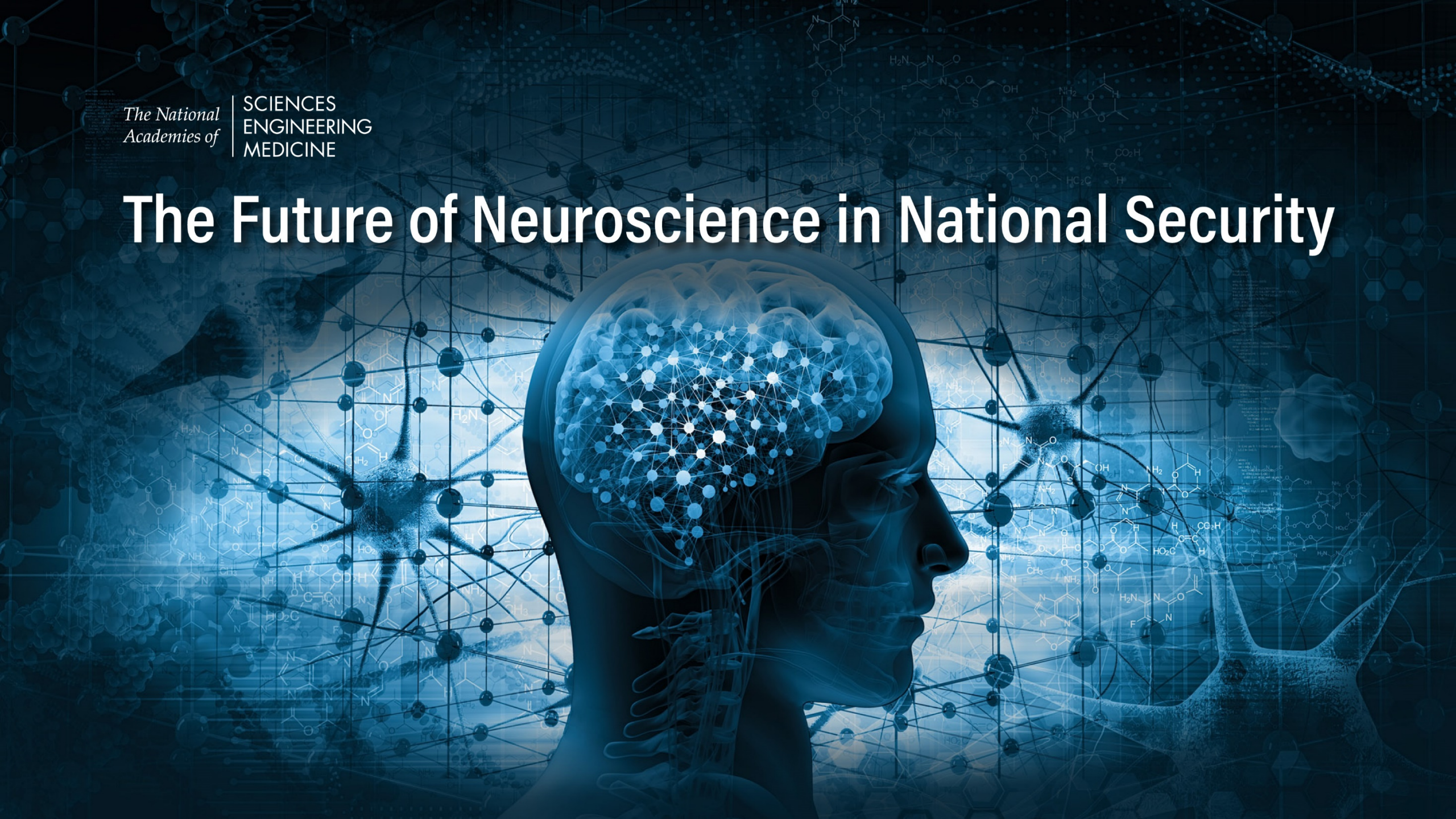
The National Academies of SCIENCES ENGINEERING MEDICINE

