

How carrots help us see the color orange

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One of the easiest ways to identify an object is by its color -- perhaps it is because children's books encourage us to pair certain objects with their respective colors. Why else would so many of us automatically assume carrots are orange, grass is green and apples are red?

In two experiments by Holger Mitterer and Jan Peter de Ruiter from the Max Planck Institute for Psycholinguistics, perception of color and color constancy (the ability to see the same color under varying light conditions) were examined using different hues of orange and yellow. By using these hues on different objects, the researchers hoped to show that knowledge of objects can be used to identify color.

In one experiment, half of the participants saw traditionally-colored orange objects in their respective hue, while the other participants saw the same objects in an ambiguous hue between yellow and orange. The participants that saw the ambiguous hue on traditionally-colored orange objects later called the item with that ambiguous hue "orange". Apparently, seeing the ambiguous hue on a traditionally-colored orange objects led participants to redefine that hue to be proper "orange".

In the second experiment, participants saw the same hues, but now on objects that could be any color (e.g., a car). Some participants were shown objects that ranged from the ambiguous color from the first experiment to a strong yellow hue, while others were shown objects in a range of strong orange hues to the ambiguous color. Just as in the first experiment, participants then had to identify a sock that had been colored with an ambiguous hue. This second experiment revealed no

differences between the two groups, showing conclusively that it was only the knowledge of how objects are naturally colored that made them redefine the colors in the first experiment.

The results, published in the July issue of *Psychological Science*, a journal of the Association for Psychological Science, determined that the use of top-down processing, such as a carrot signifying the color orange, is delayed in both color perception and also in other perceptual domains. If humans used this conceptual knowledge immediately, it would override perceptual cues and cause hallucinations.

"Delayed feedback for learning prevents such illusions, but still utilizes prior probabilities provided by world knowledge to achieve perceptual constancy," the researchers concluded.

Source: Association for Psychological Science

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