

Institute of Cognitive Science Newsletter

Spring, 2015

FROM THE DIRECTOR OF THE INSTITUTE

As another year draws to a close, I am reminded again of the vibrant and unique Cognitive Science community we have here at Colorado – a perspective provided both from the outside and the inside. The “outside” perspective has been provided by interactions with candidates for the faculty searches we have conducted this year and last. As a result of speaking with both the semi-finalists and finalists for our positions, I have come to appreciate even more the high regard at which the work on our campus is held. In the process of those searches we asked our candidates “Why do you want to come to Colorado?” Invariably they spoke of how faculty and students at the Institute take innovative and unique ways of asking questions that are of both theoretical and practical importance. They spoke of the rigor of our approaches and the breadth of our perspectives. But even more impressive was how the candidates’ comments changed after they came to campus to visit. Many noted that there was much more going on here than they had surmised or appreciated. While I was gratified by these assessments, it did make me think that perhaps we are not doing as good a job of letting the world know about us as we might. This is an issue I’d like to consider more over the summer, and one which I hope we can discuss as an Institute in the fall. The larger Cognitive Science community both here and abroad should know more about what we are doing.

And as for the “inside” perspective, that has been provided by the students enrolled in our various certificate and degree programs, and those working in ICS labs. We have ended this semester’s colloquium series with presentations from the students who received summer scholar awards on the work they performed as part of those awards. These awards are designed to aid students in interdisciplinary work and to help forge new links between ICS labs that have had limited interaction previously. To hear about the intriguing work of these emerging scholars and to see them “grow” before our eyes has been very satisfying to me. Also impressive as always, are the

number of students who pursue the difficult goal of gaining a truly interdisciplinary perspective by doing the coursework associated with our programs. This year we had 11 undergrads completing our undergraduate certificate program,

seven completing our Human Language Technology and graduate certificate programs, three obtain a joint Ph.D. in Cognitive Science and their home department, and one a triple Ph.D. in Speech, Language, and Hearing Sciences; Psychology and Neuroscience; and Cognitive Science. And if that weren’t enough, our own Jena Hwang, a 2014 joint Ph.D. in Cognitive Science and Linguistics, was one of four recipients of the 2015 Robert J. Glushko Dissertation Prize awarded by the Cognitive Science Society and the Glushko-Samuelson Foundation. Our students are indeed our “ace in the hole”. And once again, I am wondering whether we are not doing a good enough job in publicizing our programs to students on our campus. This too is an issue I would like to give more consideration over the summer, and start a more extended dialog about in the fall.

And one final note. At this point, we still do not yet know if Prof. Todd Gureckis will be joining us in the fall. It is my sincere hope that he will be responding in the affirmative in the very near future. Should that not turn out to be the case, my consolation will be to listen again next year to another set of candidates tell us what a wonderful Institute of Cognitive Science we have here at Colorado.

All the best, Marie

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FELLOWS

Center for Research on Training works with NASA Astronaut in Space

Alice Healy, Director of the Center for Research on Training, and her team are currently doing an experiment with astronaut Scott Kelly, who is on a one-year mission at the International Space Station. In this study, they are also testing other astronauts who will be at the space station for only 6 months. CU undergraduate students are also being tested in the experiment. A grant from NASA, "Effects of Long-Duration Spaceflight on Training Retention: Background Experiments in the Laboratory," supports this research to study the long-term retention and transfer of knowledge and skills.



Astronaut Scott Kelly in the International Space Station

The researchers on our team include Senior Research Associates Vicki Schneider and Carolyn Buck-Gengler and former CU doctoral student and researcher James Kole, who is now an assistant professor at the University of Northern Colorado in Greeley. The program officer on this grant is former graduate student Immanuel Barshi, who is at the NASA Ames Research Center in the Human Systems Integration Division.

Scott Kelly and his identical twin brother, Mark, are both astronauts. Mark will not be in this experiment because he's too busy with other more genetically relevant research.

Digital Learning Sciences

Tamara Sumner, Associate Professor of Cognitive and Computer Science, is Executive Director of Digital Learning Sciences, a joint research and development center between the University of Colorado and the University Corporation for Atmospheric Research (UCAR).

