



Neural Activities

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THE NEWSLETTER OF THE CENTER FOR VITAL LONGEVITY

DIRECTOR'S MESSAGE The Joy of Research



Seven years ago, in the fall of 2008, the first members of my research team arrived in Dallas, and I joined them a few months later from the University of Illinois. My research team consisted

Dr. Denise C. Park

of four recent college graduates, a master's student and one new Ph.D. I had the good fortune to have two large NIH research projects that had recently been funded, including an NIH MERIT Award, and I was eager to get off to a fast start. We set about building web pages, recruiting research participants, developing a lab computing infrastructure and research protocols, and meeting lots of wonderful new people.

The Park Aging Mind Lab grew rapidly and, with the encouragement and support of Provost Hobson Wildenthal and Dean Bert Moore, in 2010, we officially became "The Center for Vital Longevity." We moved into a wonderful new space in the Viceroy Building, based on some very helpful advice from Richard Collins, Chairman and Chief Executive Officer of iStation. In that first year, Sandra Thomas of iStation chaired our Advisory Council. Milla Perry Jones made the very first contribution to the Center, and we hosted the first Dallas Aging and Cognition Conference (see p. 3), which was a rousing success, and created a highly visible national profile for the Center. I was thrilled when Dr. Michael Rugg, an internationally recognized expert in memory, and his entire research team joined us in January



Appreciation Event for Park Lab Participants Draws Crowd to CVL

The Park Aging Mind Lab held a special appreciation event for all of its community-based research participants on August 6, attracting scores of past and present volunteers in CVL studies. Attendees were served brunch and heard results from the very studies in which they participated, such as the Dallas Lifespan Brain Study (DLBS) and the Synapse Project.

Director Dr. Denise Park gave a special welcome to the group.

"We thank each of you for contributing your time so generously to science, and by doing so, helping us arrive at new insights into how healthy minds and brains work and change as we age. Without you, our research would not be possible," she said.

DLBS is a large-scale research project looking into neural and cognitive aging across the entire adult lifespan from age 20 to 90. This study involves a search for a "neural signature" that is characteristic of healthy cognition, and also is searching for the neural footprint in middle age that predicts cognitive health or frailty in old age.

Attendees learned about new Park Labbased research as well, specifically, Dr. Kristen Kennedy's work on imaging and the thinning of certain areas of the brain as it ages.

Dr. Kennedy was followed by Dr. Gerard Bischof, who earned his doctorate over the summer. Dr. Bischof gave attendees a glimpse of his academic journey, a path that started in Germany and eventually led him to the Center, where his work focuses on amyloid deposition.

Two graduate students, Jenny Rieck and Micaela Chan, also gave presentations on findings related to the aging brain and specific interventions, such as iPad use, that, in the novice, may help strengthen cognition, similar to what researchers found in the quilting and digital photography arms of the other hallmark Park Lab study, the Synapse Project (see p. 3).

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Study Suggests Cognitive Benefit to Tablet Computer Use among Older Adults

A new study from the Center for Vital Longevity at The University of Texas at Dallas has affirmed that challenging older adults with certain never-before-tried activities — such as tablet computing, in this latest finding - might enhance cognitive vitality and ultimately help ward off or delay agerelated dementia.

Findings from the study by graduate student Micaela Chan were published online June 14 in *The Gerontologist*. The research builds on earlier work from the lab of Dr. Park, whose "Synapse Project" found that adults who engaged in cognitively demanding activities, such as learning skills in digital photography and quilting, improved their memory and speed in processing information. Their results were compared to other older adults who joined social clubs or simply stayed home and did less demanding activities, such as playing word games.

Dr. Park was also the senior author of the more recent study that examined whether training older adults to use tablet computers could enhance cognitive function.



CVL iCamp participant navigates her touch screen.

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ages 60 to 90 during the course of three months. About one-third of the participants were placed in an iPad group and given extensive training in using the tablet computer to perform various tasks and projects, spending on average more than 15 hours on an iPad each week for 10 weeks.

