Institute of Cognitive Science Newsletter - Winter 2016

From the Director of the Institute

Dear Colleagues,

As my first semester as Director draws to a close, I want to thank all of you for your kindness, energy, and support during this start-up period. I continue to be amazed by the depth and breadth of research being conducted by our faculty, fellows, and students.

Thanks to your hard work, and the leadership of our former Director Marie Banich, the Institute of Cognitive Science has laid the groundwork for transformative future growth through developing significant human, technological, and capital infrastructure over the past decade. We have a suite of talented and creative interdisciplinary tenure track and research faculty, a broad range of faculty fellows from seven participating units, and a productive and well-functioning staff (human). Our research has advanced science in learning, language, and higher order cognition, with a core emphasis on developing and using innovative computational approaches and neuroimaging to study, model, and support human cognition (technological). This research is made possible through our ongoing operation of a state-of-the-art neuroimaging facility and the CINC laboratory facility (capital).

As you can see later in this newsletter, our research and education programs are strong and vital: we are steadily receiving new grants, expanding our faculty and fellows, and producing outstanding graduates. However, our challenge in the years ahead is to devise new ways of working together so that we can build on our infrastructure to take our contributions to science and society to a new level. I firmly believe that the Institute is uniquely poised to tackle some of society's most pressing challenges: understanding brain health and wellness, developing personalized therapies and interventions, personalizing and deepening learning, and optimizing complex cognitive processes to improve performance and outcomes. These advances won't come from business as usual; we need to break out of our lab silos and double down on our mission: bringing our creativity and ideas together in new ways to promote interdisciplinary research and training in cognitive science.

Working together in new ways is easier said than done. After piloting our Interdisciplinary Research Accelerator Program for one semester, we have learned a few things about the strengths and weaknesses of our processes. One of our most profound strengths is our willingness and enthusiasm for getting together with new people or colleagues from other units to brainstorm new ideas. A challenge is making time in our busy schedule to take these wonderful ideas to the next level of concreteness. At the other end of this pipeline, we have also found that it can be hard to find experienced researchers who are able to review proposal drafts and provide constructive feedback. This is not surprising since many of us are submitting proposals to the same program or programs with the same looming deadline. I will be working with our faculty and fellows to refine and improve this program over the coming semester. If you have ideas you want to discuss, or are looking for ways to get involved, please come by for a chat. I can be found most Friday afternoons in my office in Muenzinger from 2 to 4pm, or send me an email (sumner@colorado.edu) to arrange a time.

Cheers,

Tammy Sumner

Institute of Cognitive Science
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Recent Grants Awarded to ICS Members

PI Name	Sponsor	Title of Project / Amount to ICS
Tamara Sumner	Denver Public Schools	DPS Service Agreement for Curriculum Development / $50,041
Tor Wager	Northeastern-NIH	Fundamental Subcortical Mechanisms of Affective Processing / $650,991
Jessica Andrews-Hanna (Co-PI Joanna Arch)	Templeton	Large-Scale Momentary Experience Sampling and Neurocognitive Mechanisms of Functional and Dysfunctional Prospective Thought / $28,750
Marie Banich (Co-PI Jessica Andrews-Hanna)	NIH	Clearing the Contents of Working Memory: Mechanisms and Representations / $360,448
Tamara Sumner (Co-PIs Jennifer Jacobs, Wayne Ward)	NSF	EAGER: Early Stage Research on Automatically Identifying Instructional Moves in Mathematics / $299,928
Mike Mozer	NSF	Bayesian Optimization for Exploratory Experimentation in the Behavioral Sciences / $2,275
Darya Zabelina	Templeton-Imagine Institute	The Four-Factor Imagination Theory (4FIT): Strategy, Methodology, and Anticipated Results / $107,020
Mike Mozer	NSF	Operationalizing Students' Textbook Annotations To Improve Comprehension and Long-Term Retention / $299,976
Bill Penuel (Co-PI Tamara Sumner)	NSF	EAGER: Smart and Connected Communities: Reducing Friction in the L3 Connects Infrastructure: Embedding a Recommender System into Mobile Apps to Support Real-Time Brokering / $189,988
Monique LeBougeois (Co-PI Tor Wager)	NIH	Sleep and the Neural Basis of Emotion Processing in Childhood / $449,697
Christine Yoshinaga-Itano	HRSA-UCD	Leadership Education in Neurodevelopmental and Related Disorders Training Program / $24,640
Cinnamon Bidwell (Co-PIs Angela Bryan, Kent Hutchinson)	Colorado Department of Public Health and Environment	Acute Effects of Dabbing on Marijuana Intoxication, Driving Impairment, and Cognitive Functioning / $839,500

A Celebration of 12 Years as Director of ICS

As we celebrate Dr. Marie Banich's 12-year tenure as Director, we look back on her deep influence on the Institute. Dr. Banich brought in the NSF Science of Learning Catalyst (SLC) Center, a grant centered around leveraging human generalization abilities for optimal learning. The center enabled faculty, research staff, and students to examine both theory and practice, and provided funding for graduate student experiences and pilot projects. Through the SLC Center, ICS also hosted a conference here in Boulder. Dr. Banich and Dr. Donna Caccamise also edited a 15-chapter book based on the center's work *Generalization of Knowledge: Multidisciplinary Perspectives*.

