

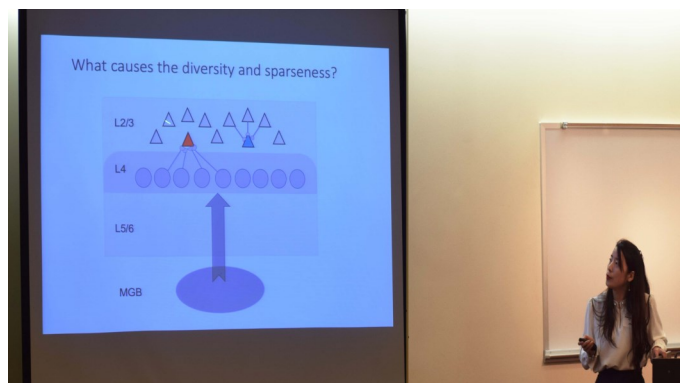
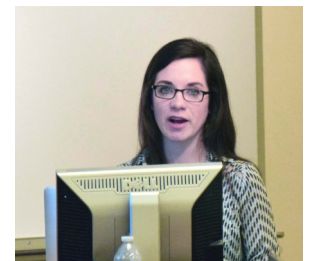
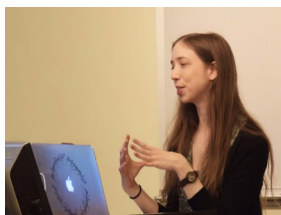
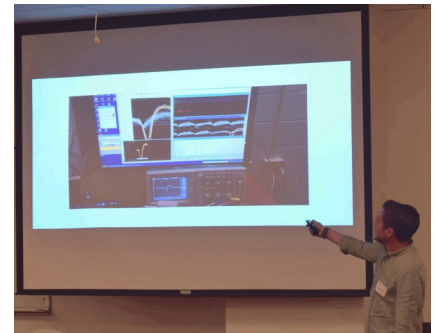
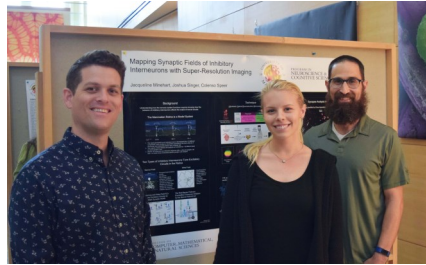
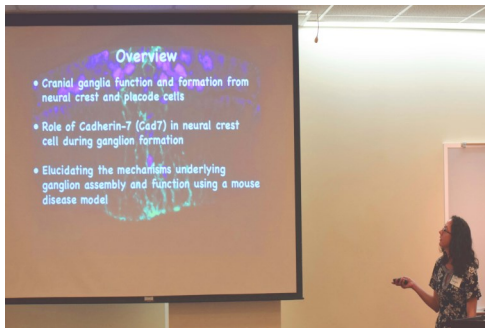
NACS Newsletter

Volume 4

May 2019

NACS Research Day

Research Day is an annual event in April in which we showcase our outstanding research to the broader NACS community. This year's event took place on Friday, April 26, from 9:30 a.m. to 2 p.m. in BRB 1103. Over 60 NACS faculty, students, and community members attended. **Dean Greg Ball and Dr. Josh Singer** gave the welcome. The day featured morning talks on Development and Aging presented by **Dr. Xiangying Meng, Dr. Lisa Taneyhill, Dr. Tracy Riggins, and Maureen Bowers**, which was followed by a poster presentation and lunch. The afternoon featured talks on Challenges and Interventions presented by **Dr. Adam Brockett, Dr. Alexander Shackman, Diana Alkire, and Dr. Jan Edwards**.