The scientists looked at 54 adults

The iPad group's results were compared to two control groups: a placebo group that completed activities of low-cognitive demand and no skill acquisition, such as watching movies and completing knowledge-based word puzzles; and a social group, which socialized for 15 or more hours a week, primarily around prescribed topics such as travel, art and history.

All three groups were given the same battery of cognitive testing before and after the 10 weeks of activities. These tests included standardized measures designed to gauge mental agility, such as a test that measures a participant's speed in comparing lists of numbers, and a word test that measures immediate recall. A comparison of scores found significant improvements in episodic memory and processing speed in the iPad group.

Episodic memory refers to the autobiographical recollection of events and personal experiences that occurred at a particular time and place. Processing speed refers to how quickly a person is able to carry out simple or automatic cognitive tasks under a time limit, which focuses attention.

"Although some individuals in the two control groups also experienced some cognitive improvements, the iPad group showed significantly more improvement over time," Micaela Chan said.

Dr. Park added that the findings are preliminary, and the iPad group was relatively small, with 18 individuals.



"At the time we planned this study, we weren't sure we could improve cognition with iPad training, and are delighted the results turned out positively," Dr. Park said. "Key to this study, however, is the notion that regardless of whether iPad training improved cognition, we were equipping older people with lifetime skills to manage many aspects of the aging process."

Dr. Park and Chan agree that participants gained technological skills useful in everyday tasks, such as online banking and communication through social media. Participants gained access and real-world insight into a tool that makes modern living easier and frees up time if used properly, Chan said.

The iPad in particular was singled out as a device for this study because of its portability, thousands of applications, intuitive interface, and large visual icons that are well-suited to the cognitive, visual and motor capabilities of older adults. The same cannot be said for the smaller iPhone and other smart devices.

Based on participant feedback, some individuals experienced great personal benefit in using the iPad, while others were affected and moved by the use of technology to reach out to loved ones.

"A year ago I never dreamed that this would happen," said one participant who had never used a computer or written an email. "At my age I assumed I was past learning something like this. It is so much easier to email than wait for the right time to phone!"

The research was supported by a grant from the National Institute on Aging (NIA), and an NIA American Recovery and Reinvestment Act Administrative Supplement grant. 🌣

CVL's Banner Aging & Cognition Conference Set for January in Dallas



UTD's Dr. Jim Bartlett, center, listens as a poster presenter outlines research at the last DACC.

Dallas will once again play host to the 2015 Dallas Aging & Cognition Conference (DACC), presented by the Center for Vital Longevity at UT Dallas.

This fourth biennial international conference brings together research scientists focused on the cognitive neuroscience of aging to share their latest discoveries and insights through invited platform talks and poster presentations.

Each conference has had a different theme over the years. For the 2015 conference, the theme is "Imaging the Aging Brain: Studies of Neuroplasticity and the Challenge of Longitudinal Designs."

Some 300 researchers will converge on Dallas to explore new ways of measuring changes in the complex patterns of neural signals that are characteristic of improving (or deteriorating) neural function.

"For past and new attendees alike, we know this will be a lively event full of enriching discussion," says co-chair and conference organizer Dr. Park. "The primary goal of the conference is to advance the science of the aging mind through the exchange of ideas, as well as to inspire an international cohort of young scholars and attendees with the

"For past and new attendees alike, we know this will be a lively event full of enriching discussion..."

best minds in the field." This year's DACC will be held at the W Hotel, at 2440 Victory Park Lane, Dallas, from January 25 to 26. More information, registration details and sponsorship opportunities are available through cvlinfo.org.

Among this year's speakers hailing from Washington, Michigan, England, Sweden, Germany and beyond, the topics will include: "Strategies for interpreting cross-sectional fMRI studies of aging," by Center Director Michael Rugg; "Dopamine and cognitive plasticity in aging, using PET, fMRI, and genetics," by Lars Backman of the Karolinska Institute; and "Analyses that isolate mechanisms underlying the evershrinking aging brain," by Wayne State's Naftali Raz.

A complete agenda including the full list of confirmed speakers is available on the CVL homepage.