Another major grant Dr. Banich brought to the Institute was the NIMH Interdisciplinary Behavioral Science Center (IBSC). The center brought together leading researchers in the field known for their testable theories of executive function at each three levels of analysis: computational, psychological, and neurobiological. The center also supported a yearly conference and a variety of visiting speakers.

Dr. Banich also led the collaboration with the Mind Research Network in Albuquerque, New Mexico to establish the Intermountain Neuroimaging Consortium (INC), which brought a Siemens Tim Trio 3 Tesla system equipped with 12- and 32-channel head coils for MRI and fMRI to our facilities. The magnet has greatly expanded the research capabilities of the Institute and the University of Colorado Boulder.

While Dr. Banich has stepped down as Director of the Institute, she will remain the Executive Director of INC and a faculty member of ICS, where she will be conducting research on her Adolescent Brain Cognitive Development (ABCD) grant. Please join us in congratulating Dr. Banich on her many achievements as Director and wishing her good luck on her future endeavors.

Dr. Banich with upgraded INC scanner.
Photo by Teryn Wilkes.

ICS Travel and Research Student Awards Fall 2016

ICS awarded the following students travel and research awards for Fall 2016:

Dan Corral	Psychology	Travel
Lakshmi Lalchandani	Psychology	Travel
Laura Michaelson	Psychology	Travel
Laura Michaelson	Psychology	Research
David Quigley	Computer Science	Travel
Marianne Reddan	Psychology	Travel
Brett Roads	Computer Science	Research
Shane Schwikert	Psychology	Travel
Adam Young	Psychology	Research

For more information about ICS Student Awards, visit colorado.edu/ics/graduate-programs/student-travel-research-awards

Digital Textbook Scribbles, Highlights Could Give Students a Learning Leg Up

(Adapted from CU Boulder Today)

The scribbles and highlights made by students reading digital textbooks should allow them to sharpen their learning curve, thanks to new software that can assess how they are digesting academic material and suggest more effective study techniques.

Funded by a four-year, $1 million grant from the National Science Foundation (NSF), the effort will allow for the development of "smart" annotated online textbooks to gain a better understanding of a particular learner's state of mind and grasp of subject matter. The project was created by the University of Colorado Boulder, Rice University, and the University of California San Diego (UCSD).

The study participants will use online textbooks provided by the nonprofit, open-source textbook publisher OpenStax that is based at Rice.

"While traditional textbooks are designed to transmit information from the printed page to the learner, contemporary digital textbooks offer the opportunity to unobtrusively gather information from learners as they read," explains CU Boulder **Professor Michael Mozer,** Principal Investigator on the project. "With a better understanding of a learner's state of mind, textbooks can make personalized recommendations for further study and review."

The project is funded by a grant from the NSF's Cyberlearning and Future Learning Technologies program. The researchers are creating software that will predict how well students will perform on tests based on what they highlight in the digital textbooks.

The researchers also will create tools that use a student's highlights to create customized quizzes and reviews, said Mozer, a faculty member at the Institute of Cognitive Science and a Professor in CU Boulder's Department of Computer Science.

"Highlighting is something students naturally do on their own, and we want to create software that can use those highlights to improve both their comprehension and knowledge retention," says Phillip Grimaldi, a co-investigator on the project and research scientist at OpenStax.

Mozer says the research team has adopted a "big-data" approach that involves collecting annotations from a group of learners to draw inferences about individual users. The project leaders will use the data to infer a student's depth of understanding of facts and concepts, predict test performances and even perform scholastic "interventions" that improve learning outcomes, he said.

OpenStax uses philanthropic grants to produce high-quality, peer-reviewed textbooks that are free online and are used by roughly 680,000 college students at more than 2,000 colleges and universities. The team is asking a large group of OpenStax student users to volunteer their digital textbook highlights for a database that can be mined for clues about their understanding of the text.

Data from highlights supplied by OpenStax users will enable the research team to create tools that are sensitive to each student's interests and highlighting choices, said Rice Professor Richard Baraniuk, a project Co-I and the director of OpenStax.

"The idea is to reformulate selected passages into review questions that encourage the active re-construction and elaboration of knowledge," notes Baraniuk.

