Since earning his B.S. degree at UC San Diego in 2007, Mitch Dattlow has been a Webmaster and a lot more for TDLC, while still active in class and cognitive science research. But he is soon leaving, as he has been accepted into a PhD program in neuroscience at Johns Hopkins University.

In his TDLC tenure, Mitch took a pedestrian website into the stratosphere and was instrumental in developing the eye-catching, news-filled ONTime newsletter. But his progression within the realm of research began even before TDLC saw the light of day, as he served on a neuroscience research project led by Virginia de Sa. Following that, he delved into rodent psychophysics work with Andrea Chiba and then became interested in neuroimaging and neural mechanisms of sensory processing. It’s this last interest that he will pursue in graduate school.

Mitch wrote a National Science Foundation Fellowship on the topic, also incorporating educational outreach, which received high marks and was awarded. So he takes his own money to Johns Hopkins, and says happily that Baltimore’s cost of living is way lower than San Diego.

Anyone who came in contact with Mitch -- whether by phone, email or in person -- may not have understood that the under-stated, smart, positive, upbeat attitude that they encountered is indeed the real deal.

So, much as these very qualities, combined with a great work ethic and sly smile, will take him all the way to prestigious Johns Hopkins University and far beyond.

New Trainee Leader (Continued from page 3)

National Science Foundation (NSF) for some 90 graduate students and postdocs. Due to substantial interest, we sent 22 students to iSLC 2009 at the LIFE Center (Learning in Informal and Formal Environments) at the University of Washington. And planning is already well underway for iSLC 2010 at CELEST (Center of Excellence for Learning in Education, Science, and Technology) at Washington.

While Mitch might be daunting to some, it’s hard to imagine any process can fail, investigators are testing how neurons learn temporally structured sequences.

The temporal organization of long-term memory

It is known that as time passes after learning, and recent memory becomes remote memory, a number of changes occur in the neural organization of memory. Utilizing functional Magnetic Resonance Imaging (fMRI) to create 3-D maps of activity in the brain, the goal is to determine how regional brain activation changes as recent recognition memory becomes remote memory. Myriad other research projects encompass inquiries into a wide range of specialized subjects. And, in addition, currently underway are many activities and projects relating to outreach, including art or translation (programming the science into the classroom). Figuring heavily in the translational arena is the Machine Perception Lab (MPLab) at UCSD.

Perhaps capping the recent accomplishments of RUBiS is the cover story in the current Smithsonian magazine. Interestingly, writer Abigail Tucker also posed the question, “What if a robot could learn like a child, as it goes along?”

Questions, Comments or Suggestions?

Is there something that you would like to see in an upcoming issue of ON Time? Or information that you would like to see on the website? Do you have any burning questions about the brain, learning, or anything else that you would like our scientists to answer for you? If so, please visit us at tdlc.ucsd.edu and use the “Contact Us” form to submit your questions, comments and suggestions. We look forward to hearing from you.

About the Author

By Carolan Gladden

Taking the reins for a yearlong stint as Chair of the TDLC Trainee Committee is Graduate Student Christopher Kanar, a Corbett Lab computer science researcher with a broad spectrum of experience beyond UC San Diego.

The Trainee Committee is composed of five trainee representatives, one from each of the five TDLC research labs; it has been designated the iSLC representative. As committee leader, Chris’s responsibilities range from setting the agenda for the committee and bringing trainee input into Center decisions and policies through

TDLC Bids Farewell

(See Who/What is TDLC on Page 4)
New Neurons and Timing

By Carolan Gladden

Feature in the July 10th issue of the journal Science is an intriguing study by TDLC’s IMS Network PI and DAK Institute Professor Fred Gage, together with his team and a group of collaborative researchers from Cambridge University in the UK. For some time it has been known that we generate new brain cells throughout our lives, but until now the purpose of newborn cells has been a topic of great debate.

At the first clues that adult human brains continually sprout new neurons – contrary to an original tenet of neuroscience that we are born with all the brain cells we’ll ever have – the paradigm began to shift. And a decade later the question is not whether neurogenesis exists but what all these new cells do.

