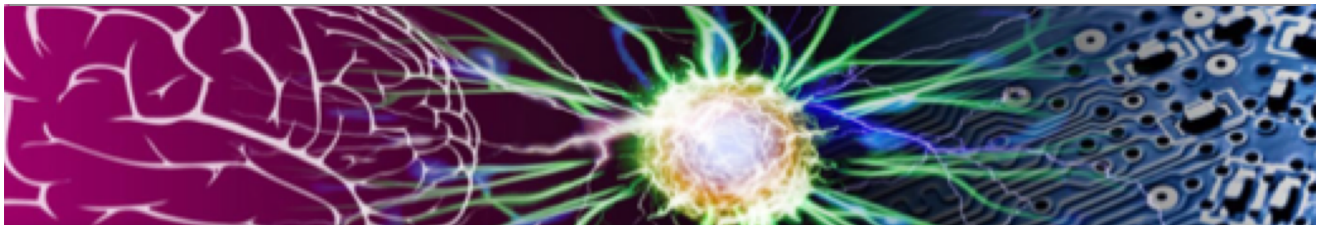
INSTITUTE OF COGNITIVE SCIENCE

Newsletter |Spring| 2018



Brain Awareness Week a Big Success!

This year, the Institute of Cognitive Science (ICS) and the Intermountain Neuroimaging Consortium (INC) partnered to host CU Boulder's Brain Awareness Week 2018. It was a big success, with hundreds of community members joining ICS faculty, staff, and students for a week of learning about the latest developments in cognitive science and neuroscience. Brain Awareness Week is sponsored by the Dana Foundation, and is an international week of activities focused on bringing attention to brain research.

ICS/INC events for Brain Awareness Week featured talks by Dr. Angela Bryan, Dr. Marie Banich, and Dr. Cinnamon Bidwell, as well as a "Community Brain Day" open house event where groups from across the university converged at the CINC building with hands-on demonstrations related to their research. The CU Boulder Neuroscience club also put on several events for CU students, including a bingo night and a demonstration of neuroscience lab methods.

Dr. Nicole Speer
Director of Operations
Intermountain Neuroimaging Consortium

Dr. Bryan, *(left)* - kicked off the week by speaking about her research on "The Impact of Exercise on the Aging Brain" to a full house at the East Boulder Senior Center. Dr. Bryan is the co-director of the CU CHANGE Lab and focuses on developing biopsychosocial models of health behavior to design, implement, and evaluate theory-based interventions to improve health.

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FROM THE DIRECTOR

It was another busy semester! We made steady progress preparing for our Academic Unit Review. I want to thank our outstanding Executive Committee for all of the policy work that they performed on our behalf this year:

- We completed a major revision of our Bylaws.
- We established our first ever Inclusiveness policy.
- We extended our merit review criteria and processes to support Research Professors.

Members of our Executive Committee also planned and led our ***spring "strategic planning" membership meeting*** which took place in early April (thank you Prof. Alaa Ahmed and Prof. Christine Brennan). As usual when we get together, there was no shortage of good ideas, which fell into four main categories.

Future Directions in Cognitive Science at CU. We identified several exciting new areas for extending our research. First, there is broad interest in building on new sensing technologies to study "cognition in the wild" and several of our labs are already moving in this direction. Along these lines, Eisenberg, Curran, and Colunga recently submitted a proposal to the National Science Foundation to study how human augmentation can change how kids learn science. Second, we talked about several avenues for building on our neuroimaging facility and expertise. These ideas included bringing education and neuroscience together to expand our understanding of cognition, bringing our expertise in neuroimaging and machine learning together to expand our understanding of brain functioning and brain health, and bringing together our neuroscience and computational expertise in emotions to expand understanding of affect and cognition. One challenge we will face is the huge learning curve associated with fMRI studies, and we discussed several options such as focusing senior hires in this area and/or developing the capacity to offer full, turn-key research services.

