

# How People Learn II: The Science and Practice of Learning

## Committee

### Cora B. Marrett

#### Chair

Cora Bagley Marrett is Professor Emerita, the University of Wisconsin-Madison, where she served on the faculty for over thirty years. For five of those years she held her faculty position concurrently with the post of Senior Vice President for Academic Affairs, the University of Wisconsin System. Her academic career includes as well appointments at the University of North Carolina-Chapel Hill, Western Michigan University and the University of Massachusetts-Amherst where she was Provost and Vice Chancellor for Academic Affairs.

Dr. Marrett took leave from the University of Wisconsin-Madison to assume administrative positions at the National Science Foundation, initially as the first Assistant Director for the Social, Behavioral and Economic Sciences, and later as Assistant Director for Education and Human Resources. She became the Acting Deputy Director for the Foundation in 2009. In 2011 President Barack Obama nominated her for and the U.S. Senate approved her appointment as the permanent Deputy Director. On two different occasions she assumed the mantle of Acting Director, National Science Foundation. When she retired from the Foundation in 2014, several members of Congress – Representatives Eddie Bernice Johnson, Frank Wolf, Daniel Lipinski, Ralph Hall, Donna Edwards, and Senator Barbara Mikulski – thanked Marrett effusively for the service she had given to the nation. She had served the nation earlier as an appointee by President Jimmy Carter to his Presidential Commission on the Accident at Three Mile Island.

The University of Wisconsin-Madison, has honored her with an Excellence in Teaching award and a Distinguished Alumna award. She is a Fellow in the American Association for the Advancement of Science, the American Academy of Arts and Sciences and Sigma Xi, the Scientific Research Society. The National Academy of Sciences appointed her to its inaugural class of Residential Fellows and subsequently to its ranks of National Associates.

Dr. Marrett has served on the following NRC Committees: Institutional Review Boards, Surveys, and Social Science Research (Chair); Division Committee for the Behavioral and Social Sciences and Education (Member); Division Committee on Engineering and Physical Sciences (Member); Commission on Behavioral and Social Sciences and Education (Member); Commission on Engineering and Technical Systems (Member); Committee on Women in Science, Engineering and Medicine (Member); OSEP Advisory Committee (Member); and Committee on Research in Mathematics, Science and Technology Education (Member). Dr. Marrett holds a B.A. from Virginia Union University, a M.A. and a Ph.D. from the University of Wisconsin-Madison, all in sociology. She received an honorary doctorate from Wake Forest University, was elected a fellow of the American Academy of Arts and Sciences and the American Association for the Advancement of Science, and was awarded an honorary degree as a distinguished alumna from Virginia Union University.

## **Patricia J. Bauer**

### **Member**

Patricia J. Bauer is the Asa Griggs Candler Professor of Psychology and Senior Associate Dean for Research in Emory College of Arts and Sciences at Emory University. Dr. Bauer's research focuses on the development of memory, with special emphasis on the determinants of remembering and forgetting; links between cognitive and neural developments and age-related changes in memory; and the elaboration of the semantic knowledge base through learning and productive processes. She was a professor in the Department of Psychology and Neuroscience at Duke University. Dr. Bauer was also on the faculty of the Institute of Child Development at the University of Minnesota from 1989 to 2005. She earned her Ph.D. in Psychology from Miami University.