NACS Town Hall

The first annual Town Hall was held on January 25, 2019 in the Biology-Psychology Building. The purpose of the Town Hall was to bring the NACS community together to talk about various aspects of the NACS program as well as future directions. The event included overviews by NACS student committee leaders Uzma Javed and Shakeera Walker (student seminars); Diana Alkire, Nicole Catanzarite, and Zoe Ovans (outreach); and Ben Rickles (methods workshops). It also included overviews and discussions by Nan Ratner and Lauren Weiss (graduate training); Jonathan Simon, Tawen Ho, and Anna Kraemer (website); Ed Bernat and Maureen Bowers (recruitment), Matt Roesch (admissions); and Josh Singer (building community). NACS plans to conduct yearly Town Hall meetings in January.

NACS Innovation Symposium

The Innovation Symposium is an event with a broad theme relating to areas of interest represented in Neuroscience and Cognitive Science. This year's event was held on July 19 and the theme was "Neuroscience in Industry." Talks were presented by four innovative leaders in the field, who discussed cutting edge research and tools:

- * **Dr. Timothy Jarsky** from the Allen Institute for Brain Science, who is part of a team working to map and characterize micro circuits in the mouse visual cortex.
- * **Dr. George Spirou**, who with his colleagues, created syGlass, a virtual reality software in viewing, annotating, and analyzing images for 3D reconstruction of brain structure.
- * **Dr. Daniel Bryden** (an alum of NACS), who is a staff scientist at Booz Allen Hamilton
- * **Dr. Jason Sherwin**, cofounder and CEO of deCervo, a neuro-tech startup that measures and improves cognitive performance.

NACS Innovation Symposium *Neuroscience in Industry*

9:00am	Breakfast, Welcome, Overview
9:45am	Dr. Timothy Jarsky, Allen Institute for Brain Science
10:20am	Dr. George Spirou, syGlass
11:10am	Dr. Daniel Bryden, Booz Allen Hamilton
11:45 am	Dr. Jason Sherwin, deCervo
12:20pm	Lunch
1:00pm	Speaker panel (for students)
3:00pm	Afternoon Tea





Dr. Nan Bernstein Ratner is a Professor in the Department of Hearing and Speech Sciences. She is a Fellow and Honors recipient of the American Speech, Language and Hearing Association (ASHA). Nan currently serves as the Graduate Director for the NACS Program.

I am fairly recent to the NACS graduate director position, having come on board after Richard Payne retired last year. But I feel rather at home, both as a faculty member and director, in a program such as NACS, because I myself am the product of an inter-disciplinary program. Years ago (when dinosaurs still roamed), I chose to go to a doctoral program in psycholinguistics that combined faculty and students from linguistics, psychology, allied health, education and other fields. I enjoyed it so much that it felt hard to graduate: each seminar, each class, each presentation gave me new perspectives on issues, and often whole issues I had no prior perspective on. It was like combining a gourmet meal, when I worked closely with my mentors, with an endless buffet that was always open, tempting me to take just one more bite of knowledge from everything going on around me.

I have been at Maryland since NACS launched, very proud that our campus had the vision to enable this cross-college, cross-departmental program, despite its real day-to-day challenges. I like to think that the potential in NACS to create exciting and new knowledge definitely outweighs the labor that NACS faculty undertake to solve financial and academic questions that don't arise when people just hunker down inside a single department. Hopefully, you will agree.

Certainly, NACS has evolved since its beginning. A number of its earlier faculty and students were from what is now CMNS [even the colleges have changed names and composition]; our distinguished Language Science program, which now attracts a number of NACS doctoral candidates, was not yet born. NACS now officially resides in BSOS. Changes in faculty have meant changes in policies and procedures – like the NACS students, the program is a living, ever-changing and evolving entity. We hope that these changes improve the NACS experience for everyone, and continue to welcome feedback and suggestions from both faculty and students that aspire to achieve this end. If you have any, feel free to pick up the phone to chat, or drop an email.

Nan Ratner
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nratner@umd.edu



Dr. Bartlett Russell (NACS PhD 2013) is a program manager at the Defense Advanced Research Projects Agency (DARPA) Defense Science Office.

Tell us about your current position and how you think the training experience in the NACS program helped you prepare for it.