The most active area of neurogenesis is in the hippocampus, where information is processed and distributed to appropriate ‘storage’ areas in the brain, ready for efficient memory recall. “Every day, we have countless experiences that involve time, emotion, intention and many other dimensions,” says Gage. “The information comes from the cortex and is channeled through the hippocampus. There, they are packaged together before they are passed back out to the cortex where they are stored.”

The hypothesis is that the dentate gyrus (DG) of the hippocampus mediates pattern separation, the formation of distinct representations of information, and also undergoes neurogenesis throughout life. Previous studies by a number of labs including Gage’s have shown that new neurons somehow contribute to hippocampus-dependent learning and memory but the exact function remained unclear.

Now come illustrations of the way young cells improve our ability to navigate our environment. Says Gage, “We believe that new brain cells can help us to distinguish between memories that are closely related in space.” And so, the researchers designed experiments that specifically challenged this function of the DG.

Using a set of focused experiments with two distinct strategies to selectively shut down neurogenesis in the DG of adult mice, the researchers found specific impairments in spatial discrimination. In the first, mice had to learn the location within a radial maze of a food reward presented in relation to the location of an earlier reward. Mice without neurogenesis had no trouble finding the new location, as long as it was far enough from the original, but they could not differentiate between the two when they were close together. Another experiment offered confirmation of the finding and also revealed that the mice had no problem recalling spatial information in general.

At this point it seems that pattern separation might not be the only role that new neurons have in adult brain function. Based on all available biological information, a computer model simulating the neuronal circuits in the DG suggested an additional function. “To our surprise,” says Gage, “it turned out that newborn neurons actually form a link between individual elements of episodes occurring closely in time.”

Thus, new experiments are in the planning stages with the teams of TDLC’s Andrea Chiba and Janet Wiles, Focus: Investigate whether new neurons are also critical for coding temporal or contextual relationships.

The paper can be viewed on the Science Magazine website, or by visiting the link below:
http://www.sciencemag.org/cgi/content/abstract/325/5937/210

Figure: Human brains sprout new neurons (in green) throughout life, particularly in the hippocampus, the brain’s learning and memory center.

Acknowledging TDLC and NSF is Critical

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Update: TEN, Tertulia, and TDLC

By Doris Alvarez

The Educator Network (TEN) had two notable events last month. The first was the launching of the Social Networking Site where scientists and educators can begin to discuss various issues that have potential for research translation. To date, over a dozen educators and scientists have joined. The website is located at theeducatornetwork.ning.com. Because the site did not get started until the end of the traditional school year, teachers are signing up slowly. Expect many more educators to take part especially if we can offer some interesting and provocative questions and answers. If you’re interested in joining, please log in to the website or let me know and I will issue a formal network invitation.

The second TEN event occurred in early June when scientists from TDLC and the Machine Perception Laboratory gathered for a discussion of an article entitled “The Future of Educational Neuroscience.” The article detailed how a sound grounding in research and teaching could be accomplished by bringing together biology, cognitive science, human development and education. It suggested creating research schools, as well as a new generation of interdisciplinary researchers with training in neuroscience.

TDLC’s Andrea Chiba, Gary Cotrell and Javier Movellan were all participants at the article discussion, along with Harri Barnett and Gwen Littlewort. Also participating were Grad student Jake Whitehill and project manager Andrew Kovacevic. The discussion was spirited and lively.

The plan is to meet periodically, have a person present a paper or a presentation followed by a “Chat” among the members present. Teachers will be encouraged to present an issue or problem that could be discussed among the group. In fact, we will call these meetings, “Tertulia,” which is Spanish for “Chat” and reflects the relaxed atmosphere we wish to convey. Next meeting will take place in early or mid-September, when summer is winding down and teachers are getting mentally ready to go back to school.

On the agenda for next year is the development of online sessions for educators on “Learning how the Brain Learns.” Doris Alvarez and Paula Talhall will head this project.

Where Have They Gone?

Catch up with former TDLC trainees

Serena Butcher, Post-Doc at Carnegie Mellon, is now Assistant Professor, Hamilton College, NY.

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Luke Barrington, while remaining a Grad Student at UC San Diego but no longer a TDLC member, has launched a human computation game on Facebook©. He says, “In order for the search engine to work (and for me to finish my thesis!) lots of people should play Herd It.” Here’s the link: www.herdit.org

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Education

Trainee Committee Gets New Leader

(continued from page 1)

Notifications, training and enhancement (such as grant possibilities, Boot Camp, Temporal Huddle, Brains R Us) and working closely on many fronts with Faculty Representative Isabel Gauthier and the Network Leaders.

