Study with infants suggests color categorization is biological

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(Medical Xpress)—A team of researchers with members from the University of Sussex and the University of California has found evidence that suggests color categorization in humans is biological rather than learned. In their paper published in *Proceedings of the National Academy of Sciences*, the group outlines the experiments they conducted with infants, what they found, and what they believe their results suggest about the nature of color differentiation in humans.

Non-colorblind people take color vision for granted—it is part of automatic processing. They see something and place it into a color category: red, green, blue, orange, etc. But scientists have not been able to agree on whether such categorizing is the result of behaviors learned from others or if it is at least in part hardwired. To learn more about color categorization, the researchers with this new effort studied babies, hoping to figure out if they categorize colors in ways similar to adults before they learn the words used to describe them.

The experiments consisted of showing 179 46-month-old infants 14 unique color swatches and watching them to see if they reacted in ways that suggested they saw them as unique colors. Prior research has found that babies tend to look at novel things longer. Thus, a baby used to seeing a blue paddle, for example, would likely find an identical paddle painted red something new, and thus would study it a bit longer. The researchers used this knowledge to test the babies using 14 colored swatches.

The researchers report that the infants were clearly able to sort colors into at least five categories: yellow, blue, purple, green and red. This, they suggest, is evidence that color categorization in humans is at least partly biological. They also found that the categories used by infants were related to prior research which identified two neural subsystems that are believed to be responsible for early stage development of color characterization. They further note that other studies, such as the World Color Survey, have also found commonalities in the way colors are categorized.

More information: Alice E. Skelton et al. Biological origins of color categorization, *Proceedings of the National Academy of Sciences* (2017). DOI: 10.1073/pnas.1612881114

Abstract

The biological basis of the commonality in color lexicons across languages has been hotly debated for decades. Prior evidence that infants categorize color could provide support for the hypothesis that color categorization systems are not purely constructed by communication and culture. Here, we investigate the relationship between infants' categorization of color and the commonality across color lexicons, and the potential biological origin of infant color categories. We systematically mapped infants' categorical recognition memory for hue onto a stimulus array used previously to document the color lexicons of 110 nonindustrialized languages. Following familiarization to a given hue, infants'

response to a novel hue indicated that their recognition memory parses the hue continuum into red, yellow, green, blue, and purple categories. Infants' categorical distinctions aligned with common distinctions in color lexicons and are organized around hues that are commonly central to lexical categories across languages. The boundaries between infants' categorical distinctions also aligned, relative to the adaptation point, with the cardinal axes that describe the early stages of color representation in retinogeniculate pathways, indicating that infant color categorization may be partly organized by biological mechanisms of color vision. The findings suggest that color categorization in language and thought is partially biologically constrained and have implications for broader debate on how biology, culture, and communication interact in human cognition.

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