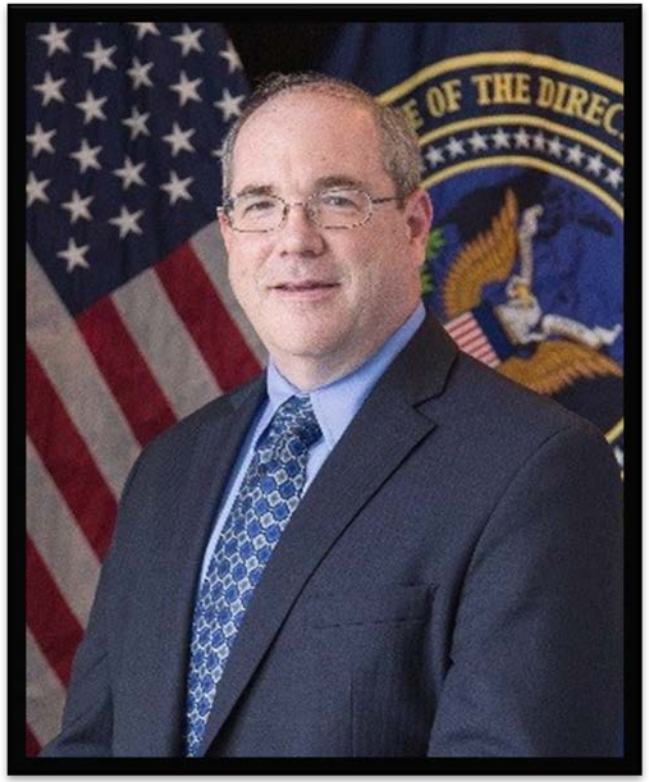
The Future of Neuroscience in National Security



AGENDA

*All times are in EDT

11:00 - 11:10	Introduction and administrative announcements, Dr. Joseph Czika, NASEM
11:10 - 11:20	Welcome from the Office of the Director of National Intelligence, Mr. Dan Flynn, ODNI
11:20 - 11:30	Welcome from the National Academies of Sciences, Engineering, and Medicine, Dr. Scott Weidman, NASEM
11:30 - 12:00	**Thinking War: Neuroscience and the Military**, Maj. Gen. Robert Latiff, USAF, Ret., R. Latiff Associates
12:00 - 12:30	**The Future of the Human Brain**, Dr. Newton Howard, MIT/GTOWN/OXON
12:30 - 1:00	**Modulation of Neural Function with Electronic, Optical, and Magnetic Tools**, Dr. Polina Anikeeva, MIT
1:00 - 1:30	**Behavioral Training Methods to Enhance Perceptual and Cognitive Skills**, Dr. C. Shawn Green, UW-M
1:30 - 2:00	BREAK
2:00 - 2:30	**Mind Wars: Brain Science and the Military in the 21st Century**, Dr. Jonathan Moreno, UPenn
2:30 - 3:00	**Predicting and Influencing Behavior by Way of the Autonomic Nervous System**, Dr. Polly O'Rourke, ARLIS
3:00 - 3:30	**Air Force Research Perspective on Applications of Neuroscience**, Dr. James Christensen, AFRL
3:30 - 4:00	**Human Behavior as the Next Frontier for AI**, Dr. Tom Griffiths, Princeton
4:00 - 5:00	Panel session moderated by Maj. Gen. Robert Latiff
5:00	ADJOURN



Dan Flynn
ODNI

Dan Flynn was selected to be the first director of the Office of the Director of National Intelligence's IC Net Assessments Division. In this position, Mr. Flynn is responsible for developing forecasts and comparative assessments to identify emerging challenges and opportunities for U.S. intelligence capabilities. Prior to his current assignment, Mr. Flynn was the director of the Global Security Program for the National Intelligence Council's (NIC's) Strategic Futures Group. In this position, he led national-level assessments of long-term and crosscutting military-security issues for senior U.S. policymakers and defense officials. Prior to joining the NIC, Mr. Flynn served in multiple positions at CIA as an analyst and manager responsible for assessments of foreign weapons, technologies, and military innovations. He was a member of CIA's Senior Analytic Service (SAS) and former Chairman of the SAS Council.