Chris is also the ISLC rep, with duties that include fostering communication between TDLC and the other five Science of Learning Centers, and implementing with planning/coordinate the important Annual ISLC Conference. As he says, “The inter-Science of Learning Center Conference is sponsored by the (See New Trainees Leader on Page 4)
Myriad other research projects encompass inquiries into a wide range of memory. Utilizing functional Magnetic Resonance Imaging (fMRI) to create D maps of activity in the brain, the goal is to determine how regional brain areas change during learning and memory tasks.

It is known that as time passes after learning, and recent memory become term memory, currently underway are many innovative projects that are advancing our understanding of how the brain encodes and retrieves information.

Perhaps the most compelling research is the work of Dr. Abigail Tucker, who proposed the question, “What if a robot could learn like a child, as it goes along?” Tucker’s work is underpinned by the idea that a robot could become a powerful tool for advancing our understanding of the brain.

Well, TDLC’s Javier Movellan and his team are tackling just such a question, and TDLC contributed critical seed funding for the development of the amazing Project One. A focus on the first year of development that will involve a “baby robot.”

Yes, since its founding in 2006, the Temporal Dynamics of Learning Center can point to a number of important accomplishments. And there is no doubt that even more are on the drawing board.

While this might be daunting to some, it’s hard to imagine any of those difficulties for Chris, since expansive multi-level activity would seem to be his norm. After all, while still in high school in rural Oklahoma, when the first email service provider opened he applied himself to exploring artificial intelligence, creating “bots” to play text-based multiplayer role-playing games.

Just five years ago Chris earned a BS in Computer Science and Philosophy at Philadelphia. And planning is already well underway for iSLC 2010 at CELEST (Center of Excellence for Learning in Education, Science, and Technology) at UCSD.

We look forward to hearing your comments and suggestions. Please contact us through our website for more information or to request materials. 

Questions, Comments or Suggestions?

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Graduate Student Christopher Kanar, a Corbett Lab computer science research assistant, was designated the iSLC representative. As committee leader, Chris’s responsibilities range from setting the agenda for the committee and bringing trainees into Center decisions and policies through

This Issue
Who/What is TDLC?
Role of New Neurons
Educator Network Update
New Trainee Leader
Where Are They Now?
TDLC Bids Farewell

Upcoming Events
1st Annual TDLC Trainee Bootcamp
August 10-22, 2009
UC San Diego

Just Who/What is TDLC?
By Carolan Gladden

The Temporal Dynamics of Learning Center (TDLC) is an amalgamation of principal investigators, researchers, faculty, post-doctoral fellows, graduate students, undergraduates and pre-undergraduates – all dedicated to the goal of understanding how the element of time is critical for learning and using this understanding to improve learning and education. These scientists, plus staff, an external advisory board and educational corporate partners presently number nearly 200. And everyone, in countless offices, classrooms and labs across the US, in Canada and even Australia are dedicated to the same mission.

To develop a science of learning that treats the element of time as a crucial component in the learning process, on time scales ranging from milliseconds to years!

Underpinned by National Science Foundation funding (as one of six Science of Learning Centers in the U.S.) and under the scientific leadership of Director Gary Cottrell, Science Director Andrea Chiba and Education/Outreach Director Terry Sejnowski, plus the administrative leadership of Shelley Marquez, TDLC’s laboratories and partnerships generate an impressive amount of relevant research.

As a multi-institute Center, logistics for TDLC are complex. With UC San Diego the lead university and operating within its Institute for Neural Computation, the Center consists of a host of other institutions as research partners: Arizona State, UC Berkeley, Brown, Carnegie Mellon, Children’s Hospital of Philadelphia, Rutgers, UC San Diego State, University of Buffalo, University of Colorado, University of North Carolina, University of Pittsburgh, University of Queensland (Australia), University of Victoria (Canada) and Vanderbilt. Currently some 60 research projects are in progress under four distinct initiatives within four networks: Interacting Memory Systems Network (IMSN), Perceptual Expertise Network (PEN), Sensory Motor Network (SMN) and Social Interaction Network (SIN).

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