## **Cynthia M. Beall**

### **Member**

Cynthia Beall (NAS) is The Sarah Idell Pyle Professor of Anthropology at Case Western Reserve. Dr. Beall is a physical anthropologist whose research focuses on human adaptation to high-altitude hypoxia, particularly the different patterns of adaptation exhibited by Andean, Tibetan and East African highlanders. Her current research deals with the genetics of adaptive traits and evidence for natural selection, with the role of nitric oxide in oxygen delivery at high altitude and with the human ecology of high-altitude Tibetan nomads. Professor Beall is a member of the U.S. National Academy of Sciences, American Philosophical Society, the American Academy of Arts and Sciences and was a Guggenheim Fellow. Dr. Beall's extensive NRC service includes: DBASSE Board Member; Roundtable on Public Interfaces of Life Sciences (Co-Chair); International Temporary Nominating Group for Class V: Behavioral and Social Sciences (Chair); NAS Nominating Committee (multiple years and roles); International Temporary Nominating Group for Class V: Behavioral and Social Sciences (Member); NAS Class V Membership Committee (multiple years and roles); 2014 NAS Award for Scientific Reviewing Selection Committee (Member); Committee on Thinking Evolutionarily: Making Biology Education Make Sense (Chair); Section 51: Anthropology (Section Liaison to the NRC); Board on International Scientific Organizations (Chair); Delegation to the 28th ICSU General Assembly, Shanghai and Suzhou, China (Delegate); Council of the National Academy of Sciences (Councilor); NAS Committee on Publications (Member); NAS Council Committee on International Affairs (Member); Committee on Standards of Evidence and the Quality of Behavioral Social Science Research (Member); Section 51: Anthropology (Chair); Board on International Scientific Organizations (Member); and U.S. National Committee of the International Union of Biological Sciences (Chair, Vice Chair, and Member). Dr. Beall earned her M.A. and Ph.D. in Anthropology from The Pennsylvania State University.

## **Margaret E. Beier**

### **Member**

Margaret E. Beier is an Associate Professor of Psychology at Rice University in Houston, TX. Dr. Beier's interests focus on learning and intellectual development throughout the lifespan. Her research investigates the individual determinants of learning, particularly as related to age, cognitive (intellectual abilities and working memory capacity), and non-cognitive (personality, interests, motivation, and self-regulation) predictors of knowledge and skill acquisition. Moreover, her work examines the effectiveness of various educational interventions and the interaction of individual factors and these interventions on learning and non-cognitive outcomes such as self-efficacy, self-concept, and interests. She has published numerous book chapters and articles in top psychology journals including the Journal of Educational Psychology, Psychology and Aging, the Journal of Applied Psychology, and Psychological Bulletin. She has received numerous awards for teaching and research, including the Rice Center for Teaching Excellence Fellowship and the George R. Brown Award for Superior Teaching from Rice University. She is a member of the American Educational Research Association (AERA), a Fellow of the Association for Psychological Science (APS) and a Fellow of Division 14 of the American Psychological Association (Society for Industrial and Organizational Psychologists). She is on the Editorial Board of Human Performance, the Journal of Business and Psychology and Work, Aging, and Retirement. Dr. Beier earned her M.S. and Ph.D. in Psychology from the Georgia Institute of Technology.

## **David B. Daniel**

### **Member**

David B. Daniel is a Professor of Psychology at James Madison University. Dr. Daniel's work forges reciprocal links between cognitive-developmental psychology and teaching practices/pedagogy. He has published in a diverse range of journals, such as JAMA, Child Development, Science and Teaching of Psychology, and consults internationally on the delivery and development of effective, evidence-based, classroom, print, and electronic pedagogy. Dr. Daniel has been the recipient of many teaching awards as well as the 2013 recipient of the Transforming Education Through Neuroscience Award. In 2014, he was rated as one of the top 1% of educational researchers influencing public debate. Dr. Daniel is past-chair of the Society for Research in Child Development's Teaching Committee (SRCD) and founding coordinator of the SRCD Teaching of Developmental Science Institute and past Chair of the Society for the Teaching of Psychology's pedagogical innovations task force. Dr. Daniel is the managing editor of the journal Mind, Brain, and Education, serves on several advisory boards and consults with numerous companies, schools and organizations regarding pedagogy, training, and other topics related to learning. His interest in the development of effective teaching has informed his current efforts to develop useable knowledge for educational practice that positively impacts both student learning and teacher performance. Dr. Daniel received a M.A. and Ph.D. from West Virginia University.