From 2004 to 2005, Mr. Flynn served as a senior staff member for *The President's Commission on the Intelligence Capabilities of the United States Regarding Weapons of Mass Destruction*. His duties included leading the Commission's research on the capabilities of the IC to support future U.S. military operations, perform strategic assessments, and conduct scientific and technical analysis.

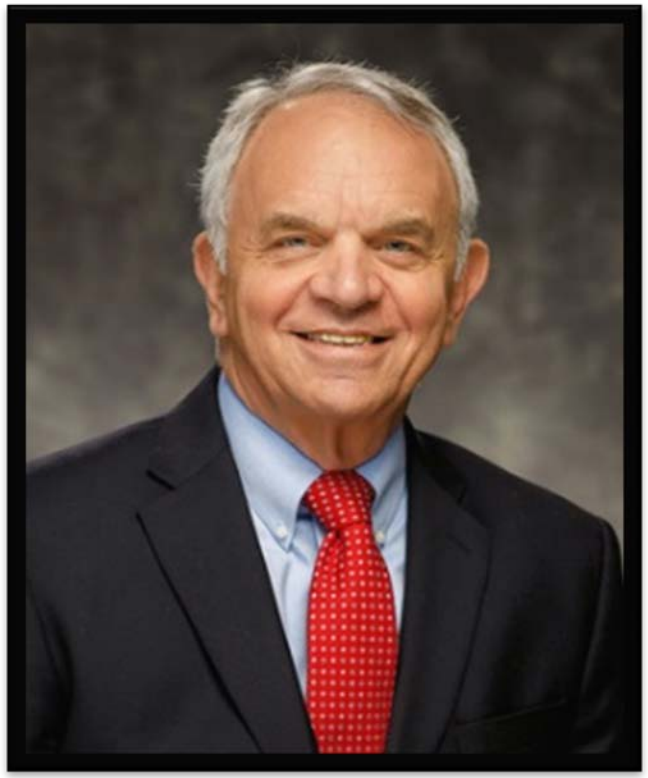
Mr. Flynn is a "Distinguished Graduate" of the National War College where he earned a M.S. in national security strategy. He also earned a B.S. in aerospace engineering from Boston University. Mr. Flynn is an ODNI "Plank Holder."

Scott Weidman

NASEM

Scott Weidman is the acting executive director for the Division on Engineering and Physical Sciences of the National Academy of Sciences. Prior to that he served as director of National Research Council's (NRC) Board on Mathematical Sciences and Analytics (BMSA). He joined the NRC in 1989 with BMSA and moved to the Board on Chemical Sciences and Technology in 1992. In 1996, he established a new board to conduct annual peer reviews of the Army Research Laboratory, which conducts a broad array of science, engineering, and human factors research and analysis, and he later also directed a similar board that reviews the work of the National Institute of Standards and Technology. He rejoined BMSA as its director in 1999. During his NRC career, he has staffed studies on a wide variety of topics related to mathematical, chemical, and materials sciences; laboratory assessments; the nuclear security enterprise; and science and technology policy. Before joining the NRC, he held positions with General Electric, General Accident Insurance Company, Exxon Research and Engineering, and MRJ, Inc.

Dr. Weidman earned B.S.'s in mathematics and materials science from Northwestern University and a M.S. and Ph.D. in applied mathematics from the University of Virginia.



Robert Latiff

R. Latiff Associates

Robert Latiff is the president of R. Latiff Associates and a private consultant, providing advice on advanced technology matters to government, industry, and academia. Dr. Latiff is an adjunct faculty member at the University of Notre Dame and a research professor and adjunct faculty member at George Mason University. Dr. Latiff retired from the U.S. Air Force (USAF) as a major general in 2006. His last active duty assignment was at the National Reconnaissance Office where he was the director of Advanced Systems and Technology and the deputy director for Systems Engineering. He has also served as the vice commander, USAF Electronic Systems Center and Commander of the NORAD Cheyenne Mountain Operations Center. While in the U.S. Army, Dr. Latiff served in both the infantry branch and the ordnance corps, where he commanded a U.S. Army tactical nuclear weapons unit.

