
ENTERTAINMENT
Review: The Oscar broadcast swindles the viewers


LIFE
Anything but dry: Orange couple go beyond the lawn in saving water


BUSINESS
Apartment developers declare 'amenity wars'


BUSINESS
Hot homes: Open space atop Anaheim Hills

LIFE

UCI boosts its brain power with top neuroscientist

BY SHERRI CRUZ / ORANGE COUNTY REGISTER

Published: March 2, 2014 Updated: March 3, 2014 2:08 p.m.

LEONARD ORTIZ, STAFF PHOTOGRAPHER

BRUCE MCNAUGHTON

Neuroscientist at the UC Irvine School of Biological Sciences, one of 28 distinguished professors on campus, the highest faculty title at the university.

Residence: Irvine. He rides his bike to work.

Family: Wife, Katarzyna McNaughton. Originally from Poland, she is doing master's work in criminology, law and society at UCI. The McNaughtons have a daughter, who is 5.

Education: Doctoral degree in psychology, Dalhousie University in Canada; Master's of science and bachelor's of science in biology, Carleton University.

UC Irvine has recruited one of the top brain scientists in the world – Bruce McNaughton.

McNaughton's expertise is the hippocampus, an area in the brain primarily responsible for memory and one of the regions first affected in people with Alzheimer's disease.

He invented a probe that allows scientists to pick up signals from multiple brain cells at once. The Canadian native will lead UCI's brain mapping projects, a national initiative that aims to ultimately prevent, treat and cure brain disorders.

Frank LaFerla, the recently appointed dean of UCI's School of Biological Sciences, identified McNaughton as someone he wanted to hire when LaFerla was chairman of the Department of Neurobiology and Behavior.

“He was one of the people we had our sights on for some time,” LaFerla said. “He's internationally renowned as one of the world's leading experts on learning and memory,” he said. “Bruce's work has been on the forefront of neuroscience for decades.”

McNaughton is UCI's 28th distinguished professor on campus – the highest position a faculty member can hold

MOST POPULAR

Wrong-way driver hits big-rig in Santa Ana

Crash leaves car upside down on sand in Huntington Beach

Tustin police shoot man during domestic call

Special report: O.C.'s best middle schools

Jail informant is key in Seal Beach mass shooting case

Career: McNaughton comes to UCI from the University of Lethbridge in Canada. Prior to that, he was at the University of Arizona for 18 years. McNaughton was born in Ottawa and has dual U.S.-Canada citizenship.

Teaching: He'll begin teaching neural coding and computation next year at UCI.

Lab in Canada: Lethbridge Brain Dynamics. He's setting up his UCI lab. He'll be splitting his time between the two this year.

Research: In the sixth year of a 10-year, $20 million Canadian Polaris Award.

Flying: McNaughton started flying small planes in 1995. His father was a test pilot for the Canadian military. McNaughton also flies sailplanes, which are gliders towed into the sky by a small plane. They have no engine, long wide wings, and are navigated from a small cockpit. He did a lot of gliding in Arizona.

"You can take off at 10 in the morning in Arizona, with no motor, and you get towed up a few thousand feet, and then you ride the thermals up and you can get up 14,000 feet to 15,000 feet and stay up all day long."

UCI SCHOOL OF BIOLOGICAL SCIENCES

Faculty: 115

Students: 3,425 undergraduate; 270 graduate

Size: The school makes up nearly 20 percent of students at UC Irvine. In 2012, the school awarded the second highest total number of degrees of any school at UCI: 952 bachelor's, 27 master's and 35 doctorates.

Departments and chair: Developmental and Cell Biology, Diane O'Dowd; Ecology and Evolutionary Biology, Laurence Mueller; Molecular Biology and Biochemistry, Christopher C.W. Hughes; and Neurobiology and Behavior, Marcelo Wood.

Goals include: More interaction among departments; more hiring of faculty with expertise in additional areas; adopting teaching methods that are less lecture-hall format and more engaging and interactive, in part, through the use of technology.

Dean: Frank LaFerla. He founded the Interdepartmental Neuroscience Program, which united various departments on research, and is the current

at UCI.

McNaughton wasn't looking for a new job when UCI came calling. His lab at the University of Lethbridge in Canada is in its sixth year of a $20 million, 10-year brain-research grant. McNaughton moved his brain science lab from the University of Arizona, where he'd been for 18 years, to Canada in 2008 after receiving the $20 million Polaris Award, the largest health research award of its kind in Canada.

“I didn't think it possible for me to move in the middle of the $20 million program,” he said. “People are counting on me to be there.” But UCI was able to accommodate him. During the first year, he'll be splitting his time between here and Canada.

“I'll be basically running two shows,” McNaughton said.

McNaughton's primary interest is the large-scale interactions of neurons in the brain during memory processes such as formation, storage and recall. This research touches aging, Alzheimer's and epilepsy. “Southern California is a major center for the kind of neuroscience that I'm interested in.”

McNaughton is also expected to lead UCI's brain mapping projects, part of the Brain Research through Advancing Innovative Neurotechnologies (BRAIN) Initiative, an effort to map every cell in the brain in order to ultimately prevent, treat and cure brain disorders. President Barack Obama launched the $100 million initiative last year.

“In many ways that initiative is written with Bruce in mind, so we're really hoping that Bruce can lead the campus' effort in undertaking this brain mapping initiative,” dean LaFerla said.

Historically, scientists recorded brain cells one at a time, McNaughton said. There are billions of brain cells that are active at any one time. As a postdoctoral researcher at University College London, he began to think of ways to record hundreds of cells at a time to get a better picture of what they were doing.