I recently joined the Defense Advanced Research Projects Agency (DARPA) Defense Science Office (DSO) as a program manager where I will be developing and managing research programs to help AI systems better understand humans, and humans better understand AI tools and capabilities. DARPA's mission, as a part of the Department of Defense, is to invest in high-risk, high-payoff research for the United States. For the five years prior, I was senior program manager leading the Human Systems and Autonomy (HSA) research area in Lockheed Martin's (LM's) Advanced Technology Laboratories (ATL). ATL is LM's internal research and development (R&D) center that serves all of the major business units by developing capabilities for both enabling today's defense needs and for generation-after-next platforms. We bridge the gap between basic and applied research and often do so by partnering with Universities - including the University of Maryland - to bring the most rigorous and cutting edge research to the field. The HSA lab is an interdisciplinary team of cognitive scientists, neurophysiologists, software engineers, and experts in artificial intelligence and machine learning who together create solutions that optimize human-machine partnerships.

When starting in NACS I knew I wanted to return to industry, and in particular in defense; I did not anticipate how well NACS' multidisciplinary approach would prepare me for the fast paced requirement of keeping up with constantly-evolving areas tangential to, but critical for advancing, neuro- and cognitive sciences in applied settings. My research focus on how stress affects attention control has been directly relevant to our research challenges, but beyond that, the core curriculum, collaboration across departments, and the Friday morning guest lectures provided a strong foundation across the whole field. I feel I can be more flexible and adaptive, and I have a broader foundation than what is standard issue from most Ph.D. programs. NACS also provided examples of how powerful collaborative work can be - such as the partnership between Dr. Avis Cohen, Dr. Daphne Soares and the robotics laboratory in the Engineering school, or that between Dr. Brad Hatfield's lab and the U.S. Air Force Academy, and the ongoing work across campus with area institutions like the National Institutes of Health. And in an age where Machine Learning is the forefront of technological advancement in almost any field, while simultaneously the "reproducibility crisis" is bringing into question long-accepted findings in behavioral science, I especially appreciate the advanced coursework in statistics for building confidence that the research we provide in support of national defense will be reliable. Finally, the ample opportunities to attend, participate, and present at conferences and other events have been indispensable for being able to talk to the press at LM's annual media day, presenting in front of large tech crowds at South By Southwest (SXSW), and when providing subject matter expertise on National Geographic's Brain Games (<https://www.dailymotion.com/video/x3zonzp>). Overall, NACS provided me a fabulous education that included both the depth expected of a doctorate, but with the added breadth that is critical for transitioning bench research into real-world solutions.



Dr. Erika Hussey (NACS PhD 2013) is a Cognitive Scientist at the Natick Soldier Research, Development, and Engineering Center (NSRDEC) and the Center for Applied Brain Cognitive Sciences (CABCS) at Tufts University.

Tell us about your current position and how you think the training experience in the NACS program helped you prepare for it.

I graduated from the NACS program in 2013 after training in several labs in the Departments of Psychology and Linguistics and at the Center for Advanced Study of Language. My graduate work focused on using cognitive training interventions to improve memory and language processing abilities. My results have been published and presented at several internationally recognized outlets. In addition to my academic contributions, I committed several years of service to the NACS program by serving on the NACS Executive Committee and founding the NACS Outreach Committee. Upon earning my doctorate, I completed a post-doctoral appointment at the University of Illinois at Urbana-Champaign, where I established collaborations with researchers at the Beckman Institute for Advanced Science and Technology and in the Departments of Psychology, Linguistics, Educational Psychology, and Kinesiology. Three years of experience with neuromodulation and neuroimaging approaches segued into a position as a scientist for the U.S. Army in 2016.

I am currently in my third year as a Cognitive Scientist at the Natick Soldier Research, Development, and Engineering Center (NSRDEC) and the Center for Applied Brain and Cognitive Sciences (CABCS) at Tufts University. In this role, I manage scientific projects with researchers from diverse disciplines such as biochemistry, mechanical and electrical engineering, computer science, occupational therapy, nutrition, and human factors. Leveraging my years of leadership experience, I now head multiple high-visibility Army Science & Technology efforts including serving as a Program Officer on the Department's Neurostimulation program and co-founding a NATO Exploratory Team on Cognitive Neuroenhancement.