Following Dr. Latiff's retirement from the USAF, he became chief technology officer for Science Applications International Corporation's space and geospatial intelligence business. Dr. Latiff is an active member of the Intelligence Committee of the Armed Forces Communications and Electronics Association (AFCEA).

Dr. Latiff earned a Ph.D. and M.S. in materials science and a B.S. in physics all from the University of Notre Dame. He is also a graduate of the National Security Fellows Program at Harvard's JFK School of Government. Dr. Latiff is a recipient of the National Intelligence Distinguished Service Medal and the Air Force Distinguished Service Medal.

Newton Howard
MIT/GTOWN/OXON

Newton Howard is a prolific scientific author and inventor whose career spans government, industry, and academia. He is highly skilled in moving research from the lab to military and commercial applications, including technologies such as Siri, Wi-Fi hot spots, Skype, Google Earth, and Google Translate. He is formerly a government scientist and currently a professor of computational neuroscience and neurosurgery at the University of Oxford and Georgetown University and the director of the Synthetic Intelligence Lab at MIT. Dr. Howard is also the founder of ni2o, Inc., which is developing a novel, artificial-intelligence driven brain-computer interface to treat a wide range of debilitating neurological disorders and to improve cognitive performance. He also founded and sits on the board of two nonprofits: the Howard Brain Sciences Foundation—which funds innovative research initiatives to improve our understanding of the human brain—and C4ADS—which is dedicated to providing data-driven analysis and evidence-based reporting on global conflict and transnational security issues.

Dr. Howard holds advanced degrees in mathematics (Oxford), cognitive informatics (Sorbonne), neurosurgery (Oxford) and a doctorate of medical sciences (Sorbonne). He has made significant contributions to the fields of neuroscience, linguistics and national defense, including the physics of cognition (a mathematical framework for modeling complex medical, economic and security equilibriums), intention awareness (a theory for predictive modeling of naturalistic systems), mood state indicators (an algorithm to model mental processes involved in human speech to predict emotional states), ADAMA (a method of autonomously identifying and contextually understanding metaphors in language), the functional code unit (a method for translating neurological signaling to logical data structures) and most recently, the brain code (a multivariate analytical model designed to extract emergent properties of the brain's neuronal system).

Polina Anikeeva
MIT

Polina Anikeeva is an associate professor of materials science and brain and cognitive sciences at MIT. Her lab focuses on the development of flexible and minimally invasive materials and devices for neural recording, stimulation, and repair.

Dr. Anikeeva earned a B.S. in physics from St. Petersburg State Polytechnic University in 2003. After graduation she spent a year at the Los Alamos National Lab working on quantum dot photovoltaic cells. She then enrolled in a Ph.D. program in materials science at MIT and graduated in January 2009 with her thesis dedicated to the design of quantum dot light emitting devices. She completed her postdoctoral training at Stanford, where she created devices for optical stimulation and recording from neural circuits.

Dr. Anikeeva is a recipient of the NSF CAREER Award, the DARPA Young Faculty Award, the TR35, and the 2018 Vilcek Prize for Creative Promise.

C. Shawn Green

UW-M

C. Shawn Green is an associate professor in the Department of Psychology at the University of Wisconsin-Madison (UW-M). His primary research focuses on developing and evaluating methods to improve individuals' perceptual and cognitive skills. His research program utilizes many reasonably standard approaches in psychology and neuroscience (e.g., psychophysics, fMRI, DWI, EEG, etc.), but also frequently takes advantage of certain modern forms of media (e.g., video games, virtual reality, etc.) in order to better understand how experience influences perceptual and cognitive skills. Dr. Green has authored over 70 peer-reviewed publications in academic journals such as *Nature*, the *Proceedings of the National Academy of Sciences*, *Nature Reviews Neuroscience*, *Neuron*, and *Current Biology*. His publications have collectively been cited over 12,000 times. He has also emphasized disseminating science in more public outlets by writing a cover article for *Scientific American* focused on video games and the brain and by appearing on the Netflix show “Bill Nye Saves the World.”