In November, researchers from CVL labs will travel to Washington for the Society for Neuroscience's annual meeting, where a number of Center members are also giving scientific talks. The lab of Dr. Rugg, for instance, is giving a total of eight presentations, while Center faculty member Dr.

Healthy CVL Representation expected at Society for Neuroscience's Annual Meeting this Fall in Washington, D.C., in lead up to DACC

Kristen Kennedy is giving five on topics as diverse as age-related decreases in regional white matter integrity, and, separately, on how increased daily cortisol secretion as a result of stress and aging are associated with smaller amygdala volume.

The lab of CVL faculty member Dr. Gagan Wig will present findings on brain networks and how different parts of the brain communicate with each other.

The Society for Neuroscience (SFN) meeting is considered the must-attend yearly meeting among neuroscientists internationally, bringing together more than 30,000 neuroscientists to present emerging science, learn from experts, forge collaborations with peers, explore new tools and technologies, and advance careers. 🌣



SFN's annual meeting is a big draw for neuroscientists worldwide

SUPPORT THE CENTER

Director's Research Circle

Founded in 2011, the Directors' Research Circle is a core group of donors that donate at least \$2,500 annually to the Center for Vital Longevity.

These generous contributors take great pride in supporting an internationally recognized research and educational center in Dallas that is addressing one of the most pressing problems facing our society: preserving the health and vitality of the mind for life. Benefits include invitations to quarterly events that provide timely access to information about the aging brain, the opportunity to schedule lunch with a Center scientist, and membership in The Love Jack Society, a UT Dallas donor recognition society. 🌣

The Legacy Society

The Legacy Society recognizes any individual who has made a planned gift commitment to any part of UT Dallas, including the Center for Vital Longevity. Planned gifts may take the form of a bequest, charitable gift annuity, charitable remainder trust or life insurance. Your membership allows us to thank and honor you for the plans you have made, and we hope it inspires generosity in others. Benefits include an annual recognition event, invitations to special events, and information on tax saving measures for you and your family.

Please call to find out more about our charitable gift annuities. Rates range from 4 percent to 9 percent for gifts of \$10,000 and above from donors age 55 and older. Your support gives CVL the opportunity to plan for future growth, knowing that these philanthropic commitments will be realized in the years to come.

To learn more about making a gift or other opportunities for supporting the Center, please contact Holly Hull Miori, director of development, at hmiori@utdallas.edu or 972-883-3728. 🌣



New Funding for Dr. Basak

The Darrell K Royal Research Fund for Alzheimer's Disease has awarded a grant totaling \$165,000 over the next three years to support the research of Dr. Chandramallika Basak, a Center for Vital Longevity at UT Dallas faculty member.

Dr. Basak will be studying mild cognitive impairment (MCI) and how acquiring skills with video games is associated with improved cognitive performance.

The funds will go toward her research into improving cognition in MCI, extending her work into new populations of older adults. The Fund was founded on the legacy of Darrell K Royal, the legendary Texas Longhorns coach of nearly two decades who died from Alzheimer's.

"I'm thrilled to be receiving this grant on successful aging from the Darrell K Royal Fund," Dr. Basak said. "I appreciate the Board of Advisors and their supporters for creating this funding opportunity for early to mid-career investigators so that we can continue to further our independent research agendas."

Dr. Basak was one of six researchers in Texas recommended for a grant by an outside panel of peers led by Ronald C. Petersen, M.D., Ph.D., director of the Mayo Clinic's Alzheimer's Disease Research Center, in Rochester, Minn. 🏶

DIRECTOR'S MESSAGE

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of 2012. I promptly asked him to join the Center as Co-Director so we could build the Center together, and in anticipation that someday, I would like to shed the administrative role of Director of the Center and return to research full-time.

That day has come.

I am returning to do what I truly love: training young scientists and conducting my research. I will now serve as Director of Research for the Center, and will do so very happily. I am delighted that Mick Rugg has agreed to be Director of the Center for Vital Longevity.

