Study indicates how we maintain visual details in short-term memory

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Working memory (also known as short term memory) is our ability to keep a small amount of information active in our mind. This is useful for information we need to know on-the-fly, such as a phone number or the few items we need to pick up from the grocery store. We hang on to the information for a brief period of time, just long enough to make a phone call or get through the checkout line, and then we forget it forever.

We receive much of our information through our visual system, but it was unknown how much of this visual information is actively involved in short term memory. Psychologists John T. Serences from the University of California, San Diego, along with Edward F. Ester, Edward K. Vogel and Edward Awh from the University of Oregon wanted to examine which neural systems enable the maintenance of these visual details in short term memory.

While undergoing functional magnetic resonance imaging (fMRI) scans, volunteers were shown an image for one second and were instructed to remember either the color or the orientation of the image. Following the image, volunteers saw a blank screen for 10 seconds, then were shown another image and had to indicate if it was the identical color or orientation (depending on which they were told to remember) as the first image. The researchers analyzed brain activity during the 10 second delay (when short term memory is active) in the primary visual cortex, the main region of the brain which handles visual information.

The results, described in *Psychological Science*, a journal of the

Association for Psychological Science, revealed that during the 10 second delay, there was very specific activation in the visual cortex, specifically in areas normally involved in processing color and orientation. Moreover, close examination of the patterns of activity in the visual cortex allowed the authors to "decode" the specific color or orientation value that volunteers were holding in mind. This suggests that during short term memory the visual area of the brain is actively "thinking" about a specific feature of an object (e.g. color or orientation), to ensure that the information will be maintained and not forgotten.

The authors note that these findings "suggest that observers have top-down control over which features are stored" because the activity in the visual cortex represented only the voluntarily stored aspects of the image. In this way, we can ensure that only the most relevant details of the world around us are maintained in this online mental workspace.

Source: Association for Psychological Science