The NACS program gave me the foundation and confidence to seek out and establish extensive expertise in multiple basic and applied cognitive science domains and to address knowledge gaps by applying principles and methodologies across traditional disciplinary boundaries. My current research and development efforts apply my expertise as a cognitive scientist to Soldier performance, and I have recently spearheaded the Department's largest interdisciplinary field study on Soldier performance, which will yield the development of new wearable sensors and technologies that detect cognitive and physical changes over time.

Recent Student Publications

(NACS students and alumni in **bold** & *italics*; faculty in **bold**)

Alkire, D., Levital, D., Warnell, K.R., & **Redcay, E.** Social interaction recruits mentalizing and reward systems in middle childhood. *Human Brain Mapping* (2018).

Francis, N.A., Winkowski, D.E., Sheikhattar, A., **Armengol, K.**, **Babadi, B.**, & **Kanold, P.** Small Networks Encode Decision-Making in Primary Auditory Cortex. *Neuron* (2019).

Bridi, M., Pasquale, R., Lantz, C., **Gu, Y.**, **Borrell, A.**, Choi, S., **He, K.**, Tran, T., Hong, S., Dykman, A., Lee, H., **Quinlan, E.**, & Kirkwood, A. Two distinct mechanisms for experience-dependent homeostasis. *Nature Neuroscience* (2018).

Ellis, J.S., Watts, A.T.M., Schmidt, N., & **Bernat, E.M.** Anxiety and feedback processing in a gambling task: Contributions of time-frequency theta and delta. *Biological Psychology* (2018), 136, 1-12.

Park, L., Furey, M., Nugent, A., Farmer, C., **Ellis, J.S.**, **Szczepanik, J.**, Lener, M., & Zarate Jr., C.A. Neurophysiological Changes Associated with Antidepressant Response to Ketamine Not Observed in a Negative Trial of Scopolamine in Major Depressive Disorder. *Int Neuropsychopharmacol* (2018).

Fishbein, A.R., Lawson, S.L., **Dooling, R.J.**, & **Ball, G.F.** How Canaries Listen to Their Song: Species-Specific Shape of Auditory Perception. *Journal of the Acoustical Society of America* (2019).

Fishbein, A.R., Löschner, J., Mallon, J.M., & Wilkinson, G.S. Sex-Specific Responses to Synthetic Songs in Duetting Suboscine Passerine. *PLOS ONE* (2018).

Lawson, S.L., **Fishbein, A.R.**, Prior, N.H., **Dooling, R.J.**, & **Ball, G.F.** Relative Salience of Syllable Structure and Syllable Order in Zebra Finch Song. *Animal Cognition* (2018).

Kuokkanen, P.T., **Kraemer, A.**, Kempter, R., Köppl, C., & **Carr, C.E.** Auditory Brainstem Response Wave III is Correlated with Extracellular Field Potentials from Nucleus Laminaris of the Barn Owl. *Acta Acustica United with Acustica* (2018), 04:874-877.

Mallikarjun, A., Shroads, E., & **Newman, R.S.** The cocktail party effect in the domestic dog (*Canis familiaris*). *Animal Cognition* (2019), 22 (3), 423-432.

Moraczewski, D., & **Redcay, E.** Inter-subject synchrony as an index of functional specialization in early childhood. *Scientific Reports* (2018).

Kirby, L.A., **Moraczewski, D.**, Warnell, K., & **Redcay, E.** Social network size relates to developmental neural sensitivity to biological motion. *Developmental Cognitive Neuroscience* (2018).

Ogg, M., **Moraczewski, D.**, **Kuchinsky, S.E.**, & **Slevc, L.R.** Separable neural representations of sound sources: Speaker identity and musical timbres. *Neuroimage* (2019), 191, 116-126.