Recently, in addition to the usual sabbatical activities of visiting colleagues and collaborators and giving a few talks, Sumner explored new models for disseminating the outcomes of her research, namely the Curriculum Customization software developed in collaboration with Denver Public Schools.

Sumner worked extensively with the Chair of their Advisory Board (Michael Jay, President of Educational Systemics), the Innovation Center of the Rockies, the CU Technology Transfer Office, and UCAR Technology Transfer officers to develop a licensing model and identify a potential CEO to lead a new startup to commercialize this technology. The Innovation Center led efforts to identify a CEO, including scouring their databases to identify potential candidates and interviewing promising candidates to develop a short list. Once the short list was identified, they organized a series of interviews with all the candidates.

An experienced CEO was chosen – John Stearns – and a licensing option was established between Stearns, CU TTO, and UCAR TTO. A landmark agreement was reached with UCAR, who co-developed the technology, to partner in this agreement and have CU TTO lead all negotiations. On October 2014, this process culminated in the exclusive option agreement between [EdTrex LLC](#), the University of Colorado and the University Corporation for Atmospheric Research. The agreement allows EdTrex to continue developing our software platform enabling on-demand creation of customizable curricula using curated open education resources.

This was a fantastic learning experience, working with new people and developing a deeper understanding of what it takes to move research out of the lab and into production.

FELLOWS

Yuko Munakata receives Faculty Award for Teaching

Yuko Munakata, a Fellow in the Institute of Cognitive Science, and a Professor in Psychology and Neuroscience, is well-known for involving a huge number of undergraduates in her developmental laboratory and allowing them to gain hands-on research experience with her young participants. In the past two years alone she had over 30 undergraduate research assistants, and another eight undergraduates who received UROP/URAP funding to work in her lab. Of those undergraduates, eight went on to complete an honors thesis under Dr. Munakata's supervision in just the past two years. Most impressive this year was her dedication to creating a total new undergraduate lab and methods course: PSYC 4744 – Developmental Methods in Psychology. In this course she taught students how to conduct all phases of developmental research from literature review to dissemination of results, and coordinated with a dozen staff members in her research lab and at the Children's Museum of Denver to provide student opportunities to design, conduct, and analyze research projects with children. This was hugely time intensive, primarily because of the need to coordinate and oversee each of the 39 students' interactions with the vulnerable research population of child participants, both in her Boulder lab and at the Children's Museum of Denver, through a partnership with her lab.



Leysia Palen receives Social Impact Award

ICS Fellow and Computer Science and Information Science faculty member Leysia Palen will be awarded the 2015 ACM Computer Human Interaction (CHI) Social Impact award at the CHI 2015 conference in Seoul, South Korea this year. In the advancing arena of large-scale on-line interaction (the "big data" of crisis response), she adapts quantitative techniques that allow the application

of qualitative methods and the "ethnographic eye" to closely observe and describe social structures in such technology-mediated situations.

Lise Menn selected as Fellow of the AAAS

The Advancement of Science (AAAS) 2014 Elected Fellows include four members of the CU Boulder community, including ICS Fellow and Linguistics Professor Emerita Lisa Menn. Congratulations, Dr. Menn!

Martha Palmer elected ACL Fellow

CU Professor of Linguistics and Computer Science Martha Palmer has been elected a fellow of the Association for Computational Linguistics (ACL). Established in 2011, the ACL Fellows program recognizes ACL members whose contributions to the field have been most extraordinary. To date, 26 members of the ACL have been honored by the ACL as Fellows. Prof. Palmer was one of six researchers granted Fellow status in December 2014, in recognition of significant contributions to the field of computational linguistics. Prof. Palmer was cited in particular for the development of semantic corpora. She has held elected leadership positions within the ACL including the office of President in 2005 and President pro-tem in 2006. She had also served as chair of ACL-SIGHAN (the Special Interest Group on Chinese Language Processing), 2001-2003, chair of ACL-SIGLEX (the Special Interest Group on the Lexicon), 1994-2000. The ACL was started over 50 years ago and is organized to foster research in computational linguistics. It hosted the first ACL conference in 1962 and has been publishing the premier journal in the field, Computational Linguistics, since 1965, with the current official title established in 1974. Computational linguistics is the scientific study of language from a computational perspective. Computational linguists are interested in providing computational models of various kinds of linguistic phenomena. These models may be "knowledge-based" ("hand-crafted") or "data-driven" ("statistical" or "empirical"). The work of computational linguists is incorporated into many working systems today, including speech recognition systems, text-to-speech synthesizers, automated voice response systems, web search engines, automatic machine translation systems, text editors, and language instruction materials.