Increasing Our Capacity for Interdisciplinary Collaborations. As demonstrated in the previous paragraph, a common theme in our discussions was "bringing together" people across departments and disciplines. Attendees identified specific expertise that we would like to recruit: philosophy, education, social psychology, and speech and natural language processing. Our community recognizes that our interdisciplinary breadth is our core expertise. We also recognize that we can improve our processes and approaches for facilitating interdisciplinary collaborations. Many of our ideas centered around students and their important role in facilitating faculty interactions. Specific ideas we discussed included establishing mechanisms that encourage faculty from different units to co-sponsor summer fellowships or co-advise independent studies. We also want to provide faculty with more opportunities to briefly share their current work-in-progress. So, please plan on participating in a faculty research blitz that we are planning for one of our fall colloquium slots. There was also a discussion around fostering more informal discussions amongst faculty, including the suggestion for the occasional happy hour gathering, which certainly falls within my skill set!

Kickstarting New Research Programs. Increasingly, the key to a successful NIH or NSF proposal is a solid pilot study. However, pilot study funding remains scarce. We discussed models such as the mini-grants being offered by CU REACH, using funds provided by private donors. In this model, investigators that receive pilot funding are expected to "pay back" twice the original grant when their external funding is successful to establish a sustainable process. There is an article on this program and the first mini-grant awarded on page 6 in this newsletter. We also discussed the CU Seed Grant Program. Everyone agreed that this is a fabulous program that needs to be radically expanded to meet demand.

Education and Training. We discussed several ways to enhance our educational programs, including funding TAs and exploring student demand for an undergraduate cognitive science minor. However, we also discussed the persistent challenge that continues to undermine our abilities to expand and enhance our educational programs: our programs are self-funded through Indirect Cost Returns generated by our research programs. We are proud of being the first Institute to pioneer certificates and interdisciplinary PhD programs. However, we have been offering these programs for almost 20 years and we have yet to receive any tuition revenue due to CU regulations that limit Institutes in this regard. We need to establish a viable financial model in partnership with the University before we can think about expanding our programs.

Cheers, Tammy Sumner

ICS PUBLICATIONS

Martin, L., Mills, C., D'Mello, S. K., & Risko, E., F. (in press). Re-watching Lectures as a Study Strategy and its Effect on Mind Wandering. Experimental Psychology.

Wilson, K., Martinez, M. Mills, C., D'Mello, S. K., Smilek, D., Risko, E. (in press). Instructor presence effect: Liking does not always lead to learning. Computers & Education.

Krasich, K., McManus, B., Hutt, C., Faber, M., D'Mello, S. K., Brockmole, (in press). Gaze-Based Signatures of Mind Wandering During Real-World Scene Processing, Journal of Experimental Psychology: General

Mills, C., Wu., J. & D'Mello, S. K. (in press) Being Sad is not always Bad: The Influence of Affect on Expository Text Comprehension. Discourse Processes.

Grafsgaard, J., Duran, N., Randall, A., & D'Mello, S. K. (in press). Generative Models of Nonverbal Synchrony in Close Relationships. Proceedings of the 13th IEEE Conference on Automatic Face and Gesture Recognition (FG'18). Washington DC: IEEE.

Faber, M., Radvansky, G., & D'Mello, K. (in press). Driven to distraction: a lack of change gives rise to mind wandering. Cognition.

Institute of Cognitive Science
UNIVERSITY OF COLORADO **BOULDER**

Brain Awareness Week Cont:

Dr. Angela Bryan Cont from page 1:

She discussed age-related changes in the brain, and how lifestyle choices and genetics may influence brain structure and function during later years of life, including recent results from her study of physical activity with older adults.

Dr. Marie Banich, (shown above) specializes in using brain imaging techniques to understand the neural systems that allow us to direct our thinking and our actions so that we can prioritize, organize, and target our behavior in a goal-oriented manner, abilities often referred to as executive functions. Her talk on "Understanding the Teen Brain" started a conversation with attending parents, educators, and students about how the neural systems that process emotion, social information, and rewards change during puberty and adolescence, and what this means for teens and the people who interact with them.

