

On the border where brain science and philosophy converge

# Of what are minds made?

BY JIM H. SMITH

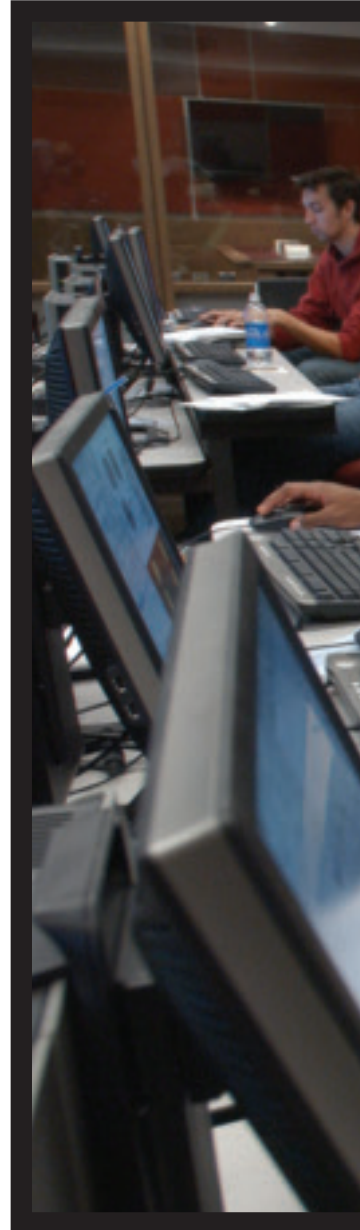
PHOTOS BY NICK LACY

Alex Fredell '07 had made a commitment to drive and he was determined to see it through. When he got behind the wheel on that cold, blustery morning last March, though, he had a few things going against him.

It was pretty early, and Fredell admits he's not a "morning person." Also, he had never driven the car before, and he'll be the first to tell you it took some getting used to.

Those things didn't stop him, though. After all, he only had to drive for an hour or so. And he was feeling pretty good, especially after the second vodka and orange juice.

Although this appears to be a recipe for disaster, Fredell, a junior neuroscience major from South Carolina, was not actually on the road. He was participating in a four-year National Institutes of Health (NIH) study of the effects of alcohol on the brain. The alcohol he consumed was administered, in carefully measured doses, at The Olin Neuropsychiatry Research Center, part of Hartford's Institute of Living. And the car he was driving was only a simulator, housed in a small, dark room where the blood flow in his brain and his simulated driving were carefully monitored as he attempted to negotiate a course with enough turns and obstacles to tax his mental acuity.

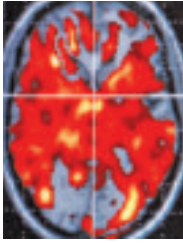




“We look at the brain as a circuit,” says Vince Calhoun, Ph.D., director of the Olin Center’s Medical Imaging Analysis Lab. “The fact is we don’t know a lot about how alcohol affects the brain. So we want to see what areas of the brain are most affected, what’s going on with motor ability and why.” The study has many potential values, including helping scientists predict how people will respond to consumption of liquor, which could, in turn, lead to future applications in the area of highway safety.

### **Neurophenomenology: uniting science and philosophy**

But Fredell is not only a participant in the NIH research project. He is also a student in Trinity philosophy professor Dan Lloyd’s “Minds and Brains” class, and the results of his participation in the Olin Center study—brain scans and records of his negotiations of the simulated course—are documents of critical importance to him and the other 13 Trinity students in the class.



“Minds and Brains” is a multidisciplinary investigation of neurophenomenology, the science that unites phenomenology—investigation of subjective experience, a philosophical concern—with neuroscience to explore the complex relationship between the brain and the mind. In

fact, Lloyd’s class syllabus begins with the rhetorical question, “Of what are minds made?”

“The contemporary answer to that question,” he says, “is brains. But how do brains compose minds? As the 21st century progresses, most scientists and philosophers agree that many, if not all, aspects of mind can be understood as manifestations of brain function. Cognition, perception, emotion, and ‘mental’ representation are now targets for scientists to explain, and few doubt that they will ultimately succeed. One core aspect of the mind, however, has not been so easy to handle.”

