

Working memory predicts individual differences in successive color constancy

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Color constancy is imperfect and shows rather large individual differences. This study tested whether individual differences in working memory (the ability to hold information in mind during distraction) are related to differences in color memory and/or color constancy. High- and low-working-memory participants were identified using the Aospan and Arspan tasks (Unsworth, Heitz, Schrock, & Engle, 2005). Participants studied a test color for one minute for later recall (paradigm modeled after Jin & Shevell, 1996). In the uniform background condition, the test color was surrounded by a uniform achromatic background that reflected all wavelengths nonselectively; in the complex background condition, the achromatic background had eight different colored sectors embedded within it. These conditions manipulated context: a complex background typically improves color constancy. During the study phase, each participant saw the (simulated) Munsell papers under one illuminant (A or C). After the study phase, participants generated random numbers for two minutes in the dark, to prohibit verbal rehearsal of the test color. A second display was then presented that had either the same illuminant used during training or the other illuminant. Participants set the color of a test patch to appear like the color they had studied (a memory match). The paradigm allowed measurement of both color memory (no illuminant change between training and test) and color constancy (illuminant change between training and test). Better color constancy was found for high- than low-working-memory participants for both background conditions. Better color memory was found for high- than low-working-memory participants only for the complex background condition. This suggests that working memory is involved in the establishment, maintenance and/or retrieval of a color-constant neural representation, not just in simple color memory for a chromaticity always viewed under the same illuminant. This study provides the first account for individual differences in successive color constancy.

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