He invented a tool for researchers called a tetrode, a probe that allowed scientists to pick up signals from multiple cells at once. He calls the probe a “10 cent technology” because it is basically four teeny wires twisted together, as thick as a strand of hair. “It's cheap but it's effective,” he said

Scientists have invented ways to surgically implant these probes, 20 or more, inside various brain regions of a test animal. It can record the activity in 200 or so brain cells at once.

There are fancier versions of the tetrode today, but they

director of the Institute for Memory Impairments and Neurological Disorders, which studies age-related brain disorders. LaFerla is an Alzheimer's expert.

Website: bio.uci.edu

come at a fancy price. “If you're going to run a lab, studying the neurophysiology of memory, you want tools that graduate students can put together and make, and if they break it, it's not the end of the world.”

McNaughton's been expanding into Alzheimer's research, a natural for a hippocampus expert. People with Alzheimer's have a damaged hippocampus, which is why it's difficult for them to acquire new memories. “Alzheimer's is a progressive disease. We lose the ability to acquire new episodic memories, which also makes it difficult for the brain to develop new semantic memories.”

Semantic memory is the acquisition of new facts, and episodic memory enables us to recall personal events, situations and experiences. Semantic memory is derived by merging episodic memories.

The hippocampus generates an “index code” for episodic memories, which are distributed all over the cortex, he said.

1 2 Next Page

MORE FROM UCI

UCI piano concert features Japanese composers

Bravo UCI: Journalist named finalist for book award

UCI researcher studies how people can best work together apart

COMMENTS | PRINT | EMAIL | SEND PDF | SHARE

Join the conversation

Comments are encouraged, but you must follow our User Agreement

Keep it civil and stay on topic. No profanity, vulgarity, racial slurs or personal attacks. People who harass others or joke about tragedies will be blocked. By posting your comment, you agree to allow Orange County Register Communications, Inc. the right to republish your name and

LIFE

UCI boosts its brain power with top neuroscientist

Published: March 2, 2014 Updated: March 3, 2014 2:08 p.m.

The hippocampus spontaneously plays out these codes during non-dream, slow-wave sleep, causing snippets of memories to be refreshed in the cortex. “That's the period in which the brain is reorganizing its connections, to capture the knowledge inherent in the current episodic memory,” McNaughton said.

Sleep is divided into rapid eye movement and non-REM. REM, when we dream, is 10 percent of sleep. “It's the slow-wave sleep that seems to be essential for this process of extracting the gist of episodes and encoding it into semantic knowledge,” he said.

Why do we have memory at all? “It's not so that when you're 70 and 80 you can have fond recollections of your childhood,” he said. “Memories are the raw material of knowledge.”

Knowledge happens when the brain devises efficient memory-coding schemes. People become experts at something when their brains process many memories, McNaughton said. Memories are represented in the brain by the activity of a small number of cells.

But there is a price for efficiency.

“In the process, the memories themselves become degraded and distorted because the cells that are encoding the original memory become modified,” McNaughton said.

McNaughton's looking forward to projects related to the BRAIN Initiative. It's one of the reasons he came to UCI, he said. “The holy grail is to record from as many cells as possible – hopefully all of them,” he said.

“I don't think we have the computing power today, but it's not actually necessary,” he said. “You can learn huge amounts by recording several hundred at a time.”

MOST POPULAR

Wrong-way driver hits big-rig in Santa Ana

Crash leaves car upside down on sand in Huntington Beach

Tustin police shoot man during domestic call

Special report: O.C.'s best middle schools

Jail informant is key in Seal Beach mass shooting case

He once thought of brain mapping as “pie in the sky.” “But the technology is developing so quickly that it's just at the point of taking off,” he said. One of the advances moving brain mapping forward is using light to record cellular activity.

McNaughton recently applied for a four-year grant from the Defense Advanced Research Projects Agency to do research on restoring memory capability of people with brain damage. DARPA is known for pushing the frontiers of science and played a role in inventions such as the Internet.

The research project will probably take longer than the four years DARPA has allotted, McNaughton said, but progress will be made.

“Discovery research is opportunistic,” McNaughton said, meaning a scientist may have ideas for a project but needs funding, collaborators and researchers. “It depends on the resources that show up,” he said.

One of the advantages of hiring someone of McNaughton's caliber is it makes it easier to recruit junior faculty, LaFerla said.

“Faculty want to go where there's a lot of synergy, and the possibility to collaborate and expand their own research in new directions, so Bruce allows us to leverage his reputation to recruit the best of the best.”

Contact the writer: scruz@ocregister.com

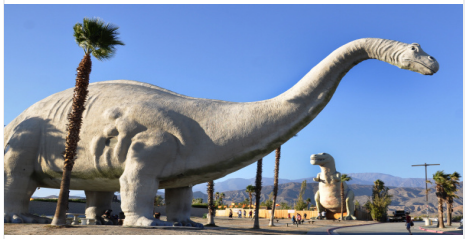
MORE FROM UCI

UCI piano concert features Japanese composers

Bravo UCI: Journalist named finalist for book award

UCI researcher studies how people can best work together apart

MUST-SEE PHOTOS



Desert detours are a trip down memory lane

ARTS & ENTERTAINMENT

See stars on the red carpet at the Academy Awards

Split decision at the Oscars

Review: The Oscar broadcast swindles the viewers

Reactions: Oscar winners dazed and bemused

Comics | Horoscope | Puzzles & Games