## **Robert L. Goldstone**

### **Member**

Robert L. Goldstone is Chancellor's Professor in the Psychological and Brain Sciences department and Cognitive Science program at Indiana University, where he has been a faculty member since 1991. Dr. Goldstone's research interests include concept learning and representation, perceptual learning, educational applications of cognitive science, decision making, collective behavior, and computational modeling of human cognition. His interests in education focus on learning and transfer in mathematics and science, computational models of learning, and the design of innovative learning technologies. He was awarded two American Psychological Association (APA) Young Investigator awards in 1995 for articles appearing in the *Journal of Experimental Psychology*, the 1996 Chase Memorial Award for Outstanding Young Researcher in Cognitive Science, a 1997 James McKeen Cattell Sabbatical Award, the 2000 APA Distinguished Scientific Award for Early Career Contribution to Psychology in the area of Cognition and Human Learning, and a 2004 Troland research award from the National Academy of Sciences. He was the executive editor of *Cognitive Science* from 2001-2005, associate editor of *Psychonomic Bulletin & Review* from 1998-2000, and associate editor of *Cognitive Psychology* and *Topics in Cognitive Science* from 2007-2013. He is an elected fellow of the Society of Experimental Psychologists, the Association for Psychological Science, and the Cognitive Science Society. From 2006 to 2011 he was the director of the Indiana University Cognitive Science Program. He currently serves on the NRC Board on Behavioral, Cognitive, and Sensory Sciences. Dr. Goldstone received a B.A. degree from Oberlin College in Cognitive Science, a M.A. in Psychology from the University of Illinois, and a Ph.D. in Psychology from University of Michigan.

## **Arthur C. Graesser**

### **Member**

Arthur C. Graesser is a Distinguished University Professor of Interdisciplinary Research in the Department of Psychology and the Institute of Intelligent Systems at the University of Memphis, and is an Honorary Research Fellow in the Oxford University Center for Educational Assessment at the University of Oxford. His primary research interests are in cognitive science, discourse processing, computational linguistics, and the learning sciences. He has developed automated tutoring systems with conversational agents (such as AutoTutor and Operation ARA) and automated text analysis systems (Coh-Metrix, QUAID). He served as editor of the journal *Discourse Processes* (1996-2005) and *Journal of Educational Psychology* (2009-2014). His service in professional societies includes president of the Empirical Studies of Literature, Art, and Media (1989-1992), the Society for Text and Discourse (2007-2010), the International Society for Artificial Intelligence in Education (2007-2009), and the Federation of Associations in the Behavioral and Brain Sciences Foundation (2012-13). He has chaired or been a member of expert panels for the Program for International Student Assessment and the Program of International Assessment of Adult Competencies in addition to consulting for Educational Testing Service and the College Board. He has received major lifetime research achievement awards from the Society for Text and Discourse and the American Psychological Association, as well as receiving the first University of Memphis Presidential Award for Lifetime Achievement in Research.

## **Mary Helen Immordino-Yang**

### **Member**

Mary Helen Immordino-Yang is an Associate Professor of Education at the Rossier School of Education, an Associate Professor of Psychology at the Brain and Creativity Institute, and a member of the Neuroscience Graduate Program Faculty at the University of Southern California. Dr. Immordino-Yang has many interests in her field including psychological and neurobiological bases of social emotion and self-awareness across cultures, connections to social and moral development and intrinsic motivation and implications for pedagogy in urban schools. She uses an interdisciplinary approach that combines human developmental and educational psychologies with affective and social neuroscience. She is Associate Editor for the award-winning journal *Mind, Brain and Education* and for the new journal *AERA Open*. She is on the editorial boards of the *Journal of Experimental Psychology: General* and *Culture and Brain*. Dr. Immordino-Yang was elected to the presidency of the International Mind, Brain and Education Society, and serves on multiple advisory boards, among them Long Trail School (in VT), the Ross School Innovation Lab: Science, Math and Engineering Academy (in NY), the USC Kortschak Center for Learning and Creativity, The Institute for Media and the Developing Child, and the University of New Mexico Family Development Program. She serves as a scientific adviser to several Los Angeles schools/districts. In 2012 she launched a 5-year NSF-funded collaborative research project with ABC Unified School District, Cerritos College, Rowland Unified School District, and Huntington Park High School. Dr. Immordino-Yang earned an Ed.M. in Cognitive Development and an Ed.D. in Human Development and Psychology from Harvard University.