PUBLICATIONS

Borko, H., Jacobs, J., Koellner, K., & Swackhamer, L. E. 2015 Teachers College Press, New York. *Mathematics Professional Development: Improving Teaching Using the Problem-Solving Cycle and Leadership Preparation Models.*

Caccamise, D., Friend, A., Littrell-Baez, M.K., & Kintsch, E. (2015). Constructivist theory as a framework for instruction and assessment of reading comprehension. In S.R. Parris & K. Headley (Eds.), *Comprehension instruction: Research-based best practices* (3rd ed.). New York, NY: Guilford.

Chang, L.J., Gianaros, P., Manuck, S., Krishnan, K., & Wager, T.D. (In Press). A sensitive and specific neural signature for picture induced affect. *PLoS Biology*.

Chang, L.J., Reddan, M., Ashar, Y.K., Eisenbarth, H., & Wager, T.D. (In Press). The challenges of forecasting resilience. *Behavioral Brain Sciences Commentary*.

Duffield, C. J., & Menn, L. 2014. Simplicity and Complexity in Constructions: Evidence from Aphasia. *The Mental Lexicon*. 9:2, 232-266.

Fareri, D.S.*, Chang, L.J.*, Delgado, M.R. (In Press). Neural and computational mechanisms underlying interpersonal collaboration. *denotes equal contributions. *Journal of Neuroscience*.

Hilger, A., Ramsberger, G., Gilley, P., Menn, L., Pak-Hin Kong, A. 2014. Analysing speech problems in a longitudinal case study of logopenic variant PPA. *Aphasiology* 28, 840-861.

Littrell-Baez, M. K., Friend, A., Caccamise, D., & Okochi, C. (2015). Using Retrieval Practice and Metacognitive Skills to Improve Content Learning. *Journal of Adolescent & Adult Literacy* doi: 10.1002/jaal.420

Orr, J.M., Smolker, H.R., & Banich, M.T. (In Press). "Organization of the Human Frontal Pole Revealed by Large-scale DTI-based Connectivity: Implications for Control of Behavior." Paper was accepted to PLoS ONE.

Schafer SM, Colloca L, Wager TD. Conditioned placebo analgesia persists when subjects know they are receiving a placebo. *Journal of Pain* (2015) doi: 10.1016/j.jpain.2014.12.008.

Schafer SM, Wager TD, Mercado RA Jr., Thayer JF, Allen JJB, Lane RD. Partial Amelioration of Medial Visceromotor Network Dysfunction in Major Depression by Sertraline. *Psychosomatic Medicine* (in press)

Tanaka-Welty, H., Menn, L., & Oishi, N. 2014. Developmental Reading Disorders in Japan - Profiles and Research. *Topics in Language Disorders* 34, 121-132.

Wager, T. D. & Woo, C. -W. (2015). fMRI in analgesic drug discovery. *Science Translational Medicine*. 7, 274fs6, doi:10.1126/scitranslmed.3010342

Woo, C. -W., Koban, L., Kross, E., Lindquist, M. A., Banich, M. T., Ruzic, L., Andrews- Hanna, J. R. & Wager, T. D. (2014). Separate neural representations for physical pain and social rejection. *Nature Communications*, 5, 5380. doi: 10.1038/ncomms6380

Woo, C. -W., Roy, M., Buhle, J. T. & Wager, T. D. (2015). Distinct brain systems mediate the effects of nociceptive input and self-regulation on pain. *PLoS Biology*. 13(1): e1002036. doi:10.1371/journal.pbio.1002036



PRESENTATIONS - FELLOWS

Hathorn, L. G., & Healy, A. F. Decision-making and the bat-and-ball problem. Poster to be presented at the 27th APS Annual Convention, New York, NY, May 2015.

Healy, A. F., Schneider, V. I., & Bourne, L. E., Jr. Invited paper to be presented in the Special Session "Does Bilingualism Impose Desirable Difficulties" at the 10th International Symposium on Bilingualism (ISB10), New Brunswick, NJ, May 2015.