The research team also includes Co-I and Professor Hal Pashler, who will lead the activities at UCSD.

New Grant for Bidwell on Marijuana

ICS Assistant Research Professor Dr. Cinnamon Bidwell is slotted to receive a grant from the State of Colorado's Department of Public Health and Environment to study the pharmacokinetics and acute effects of high potency forms of marijuana. Data from the project, "Acute effects of dabbing on marijuana intoxication, driving impairment, and cognitive functioning," will fill a key gap in informing the public and policy makers in Colorado about the impact of use of widely available and legal high potency marijuana products.

New Grant for Yoshinaga-Itano on Leadership Education

Dr. Christine Yoshinaga-Itano, SLHS Professor Emeritus and current ICS Research Professor, will receive a grant from the Health Resources and Services Administration for a project entitled "Leadership Education in Neurodevelopmental and Related Disorders Training Program." She will provide educational content and lectures to the trainees in the area of pediatric hearing loss and Autism Spectrum Disorder and other Developmental Disorders. Her team will evaluate trainee candidacy and learning outcomes.

# ICS Welcomes
Dr. Darya Zabelina

This fall Dr. Darya Zabelina joined the Institute as a Research Associate. Her research program centers at the intersection between the psychology and neuroscience of attention, executive functions, and internally-guided cognition. Specifically, her work links traditional subfields of cognitive psychology with important under-explored processes spanning creativity and imagination. She applies a variety of techniques, including behavioral, genetic, electrophysiological (EEG and ERP), and functional MRI (fMRI) techniques. A long-term objective is to create a theoretical foundation upon which to develop methods to enhance creative thinking and problem-solving abilities. Dr. Zabelina earned her PhD in cognitive neuroscience at Northwestern University. Her work is funded by a grant from the Templeton Foundation's Imagination Institute.

Please join us in welcoming Dr. Zabelina to the Institute!

Carter Lab News

Members of the Social Neuroscience and Games (SNaG) lab run by Dr. McKell Carter recently shared their exciting fMRI and behavioral results at several conferences around the globe. Post-doctoral researcher Kim Fairley presented a poster at the Society for Neuroeconomics in Berlin last August, and most recently gave a talk at the North-American Economic Science Association in Tucson. Dr. Fairley's work, which validates the predictive power of the Balloon Analogue Risk Task (BART) for real-life risk behaviors, such as substance abuse, was well received by both audiences.
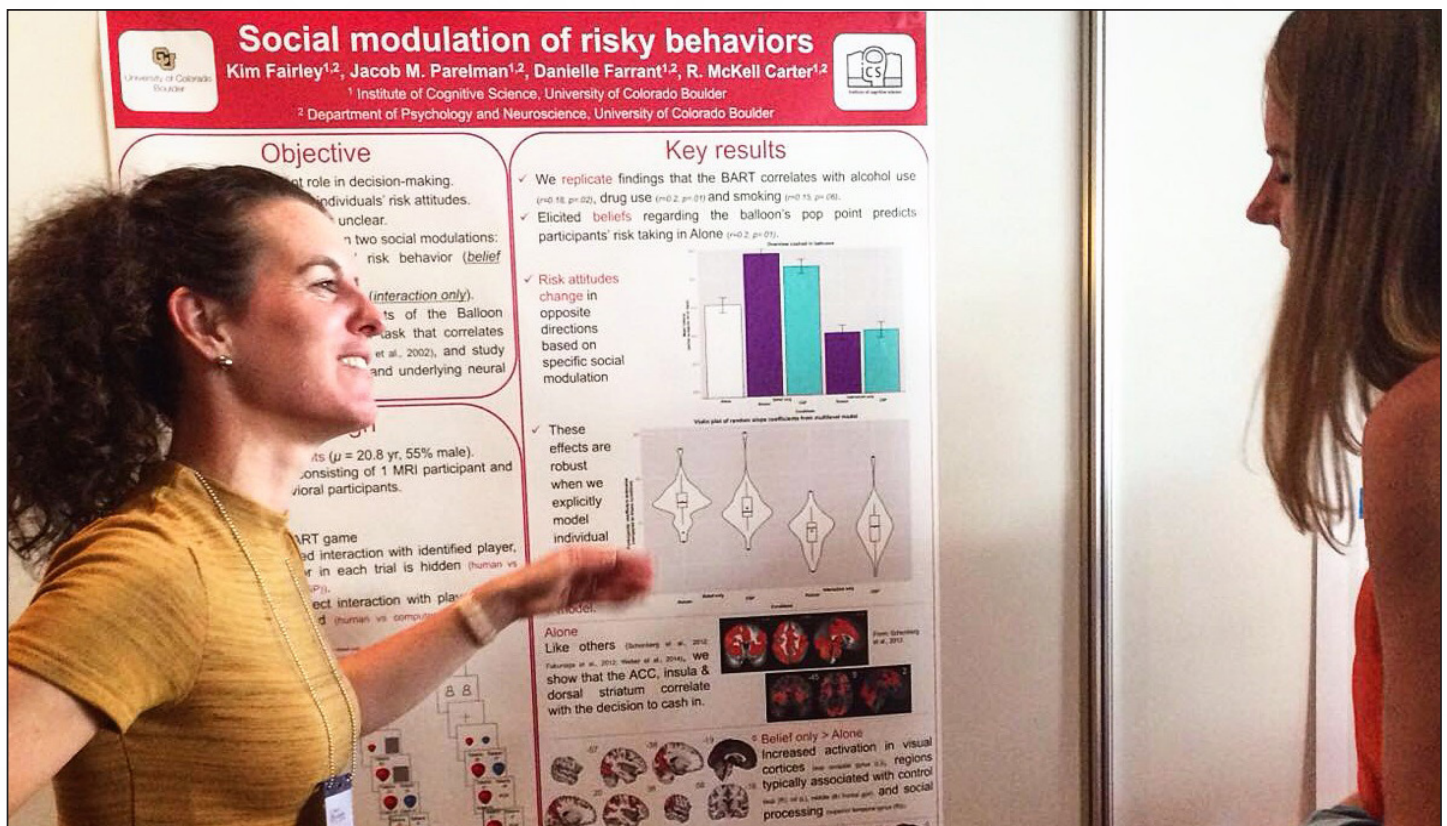
Dr. Kim Fairley in Berlin, Germany.