Since I arrived at UT Dallas, the Center has grown to have six major research labs, each headed by a UT Dallas faculty member. We have over 50 employees and are training brilliant young scientists. Despite the small size of our unit, every year since its inception, the Center has played a major role in greatly increasing the amount of external funding at UT Dallas for prestigious, highly competitive NIH research grants.

I will focus my efforts on the Dallas Lifespan Brain Study, one of the largest studies of the trajectory of healthy brain aging in the United States. I am also developing the next generation of the Synapse Project, an intervention study designed to assess whether challenging older adults through new learning enhances their cognitive function with the long-term goal of slowing the aging process, providing additional years of cognitive health to older adults.

I will continue to be highly active at the Center and thank Provost Wildenthal, Dean Moore and President David Daniel as well as you, our participants and friends, for strongly supporting our mission. 🏶

Dr. Sarah Yu Transitions from CVL into **Consumer Neuroscience Research**



Who said the career paths of the ivory tower only lead to higher floors in the tower? Or that hard lab work leads to a corner office in a bigger lab away from

scientific equipment?

Dr. Sarah Yu, a neuroscientist alumna of CVL, has shown that science has a place in business, and perhaps in some respects, business has a place in science.

Dr. Yu was a Ph.D. student and postdoctoral researcher at CVL working under Dr. Rugg, prior to moving to Chicago and taking a job with Nielsen Neuro, the consumer neuroscience division of Nielsen, a global information company that may be best known for its TV ratings system and measurements of what consumers buy and watch.

At Nielsen Neuro, along with 13 other neuroscientists worldwide, Dr. Yu is part of a team that is probing neural responses elicited when consumers interact with marketing communications - from the neurophysiological responses that accompany an encounter with new product packaging, to the highs and lows of emotion that are experienced during the course of watching a 30-second television ad. Think of the best Super Bowl ads you've seen. Why were they so good? The answer has something to do with how it resonated in the brain.

All of this is being done by Nielsen Neuro to understand what makes advertising effective to the consumer by deploying standard tools that neuroscientists in academia have used for decades (e.g., lectroencephalography, or EEG). The EEG is an electrical record of the complex neuronal activity of the brain generated, for example, while seeing a stimulus. In Dr. Yu's line of work, the stimuli of interest are

"We have the capacity to run 20 to Nielsen Neuro's clients also include

marketing communications like TV ads, print ads, or new package designs. 24 subjects a day, and work with clients in consumer packaged goods, retail, financial services, automotive and technology industries," Dr. Yu said one recent afternoon on a return trip to CVL for Dr. Gerard Bischof's dissertation defense. "The range of my role is wide, from accompanying client service teams to client meetings as a staff expert on cognitive neuroscience and translating highly technical findings into concepts, which marketing and creative teams can understand, to designing experiments and interpreting findings that ultimately influence and sometimes determine product direction for our clients." non-profits seeking to follow a scientific path in making more appealing consumer messages that will spur change for the good, such as those of the Ad Council, whose various advertising campaigns bring awareness to childhood hunger or pet adoption.

Traditionally, insights on how consumers perceive marketing communications were gathered through responses to surveys, and through



focus groups and panels. Nielsen Neuro bypasses such responses and measures directly consumers' brain responses.

"Using EEG to find out which seconds of a TV ad are most emotionally engaging or which seconds are causing confusion to the viewer is a really powerful tool for our clients, whose goals are to optimize the effectiveness of their marketing material. It's an ability to find out what works-and what doesn't-at a very diagnostic and precise level for their advertising."

In addition to obtaining EEG waveforms from participants, an eye-tracking camera captures where participants' eyes are drawn while viewing the advertisement.

Dr. Yu credits a big part of her smooth transition into consumer neuroscience research to the training she received with Dr. Rugg and at the Center. "The skill I learned from Mick of saying only what I mean and not over-interpreting data is one I use every day when providing science support to my team and with clients," Dr. Yu said. "I never imagined that my background in basic memory research could have led me to a career in market research. Ultimately it was a great match!" 🌣

Appreciation Event

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Among the guests and attendees were husband and wife Nathan and Dorothy Ivey.