Shaw, E.P., **Rietschel, J.C.**, Hendershot, B.D., Pruziner, A.L., **Miller, M.W.**, **Hatfield, B.D.**, & **Gentili, R.J.** Measurement of attention reserve and mental effort for cognitive workload assessment under various task demands during dual-task walking. *Biological Psychology* (2018), 134, 39-51.

Gentili, R.J., Jaquess, K.J., **Shuggi, I.M.**, **Shaw, E.P.**, **Oh, H.**, Lo, L.C., **Tan, Y.Y.**, Domingues, C.A., Blanco, J.A., **Rietschel, J.C.**, **Miller, M.W.**, & **Hatfield, B.D.** Combined assessment of attentional reserve and cognitive-motor effort under various levels of challenge with a dry EEG system. *Psychophysiology* (2018), 55, e13059.

Becker, L., Schnee, M.E., Niwa, M., **Sun, W.**, Maxeiner, S., Talaei, S., **Kachar, B.**, Rutherford, M.A., & Ricci, A.J. The presynaptic ribbon maintains vesicle populations at the hair cell afferent fiber synapse. *eLife* (2018).

Alfini, A.J., **Weiss, L.R.**, Nielson, K.A., Verber, M.D., & **Smith, J.C.** Resting Cerebral Blood Flow After Exercise Training in Mild Cognitive Impairment. *J Alzheimers Dis* (2019), 67(2), 671-684.

Won, J., Alfini, A.J., **Weiss, L.R.**, Michelson, C.S., **Callow, D.D.**, Ranadive, S.M., **Gentili, R.J.**, & **Smith, J.C.** Semantic Memory Activation After Acute Exercise in Healthy Older Adults. *Journal of the International Neuropsychological Society* (2019).

Congratulations Recent Graduates!

Fall 2018

Clare Sengupta
Advisor: Elizabeth Quinlan

Spring 2019

Jessica Ellis
Advisor: Ed Bernat

Summer 2019

Mattson Ogg
Advisor: Bob Slevc

Dustin Moraczewski
Advisor: Elizabeth Redcay

Awards and Accomplishments

Behtash Babadi, Patrick Kanold, and others are part of a five-year, \$20 million project titled "Readout and control of spatiotemporal neuronal codes for behavior." The project aims to improve understanding of brain function by providing a unifying account of how brain activity and behavior are mutually informing.

Christian Brodbeck, Jonathan Simon, and L. Elliot Hong published an article "Rapid Transformation from Auditory to Linguistic Representations of Continuous Speech" in the journal, *Current Biology*. The article also caught the attention of the *UK Daily Mail*, "Why you can't listen to two people speak at once."

Karen Carleton, co-authored an article "Vision using multiple distinct rod opsins in deep-sea fishes" in which she and others discovered a previously unknown visual system that may allow color vision in deep, dark waters where fish are generally thought to be colorblind. The research appears on the cover of the May 10, 2019, issue of the journal *Science*.

Catherine Carr and Lutz Kettler had a paper accepted in the *Journal of Neuroscience* on Interaural Time Difference (ITD): "Neural maps of interaural time difference in the American alligator: a stable feature in modern archosaurs."

Kevin Dunbar was named a fellow of the Association for Psychology Science in the field of Biological/Neuroscience. Fellow status is bestowed by the APS Board of Directors annually, in recognition of outstanding contributions to the science of psychology in research, teaching, service, or application.

Diego Elgueda, Jonathan Fritz, and Shihab Shamma, along with several others from ISR and the Oregon Hearing Research Center, published a new article "State-dependent encoding of sound and behavioral meaning in a tertiary region of the ferret auditory cortex" in *Nature Neuroscience*.

Ken Grant has had several publications recently, including chapters in *The Auditory Perspective*. He's also given podium presentations at the Midwinter Meeting of the Association for Research in Otolaryngology, and poster presentations at the American Auditory Society. In addition, he served on a grant review panel for the Veteran's Association, and was promoted to Professor of Surgery, Uniformed Services University of Health Sciences (USUHS).