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ICS Fellow Presentations

Caccamise, D., Littrell-Baez, M.K., & Okochi, C. (2016, July). A secondary reading comprehension curriculum: How FOI impacts student performance. Paper presented at the Twenty-Second Annual Meeting of Society for the Scientific Study of Reading, Porto, Portugal.

Hathorn, L., & Healy, A. F. Attribute substitution in the bat-and-ball problem. Poster presented at the 28th APS Annual Convention, Chicago, IL, May 26, 2016.

Hathorn, L. G., & Healy, A. F. Biased and correct responders show different patterns of recall for decision questions. Invited poster in the Symposium on Memory Dynamics and the Optimization of Instruction Revisited. American Psychological Association Convention, Denver, CO, August 6, 2016. Canceled due to serious illness (L. G. Hathorn passed away the next day).

Healy, A. F., & Zangara, T. K. Comparing misses in letter detection and reading aloud. Paper presented at the International Meeting of the Psychonomic Society, Granada, Spain, May 6, 2016.

Healy, A. F., & Zangara, T. K. Examining misses in reading aloud repeated words: Explanations from models of the missing letter effect. Paper presented in the symposium The Missing Letter Effect: History, Models and Current Avenues at the 26th Annual Meeting of the Canadian Society for Brain, Behaviour and Cognitive Science (CSBBCS), Ottawa, Canada, June 25, 2016.

Lalchandani, L., & Healy, A. F. The effects of note taking medium based on lecture format. Poster presented at the International Meeting of the Psychonomic Society, Granada, Spain, May 6, 2016.

Lalchandani, L. A., & Healy, A. F. Disentangling the effects of note-taking strategy: Generation and summarization. Poster presented at the 57th Annual Meeting of the Psychonomic Society, Boston, MA, November 18, 2016.

Schneider, V. I., Healy, A. F., Buck-Gengler, C. J., Kole, J. A., & Barshi, I. Distinctive responding protects against forgetting associations: Role of working memory. Poster presented at the 57th Annual Meeting of the Psychonomic Society, Boston, MA, November 18, 2016.

Sherwood, D. E., Lohse, K. R., & Healy, A. F. Direction and relevance of the focus of attention in dart-throwing with and without concurrent visual feedback. Paper presented at the annual NASPSPA (North American Society for the Psychology of Sport and Physical Activity) Conference, Montreal, Canada, June 18, 2016.

Tack, L. A., Healy, A. F., Jones, M., & Curran, T. Isolating the effects of individual accuracy, group accuracy, and task feedback on learning. Invited poster presented in the Symposium on Memory Dynamics and the Optimization of Instruction Revisited. American Psychological Association Convention, Denver, CO, August 6, 2016.

Young, A. P., Healy, A. F., Jones, M., & Bourne, L. E. Jr. On the relative benefits of spacing and massing practice for learning cognitive and motor associations. Invited poster presented in the Symposium on Memory Dynamics and the Optimization of Instruction Revisited. American Psychological Association Convention, Denver, CO, August 6, 2016.