Dr. Cinnamon Bidwell (left), investigates the effects of abused drugs and how these effects impact acute and chronic psychological and physical health, particularly with regard to high potency marijuana and cannabinoids in psychiatric and medical populations. Dr. Bidwell spoke about her work to understand cannabis, cannabinoids, and health in a post-legalization world to an audience of community members, students, and health practitioners at the new Sustainability, Energy, and Environment Community building in CU Boulder's Research Park.

continues on page 6

ICS Publications -cont.

Hutt, S., Gardener, M., Kamentz, D., Duckworth, A., & D'Mello, S. K. (2018). Prospectively Predicting 4-Year College Graduation from Student Applications. In S. B. Shum, R. Ferguson, A. Merceron & X. Ochoa (Eds.), Proceedings of the 8th International Learning Analytics and Knowledge Conference (LAK'18) (pp. 280-289). New York: ACM.

Bhaduri, S., Horne, K. V., Ristvey, J., Russell, R. and Sumner, T. (2018). From toys to tools: UAVs in middle-school engineering education (RTP). In 2018 ASEE Annual Conference & Exposition, Salt Lake City, UT.

Bhaduri, S., Horne, K. V., Gyory, P., Ngo, N. and Sumner, T. (2018) Enhancing 3D Modeling with Augmented Reality in an Bhaduri, S., Horne, K. V., Gyory, P., Ngo, after-school engineering program. In 2018 ASEE Annual Conference & Exposition, Salt Lake City, UT.

Bhaduri, S., Horne, K. V., Ristvey, J., Russell, R. & Sumner, T. (2018). Learning Engineering Practices Through Drones: Iterative design of an informal learning curriculum. In Proceedings of the 13th International Conference of the Learning Sciences (ICLS).

ICS VISITING SCHOLAR

YAEL KALI, UNIVERSITY OF HAIFA

Associate Professor Yael Kali is a visiting scholar at ICS, coming from the University of Haifa in Israel, where she directs two research centers: Learning In a Networked Society (LINKS), and Taking Citizen Science to School (TCSS). Professor Kali is joining the Inquiry Hub Research+Practice Partnership which includes faculty and students from ICS, the School of Education and Denver Public Schools. Inquiry Hub is currently developing a year-long high school biology curriculum that incorporates engineering design challenges and citizen science in novel ways. During her 6 month visit, Prof. Kali will be conducting a study on a fascinating aspect of the Inquiry Hub curriculum— incorporating ethical debates within science instruction. A culminating activity of the Genetics Unit is a "world cafe" event, in which students lead discussions on the ethics of genetic engineering with peers and adults in their community. This resonates with the notion "students as science ambassadors in their community" that Yael has been studying in the context of citizen science.

***Dr. Kali** is shown here with her family: From right to left (as is written in Hebrew) **Yoav** - Dr. Kali's husband (working on his thesis in music composition), **Itamar** - 19 and **Roy** - 23 (both in Israel) **Nadav** - 16 (studying at Fairview HS. Boulder) And **Dr. Kali**.*

NEW ICS FELLOW- SHAUN KANE

Dr. Shaun Kane is an Assistant Professor in the Department of Computer Science, and Director of the Superhuman Computing Lab. His research examines how technology can be used to enhance people's physical, sensory, and creative abilities. Dr. Kane is well known for his pioneering work on how to design new technologies to be accessible to people with varying abilities. In 2016, Prof. Kane received a prestigious Sloan Fellowship.

Welcome to ICS Shaun!

PUBLICATIONS Continued:

Bidwell, L.C., Mueller, R., YorkWilliams, S., Hagerty, S., Bryan, A.D., & Hutchison, K.E. (2018). A Novel Observational Method for Assessing Acute Responses to Cannabis: Preliminary Validation Using Legal Market Products. Cannabis and Cannabinoid Research, 3(1), 35-44.

