

Research Initiative Update

Attention and Memory

CCSN Research Initiatives were created to organize Center members into interdisciplinary groups that address “big questions” in the areas of cognitive and social neuroscience. Members of each initiative strive to employ complementary methodologies and identify opportunities for new research programs. David Gallo, Assistant Professor of Psychology at the University of Chicago, was interviewed about the current work of the Attention and Memory Research Initiative.

What projects are currently being explored by the Attention and Memory Research Initiative?

One current project is spearheaded by Kimberly Fenn, University of Chicago graduate (Ph.D. 2006) and Assistant Professor in the Department of Psychology at Michigan State University. Fenn is interested in the effects of sleep on learning. With CCSN faculty members Howard Nusbaum and Dan Margoliash, Fenn published an elegant set of studies in *Nature*. These studies found that sleep promotes learning and consolidation of speech perception. If you get a good night’s sleep, you actually regain some of the losses that you had during the day due to forgetting. This initial work naturally raised the question as to whether the beneficial effects of sleep were restricted to perceptual learning, or whether sleep also might influence other forms of learning and memory, such as our ability to accurately recollect past events.

In another study, which was recently

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DAVID GALLO

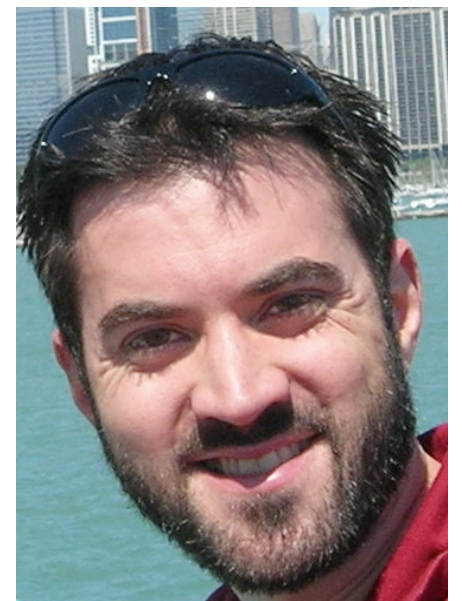
published in *Learning & Memory*, we tested the effects of sleep on false memories. Although there had been some work assessing the effects of sleep on memory for experienced events, ours was one of the first studies to investigate the effects of sleep on false memories. To elicit false memories, we presented subjects with sets of words that were associated with a broader concept. For example, people were presented with words like “sun, sand, water, waves, shells” and then later they were asked if the word “beach” was in the list. Prior work indicates that most people tend to think that the non-presented word was in the list, representing a robust memory illusion. Our study found that people were less likely to falsely remember the non-presented word after a night of sleep, compared to a control group that was tested after an equal interval of being awake. This was an exciting result, because it suggested that sleep can strengthen our ability to strategically monitor the accuracy of our memories, thereby reducing false memories. We are currently working on additional experiments to test the effects of sleep on other kinds of memory accuracy and distortion.

How has this Research Initiative fostered research connections across labs?

At the University of Chicago, Harriet de Wit, Director of the Human Behavioral Pharmacology Laboratory, and I are now collaborating on a project examining the effects of drugs on memory for emotional material. De Wit’s research focuses on the physiological, subjective (i.e., mood-altering) and behavioral effects of drugs. For our current study, which is being conducted with Michael Ballard (Ph.D. student) and others in de Wit’s lab, we want to see how drugs influence information processing. We hypothesize that some drugs might distort memory such that, when sober, people misremember the positive aspects of the drug and not the negative aspects. Such an effect could have big implications for the mechanisms of addiction.

In this work, we present people with emotionally valenced pictures while they are under the influence of different kinds of drugs (e.g., different doses of THC, the active ingredient in marijuana) compared to placebo. We then bring them back into the lab a couple days later and test their memory when they are sober. The idea is that, when people are sober, they might remember more of the positive images from when they were under the influence, and they might rate them more positively. The interesting thing about THC is that it can have an overall amnesiac effect, so you are less likely to remember anything that was presented. Another drug condition we are looking at is an amphetamine derivative. Unlike THC, amphetamines can increase overall levels of memory by enhancing attention. However, we believe that similar emotionally-biasing effects might be involved. We are still in the middle of analyzing the data, so we will have to wait and see what the results will tell us. But our preliminary results look promising – both drugs seem to have larger effects on memory for emotionally valenced information compared to neutral information.

Interestingly, even the high dose of THC does not seem to have a very large amnesiac effect. This runs contrary to conventional wisdom, potentially due to the materials we are using. Most prior studies have used relatively simple stimuli (i.e., neutral word lists), whereas we are testing memory for more complex pictures of socially relevant material. This raises all sorts of questions, including the extent to which previously reported THC effects generalize to the more complex memories that are characteristic of our everyday lives. I think that this sort of result nicely demonstrates the novel insights that can be gained by integrating both cognitive and social approaches in psychological research. There is much more work that needs to be done looking at the neurophysiological effects of these drugs during these kinds of tasks as well, and I am sure we will have more to say about that in the future.



ABOVE: David Gallo, Associate Professor of Psychology at the University of Chicago.

What other current research questions do you find particularly promising?

One big question I have is how metacognition, or people’s personal beliefs about their cognitive abilities, can affect memory accuracy. I am currently using a combination of cognitive and fMRI techniques to tackle this question, with particular emphasis on how metacognition may be differentially affected by brain changes associated with normal aging and Alzheimer’s disease. Most of the research in the field of cognitive aging examines very basic phenomena, using well controlled tasks and settings, in order to get precise answers about theoretical mechanisms. But the questions we are after are much deeper than that. I think that memory is the basis for our entire understanding of reality. ■

UPCOMING EVENTS AND RESOURCES

Grant Writing Workshop

On April 26, 2010, the Center for Cognitive and Social Neuroscience hosted a National Institutes of Health (NIH) Grant Workshop. The panel discussants included John Cacioppo, Ron Thisted, Harriet de Wit, Dan Margoliash, and Matthew Christian. This workshop allowed participants to explore NIH funding mechanisms and obtain key information for the process of crafting grant applications. *Grant Application Writer’s Workbooks* for NIH and NSF are available at the CCSN.

Ron Thisted prepared a comprehensive handout for this event, which can be downloaded at the following URL:

<http://ccsn.uchicago.edu/Thisted.pdf>

Upcoming Conferences

Neurobiology of Language Conference

11 - 12 November 2010
San Diego, CA

The Neurobiology of Language Conference seeks to foster interaction, collaboration, and new approaches to understanding the neurobiology of language. Register for the Conference at <http://www.neurolang.org/>.

Society for Social Neuroscience First Meeting

12 November 2010
12:00pm - 6:00 pm, San Diego, CA

The Society for Social Neuroscience is an international, interdisciplinary, scientific society that aims to advance and foster scientific research, training, and applications. Register for the Conference at <http://www.s4sn.org>. Following the conference, videos of presentations will be available at this website.

Research in Progress Seminars

The Center faculty participate in workshops, brown bags, and research in progress seminars. To be added to the distribution list for announcements of talks and events, please email Anna Gomberg at agomberg@uchicago.edu.