

UNIVERSITY OF PENNSYLVANIA  
CENTER FOR COGNITIVE NEUROSCIENCE (CCN)



## CENTER FOR COGNITIVE NEUROSCIENCE PATIENT DATABASE

The University of Pennsylvania Center for Cognitive Neuroscience Patient Database is a database of patients with focal brain injury who wish to work with researchers who study the cognitive implications of brain injury. To date, 179 patients and 87 non-brain injured control subjects have enrolled in the program. The participation of these individuals has resulted in more than 1600 testing sessions investigating such cognitive functions as decision making, visual-spatial abilities, reading, word comprehension, the ability to make skilled motor movements and memory (see page 4 of this newsletter for a recent list of scientific publications and presentations). Approximately 16 National Institutes of Health (NIH) grants directly support this patient work, along with funding awarded by a variety of other agencies (e.g., the National Science Foundation). We look forward to the growth of the database as more researchers join the center and as we invite more patients to participate.

## A KIND THANK YOU TO OUR DATABASE PATIENTS

### ***DR. CRIS HAMILTON:***

I would like to thank everyone that participated in our experiments over the Spring. You have all made important contributions to our research. Most recently, we have submitted data collected from members of the Penn Database to the Annual Meeting of the Academy of Aphasia ([www.academyofaphasia.org](http://www.academyofaphasia.org)) which will be held in Washington, D.C. this November.

### ***DR. LILA CHRYSIKOU AND DR. SHARON THOMPSON-SCHILL:***

We wish to thank the patients who recently worked with Dr. Chryssikou, for their time and participation in the research project involving the generation of usual and unusual uses for everyday objects. With their help, we were able to collect important data on how the prefrontal regions of the brain process information when people use objects to achieve goals.

### ***DR. MARIAN BERRYHILL:***

Thanks to all the database members who contributed to the visual short-term memory studies. Your willingness to suffer through all the color patches, tools and abstract shapes was worth it and the manuscript has been submitted. We are going to be running several follow-up studies over the summer and fall. Hopefully, we will be able to visit you all again!

I would also like to thank two very special patients who have let me come to test them many times over the past six months. These two patients with bilateral parietal damage have improved our understanding of visual memory and visuospatial processing. We are finishing up several projects with these data and will be submitting articles over the summer. With their help we are learning tremendous amounts about the brain! Thank you!

## FOCUS ON RESEARCH: DR. SHARON THOMPSON-SCHILL

Dr. Sharon Thompson-Schill, Ph.D. is the principal investigator of an NIH-funded grant entitled "Linguistic and Nonlinguistic Functions of Frontal Cortex". In this project, she is looking at the types of impairments that occur following damage to the frontal lobes. Other investigators from Penn involved in the research include Dr. Branch Coslett, Dr. Roy Hamilton, Dr. Geoff Aguirre, and Dr. Myrna Schwartz (from our neighboring institution, Moss Rehabilitation Research Institute). Over the past four years of funding for this project, they have tested many volunteers from the Patient Database. Recently, NIH awarded this research team another five-year period of funding for this project, which will extend their research support until the end 2012. We look forward to many more years of research with this group.

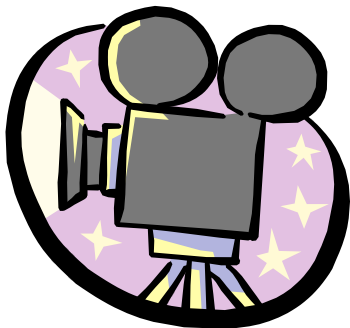
## **MEMORY IN THE MOVIES**

### **~DR. INGRID OLSON**

Hollywood loves amnesia. It seems that at least once a year, a movie comes out in which a prominent character has amnesia. Unfortunately, they usually get it wrong. Take "50 First Dates" which came out in 2004. This movie is about Adam Sandler who falls in love with a woman, Drew Barrymore, who is amnesic. Every time they go out, it's a first date – from her point of view, anyway. This leads to some comical events - such as her beating him up when she finds him in her bed. Memories, however, are not accrued throughout the day only to be lost upon sleeping in persons who suffer from organic memory loss.

Interestingly, one movie that gets it right is a children's movie: "Finding Nemo." Marlin is a timid clownfish who lives on Australia's Great Barrier Reef and sets off in search of his son Nemo (who has been caught and put into a fishtank). He's accompanied by Dory, a blue fish who suffers from anterograde amnesia. There are several instances where Dory shows that she has implicit, if not explicit, long-term memory, just like humans suffering from anterograde amnesia. For example, at one point on their journey Dory is cautioned to go *through* a trench, not over it. Dory forgets this information, of course, but when they get to the trench she has the intuitive feeling that they should go through, not over. Marlin overrules her, and they encounter many frightening jellyfish.

