Color – What is it?

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The brain is an amazing thing. Nobody fully understands how it works, yet we do know a lot.

For example we all feel pain. Hit your thumb with a hammer and the pain is overwhelming but lost is the fact that pain is created in the brain, not the part of the body that is hurting. Some masters have learned to turn off pain by force of will. The rare person may be born with a defect so that this person can feel no pain. In short, what we call pain is what is created by the brain. Nerves report signals to the brain then the brain responds by processing these signals and giving the correct response, all the way from the soft feeling of a breeze on our skin, to debilitating pain.

What does this have to do with “Color” you must wonder. The answer is that like pain, what we see as color is also a creation of the brain. Things do not actually have color. A dog, and most animals see in gray-scale and see no color, just black and white. A dog cannot conceive of color. The dog sees the same thing a human does but our brains interpret it differently.

What we all see, animal or human, is reflected light and what we see as color is various wavelengths of light that are dependent on the source light. What we see has no color as such. Proof of this can be demonstrated in a number of ways. You may have a bright Red automobile and at night you park it under a Sodium light that is lighting the parking lot. Look at your car… it is BLACK! No sign of any other color, it is simply Black. This is because the frequency of light we call Red is not being emitted by the Sodium light source, so it cannot reflect, and there is no Red. In a dark room use a laser pointer and look at various things. The only color you see is the color of the Laser light because it is a pure light with no other light colors emitted. No matter what you illuminate with a laser. it will reflect only the laser color

In dim light our eyes still work but we no longer see color, we see gray-scale until it is too dark to see anything. This only means there is not enough light of the correct frequencies for our eyes and our eyes are more sensitive in gray-scale.

Things do not have color, only different reflective properties. What we see as color is how our brains interpret the reflected light. Color is a gift from God that gives us the ability to see the beauty of His creation. God created the Sun which provides frequencies of light that exceed our ability to see. Insects like bees see into the ultra-violet range and their world looks completely different than what we see. Some snakes see infrared in the dark.

Here is a very simple test that what we see is reflected light; go into a closed room and turn off the light. What do you see? Nothing, you can only see reflected light, or light directly coming from a light source. You might think you see nothing because it is dark, however if you take a Red light and shine it on an object in the dark, it will look shades of Red, same with any other color. You can only see what is reflected.

It is not an easy concept but all radiated energy has a frequency. Like pitch is to sound and the ear, or radio waves, or light… all of it is the same in the sense of waves of energy like ripples in water. The frequency is different and like the radio receiver they can be detected. Our ears can hear down to about 60 Cycles Per Second (Hz) and up to maybe 20,000 Hz if your hearing a very very good.. If it is outside that range we cannot hear it. Humans cannot directly sense radio waves, but we build equipment that generates and receives these waves. As you tune your radio to different stations, you are just selecting different frequencies. Our eyes see from just above the infrared range to just short of ultra-violet, so all color we see is in that range of frequencies. Some animals see different ranges and what they see is completely foreign to our eyes but it is never-the-less just as real. Wave energy covers from no wave (flat line) at the low end all the way to beyond light at the high end. We give names to ranges, like Audio, Radio, Microwaves and while there seems to be no limit, we know of only what we are able to detect, but the entire range is all energy oscillating at different frequencies.

As a practical matter none of this matters to us, we see colors so the ocean is blue, the grass is green, and so on, and we enjoy what we see. In fact, only the light source, like the Sun, radiates light of the different frequencies and what the light shines on has reflective properties that adsorb some frequencies and reflect others and what we see as color is the sum of what is being reflected. The light goes into our eyes and our brain somehow sees color.

As an aside, we go into a restaurant and order food. The cook places the food on the counter under an infrared lamp while it awaits pick-up. The infrared light does not reflect and is absorbed into the food and the added energy keeps the food hot. Many snakes have infrared sensors on each side of the head and they see in the dark without using their eyes. Remember, infrared light is just below the ‘visible’ (to humans) spectrum and any warm object is emitting infrared. The fact is heat and infrared are pretty much the same thing. Mostly we ‘feel’ heat but infrared sensors can ‘see’ heat. Infrared is just another form of light energy.

It is also interesting that there are 3 primary colors, Red, Green, Blue, and by mixing them with different intensities any other color can be seen by the eye, color TV for example only has three colors of ‘pixels’ and each pixel is made up of three dots, one Red one Blue, and one Green, but our eyes see the combined as different colors. The pixels are very small and on modern TV’s we cannot see them. The TV screen is a light source, it is not based on reflected light.

I have always been fascinated how, before LED lights were used for automobile lights, some people would drill a small hole in the Red tail-lights and insert a tiny Blue lens/button. The incandescent light-bulb produce white light so when the brakes were applied the Red would be illuminated and filtered as normal but that tiny spot of Blue mixed in and in the distance it made the light look a bright Amber color that made it stand out from all of the other traffic taillights. A colored lens is a filter so the Red tail-lights (before the LED) filtered out everything except for the Red that passed through. Modern cars use LED (Light Emitting Diode) which do not produce White light then filter out unwanted colors, they just directly produce the desired color. This is MUCH more efficient and no filter is necessary. There are still plastic lens with color but only because that is what people are accustomed to seeing and it would look strange if it was clear plastic.

A colored lens does not produce a color, it simply blocks all light except for the desired color… it is a filter.

I noticed with interest that across from my home, a house was having Solar panels installed on the roof. I noticed the color of the panels looked to be a gray/brownish color. The panels were installed and activated and, I looked, and the panels were solid black. I thought about that and it makes sense. When the panels were not connected there was no place for power to go, so the light did not produce power, some reflected and the panels just got hot in the Sun. When the panels were connected and started producing power, the light energy was turned into electricity and light did not reflect, and in fact any reflected light would be inefficiency. Since light is not reflected, we see black. A working panel must be black, not because it is colored black by the manufacturer, it is black because it is adsorbing all light, and this lack of reflected light makes our eyes see black (black is not a color, it is the absence of color).

Eat a lot of bright orange carrots. They are digested and this changes the reflective properties so when expelled, it is no longer orange and there is no orange left in your body, in fact as soon as swallowed, food has no color. We can also conclude that nocturnal animals do not see in color because there is no white light source, so even if they could see color, they still would not. Gray scale works in the intensity of the light and has no color perception. This kind of sight is very sensitive so the nocturnal animals see very well with low light levels.

What is the importance of all of this? Only two-things. First, it helps us understand our environment, and secondly it is a demonstration of how wonderfully we have been created. Color is a gift from God. One could say that color only exist in our minds.