The couple, who have been part of CVL studies for the last four years, attribute part of their cognitive vitality to participating in CVL research.

"To me, the work of the Center is terribly important," Nathan said. "We've been delighted to participate – one thing is clear, though - my wife's memory is better," he smiled.

Finally, in new work being explored by CVL research scientist Dr. Zhuang Song, himself new to the Center as of this year, participants also learned about a just-launched sleep study that is looking into the effects of sleep patterns on neural and cognitive processes.

Participant James Frame spoke after the event about friends

NEW FACES

Xi Chen, Graduate Student, Park Lab



Xi Chen received her undergraduate degree in psychology from Beijing Normal University. After having moved to Dallas from her native China in August 2012, she was quickly greeted by Texas' stifling summer heat, she remembers. But she didn't have time to dwell on it – or even be outside very much – as she quickly launched into her master's degree at

UTD in applied cognition in neuroscience, in the lab and under the tutelage of Dr. Basak. After earning her master's in May, two years in Dallas are now stretching out to at least five more as she begins her doctoral studies in the lab of Dr. Denise Park, where she is now studying cognition and neural structures via fMRI. As pastimes, she enjoys traveling (one of her favorite countries is Germany) and has been to Bali and other exotic locales. She still plays piano, although loads of academic work have cut into her playing time, she says. 🌣

Jonathan Siegel, Graduate Student, Rugg Lab



Jonathan joined the Rugg lab in May. Currently a Ph.D. student in Cognition and Neuroscience at UT Dallas, Siegel completed his BA in psychology from the University of Texas at Austin in 2005. As a Longhorn, Siegel discovered his academic interest in research while studying anxiety and fear. After returning home to Chicago, he absorbed

the work of Dr. Harriet de Wit, a professor at the University of Chicago looking into the effect of drugs on human behavior and learning. He then received a master's in social sciences from the University of Chicago under the tutelage of Dr. David Gallo in 2011, where his thesis was on post-learning emotional arousal and false memories. Siegel also received a master's in cognitive psychology in 2014 from the University of Pittsburgh, where he worked under Dr. Mark Wheeler investigating memory and cognitive aging. Siegel enjoys riding motorcycles and playing basketball in his free time. 🌣



CVL participants Nathan and Dorothy Ivey caught up with Dr. Denise Park after the event.

he knows, who are actively pursuing strategies and lifestyles that keep them mentally agile. His recommendation to them is to participate in CVL studies because of his own experience.

"Personally I have been keenly aware of the great research here, and I am glad to be a part of it," he said. "I plan to be active for at least 22 more years, and will hopefully benefit from this research. I learned a lot, and felt honored to have been invited. Particularly helpful was the information that our brains rejuvenate by learning new things." 🌣

Arielle Click, Lab Manager, Park Lab



Arielle joined the Center after spending the past five years at UT Southwestern, where she studied neurobiology and aging in independent contexts; she is looking forward to putting the two together at the Center. Before UT Southwestern, she earned degrees in biology and biomedical engineering from UT Arlington, giving her an appreciation for all forms of technology and feeding her desire to "tinker" with

everything from cars to code. In her free time, Arielle enjoys gardening, hanging out with her husband and two dogs, and learning new things. She is very excited about the research of the Park Lab and already loves being a part of it. 🌣

Debby Kirchhevel, Executive Assistant, Park Lab



Debby wasn't looking for a new job, having spent the past six years since arriving in Dallas at UT Southwestern as administrative assistant to the Hematology/Oncology Division Chief on the academic side, where she enjoyed interacting with 40 oncologists and a team of 13 administrative professionals. However, when opportunity knocked, she jumped at the chance

to be more closely involved with Dr. Park's aging brain research, in which she had been a study participant, and had found fascinating. In her free time, Debby enjoys creating jewelry, painting on canvas and silk, nature photography and writing. She plans to publish her first book this year, and hopefully many more in years to come.