## **Ruth Kanfer**

### **Member**

Ruth Kanfer is Professor of Psychology at the School of Psychology at the Georgia Institute of Technology. Dr. Kanfer's research focuses on the influence of motivation, personality, and emotion in workplace behavior, job performance, and worker well-being. Past projects have examined the impact of these people factors and situational constraints as they affect skill training, job search, teamwork, job performance, and the development of workplace competencies. Recent projects have focused on adult development and workforce gaining, job search-employment relations, motivation in and of teams, and person determinants of cross-cultural effectiveness. She is co-director of the Kanfer-Ackerman laboratory, where they conduct longitudinal and large-scale laboratory and field collaborative projects on topics such as workforce aging, work adjustment, cognitive fatigue, skill acquisition, adult development and career trajectories, and self-regulated learning. She has served on a number of Editorial Boards, including the Academy of Management Learning and Education; *Applied Psychology: An International Review*; *Human Performance*; the *Journal of Occupational and Organizational Psychology* and has received the 2007 Distinguished Scientific Contributions Award and the 2006 William R. Owens Scholarly Achievement Award from the Society for Industrial and Organizational Psychology. Dr. Kanfer served as an external presenter for the NRC Committee on Learning Sciences: Foundations and Applications to Adolescent and Adult Literacy. Dr. Kanfer earned her Ph.D. in Psychology from Arizona State University.

## **Jeffrey Karpicke**

### **Member**

Jeffrey D. Karpicke is the James V. Bradley Associate Professor of Psychological Sciences at the College of Health and Human Sciences at Purdue University. Dr. Karpicke's research interests include human learning and memory, especially retrieval processes; cognitive science and education; complex learning, comprehension, and knowledge application; learning and cognitive strategies in children; metacognition and self-regulated learning; and education technology and computer-based learning. He has received numerous awards including the Janet Taylor Spence Award for Transformative Early Career Contributions from the Association for Psychological Science in 2015, Outstanding Young Investigator Award from the Psychonomic Society in 2013, the Presidential Early Career Award for Scientists and Engineers (PECASE) in 2012, and a National Science Foundation CAREER Award in 2012, the Purdue University Seed For Success Award, Association for Psychological Sciences "Rising Star", and College of Health and Human Sciences Early Career Research Achievement Award. Dr. Karpicke earned his Ph.D. from Washington University in St. Louis.

## **Barbara M. Means**

### **Member**

Barbara M. Means is executive director of Learning Sciences Research at Digital Promise. Previously the founder and director of the Center for Technology in Learning at SRI International, she is an educational psychologist whose research focuses on ways technology can support students' learning of advanced skills and the revitalization of classrooms and schools. Her 2014 book, *Learning Online: What Research Tells Us About Whether, When, and How*, describes the state of the art in online learning from kindergarten through higher education and adult learning and provides a critical appraisal of the research base for practices in each of these domains. Her recent work includes evaluating the implementation and impacts of newly developed adaptive learning courseware developed with funding from the Bill & Melinda Gates Foundation. Previously, she helped the Office of Educational Technology, U.S. Department of Education, develop a framework for describing new research approaches and forms of evidence made possible when students learn online. She has been an author or editor for eight books on topics in education, learning technology, and education reform. She earned her bachelor's degree in psychology from Stanford University and her Ph.D. in educational psychology from the University of California, Berkeley.

