MedicalXpress

Why Are Uniforms Uniform? Because Color Helps Us Track Objects

June 22 2006

If someone, somewhere hadn't thought to make team uniforms the same color, we might be stuck watching NBA finals or World Cup soccer matches with only two players and a ref.

It is that color coding, Johns Hopkins University psychologists have now demonstrated, that allows spectators, players and coaches at major sporting events to overcome humans' natural limit of tracking no more than three objects at a time.

“We’ve known for some time that human beings are limited to paying attention to no more than three objects at any one time," said Justin Halberda, assistant professor of psychological and brain sciences in the university's’ Zanvyl Krieger School of Arts and Sciences.

"We report the rather surprising result that people can focus on more than three items at a time if those items share a common color," he said. "Our research suggests that the common color allows people to overcome the usual limit, because the ‘color coding’ enables them to perceive the separate individuals as a single set."

Thus: Miami Heat fans perceive their five white-jerseyed players as a unit in action against five blue-shirted Dallas Mavericks. England's football faithful can track their white-shirted field players against Sweden's yellow-garbed 10. (Since soccer goalies wear different colors than field players, though, fans of both clubs may have to think a moment before remembering which keeper goes with which team.)

The color-sorting ability comes in handy not just in sports. Poker players get a feel for the size of the pot by checking out different colored chips; a glance in the cooler tells a picnic organizer whether she has the right mix of red Coke cans and blue Pepsis.

Knowing that color is the key to making sense of large numbers of objects “informs our understanding of the structure of visual cognition and reveals that humans rely on early visual features to attend large sets in parallel," Halberda said. “Ongoing work in our lab is revealing which other features humans might use.”

Halberda and Feigenson reached their conclusion by asking Johns Hopkins undergraduate volunteers to view series of colored dots flashing onto a black computer screen. The subjects were asked to estimate the number of dots in one randomly selected set on each trial.

Half the time, the subjects were told in advance whether to pay attention to, say, just the red dots or just the green ones. Otherwise, the subjects were required to store as much information as possible in visual memory from what they saw briefly onscreen.

Some sets contained as many as 35 dots and subjects viewed the sets for less than one half second, which Halberda points out “is too short to allow the subjects to actually count the dots.” Subjects were very accurate when told in advance which set to pay attention to, regardless of how many different colors were present, revealing that humans are able to select a set that shares a common color. Subjects were also very accurate at enumerating a color subset when asked after the flash of dots so long as the flash contained three or fewer colors.

“We found that humans are unable to store information from more than three sets at once,” Halberda said. “This places an important constraint on how humans think about and interact with sets in the world.”

Johns Hopkins University and the National Institutes of Health provided funding for this study, which is reported in the July issue of *Psychological Science*.

Source: Johns Hopkins University