Lorilei Cooley, Financial Services Assistant



Lorilei arrived at the Center in July after transferring from UT El Paso. She had been wanting to move to Dallas since last year and decided to look at opportunities at UT Dallas. She looks forward to growing with the Center and being part of the team. At the Center she is responsible for non-research cost-center budgets and expense reports, among other duties. She graduated in 2013 from Grantham University with a

Bachelors of Science in accounting and is currently pursuing an MBA. She loves spending time with her daughter, meeting new people, admiring art, hanging out with friends, cooking and traveling.

Dollars and Sense Does a higher reward affect brain activity?

A penny for your thoughts is little incentive, right? What about two dollars?

A soon-to-be-published study in the journal Cerebral Cortex (already published online ahead-of-print) uses imaging to determine if remembering an item associated with more, compared to less, money might yield different patterns of activity involving one or more distinct areas of the brain.

In a study involving 20 subjects, principal investigator Dr. Rachael Elward, a postdoctoral researcher in Dr. Rugg's lab, used functional magnetic resonance imaging (fMRI) to understand what neural areas correlated with remembering low- and high-reward items presented during imaging.

Random items shown before scanning, such as a picture of a bed, were presented next to representations of money, in this case the extinct currencies of the Italian lira and the Deutsche mark. During this part of the experiment, participants were asked to study each object as well as the coin paired with the object on the slide, not knowing either of the coins' values.

Before entering an MRI scanner, however, participants learned the values of the money represented by the Lira and the Mark, in denominations roughly equivalent to 2 cents or \$2, respectively. Participants who correctly remembered what coins went with which images earned a reward corresponding to the value of the coin, allowing the participant to pocket more money for accurate than inaccurate recollections.

Interestingly, two brain areas that showed activity associated with successful recollection also showed more activity when people thought they were going to get a large reward: these were the left angular gyrus and medial prefrontal cortex. In both regions, expecting a high reward was associated with more brain activity than expecting a small reward, and in addition, correct memory for the coin was associated with more brain activity than incorrect memory for the coin. It seems that these two regions code for both reward and memory, and do so in an additive fashion, Dr. Elward said. In other words, the pattern of memory activity was the same for remembering the \$2-valued coin as for the

CVL represented at Alzheimer's **Conference in Denmark**

as middle age.



Michelle Farrell

a graduate student at CVL, presented study findings to hundreds of Alzheimer's researchers in Copenhagen, Denmark

as part of the Alzheimer's Association International

Conference 2014. During the Alzheimer's Imaging Consortium track held July 12,

Farrell presented findings on amyloid deposition in early and middle adulthood, and whether genetics and life experiences might have an impact

on amyloid deposits on the brain. Using both PET scans, MRI scans, and genetic analysis of blood or saliva, Farrell found that deposits of amyloid protein pieces that can clump together to form plaques that are associated with Alzheimer's — could be detected as early

Additionally, she found that the amount of amyloid was modified by both genetics and life experience. About 20 percent of the population carries an APOE-4 gene, which is associated with a greater risk of developing Alzheimer's disease and high levels of amyloid. Farrell, however, showed that life experiences appeared

to modify the impact of APOE-4.

Carriers of APOE-4 who reported greater engagement in activities like reading, writing, and other intellectual activities in both youth and middle age showed lower deposits of amyloid than those who were less cognitively active. The engagement in these behaviors appeared to protect those at high genetic risk from depositing amyloid in both middle and old age.

"More research is needed, but these results hint at the possibility that you might be able to reduce your risk for Alzheimer's disease by being more cognitively active when you're young," she said. 🌣

Neural Activities is published by the Center for Vital Longevity at UT Dallas. Susan McReynolds, Designer

Participants were scanned using an MRI machine at UT Southwestern.

2 cents-valued coin, meaning that the memory effects were not modulated by the size of the payout.

Other brain regions were uniquely sensitive either to memory or reward. In no region, though, did the value of the reward alter the amount of memoryrelated activity.

"In this case, offering a larger financial reward for some items didn't seem to change the pattern of memoryrelated activity," Dr. Elward says. "We found that the neural processes associated with memory were not different depending on which coin was remembered." 🗘





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