SCIENCE

The Mind's Eye

Doug Crawford, winner of this year's Steacie Prize, gave up his guitar for brain research. **BY MICHAEL TODD**

IT WASN'T UNTIL HIS THIRD YEAR at the University of Western Ontario, while an undergrad, that Doug Crawford had his epiphany. That's when he decided to stop playing electric guitar three hours a day, and concentrate more on studying science. "At the time, I had the usual fantasies about becoming a rock star," says Crawford, who comes from a family with a farming background in southwest Ontario. He was the first among them to attend university.

Although he's not on stage cranking out tunes, Crawford has still earned star status. Earlier this year, he received the prestigious Steacie Prize. The award is given to a promising young Canadian scientist or engineer who is 40 or under. Essentially it's the Canadian science establishment's version of an Academy Award for its younger members. Past Steacie honorees have included such scientific big guns as chemist John Polyani, who went on to win the Nobel Prize.

Crawford, who holds the Canada Research Chair in Visuomotor Neuroscience at York, is also associate director of York's Centre for Vision Research and a professor in the departments of Psychology, Biology and Kinesiology & Health Science. He's in charge of a lab that's engaged in three areas of vision research: eye-hand coordination; 3-D gaze control; and trans-saccadic integration (piecing together perceptions across different gaze fixations). In part, the award – York's first – recognizes the contributions to brain science made by Crawford and his interdisciplinary team of 20 researchers.

"I wasn't your prototypical geeky science kid," says Crawford. But he was always very curious about the natural world and how it worked. "As a child I was interested in frogs, bones and rocks and that kind of thing. I remember one day showing up on the back porch with a decomposing raccoon and asking my mom if we could do something that would strip all the flesh off it. I think there were a few childhood dissections sprinkled in there, too. And in Grade 4 I did a project on the human body."

One curiosity – considering that much of what Crawford and his labs now study is concerned with vision and the brain – is that in Grade 5 he proposed a project to his teacher on the vision of his pet tropical fish. "I wanted to know how they could see, or what it was they were seeing. It's strange when you look back on things like that."

But Crawford says his interests as a university student weren't all science-related. He had an abiding interest in philosophy. "I was interested in the human mind and body. And now here I am looking at visual systems as they relate to our brain – our minds, if you want to think of it that way."

Philosophy, he says, still very much ties into what he does or, at least, his approach to science. "I'm interested in basic science but I've always tried to find a medical application for what I do. My work can help particularly where you have people with stroke or trauma damage to their visual or motor systems."

He and his collaborators recently released a groundbreaking study (appearing in the April issue of the respected journal *Nature Neuroscience*) that should aid stroke and head injury victims' rehabilitation. "We showed that our theory of spatial memory and eye-hand coordination can explain the problems observed in patients with damage to the parietal cortex of the brain," says Crawford.

"The question is: How do you know – after you've looked at an object and then are looking at something else – where that original object still is? How are we able to reach for it, more or less accurately, without actually looking at it?" asks Crawford. The scientists knew the brain creates visual maps (and keeps revising them) as we move our head and our eyes, he notes. "We showed this earlier using computer models, behavioral recordings and brain imaging, but this time we were actually able to use these findings to explain some unusual problems in brain-damaged patients. Amazingly, we found that these patients could reach quite normally to remembered objects, or quite poorly, depending on how they turned their eyes just before their reach." The simple secret, Crawford found, was that people with damage to the right side of the parietal cortex needed to look left, and vice versa. "So this is something they can learn to do to help them recover, and it is also a way for doctors to diagnose their problem."

Crawford says the parietal cortex relies on one fairly simple spatial "language" (or map) to guide our movements, whereas other areas of the frontal cortex can be thought of as "multilingual". Medical researchers are now working on ways to "hook up" these areas with prosthetic devices which may allow stroke or other trauma patients to regain certain movements.

Expect more such insights from Crawford's lab. "What I really enjoy these days is the synergy between training students, and research itself," he says. And if he wasn't busy being a scientist, what would he like to be doing? "Working as a writer. I'm too old for the rock guitar thing now."

STAR STATUS: Crawford

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