National Science Board Visit to the Temporal Dynamics of Learning Center Agenda

SDSC Auditorium, UC San Diego
September 19, 2012

8:00-8:05 ***Welcome:*** **Pradeep Khosla, Chancellor, UCSD**
8:05-8:10 ***Welcome and overview of research at the San Diego Supercomputer Center:*** **Michael Norman, Director, SDSC**
8:10-8:20 ***Overview of Research at UCSD:*** **Sandra Brown, Vice Chancellor for Research, UCSD**
8:20-8:30 ***TDLC Overview:*** **Gary Cottrell, Director, TDLC**
8:30-9:45 Posters, Demos, Lab Visits
9:45-10:00 Group Q&A Period, SDSC Auditorium
10:00 Board Bus, depart SDSC

There are two lab tours, each beginning at 8:30. The National Science Board Members are invited to choose one of the tours based on interest. The rest of the time will be allocated to posters and demos. The National Science Board members will break into two groups based on their chosen lab tour, with schedules as follows:

Group	8:30	8:55	9:45-10:00
I	Motion Capture and Brain Dynamics in an Immersive Virtual Reality Environment. *(Room B 234E)*	Posters & Demos	Group Question and Answer Period, SDSC Auditorium
II	Real-time neuronal temporal dynamics of learning. *(Room B145)*	Posters & Demos	

Lab tours:

I. Motion Capture and Brain Dynamics in an Immersive Virtual Reality Environment, led by Howard Poizner. The ***Motion Capture/Brain Dynamics Facility*** is, as far as we know, the only lab in the world that can combine EEG, full body Motion Capture and immersive Virtual Reality in the same experiment. The subject is able to move freely in a completely controlled environment while his or her brain waves are being recorded as he or she is passing through locations, remembering past events, and making decisions. This allows us to study the temporal dynamics of the brain while the subject is *actually moving*, and thus providing vestibular, somatosensory, and proprioceptive brain afferents that underlie construction of spatial maps. Thus, we can simultaneously study phenomena such as neural mapping of space in humans, decision making, and the cortical dynamics underlying motor control. These technological developments open up entirely new possibilities for investigating the cortical substrates of cognition.

II. Real-time neuronal temporal dynamics of learning, led by Andrea Chiba. The ***Behavioral Neurophysiology Lab*** is a unique facility where we can record neurons and local field potentials while a rat is making decisions in a temporally extended environment. We have developed a robotic rat that can interact naturally with the real rats, allowing us to study, for the first time, interactions between rats where we have complete control over one of the "rats." The lab tour will be webcast in the High Tech Conference Room, Room B145E on Floor B1. Visitors will be able to observe recordings in awake behaving rats, and ask questions interactively.

Posters and Demos:

These will be presented for the most part by our trainees, who will show work they have performed from each of our three major research initiatives. In addition to the standard poster format, we will have live demonstrations of 1) our Gamelan[1] project, a project investigating the role of attention in learning to be in synchrony with other players; 2) the RUBI project, a social robot teacher's aide that can teach children their colors and shapes; 3) *Faces In Motion,* a program demonstrating the use of dynamic expression recognition technology to train children with autism how to recognize and produce facial expressions.

Demos:

1. **The RUBI Project and the Diego Project.** Mohsen Malmir, Tingfan Wu, Paul Ruvolo, Deborah Forster, and Javier Movellan.

2. **Faces in Motion: A novel intervention for children with autism using automatic facial expression recognition technology.** Josh Susskind, Marian Bartlett, Jim Tanaka, Bob Schultz, John Herrington, Piotr Winkeilman, David Deriso, Marian Bartlett.

3. **The Gamelan Project: Music, Synchrony, and Attention.** Alexander Khalil, Victor Minces, Andrea Chiba. *Demo located in East side of auditorium.*

Posters

4. ***Correlations teased apart, the role of noise in neural correlations.*** Victor Minces, Lucas Pinto, Yang Dan, and Andrea Chiba.

5. ***Temporally Selective Contextual Encoding in the Dentate Gyrus of the Hippocampus.*** Rangel, L.M., Alexander, A.S., Aimone, J.B., Wiles, J., Gage, F.H., Chiba, A.A. , Quinn, L.K.

6. ***Theta and Beta Oscillatory Dynamics in the Dentate Gyrus of the Hippocampus During Associative Learning.*** Quinn, L.K., Rangel, L.M., Sullivan, D., Buzsaki, G., Chiba, A.A.

7. ***Brain activity in humans in medial temporal lobe and neocortex as a function of the age of memory (1 hour to 1 month).*** Christine N. Smith, Robert E. Clark, & Larry R. Squire.

8. ***Dopamine-dependent Spike-Timing Dependent Plasticity at corticostriatal synapses modulates firing patterns in Medium Spiny Neurons.*** David A. Peterson and Terrence J. Sejnowski.

9. ***Multiple-accumulator model of decision making during visual search.*** Braden A. Purcell, Richard P. Heitz, Jeffrey D. Schall, Gordon D. Logan, and Thomas J. Palmeri.

[1] Balinese gamelan is a musical genre that features ensembles of players playing metallophones in tight rhythmic synchrony. We are using gamelan-like instruments and music to investigate the relationship between ability to synchronize and attentional performance. In our first study, we found a significant correlation between these two characteristics. Currently, we are launching an intervention study that tests whether improved ability at rhythmic synchrony translates to improved attentional performance.

10. ***A novel method for the integration of error detection into a motor imagery BCI.*** Adam S. Koerner, Virginia R. de Sa.

11. ***Spatial maps in the human brain during exploration.*** Joseph Snider, Markus Plank, Gary Lynch, Eric Halgren, Howard Poizner.

12. ***Non-linear time series analysis using delay differential equations of Human EEG during reaching to and grasping virtual objects.*** C Lainscsek, M Hernandez, J Weyhenmeyer, TJ Sejnowski, & H Poizner.

13. ***ERPs during motor preparation co-vary with eye-hand coordination and predict reaching accuracy.*** M Plank, S Hillyard, J Snider, C Huang, S Gepshtein & H Poizner.

14. ***Monitoring the Social Brain: EEG and Motion Analysis of Toddlers and Parents Playing a Game.*** Gedeon Deak, Yu Liao, Scott Makeig.

15. ***A Risk Averse Visual Decision Making Model.*** Ruixin Yang, Garrison Cottrell.

16. ***Connectivity asymmetry can explain visual hemispheric asymmetries in local/global, face, and spatial frequency processing.*** Ben Cipollini and Garrison Cottrell. Presented by Akin Omigbodun.

17. ***Auditory saliency using natural statistics*****.** Tomoki Tsuchida and Garrison Cottrell.

18. ***How neural signals for visual preference can assist in online learning.*** Sophie Lebrecht, Deborah M. Johnson, David L. Sheinberg, & Michael J. Tarr.

19. ***Towards an Optimal Affect-Sensitive Instructional System of Cognitive Skills*****.** Jacob Whitehill, Zewelanji Serpell, and Javier Movellan.

20. ***Behavioral Indices of Cognitive Processing*****.** Linda Salamanca, Gwen Littlewort, Marian Bartlett, Judy Reilly.

21. ***Recognizing Objects, Faces, and Flowers using Fixations.*** Christopher Kanan and Garrison W. Cottrell.

22. ***Trainee and Fellow Education and Development Highlights.*** Christopher Kanan and Linda Salamanca (iSLC), Andrew Kovacevic**.**

23. ***The Race: iRat meets Rat - A TDLC Summer Institute training project*****.** So-One Hwang, Nan Renner, Linda Salamanca.

24. ***The Educator Network.*** Doris Alvarez.