Woo, C. -W., et al. (June, 2016). Distinct neural mechanisms of pain modulation through distraction and placebo. Poster presentation at the annual meeting of the Organization for Human Brain Mapping, Geneva, Switzerland

Woo, C. -W., et al. (Sep, 2016). Distinct neural mechanisms of pain modulation through distraction and placebo. Poster presentation at the16th World Congress on Pain, International Association of the Study of Pain, Yokohama, Japan

Woo, C. -W., et al. (Nov, 2016). Quantifying cerebral contributions to pain beyond nociception: A mega-analytic approach. Oral presentation at the annual meeting of the Society for Neuroscience, San Diego, CA.

Graduate Student Awards

Marianne Reddan won the Social Affective Neuroscience Society Logo Contest for their 2016 Conference in NYC.
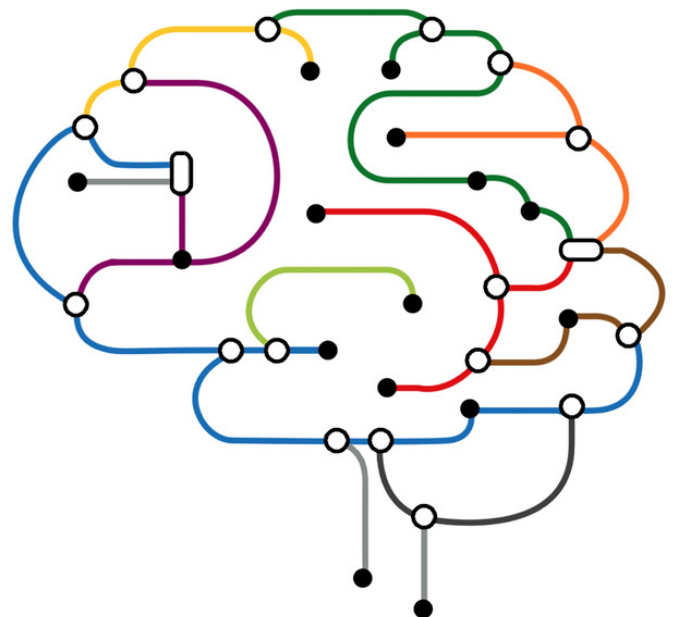
ICS Fellow Publications

Ashar, Y. K., Chang, L. J., **Wager, T. D**. (in press) Brain and psychological mechanisms of the placebo effect: An affective appraisal account. Annual Reviews Clinical Psychology.

Chapman, M. J., **Healy, A. F.**, & Kole, J. A. (2016). Memory load as a cognitive antidote to performance decrements in data entry. Memory, 24, 1182-1196.

Gahl, Susanne & **Menn, Lise**. 2016. Usage-based approaches to aphasia. Published in Aphasiology online, Feb. 2016. Aphasiology 30:11, 1169-1173.

Healy, A. F., & Zangara, T. K. (2017). Examining misses in reading aloud repeated words. Quarterly Journal of Experimental Psychology, 70, 373-377.

Krishnan, A., **Woo, C. -W**., Chang, L. J., Ruzic, L., Gu, X., **López-Solà, M.**, Jackson, P. L., Pujol, J., Fan, J., & **Wager, T. D.** (2016). Somatic and vicarious pain are represented by dissociable multivariate brain patterns. eLife. 5:e15166. doi:10.7554/eLife.15166.001

López-Solà, M., Woo, C. -W., Pujol, J., Deus, J., Harrison, B. J., Monfort, J. & **Wager, T. D.** (2016). Towards a neurophysiological signature for fibromyalgia. PAIN.

L. Menn & R. Bastiaanse, Guest Co-Editors. Special Issue of Aphasiology: Frequency, Language Processing, and Aphasia. Vol. 30, No. 11 (November 2016).

Menn, L. & Bastiaanse, R. 2016. Beyond Chomsky versus Skinner: Frequency, Language Processing, and Aphasia. Aphasiology 30:11, 1361-1377.

Raymond, W. D., Brown, E. L., & Healy, A. F. (2016). Cumulative context effects and variant lexical representations: Word use and English final t/d deletion. Language Variation and Change, 28, 175-202.

Tao, L., & **Healy, A. F.** (2016). Psycholinguistics: Reading Chinese. In Sin-wai Chan (Ed.), The Routledge encyclopedia of the Chinese language (pp. 685-705). New York: Routledge.

Vachon-Presseau, E. Roy, M., **Woo, C. -W**., Kunz, M. Martel, M., Sullivan, M. J., Jackson, P. L., **Wager, T. D**., & Rainville, P. (2016). Multiple faces of pain: Effects of chronic pain on the brain regulation of facial expression. PAIN. doi:10.1097/j.pain.0000000000000587

Walter Kintsch, Comprehension (2016). In R. J. Sternberg, S. T. Fiske, and D. J. Foss (Eds.): Scientists making a difference. Cambridge University Press.

