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Student Profile: Greg Detre

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Why I chose Princeton for my doctoral degree

In 2003 I read an article that made some assertions about the hippocampus that didn't sound right. I was pleased to find a particularly lucid comment on the piece from a professor who studied memory. When I looked up his website and found that he was looking for a research assistant, I dashed off an e-mail to him. That was how I met Ken Norman, my current adviser. After just a few happy months working with him as a research assistant, I was certain I wouldn't find anyone smarter or kinder working on things I care about, and so I was delighted to be accepted to work as a Ph.D. student with him at Princeton.

I did my undergraduate degree at Oxford University, majoring in philosophy, with smaller measures of psychology and neuroscience.

My main research focus:

I'm interested in how we learn, remember and forget. We know that whenever you fully recall something, you actually strengthen your memory for it slightly. That doesn't seem so surprising. We're more interested in what happens when you only *partially* recall something. Our (and others') idea is that when a thought gets activated in your mind ever so slightly without getting a chance to bloom into a full memory, it actually gets *weakened*. It's almost as if our brain figures that if the thought or memory were important, it would have activated completely—but since it only half-flickered alive, it's probably a distraction or irrelevance, and should be suppressed next time.

Most of my thesis experiments revolve around trying to remind people a little bit, but not too much, to see if I can indeed weaken their memories. This is incredibly tricky, and so I'm trying lots of variants.

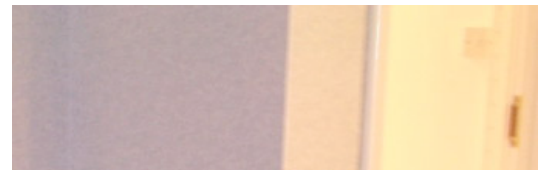
Sometimes, I prod their memory with a cue in the background while asking them to do some other task simultaneously, other times I flash reminders subliminally... I also scan their brains while they're doing this, to try and detect and measure these half-thoughts, in order to predict whether the memories are going to be stronger or weaker at the end of the experiment.

It's counterintuitive and still a little controversial to think that partial recollection could actually end up weakening the memory that was partially recollected. If we can really get a grip on this process, then we can start to think about how to make use of it in learning more effectively. This idea of partial reminding to weaken a memory might also help in clinical cases where we'd like to help people *forget more*, such as post-traumatic stress disorder.

Faculty mentors and an integrated approach to research:

I've worked primarily with Ken Norman since I've been at Princeton.

We started working on computational models of memory (simulating a simplified brain on a computer), from which we branched out into brain scanning. Our aim has been to try and detect and discriminate different thoughts using fMRI in a fine-grained way, using state-of-the-art machine



learning techniques to differentiate the patterns of blood flow associated with different mental representations. Now, we're trying to feed these methods back into our experiments, so that we can detect the degree to which different processes and memories are activating at any given moment.

Ken's strong background in both psychology and computational methods, along with his excited encouragement to try new methods and ideas has really made these attempts to bridge multiple disciplines possible.

Jon Cohen is my secondary adviser—his guidance has been very helpful at critical junctures and in helping me shape my long-term research agenda.

The application of machine learning methods to fMRI has brought together a number of people from around the University. As a result,

I've ended up working closely with a number of other people in psychology, as well as from computer science, applied math, molecular biology and physics, on the development of new methods, applications and software.

Why I recommend studying neuroscience at Princeton:

The computational expertise and ready access to imaging resources are excellent—this is really important.

Princeton makes it easy to focus. The University works pretty hard to sweep away problems and unwelcome distractions, and as a result, I'm happy with my office, my home, my friends and my work.

I personally really like the emphasis on computational approaches.

Perhaps most importantly to me, I'm surrounded by an almost unbelievable density of smart, funny and kind people.