Michaelis, L., & Kay, P. Plenary talk at the Eleventh Workshop on Multiword Expressions during the North American Association for Computational Linguistics (NAACL) conference, on "Constructional Meaning," in Denver, Colorado, June 2015

Michaelis, K. & Kay, P. Plenary talk at a workshop "Grammar Development: Multilingual Aspects of the Syntax-semantics Interface" to be held in Beit Daniel, Zichron Ya'akov. This workshop is organized in conjunction with the Israeli Seminar on Computational Linguistics at the Open University of Israel, June 2015

STUDENTS

Steve Duman, ICS and Linguistics PhD candidate, received an Award of Excellence as an Outstanding Teacher for Technology in Teaching from ASSETT (Arts & Sciences Support of Education through Technology). Duman received recognition for the class he taught entitled *Perspectives on Language*. ASSETT is a student-funded initiative supporting the use of technology in advancing the teaching and learning mission of the College of Arts and Sciences.

Steven Duman and **Kevin Gould**, both ICS and Linguistics graduate students, recently launched an iPhone and iPad app developed with an NSF grant they received last year to develop a language learning game for mobile devices using augmented reality technology. The game, called Nano Nano—Learn Spanish, teaches language concepts in a unique, fun way that utilizes actual physical motion to best reflect the patterns of neurological activation that occur when one uses language.

Katherine Goodman

- Invited talk at University of Cologne's Institute for Physics and Physics Education.
- Poster at REASON International Spring School, on "Visual Expertise in Fluid Physics: Expanding Perception in Engineering Students," in Munich, Germany, March 2015.
- Presentation on "Aesthetics of Design: a Case Study of a Course", also a poster on "Expansion of Perception in Fluids." At American Society for Engineering Education (ASEE) in Seattle, WA, June 2015.

Jena Hwang, a December, 2014 LING/CogSci joint PhD graduate, is one of four recipients of the 2015 Robert J. Glushko Dissertation Prize awarded by the Cognitive Science Society and the Glushko-Samuelson Foundation. The prize itself is \$10,000 along with three years of complimentary membership in the Cognitive Science Society.

Marianne Reddan Invited talk at the Organization of Human Brain Mapping (June 16th): "Imagined Extinction Reduces Real-life Threat Expression" at the Organization of Human Brain Mapping; Emotion and Motivation Session, Honolulu, Hawaii, June 16, 2015.

Choong-Wan (Wani) Woo, ICS Psychology and Neuroscience graduate student, was chosen to receive the 2015 Carol B. Lynch Graduate Fellowship. The award is made each year to a student in the sciences whose research interests are interdisciplinary. He was also chosen to receive the Heyer Award, which honors

ICS CERTIFICATION

UNDERGRADUATE CERTIFICATE:

Shirley Cheung
Alice Chien
Courtney Fanshier
Mackenzie Phillips
Shane Powers
Heather Rubi
Tatyana Sasyniuk
Kayla Stearns
Michelle Steele
Leah Weiss
Nancy Wilkening

GRADUATE CERTIFICATE:

Claire Barton
Kevin Gould

HUMAN LANGUAGE TECHNOLOGY CERTIFICATE:

Sarah Alcorn
Jared Desjardins
Ryan Hartsfield
Megan Hutto
Nicholas Reese

JOINT PH.D:

Ifeyinwa Okoye - Computer Science/Cognitive Science
Ashwini Vaidya - Linguistics/Cognitive Science

TRIPLE PH.D:

Julia Campbell - Speech Language and Hearing Sciences/
Neuroscience/Cognitive Science

outstanding work by a graduate student in applied/organizational psychology.

Choong-Wan (Wani) Woo, Koban, L., Kross, E. Lindquist, M. A., Ruzic, L., & Wager, T. D. Separate neural representations for somatic pain and social rejection. Poster presentation at Keystone Symposia on "The Brain: Adaptation and Maladaptation in Chronic Pain", Keystone, Colorado, June 2014.



TRANSITIONS

Anjali Krishnan, ICS Post-Doc in the Wager Lab, has accepted a tenure-track Assistant Professor position in Quantitative Psychology in the Psychology Department at Brooklyn College, part of the City University of New York system.