ICS Student Presentations

Jung, H., Mosner, M. G., McLaurin, R.E., Hakimi, S., **Parelman, J.M.,** Kinard, J., Chakraborty, P., Dichter, G., Carter, R. M. (2016, May). Co-opted Social Cognitive Neural Substrates in Autism During Strategic Gameplay. Poster presented at the 2016 71st Annual Scientific Convention and Meeting of Society of Biological Psychiatry, May 12-14, 2016, Atlanta, Georgia.

Reddan, M., Wager, T., Schiller, D., (2016, October) Imagined Extinction Reduces the Physiological and Neural Expression of Threat. Presented at the Social Affective Neuroscience Society Annual Meeting, New York, NY.

Sommer, S., Hinojosa, L., & Polman, J. L. (2016). Utilizing eye tracking technology to promote students' meta-cognitive awareness of visual STEM literacy. Presented at the International Conference of Learning Science in Singapore.

Sommer, S., Graville-Smith, C., Polman, J., **& Hinojosa, L.** (2016). Iterative curricular design of collaborative infographics for science literacy in informal learning spaces. Presented at the International Conference of Learning Science in Singapore.

Ward, A., **Schwikert, S. R.,** (2016, October). The Accessibility Liability: Digital Information Undermines Conceptual Understanding. Presented at the International Association for Consumer Research Conference in Berlin, Germany.

ICS Fellows Beyond CU

Randy O'Reilly was elected as a Fellow of the Society of Experimental Psychologists. (http://www.sepsych.org)

Rafael Frongillo co-chaired the 2016 SIGAI Career Network Conference (CNC) on October 19-20 in Boston, which brings together PhD students and postdocs on the job market to showcase their research to each other and to potential employers. (http://sigai.acm.org/cnc)

The Colorado Data Science Team officially launched this semester, advised by Rafael Frongillo and with student officers Monal Narasimhamurthy, Bradley Gordon, Pedro Rodriguez, Nicolas Metts, and Apoorva Bapat. The primary goal of the team (and 1-credit companion course) is to give students more hands-on experience with data and machine learning algorithms. (http://codata.colorado.edu)

Rafael Frongillo is co-organizing the NIPS 2016 Workshop on Crowdsourcing and Machine Learning (CrowdML), focusing on how machine learning can improve crowdsourcing and vice versa.(http://crowdml.cc/nips2016)

Dr. Mike Mozer's Group Receives Best Paper at EDM

This July, ICS Faculty Dr. Mike Mozer and his collaborators won Best Paper at the 2016 Educational Data Mining conference in Raleigh, NC. The paper entitled "How Deep is Knowledge Tracing?" was co-authored by Mohammad Khajah, Robert Lindsey, and Mozer, all of whom are in the Computer Science Department at CU Boulder. This was Khajah's 3rd best paper award, and he is two for two at the Educational Data Mining conference.

EDM16
The 9th Intl. Conf. on Educational Data Mining

Abstract: In theoretical cognitive science, there is a tension between highly structured models whose parameters have a direct psychological interpretation and highly complex, general-purpose models whose parameters and representations are difficult to interpret. The former typically provide more insight into cognition but the latter often perform better. This tension has recently surfaced in the realm of educational data mining, where a deep learning approach to predicting students' performance as they work through a series of exercises—termed deep knowledge tracing or DKT—has demonstrated a stunning performance advantage over the mainstay of the field, Bayesian knowledge tracing or BKT. In this article, we attempt to understand the basis for DKT's advantage by considering the sources of statistical regularity in the data that DKT can leverage but which BKT cannot. We hypothesize four forms of regularity that BKT fails to exploit: recency effects, the contextualized trial sequence, inter-skill similarity, and individual variation in ability. We demonstrate that when BKT is extended to allow it more flexibility in modeling statistical regularities—using extensions previously proposed in the literature—BKT achieves a level of performance indistinguishable from that of DKT. We argue that while DKT is a powerful, useful, general-purpose framework for modeling student learning, its gains do not come from the discovery of novel representations—the fundamental advantage of deep learning. To answer the question posed in our title, knowledge tracing may be a domain that does not require 'depth'; shallow models like BKT can perform just as well and offer us greater interpretability and explanatory power.

Dr. Banich Begins Work on ABCD

(Adapted from CU Boulder Today)

Long-term study recruitment began this September for the Adolescent Brain Cognitive Development (ABCD) study, which will follow the biological and behavioral development of more than 10,000 children beginning at ages 9-10 through adolescence into early adulthood. Recruitment will be done over a two-year period through partnerships with public and private schools near research sites across the country as well as through twin registries.