Bidwell, L.C., Karoly, H.C., Thayer, R.E., Claus, E.D., Bryan A.B., Weiland, B.J., YorkWilliams, S., & Hutchison, K.E. (2018). DRD2 Promoter Methylation and Measures of Alcohol Reward: Functional Activation of Reward Circuits and Clinical Severity. Addiction Biology. 1.

Bidwell, L.C., Balestrieri, S.G., Colby, S.M., Knopik, V.S., & Tidey, J.W. (2017). Abstinence-Induced Withdrawal Severity among Adolescent Smokers With and Without ADHD: Disentangling Effects of Nicotine and Smoking Reinstatement. Psychopharmacology.

Bidwell, L.C., Karoly, H.C., Hutchison, K.E., & Bryan, A.D. (2017). ADHD Symptoms Impact Smoking Outcomes and Withdrawal in Response to Varenicline Treatment for Smoking Cessation. Drug and Alcohol Dependence, 179, 18-24. doi: 10.1016/j.drugalcdep.2017.06.020.

Bidwell, L.C., Gray, J.C., Weafer, J., Palmer, A., de Wit, H., & MacKillop, J. (2017). Genetic Influences on ADHD Symptom Dimensions: Examination of A Priori Candidates, Genome-wide Variation, and SNP Heritability. American Journal of Medical Genetics, Part B, 174(4), 458-466.

Bidwell, L.C., Marceau, K., Brick, L., Karoly, H.C., Palmer R.H.C., Todorov, A., Heath, A.C., & Knopik, V.S. (2017). Prenatal exposure effects on early adolescent substance use: A genetically-informed Bayesian approach. Journal of Studies on Alcohol and Drugs.

Schneider, V. I., Healy, A. F., Kole, J. A., & Barshi, I. (2018). Does spatial information impact immediate verbatim recall of verbal navigation instructions? Psychonomic Bulletin & Review, 25, 681-687.

ICS GRADUATE STUDENTS Recognized

2017-2018 Graduate Student Awards from the Department of Computer Science.

Srinjita Bhaduri: Outstanding Service Award
Stephen Hutt: Outstanding Service Award
Rick Parker: Outstanding GPTI Award

ICS STUDENT PRESENTATIONS

Hinojosa, L. (2018, April). Encountering and Becoming Role Models Underrepresented in STEM. Presented at the Annual Meeting of the American Educational Research Association (AERA) (poster). New York.

Hinojosa, L., Swanson, R., & Polman, J. L. (2018, April). Citizen science identity: Becoming citizen scientists in a museum-based genetics of taste program. Presented at the Annual Meeting of the American Educational Research Association (AERA) (roundtable). New York.

ICS Fellows Awards

Professor Kent Hutchison:
RSA (Research Society on Alcoholism) Marlatt Mentorship Award

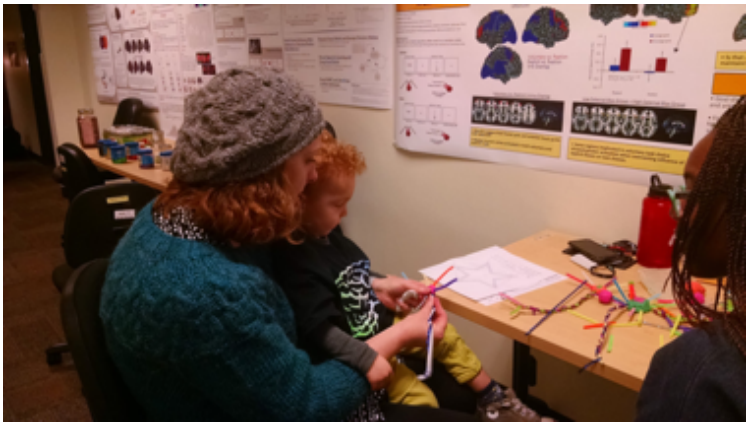
Professor Angela Bryan:
May 2017 2016-2017 Outstanding Faculty Mentor Award, University of Colorado Boulder

Assoc Rrch. Prof. Cinnamon Bidwell: Fulker Award, Outstanding Contributing Paper/Special Issue, published in Behavior Genetics (2017)

Brain Awareness Week cont.