It is the question of consciousness. “Most cognitive scientists presume that consciousness is an aspect of brain function,” says Lloyd, “but how does conscious experience arise in the biological brain?”

That question is at the heart of Lloyd’s class, which may be unique, he says, in its combination of careful phenomenology and thorough neuroscience. The uniqueness begins with the Olin Center.

“We may be the only liberal arts college with direct access to a scientific center of this caliber,” says Lloyd. That resource is a benefit of Trinity’s partnership with the Institute of Living as members of the Southside Institutions Neighborhood Alliance (SINA). That nearly 30-year-old collaboration, which also includes Hartford Hospital and the Connecticut Children’s Medical Center, has produced, among other benefits to Trinity’s neighborhood, the Learning Corridor.

Lloyd’s class, indeed, would be decidedly different without access to Calhoun’s project. Since the goal of “Minds and Brains” is to train the students to think like neurophenomenologists—which is to say, scientists who try to understand the brain by observing what it is doing, physiologically, and what it is conjuring, simultaneously—access to the scans produced during participation in the Olin Center study is invaluable. Participating students, not all of whom actually ingest alcohol, are able to recall what the experience of driving the simulator was like and compare those memories with their brain scans.

## A communal understanding of the mind and brain

If there’s a word to summarize the border landscape where brain science and philosophy converge, it must be “surreal.” Surely that would be an apt word to describe the experience of driving a simulated car at 8:30 a.m., under the influence.

But even when Lloyd’s class meets on a sunny afternoon about a week after Fredell’s morning drive, the experience involves a peculiar juxtaposition. Gathered in a circle, Lloyd’s budding psycho-detectives are quick to share their experiences and observations.

They’ve been reading about hyperscanning, a cutting-edge technology that makes it possible for multiple subjects, often in far-flung locations, to have their brains simultaneously scanned while they interact with each other in the cyber-hive of the Internet. Lloyd soon, and adroitly, seasons this dialogue with the first data any of the students have seen from the Olin Center study, graphs that compare how three of the participating students, including Fredell, did on multiple trips down the simulated highway.

Drawing upon previous class exercises, as well as readings from a wide range of sources, including Lloyd’s mind-stretching 2003 novel, *Radiant Cool*, the students discuss what happened—on a range of levels—during the Olin Center experience. And they begin thinking about potential experiments they may employ to tease the meaning from the complex data. The course involves a weekly laboratory that affords students an opportunity to explore the foundations of cognitive neuroscience using such tools as computer simulations and workshops to understand brain imaging data.

It’s a wide-ranging dialogue, electric with ideas that spark back and forth across the synapses of the circle. On the other hand, the Clement Chemistry Building, where the class is held, is a funky old ivy-covered box, little changed in a century. There may be better metaphors for a brain, but it will serve, especially for a class designed to probe what Lloyd calls “the frontier of knowledge” and especially when that frontier is within one’s own head.

Indeed, the reactions of the students, upon seeing their brain scans for the first time, ranges from awe to something akin to parental pride.

“The experience of seeing a depiction of your own brain in action is amazing,” says Wesley Stonely ’06, a neuroscience major. “This seems to be the ultimate investigation into the workings of one’s own mind.”



“As odd as the comparison sounds, I feel a bit like I have a new baby,” says Alexandra Hoffman ’08. “I’m proud of the effort of bringing it to light, and of the fact that it is a part of me, and also pleased with its—as I see it, at least— beauty.”

“Developing a construct for how someone else thinks, you really need to understand yourself,” says Fredell, who hopes to pursue a career in the development of artificial intelligence after he graduates. “The phenomenology aspect is especially important. I learned a lot about

research by participating in the Olin center study, especially about how participants are affected. This is a terrific class. It generates a lot of interesting questions about consciousness.”

And questions, says Lloyd, are the meat of this class, which he compares to a think tank or “a group mind.”

“There are no right answers here,” he says, “no final authorities. Together, we work toward a communal understanding of the mind and brain.”