CU Boulder is one of 19 sites across the nation selected to host the study. Research will be led by the university's Institute of Cognitive Science (ICS) which runs the campus's neuroimaging center and the Institute for Behavioral Genetics (IBG).

"Adolescence is a remarkable period of brain development, a time when the brain is particularly malleable and receptive to the environment," said Marie Banich, Director of the Intermountain Neuroimaging Center and one of the principal investigators of the ABCD study. "The size and scope of this study will provide foundational research to understand how brain development enables the growth in mental and emotional functions that characterize the transition from childhood to adolescence to adulthood."

Dr. Banich meets with Rep. Jared Polis in Washington, DC to discuss ABCD grant.

ICS Degrees and Certifications
Summer and Fall 2016

Undergraduate Certificate

Colleen O'Connor — SLHS

Allison Van Crey — Psychology and Neuroscience

Graduate Certificate

Erik Summerside — Integrative Physiology

Marcia Walsh — Linguistics

Human Language Technology Certificate

Audrey Farber — Linguistics

Joint PhD

Nicole Beckage — Computer Science and Cognitive Science

Dr. Beckage attended the Santa Fe Institute Complex Systems Summer School this summer, and has accepted a position as an Assistant Professor at the University of Kansas in the Electrical Engineering and Computer Science department.

Maha Foster — Linguistics and Cognitive Science

Dr. Foster will continue teaching at the University of Denver as an Associate Teaching Professor and focus on research and developing the Arabic program. She would like to expand her research to second language learners.

Katherine Phelps-Ridgeway — Linguistics and Cognitive Science

This fall, Dr. Phelps-Ridgeway taught three classes in CU's SLHS dept. She is hoping to find a job next year, ideally doing research in her field, or in the realm of data science.

Sam Severance — Education and Cognitive Science

Dr. Severance is serving as a postdoc at the Create for STEM Institute at Michigan State University, working with Dr. Joseph Krajcik and other faculty to develop new innovations in science education. Currently, he is doing design-based research to develop and implement elementary-level project-based learning curricular materials as part of a 5-year research effort funded by Lucas Education Research.

Choong-Wan (Wani) Woo — Psychology & Neuroscience and Cognitive Science

Dr. Woo will continue working on the development of process-based predictive models for pain and emotions using functional MRI in the Wager Cognitive and Affective Neuroscience Laboratory.

Triple PhD

Alejandro De La Vega — Psychology & Neuroscience, Neuroscience, and Cognitive Science

Dr. De La Vega is starting a Postdoctoral Fellowship in the Psychoinformatics Lab, led by Dr. Tal Yarkoni, at University of Texas at Austin. The goal of the laboratory is to develop and apply new methods for large-scale acquisition, organization, and synthesis of psychological data to derive new and robust insights about the human mind.

Nicholas Ketz — Psychology & Neuroscience, Neuroscience, and Cognitive Science

Dr. Ketz is currently working as a post-doc at HRL Laboratories, a research company in the Los Angeles area, in their information and systems sciences labs (http://www.hrl.com/laboratories/ISSL/BrainMachineIntel.html). He is working on a project that uses non-invasive brain stimulation (tDCS and tACS) during sleep to promote better memory retention and faster learning.

Scott Schafer — Psychology & Neuroscience, Neuroscience, and Cognitive Science

Dr. Schafer recently started working as a Data Scientist/Analyst at Comcast.

Congratulations to all our graduates!

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INC News Update

The INC celebrated its 5th anniversary on September 30, 2016 with a full house including Provost Russel Moore, Vice Chancellor Terri Fiez, scientists, students, staff, and community members. Dr. Marie Banich gave an overview of ongoing brain imaging research at the INC, with a focus on INC scientists' unique computational approaches to understanding brain function and the center's growing emphasis on brain health and wellbeing. Attendees heard about the breadth and strength of projects taking place at the INC. Drs. Angela Bryan, McKell Carter, and Tor Wager discussed how neuroimaging has advanced their research specifically and their fields more broadly, and fielded questions about their projects on pain, exercise, and autism.

Marie Banich provides an overview of INC research.

Tor Wager greets Provost Russell Moore and Lewis Harvey.

Balloons, brochures, and tokens welcome visitors to the INC.

Tor Wager, Angela Bryan, and McKell Carter answer audience questions.

CU administrators get a tour of the upgraded INC facilities.

Marie Banich and ICS Director Tammy Sumner talk with Vice Chancellor Terri Fiez.

Research assistants David Caha and Jake Parelman and Associate Research Professor Sarel van Vuuren wait for hors d'oeuvres.

Students, staff, and post-docs mingle before the panel discussion.