The grand finale for Brain Awareness Week was the Community Open House evening held at our Center for Innovation and Creativity. The corridors of CINC were packed with families, friends, faculty, and research teams engaged in an amazing array of hands-on activities, including playing with hoverboards instrumented to support physiological studies, using eye tracking software, experiencing what it is like to hear via a cochlear implant, and making colorful models of neurons. Visitors could also participate in tours of the fMRI imaging facility and the Mobile "CannaVan" Lab operated by CU Change/REACH. One community member left the event saying "This research is incredible! Everyone should be here!"

Visitors creating a model of a neuron constructed out of pipe cleaners and modeling clay at Community Brain Day during Brain Awareness Week 2018



Planning for Brain Awareness Week 2019 will begin in the fall.
Please contact
Nicole.Speer@colorado.edu or Yasko.Endo @colorado.edu
if you are interested in participating in or sponsoring next year's events.

Dr. Monika Fleshner Receives

First Research Excellence Award from CU REACH

Dr. Fleshner was recently awarded $3200 to support a pilot study investigating the potential for CBD to ameliorate the effects of stress, such as anxiety and problems sleeping.

REACH
Research, Education, & Application: Cannabinoids and Health

This was the first grant made through the newly created REACH Research Excellence Award, which is supported by private donations to CU REACH. CU REACH hopes to support two award cycles per year, in the Fall and Spring, with the aim of furthering REACH's mission of "expanding [the] ability for investigators to access pilot funding and to raise and accept funding" for important topics in Cannabis across disciplines. Funds were awarded based on peer review of submitted proposals by REACH members and scored on significance, approach, potential for future funding, budget, and overall impact.

What makes the REACH Research Excellence Award unique is that awardees who are able to secure future funding based on pilot research enabled by the award agree to return double the award amount to the REACH Fund. This mechanism was built into the award by REACH members in an effort to continue to support the endowment of the fund for use by future researchers. Any parties interested in contributing to the fund or who wish to learn more about REACH can visit the website at https://www.colorado.edu/center/reach

Alice Healy

College Professor of Distinction

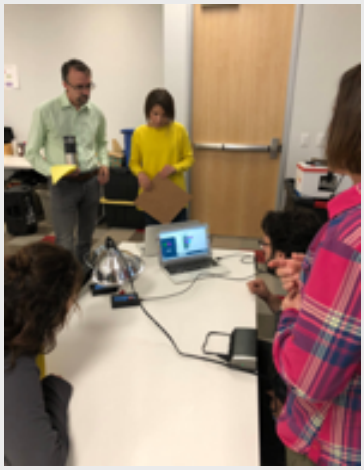
to Retire

It is with both happiness (for Alice) and sadness (for us) that Alice Healy is retiring this year. Alice has been a tireless support to the Institute of Cognitive Science since joining the CU Boulder community many years ago as faculty in the Department of Psychology and Neuroscience and Fellow in ICS.

Alice was our first Director of Academic programs, first establishing certificate programs in cognitive science, then working with the ICS and CU administration to create the combined Ph.D. program, which was the first of its kind in Colorado and the model for others that came later. This innovative program allows students from one of our participating departments to broaden their training in a manner that embraces interdisciplinary approaches to studying cognitive science. Her students have participated in our ICS academic programs since their inception and have thus enriched our institute.

As Mike Mozer noted, as a colleague and collaborator Alice taught all of ICS what it means to be a cognitive psychologist. Her standards for experimental design, inference from data, and precision in writing raise the bar for everyone who has had the good fortune to collaborate with her or to have her on a thesis committee. Some of us focus on the big questions and don't sweat the details. Alice focuses on the big questions while sweating the details. If anyone plays fast and loose with data, Alice snags them. She has often generously given her time to review a paper, thesis or proposal, offering detailed and insightful constructive comments for improvements.