Other movies that have characters with memory loss include "Spellbound", "Memento," and "Paycheck."



Dr. Ingrid Olson does research on memory disorders. If you or a family member suffers from a severe memory loss, or severe navigational problems, not due to a dementing illness, such as Alzheimer's Disease, please contact Dr. Ingrid Olson or Dr. Marianna Stark.

## **New Researcher Joins Patient Program**

**DR. EVANGELIA G. CHRYSIKOU** joined Dr. Sharon Thompson-Schill's lab in the Fall, 2006 as a postdoctoral research fellow. She earned her BA (summa cum laude) with honors from Panteion University of Athens in Greece and her Ph.D. in cognitive and experimental psychology from Temple University, where she further pursued a year-long postdoctoral training position in cognitive neuropsychology. Dr. Chrysiou's interests include the neural bases of semantic knowledge and goal-oriented action, with emphasis on human problem solving and innovative tool use in everyday tasks. Her current projects involve behavioral, neuroimaging, transcranial magnetic stimulation, and neuropsychological studies on the flexibility of human semantic knowledge during the generation of common and alternative uses for everyday objects. Dr. Chrysiou has taught several courses in cognitive psychology, experimental psychology, and scientific thinking and design during her graduate and post-graduate years. She is a Fulbright Fellow and a member of various professional organizations; she has been honored with numerous awards for her research and teaching, among which are the Bolton Dissertation Research Award and the Distinguished Teaching Award from Temple University. Dr. Chrysiou plans to continue her research on purposeful behavior in Dr. Thompson-Schill's lab before pursuing an academic career in Psychology and Neuroscience.

## ***THE CEREBELLUM AND MOTOR CONTROL***

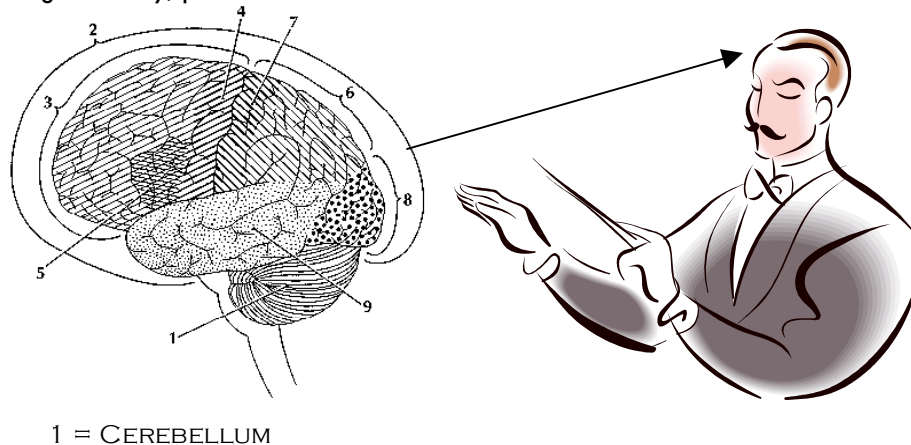
### ***~DR. JARED MEDINA***

Whenever we go to grab a cup, pick up an object, or do any task that involves moving a limb to a target, our brain is involved in two separate but complementary tasks. First, the brain sends out motor commands to the arm to communicate where it should go. In order to do this, the brain needs to calculate exactly where the target is, and then send the correct muscle commands in order to move the hand to the target. Second, the brain is also involved in keeping track of the position of the limb as it goes out to the target, sending this sensory information back to the brain to provide information about hand position.

This relay of information is important, since it can be used to correct motor commands if the hand goes off-course. However, there are potential ways in which integrating outgoing motor commands and incoming sensory input could go wrong. For example, it takes about 100-150 milliseconds for information about hand position to get back to the brain. By the time this information goes back to the brain and the brain reprograms a change in movement (which may take 300-700 milliseconds), the hand could have continued on the "wrong path" for nearly half a second.

But obviously, most people in everyday life aren't reaching wildly and inaccurately towards cups, pencils, and other objects. This is because the brain generates internal models of limb position that *predict* the position of the hand during a reaching movement and compare the location of the hand to where it should be. This *forward model* integrates both sensory information (i.e., information about limb position from your hand) and motor information (i.e., the generated motor plan) to create a model that can be used to rapidly correct movements.

Currently, our knowledge regarding what parts of the brain are involved in this predictive motor control models is limited. One area of the brain that is thought to be involved in generating these models is the cerebellum. However, our knowledge of its involvement is limited. We are currently doing studies to understand how the cerebellum contributes to these predictive models in order to learn more about motor control. If you have had a cerebellar stroke, your participation in ongoing studies would be very useful in order to deepen our understanding of motor control. If you are interested in participating in a study, please contact Dr. Marianna Stark.



