would travel instantaneously.
Species would be fixed and unchanging, never evolving, only there or extinct