In 2005, Alice established one of our longstanding, vibrant Centers, The Center for Research on Training (CRT). As the Director of this center she has served as an ex-officio member of the ICS Executive Committee. Alice has always been there to help when we need her, including serving on our faculty hiring committees, and actively participating in new initiatives as they emerge. Alice's wisdom and tireless support of ICS will be sorely missed. In honor of her dedication to the institute, ICS has made her an Emerita Institute Faculty member. We wish her all the best in her new life chapter, which we hear will include active collaboration with her last and former students —that's Alice!



SchoolWide Labs:

Using Environmental Sensors to Investigate the School

By Alex Gendreau,
Joint PhD Candidate in Computer and Cognitive Science

The SchoolWide Labs project (NSF #1742053 and #1742046) is wrapping up its first year after the completion of a successful pilot study and professional development workshop series. The project is a collaborative effort between CU, Denver Public Schools (DPS), SparkFun, and Utah State University funded by a three-year, two million dollar grant from the National Science Foundation's STEM+Computing (STEM+C) program. The project involves integrating physical sensing systems controlled by the students into the classroom to measure things such as humidity and carbon dioxide levels in an effort to move beyond traditional science labs to school wide investigations. These investigations promote not only scientific knowledge acquisition but also computational thinking through the interaction with the sensor system and data analysis. To support the use of the sensor system in the classroom, teacher professional development workshops are held throughout the school year and summer to design curriculum that integrates the sensor system with the next generation science standards and computational thinking.

Working with a teacher advisory board (see accompanying photo), the research team developed a week long pilot study to test the first version of the sensor system in a schoolwide investigation for conditions that promote mold growth. Students used a combination of observations and sensor data (temperature and humidity) to determine the favorability of mold growth at their chosen location (i.e. the boiler room or under the drinking fountain). The students found the investigation engaging, with one group of students developing a mold remediation and monitoring plan when they found actual mold during their investigation, which they shared with the principle and custodial stuff. We collected feedback about using the sensor system and desired functionality that will be used to guide the development of an updated version that will be used during the 2018-2019 school year with an expanded group of teachers. The research team is looking forward to developing more involved curriculum using the updated version of the sensor system at the summer design workshop with an expanded cohort of teachers.

Dissertation Spotlight:

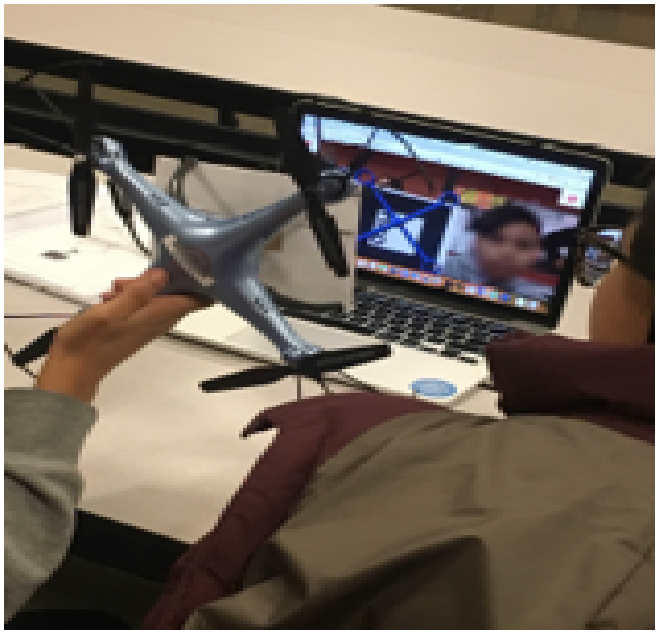
Using Augmented Reality and 3D Modeling to Enhance Spatial Thinking Skills

By Srinjita Bhaduri, Joint PhD Candidate in Computer and Cognitive Science

The objective of my work is to study how Augmented Reality (AR) can be used to enhance 3D modeling ability and spatial thinking skills in middle and high school students. 3D modeling and printing is transforming manufacturing processes, making small scale and just-in-time manufacturing feasible. While these new technologies are very powerful and flexible, they raise cognitive challenges for learners who need to be able to perform a variety of mental operations on their evolving models and designs to assess their feasibility and utility. My research studies ways in which augmented reality technology can be coupled with 3D modeling to scaffold and enhance students' spatial thinking and reasoning processes.