All photos by Teryn Wilkes

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The INC scanner upgrade ended in May, with the upgraded scanner fully operational in June. The upgrade included hardware and software updates, which enable the INC scanner to take advantage of the latest brain imaging sequences such as multiband functional imaging to more quickly measure the timing and location of changes in brain activity as well as diffusion tensor imaging to better map the white matter tracts that connect different regions of the brain.

A number of new studies are taking advantage of the upgraded facilities to study topics such as:

- How social relationships influence empathy for others' pain

- How a relapse prevention program changes the brains of people recovering from alcoholism

- The brain regions and networks underlying the construct of imagination

- How cognitive pain regulation influences different components of pain

- Whether brain structure and function in old age are affected by chronic marijuana use

- How the brain develops from childhood through adolescence and how environmental factors may influence that process

- How mindfulness and cognitive therapy change brain structure and function in women with depression.

The INC hosted some unique visitors this summer and fall, including: Davidi Kitai, a world-renowned poker player; U.S. Representative Jared Polis; and a delegation from South China Normal University. With continued funding from the Office of Outreach and Engagement, INC scientists and students continue to teach K-12 students and teachers about neuroscience and brain development. This winter the INC will host CU Boulder's first Brain Bee to encourage Colorado high school students to pursue careers in brain research. The winner of the CU Boulder Brain Bee will go to the National Brain Bee, where they will have a chance to compete for a spot at the International Brain Bee.
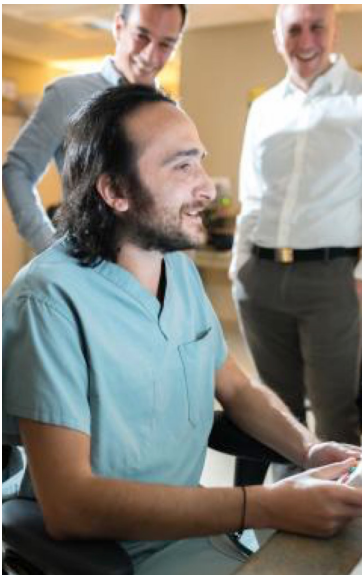
McKell Carter studies the brain of world-renowned poker player Davidi Kitai, pictured here in scrubs, at the INC.

INC staff meet with U.S. Representative Jared Polis.

INC staff with Dr. Carol Seger (Colorado State University) and representatives from South China Normal University.

Stay up to date with the INC online:

www.colorado.edu/mri   Facebook: #cubouldermri   twitter: @cubouldermri

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New ICS Fellows

The Institute welcomed the following new Fellows in 2016, and looks forward to our collaborations:

Danielle Albers-Szafir
Assistant Professor
Information Science

Szafir develops interactive visualization systems and techniques for exploring large and complex data in domains ranging from biology to the humanities.

Naomi Friedman
Assistant Professor
Psychology and Neuroscience, Institute of Behavioral Genetics

Research interests include neural and genetic mechanisms underlying individual differences in executive functions and their relations to self regulation, substance use and abuse, and psychopathology.

Rafael Frongillo
Assistant Professor
Computer Science

Research interests are at the interface between theoretical machine learning and economics, primarily focusing on domains such as information elicitation and crowdsourcing which involve the exchange of information for money, and drawing techniques from convex analysis, game theory, optimization, and statistics.

Valerie Otero
Professor
School of Education

Research explores the conceptual development of students in student-centered learning environments. She is interested in the evolution of the system as a whole, including students, tools, teachers, course materials, and the interactions among these components.

Patricia Rankin
Professor
Physics

Research interests include leadership, women in science, inclusion decision making, elementary particles and fields.

Daniel Szafir
Assistant Professor
ATLAS, Computer Science

Focuses on human-robot interaction (HRI) and human-computer interaction (HCI). He studies the design and use of robots and related novel technologies, including brain-computer interfaces and virtual reality, with the goal of improving usability and outcomes such as learning and collaboration.

Stephen Voida
Assistant Professor
Information Science

Conducts research in human-computer interaction (HCI), at the intersection of personal management, user interface design, ubiquitous computing, and computer-supported cooperative work. The focus of his research is to better understand and develop solutions for the widespread problem of information overload.

Newest ICS Faculty Member, Dr. Sidney D'Mello

After an intensive search, the Institute is happy to announce that Dr. Sidney D'Mello will be joining the Institute next year as ICS's newest faculty member.

Dr. D'Mello will join ICS as an Associate Professor in August 2017. He will have his tenure home in Computer Science and a courtesy appointment in Psychology and Neuroscience. His primary research interests are in the cognitive and affective sciences, artificial intelligence, human-computer interaction, and the learning sciences. More specific interests include affective computing, artificial intelligence in education, speech recognition and natural language understanding, and computational models of human cognition.

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