Luke Chang, Research Associate in the Wager lab, has accepted the position of Assistant Professor, Department of Psychological and Brain Sciences, Dartmouth College, Hanover, NH

Joseph Orr, ICS Post-Doc in the Banich Lab, has accepted a job as Assistant Professor at Texas A&M University.

As of January, **Elizabeth Losin** has taken a position as Assistant Professor in the Psychology Department at the University of Miami.

The Carston lab has taken on a post-doc, **Shabnam Hakimi** PhD. Shabnam is a postdoctoral researcher using neuroimaging to study the role of social cognition in the neural processing of risky decisions. She is interested in modeling the impact of individual differences—including genes, personality, and environment—on the neural correlates of human learning and decision making in both healthy and clinical populations. In 2014, Shabnam earned her Ph.D. from Caltech, where she investigated the neural mechanisms supporting cognitive control, focusing on prefrontocortical signals and their ability to predict individual behavior.

Kim Fairley will soon be welcomed by the Carston lab. She will start as a Postdoctoral Research Associate in the SNaG Lab this coming September. Currently she is finishing her PhD in Economics at the Radboud University Nijmegen in The Netherlands. During her PhD she intensively collaborates with the Donders Institute for Brain, Cognition and Behavior. Kim uses neuroimaging to better understand models of decision making, particularly how uncertainty directly stemming from another human being (strategic uncertainty) is differently processed than the lottery sources typically used to elicit preferences for uncertainty. Secondly, her research aims to investigate individual risk and ambiguity preferences outside the laboratory by relating it to real-life behavior.

Ellen MacKenzie, formerly in the ICS main office in Muenzinger, has been promoted to Accounting Tech in CINC, in the ICS Accounting office.

ICS GRANTS

ICS GRANTS FOR SPRING 2015

The following students have been awarded ICS grants for Spring 2015:

Nicole Beckage - Computer Science - travel
Nicole Beckage - Computer Science - research
Nick Ketz - Psychology - travel
Brett Roads - Computer Science - research
Scott Schafer - Psychology - travel
Choong-Wan (Wani) Woo - Psychology - travel

IN MEMORIAM

It is with great sadness that we report that one of our long time Fellows of ICS, Kenneth Hammond, passed on April 28, after a short illness. Professor Emeritus Kenneth R. Hammond, an icon of the University of Colorado's Psychology & Neuroscience department, and co-founder of the Center for Judgement and Policy was one of the pioneers in the field of judgment and decision-making. Prolific in his academic pursuits all of his life, he published his 12th book at the age of 90.

INTERMOUNTAIN NEUROIMAGING CONSORTIUM

Bringing Cutting-edge Neuroscience Research to the Classroom to Improve Public Health

by Hannah Fletcher, Office for Outreach and Engagement

The University of Colorado Boulder is at the forefront of research on the role of healthy lifestyle choices in the prevention and treatment of illnesses related to the brain. Now an interdisciplinary group of researchers and students have put their heads together to create a program that brings neuroscience lessons and demonstrations into local classrooms to empower elementary students to take charge of their mental and physical health.

From the impact of exercise on protecting and enhancing brain function to the role of sleep in early childhood development, CU-Boulder research findings underscore the impact of healthy behaviors on the brain. The purpose of this program, titled “[Bringing Cutting-edge Neuroscience Research to the Classroom to Improve Public Health](#),” is to pass this research on to the broader community.

Launched in 2013, the program sends a team of CU-Boulder undergraduates into area classrooms to teach children and adolescents about the brain through a series of fun and engaging activities and exercises.

The activities build on the research conducted by researchers from the CU-Boulder **Intermountain Neuroimaging Consortium**. Led by Marie Banich, professor of Psychology and Neuroscience, and Monique LeBourgeois, Assistant Professor of Integrative Physiology, the program draws on diverse expertise from more than a dozen consortium investigators spanning multiple departments and institutes.

Similarly, the program attracts CU-Boulder students from across campus and a wide variety of majors and departments— education, philosophy, computer science, engineering, integrative physiology, biology, and psychology and neuroscience. The students gain experience bringing scientific research findings to public awareness and help develop the classroom activities.