Prior to joining UW-M in 2011, Dr. Green completed post-doctoral training in computer vision and machine learning at the University of Minnesota. He received his B.A., M.A., and Ph.D in brain and cognitive sciences from the University of Rochester.

Jonathan Moreno
UPENN

Jonathan Moreno is the David and Lyn Silfen University Professor, the Penn Integrates Knowledge (PIK) Professor, and professor of medical ethics and health policy, of history and sociology of science, and of philosophy at the University of Pennsylvania. He is a renowned author who wrote acclaimed books on neuroscience such as *The Brain in Context: A Pragmatic Guide to Neuroscience* and *Mind Wars: Brain Research and National Defense*.

Dr. Moreno is senior consultant to a six-year, 10-million euro project on cold war medical science on both sides of the iron curtain, funded by the European Research Council. He often appears on broadcast and online media and was a columnist for ABCNews.com. Dr. Moreno is a former senior fellow at the Center for American Progress and editor of the online magazine Science Progress. He has published more than a thousand papers, articles, reviews, and op-eds, and *The American Journal of Bioethics* called him “the quietly most interesting bioethicist of our time.”

Dr. Moreno earned a Ph.D. in philosophy from Washington University in St. Louis, was an Andrew W. Mellon post-doctoral fellow, holds an honorary doctorate from Hofstra University, and is a recipient of the College of William and Mary Law School Benjamin Rush Medal, the Dr. Jean Mayer Award for Global Citizenship from Tufts University, and the Penn Alumni Faculty Award of Merit. He holds the honorary Visiting Professorship in History at the University of Kent in Canterbury, England. In 2018 the American Society for Bioethics and Humanities presented him with its Lifetime Achievement Award.

Polly O’Rourke

ARLIS

Polly O’Rourke is an associate research scientist at the Applied Research Laboratory for Intelligence and Security (ARLIS), a University-Affiliated Research Center (UARC) of the United States Department of Defense. Dr. O’Rourke’s research encompasses neurocognitive approaches to improving performance, the relationship between physiological state and cognition, and the role of individual differences in behavior and performance. She is currently leading the University of Maryland’s performer team in the DARPA Targeted Neural Plasticity (TNT) program in which she is examining the impact of noninvasive peripheral nerve stimulation on language learning.

Polly O’Rourke earned a Ph.D. in linguistics from the University of Arizona, where she specialized in psycholinguistics and cognitive neuroscience.

James Christensen
AFRL

James Christensen is the product line lead for Airman Sensing and Assessment within the 711th Human Performance Wing of the Air Force Research Laboratory. He has dedicated his Air Force career to the assessment, protection, and enhancement of human performance and cognitive function. Dr. Christensen leads research teams investigating real-time cognitive workload, wearable monitoring applications for human performance, and cockpit sensors to reduce physiological events. He is a command pilot for Angel Flight, a charitable patient transport organization, and is also the volunteer appointee president of the Greene County Regional Airport Authority**.**

Dr. Christensen received his B.S. in biopsychology from the University of Michigan in 2001, and his Ph.D. in cognitive psychology from the Ohio State University in 2008.

Tom Griffiths

Princeton

Tom Griffiths is the Henry R. Luce Professor of Information Technology, Consciousness and Culture in the Departments of Psychology and Computer Science at Princeton University. His research explores connections between human and machine learning, using ideas from statistics and artificial intelligence to understand how people solve the challenging computational problems they encounter in everyday life.

Dr. Griffiths earned a Ph.D. in psychology at Stanford University in 2005, and subsequently taught at Brown University and the University of California, Berkeley before moving to Princeton.

Dr. Griffiths has received awards for his research from organizations ranging from the American Psychological Association to the National Academy of Sciences, and is a co-author of the book *Algorithms to Live By: The Computer Science of Human Decisions* which introduces ideas from computer science and cognitive science to a general audience.