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Ask the Vet: Dogs don't distinguish colors like humans

My patient was a beautiful golden retriever. She had a favorite orange toy ball that she kept with her always until one day when the ball did not return to the house with the dog. It was lost and despite efforts, it could not be found. This story was described to me by the dog's owners in my exam room many years ago. Her owners told me that they had purchased an identical toy ball as a replacement except that the color of the new ball was red. Their dog did not treat the new ball as she had treated her favorite orange ball. "Do you think she can see the difference in the color?" the dog's owners asked. Many times since then variations of the same question have been posed to me. So what is the answer to this common question: Do dogs see color?

The simple answer is yes, dogs do see colors. The colors they see, however, are a bit different than the colors that humans generally see. Let's explore the question of seeing color with the broader question, "How well do dogs and cats see?" Color perception is just one part of vision. Other factors that work together to define one's vision include the ability to perceive light and motion, visual perspective, the field of view, depth perception, and visual acuity or clarity.

It is a well known fact that dogs and cats are much more sensitive to light than humans. Cats are exceptionally well suited for nighttime vision, needing up to 7 times less light than humans need to see. Many animals have a reflective surface (tapetum) in the back of their eyes which helps to intensify low levels of incoming light. This is the cause of the "glowing" reflective eyes we see at night in many animals.

Animals and people are visually more sensitive to objects that are moving versus objects that are stationary. And interestingly, humans are about 10 times better than cats at detecting motion in bright lighting. Not surprisingly, domestic mammals seem to have a much better motion detection in dim light. Dogs and cats also have a very large field of peripheral vision. They therefore have a very good ability to detect peripheral motion, especially if a stationary object begins to move.

Another factor of vision is an individual's field of view. For example, different breeds of dogs have different fields of view based on head shape and eye positions. Consider the shortened face of the pug: the eyes are positioned a little more to the sides than other dogs. Their field of view and area of binocular vision would be different than a dog with more closely placed eyes.

Visual clarity and focus are even more important than those qualities already mentioned. Various diseases and natural aging can affect the clarity of the cornea, lens, and internal fluids of the eye. Without perfect clarity of these windows through the eye, vision suffers. For example, cataract formation which obscures the lens, occurs in many diabetic dogs if their disease is not tightly controlled.

Finally, back to the question of seeing color. As in humans, two types of light-sensitive cells populate the retina at the back of the eye. The rods are most sensitive to light and dark, shape, and movement. The cones are more sensitive to colors, and essentially work only in brighter lighting.

Studies suggest that dogs, and to a lesser degree cats, do possess color vision though they have far fewer color sensitive cone cells than humans. Human cones have three different types of color sensitivities, whereas it has been shown that dogs have two main types: cones sensitive to violet and cones sensitive to yellow-green light. Dogs appear to be similar to humans who are "red-green color blind".

So, dogs might have difficulty distinguishing between red, orange, yellow and green objects solely on the basis of color. Dogs also can not differentiate blue-green from gray objects. Dogs use clues such as object position, brightness, smell, taste, and texture for object recognition. It is interesting to note that guide dogs in assisting at traffic signals are not trained to read the traffic lights themselves because of the inability to distinguish those colors.

So could my patient with the lost favorite orange ball see that her new ball was red and, therefore, different? She most likely would not have perceived a color difference between the two balls. I'm still not sure of the reason for the lack of acceptance of the new ball, but factors such as a different smell or a new texture are certainly possible.