Kazuo Hashimoto and Masaaki Torii received an R01 grant from the NIH/NIAAA to study the mechanisms and treatments of learning deficits in Fetal Alcohol Spectrum Disorders.

Jared Novick was awarded the 2018 Excellence in Teaching Award for tenure-track faculty category from the College of Behavioral and Social Sciences. (BSOS) The Excellence in Teaching Award recognizes tenure-track and professional track faculty members and graduate students who have made distinctive contributions to student instruction within BSOS.

Devon Payne-Sturges published a paper in *The American Journal of Public Health* on the neurodevelopmental harms of air pollution and policy options to reduce exposures. Dr. Payne-Sturges was also awarded an NIH grant to explore how exposure to social and environmental stressors affects child neurological development.

Nan Ratner received \$2.1 million from NIDCD to develop, validate and distribute software to improve assessment of children's expressive language development. The project is called CLASP (Child Language Assessment Project).

Tracy Riggins, in collaboration with **Rebecca Spencer** at the University of Massachusetts at Amherst, received federal funding from the National Institutes of Health (NIH) and the National Science Foundation (NSF) to study the role of sleep and brain development on memory during early childhood, specifically when children transition out of naps. The study will examine whether maturation of memory-related brain structures (specifically, the hippocampus) results in more information being retained without interference, reducing the need for frequent consolidation, which underlies the transition out of naps.

Alexander Shackman and colleagues recently published a study in *Scientific Reports* entitled, "How Alcohol Dilutes Anxiety," which identifies for the first time how alcohol affects the central amygdala, an area of the brain related to fear and anxiety. The study allows researchers to understand how alcohol affects areas of the brain that are involved in social cues.

Carson Smith published an article in the *Journal of the International Neuropsychological Society* entitled, "Semantic Memory Activation After Acute Exercise in Healthy Older Adults." The study showed that exercise increased activity in the regions of the brain that affect semantic memory. The article got the attention of The New York Times which published an article, How Exercise Affects Our Memory based on Carson's article.

Jason Triplett received an R21 entitled, "Role of Hip signaling in parallel circuit formation." The main focus of the project is the work of Uzma Javed, a third year NACS student.

NACS Faculty awarded BBI Seed Grants in FY19

Rochelle Newman, Polly O'Rourke, & Kristin Slawson: *The impact of transcutaneous vagus nerve stimulation on therapy outcomes in aphasia*

Colenso Speer, Majib M. El-Sayed, & Peter Nemes: *Molecular connectomics of activity-dependent circadian circuit development*

Ed Bernat & Ming Hu: *Nexus between sustainable buildings and human health: a neuroscience approach*

Ed Bernat & Rachel Rosenberg Goldstein: *Moving beyond the "Yuck Factor": measuring brain responses to water reuse terms and determining if natural environmental images change responses*

Ellen Lau & Jonathan Simon: *Neural representations of continuous speech and linguistic context in native and non-native listeners*

Volunteer for Outreach!



The NACS Outreach Committee is a student-led program to bring neuroscience and cognitive science into the community. By taking science to schools and other community venues, they are fostering a potential interest in science for future generations and enhancing their abilities to communicate science to a diverse audience.

If you are interested in participating, please contact NACS students Diana Alkire (diana@umd.edu), Nicole Catanzarite (ncatanz@umd.edu) or Zoe Ovens (zovans@umd.edu).

Support NACS!

We would like to take this opportunity to remind you that you can donate to the NACS Program Gift Fund. The NACS Gift Fund is a very important source of funding for our program. We use the funds to pay for expenses that we cannot pay for using our state funds, such as appreciation gifts or awards and our recruitment event.

Donating is easy and simple. To donate go to our website and click on "Give to NACS."

Upcoming NACS Events!

Retreat

September 6

Town Hall

January 24

NACS-Fest

February 13 & 14

Research Day

April 24



PROGRAM IN
NEUROSCIENCE &
COGNITIVE SCIENCE

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Grants Development Specialist: Joo Yun Jun, Ph.D. (jyjun@gmail.com)

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