“The CU-Boulder students are playing an important role by devising new, creative, and innovative methods to demonstrate ideas about brain function,” Banich said. “They help bring the concepts to life in ways that the children in school can understand. The CU-Boulder students also act as ambassadors for science, bringing

their enthusiasm for the subject matter to school children who might think science is stodgy or ‘not fun.’”

The curriculum focuses on a basic, age-appropriate understanding of how the brain works. Then elementary students learn about the effects of lifestyle choices on brain development and mental health. Activities range from building pipe cleaner neurons to studying food labels for added sugar to learn about impact of nutrition on brain development.

Nicole Speer, [Operations Director of INC and] Project Coordinator, and Janie Routh, a graduate student assistant from the School of Education, lead undergraduate training and fine tuning of the school curriculum based on feedback from teachers and undergraduate teaching assistants. Now in its second year, the program organizers continue to hone in on what resonates in the classroom.

“The undergraduates came up with some brilliant modifications to our activities from last year,” Speer said. “One student designed a modified ski helmet to act as a ‘brain recording’ helmet that allows kids ‘see’ what their brains are doing on a computer screen. I am so proud of all the work they do.”

The curriculum also incorporates bilingual, take-home materials for students and teachers, extending the lessons beyond the classroom and to their families. With support from a [CU-Boulder Outreach Award](#), the program aims to reach a total of 600 kids and at least 25 local classrooms, approximately two-thirds of which are classrooms in Title 1 schools serving lower-income students.

In turn, the program provides an opportunity for the CU-Boulder researchers to assess their research and its impact on the public.

“Thinking about how to present information in a new manner to a new audience always makes me re-evaluate what I think is important about work in my field,” Banich said. “In addition, it is satisfying because such projects force me to look at research about the brain from a new vantage point because I am trying to see how someone else would understand it — it helps me discover something new in what I already knew.”

INTERMOUNTAIN NEUROIMAGING CONSORTIUM

RESEARCH STUDIES ARE NOW ENROLLING

Neuroscientists across the Front Range are now enrolling community participants of all ages for MRI-based research studies at the CU Boulder Intermountain Neuroimaging Consortium (INC).

Minimum criteria to participate: ***Not claustrophobic. *Weight under 250 lbs. *No permanent metal in body.**

The INC is a state-of-the-art brain imaging research facility supporting a range of research on complex psychological processes such as addiction, pain, emotion, sleep, attention, learning and memory. INC researchers are leading their fields and changing the way we think about the brain.

Recent INC research has shown:

- Exercise can protect the brain from damaging effects of heavy alcohol use
- How brain changes during adolescence relate to decision making abilities
- Which patterns of brain activity objectively measure the pain someone is experiencing
- Brain abnormalities that may precede the development of psychosis



As a research facility we do not accept solicitations for brain scans from the public, but if you are interested in participating in some of our current research studies and contributing to our growing knowledge of the brain, there may be a study opportunity of interest to you, your family members and friends.

New Mothers and Infants - Recruiting first-time mothers that are currently pregnant or have a baby between - and 5 months old. Also recruiting 10-12 month old infants of first-time mothers. Contact the Family and Child Neuroscience, University of Denver, at 303-871-3096 or email FCNLab@gmail.com.

Children age 3 to 12 - Recruiting children who are interested in playing fun games that teach us about their learning. Contact the Cognitive Development Center at 303-492-6389 or email cogdevctr@grey.colorado.edu.

Young people age 12 to 21 - For those concerned about troubling new thoughts, perceptions and feelings. Call ADAPT at (303) 492-4616 or visit the website: <http://www.adaptprogram.com>.

Adults - For a study on sensation seeking. Email btconnerlab@gmail.com with subject line, "MRI Study"

Committed Couples - Couples who are currently married or have been in a relationship at least 2 years. Studying how positive and negative interactions impact the relationship and well-being. Info at <http://redcap.ucdenver.edu/surveys/?s=rUmvXabFZR> or email Relationship_Lab_MRI@colorado.edu.

Not Physically Active (exercise less than 60 minutes/week) age 25-35. For a study on brain functioning and health. Contact CU CHANGE research lab at 303-492-9549, or force.researchstudy@gmail.com.

Older Adults (60+) No personal history of heart disease; no current blood pressure meds or blood thinners. Contact Integrative Physiology of Aging Laboratory at IPAlab@colorado.edu, or call (303) 735-6410.