This research is being conducted in the context of an after-school engineering program - Engineering Experiences (NSF #1513102 and #1510922) - built around Unmanned Aerial Vehicles (UAVs/ Drones). This program has been designed and implemented by an interdisciplinary partnership between the University Corporation for Atmospheric Research(UCAR), CU Boulder, and the I Have A Dream Foundation (IHAD). Youth in the program are tasked with understanding the capabilities of UAVs and using them to address a societal need: delivering supplies via drone to a remote village impacted by a natural disaster. The 15 week UAV curriculum is developed around a realistic storyline in which youth consider the needs of a small town to monitor conditions of a nearby disaster. Throughout the sessions, conditions change resulting in youth needing to plan and implement survey and rescue activities using the UAVs.

This school year, I conducted a pilot study with low income middle school youth from the I Have Dream Program who were participating in the Engineering Experiences after school program. I created a new design challenge where youth used an AR app (3DAR Visualizer) to augment 3D models of UAV attachments, which they then printed and mounted onto their UAVs to test their designs. These attachments are needed to support different aspects of the natural disaster storyline. For instance, students were asked to make skyhooks for carrying water and supplies that can be attached to their drones. I observed that youth were able to better understand the strengths and weaknesses of pre-designed 3D models with the help of the AR application, and they made better and more informed design decisions that resulted in successful delivery of supplies to the disaster area. In Summer 2018, I will be teaching a CU Science Discovery summer camp on 3D modeling for high school students where I will have another opportunity to implement this design challenge and collect additional research data.



ICS Certificates Awarded in May 2018

Interdisciplinary Undergraduate Training Program in Cognitive Science

Bethany Baker
Madison Phillips
Lita Rattanakit
Alyssa Zinser

Interdisciplinary Graduate Training Program in Cognitive Science

Judith Carlisle
Amelia Humphrey
Benjamin Kultgen
Joseph Wilson

Visiting Scholar Finds Gold Cache and Makes Us All Proud to Know Him

Dr. Ahmed Mohamed Fahmy Yousef has been a visiting Fulbright scholar in ICS for the past academic year. As he was preparing to return home to Egypt, he went to a local thrift store to get another suitcase on the advice of friends. When he got home and started to pack, he found quite a surprise hidden in the suitcase: nearly two dozen old gold coins! With only a couple of weeks remaining on his visa, Dr. Yousef applied all of his investigative skills to find the original owner and return the coins worth approximately $10,000. Way to go Ahmed! The full story is in the Daily Camera at http://www.dailycamera.com/news/boulder/ci_31904485/visting-egyptian-scholar-chances-gold-coin-cache-finds

Donations to ICS

We would like to thank the following individuals for their generous contributions to the Institutewhich help to support our research programs and the professional development of our early career scholars and students.
All contributions were received between December 2017- May 2018.

ICS FUND DONORS

Dr. Ogheneovo Dibie
Dr. Arafat Sultan and matching company gift
Mr. Eric Worden
Dr. Candice Miller & Dr. Kevin Markey
Dr. Dean Wyatte
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Dr. Gregg Brickner
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Mrs. Molly & Mr. Chris Allen
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THE BIDWELL LAB FUND

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THE CU REACH FUND

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Ms. Margaret Blazek
Mr. Thomas Yoksas

ICS Building Community & Collaboration Fund

Dr. Tammy Sumner and Mr. Michael Wright

The Chronic Back Pain Study Fund

Psychophysiological Disorder Association Gift (PPDA)
Clarke Family
Anonymous Donor Gift