### **FACULTY ANNOUNCEMENTS:**

**Dr. Sharon Thompson-Schill**, one of the faculty directors of the patient database since the database was started in 1998, was recently elected to a three-year term on the Board of Directors of the Association for Psychological Science.

**Dr. Anjan Chatterjee** was interviewed on July 17, 2007 about the effects of brain damage on art for a podcast at Science Update, [www.scienceupdate.com](http://www.scienceupdate.com), sponsored by the American Association for the Advancement of Science (AAAS). Listen to the interview entitled "Art and Brain Damage" at <http://www.scienceupdate.com/show.php?date=20070717>

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Philadelphia, PA 19104-6241**Website:**[www.ccn.upenn.edu](http://www.ccn.upenn.edu)**Patient Coordinator:**Marianna Stark, Ph.D.  
215-615-3649**Director:**

Anjan Chatterjee, M.D.

**Faculty:**H. Branch Coslett, M.D.  
Martha Farah, Ph.D.  
Daniel Kimberg, Ph.D.  
Ingrid Olson, Ph.D.  
Sharon L. Thompson-Schill, Ph.D.

**RECENT DATABASE RESEARCH:** These publications and presentations have been made possible through the generous participation of our database patients and control subjects.

**Publications:**

- Bedny, M., Hulbert, J. C., & Thompson-Schill, S. L. (2006). Understanding words in context: The role of Broca's area in word comprehension. Brain Research.
- \*Wu, D.H., \*\*Waller, S., & Chatterjee, A. (in press). The functional neuroanatomy of thematic role and location-relational knowledge. Journal of Cognitive Neuroscience.

**Scientific Conferences:**

- Berryhill, M., Olson, I.R. (2007). Is the parietal lobe critical for visual working memory? Evidence from patients with unilateral and bilateral parietal lesions. Vision Science Society, Sarasota, FL and Cognitive Neuroscience Society, New York, NY.
- Olson, I.R., Berryhill, M., Most, S. (2007). The blinking attentional blink. Vision Science Society, Sarasota, FL.
- Thomas, A., Lawler, K., Olson, I.R., Aguirre, G.K. (2007). The Philadelphia Face Perception Battery. Vision Science Society, Sarasota, FL.
- Ezzyat, Y., Sledge Moore, K., Olson, I. (2007). Learning modulates neural activity in visual working memory. Cognitive Neuroscience Society, New York, NY.
- Olson, I.R., Plotzker, A., Ezzyat, Y. (2007). The human perirhinal cortex: Involvement in visual perception is task specific. Cognitive Neuroscience Society, New York, NY.

- \* **Dr. Denise Wu** is now an assistant professor at the National Central University in Taiwan.
- \*\* **Dr. Sara Waller** is now an assistant professor at Case Western Reserve University in Cleveland, OH.

**YOUNG STROKE SUPPORT GROUP**

Penn's Young Stroke Support Group provides a chance for stroke patients to meet and talk with others facing similar challenges. The group is positive and upbeat, and there is usually a guest-speaker who is invited to address issues relevant to younger adults.

Meetings: 3<sup>rd</sup> Thursday of the month, 6:30 p.m.

Ravdin-6 Conference Room, HUP (34<sup>th</sup> & Spruce Streets)

For more information and to confirm summer meeting times, contact Jeanie Luciano, MSN, CRNP (Stroke) at 215-614-0175 or jluciano@mail.med.upenn.edu.

**PATIENTS NEEDED**

Participants diagnosed with frontal lobe lesions are needed for a behavioral study on the organization of people's knowledge about the use of objects. If you decide to participate, we will ask you to answer some questions about a set of pictures shown on a computer screen. A testing session will last approximately 1 hour. As compensation for your participation, you will receive \$20/hour and you will be compensated for your travel expenses. For participation in this study, you must be right-handed and you must have learned English as your first language. Please contact Dr. Marianna Stark at 215-615-3649 for more information.

This study is being conducted by Dr. Lila Chryssikou and Dr. Sharon Thompson-Schill, Center for Cognitive Neuroscience and Department of Psychology, University of Pennsylvania.

**WE NEED VOLUNTEERS**

Non brain-injured subjects are needed for our research studies. These individuals are often the spouses and caregivers of our patients. Subjects receive the same tests as the patients, and they help to establish a baseline for how non brain-injured individuals perform on the same tasks. Payment is \$15 per hour plus mileage and parking. Call 215-614-1971 for more information.