# **Douglas L. Medin**

## **Member**

Douglas L. Medin (NAS) is the Louis W. Menk Professor of Psychology and holds a joint appointment in education and social policy at Northwestern University. Dr. Medin taught at Rockefeller University, the University of Illinois and the University of Michigan. Best known for his research on concepts and categorization, his recent research interests have extended to cross-cultural studies of biological categorization and reasoning, cultural and cognitive dimensions of moral reasoning and decision making, and culturally and community-based science education. This latter work has been conducted in the form of a partnership involving the American Indian Center of Chicago, the Menominee tribe of Wisconsin and Northwestern University. He has conducted research on cognition and learning among both indigenous and majority culture populations in Guatemala, Brazil, Mexico and the United States. Dr. Medin served on the National Research Council Committee on Informal Science Learning. He is a recipient of an APA Presidential Citation and the APA distinguished Scientific Contribution Award, and the APS William James lifetime achievement award. He is a member of the American Academy of Arts and Sciences, the National Academy of Sciences and the National Academy of Education. Dr. Medin was the recipient of a James McKeen Cattell Sabbatical Fellowship Award for the 2010-11 academic years. He has served as editor for *The Psychology of Learning and Motivation and Cognitive Psychology*. His NRC service includes: Section 52: Psychological and Cognitive Sciences (Chair); 2013 - 2015 NAS Class V Membership Committee (Section Representative); U.S. National Committee for the International Union of Psychological Science (Member); Committee on Learning Science in Informal Environments: A Review of that Research Past, Present, and Future (Member); Committee on International Collaborations in Social and Behavioral Research (Member); and Ford Foundation Diversity Fellowships Predoctoral Review Panel on Psychology (Member). Dr. Medin earned his M.A. and Ph.D. in Psychology from the University of South Dakota.

## **Linda Nathan**

### **Member**

Linda Nathan is the executive director of the Center for Artistry and Scholarship, which fosters and mobilizes creative, arts-immersed schools, where students are making and doing, teachers are asking how and why, and schools are engaged in their community. In this role, she oversees key programs including the Perrone-Sizer Institute for Creative Leadership in partnership with the University of Massachusetts, Boston. She also works closely with the leadership of Conservatory Lab Charter School to support its development as a national model of project-based learning and arts-immersed education. Dr. Nathan was the founding Headmaster of Boston Arts Academy, Boston's first public high school for the visual and performing arts. As an experienced leader in education, Dr. Nathan actively mentors teachers and principals, and consults nationally and internationally on issues of educational reform, leadership and teaching with a commitment to equity, and the critical role of arts and creativity in schools. Dr. Nathan also facilitates workshops and conversations about issues of race, equity, and culturally relevant pedagogy for school leaders, teachers, parents, and students across the nation. She is the author of two books: *Hardest Questions Aren't on the Test* (2009, Beacon Press) and *When Grit Isn't Enough* (2017, Beacon Press). Dr. Nathan is also an adjunct lecturer at the Harvard Graduate School of Education where she has taught for 17 years. She earned master's degrees in education administration from Antioch University and in performing arts from Emerson College and received an Ed.D. from Harvard University.

## **Annemarie S. Palincsar**

### **Member**

Annemarie Sullivan Palincsar is the Jean and Charles Walgreen Jr. Chair of Reading and Literacy, Arthur F. Thurnau Professor, and a teacher educator at the University of Michigan. Annemarie's primary research interest is in supporting students to learn how to engage in knowledge building with informational text, especially in the context of project-based scientific inquiry. She has a particular interest in children who struggle with challenging academic work. With her research group - and in collaboration with computer scientist, Elliot Soloway - she has designed and studied the use of a cyber-learning environment in which students collaborate as they read texts, view video, use simulations, write, and draw, while engaging in scientific inquiry. With science educator, Betsy Davis and the ELECTS team, she participated in a series of studies investigating the value of educative supports for science teaching in the upper elementary grades. With linguist, Mary Schleppegrell and the Language and Meaning research group, she conducted design-based research to investigate the process and outcomes of teaching English learners the use of functional grammar analysis as a means of supporting them to interpret and learn from narrative and informational text. Annemarie has served as a member of: the National Academy's Research Council on the Prevention of Reading Difficulty in Young Children, the OERI/RAND Reading Study Group, the National Research Council's Panel on Teacher Preparation, The International Reading Association's Literacy Research Panel and the National Advisory Board to Children's Television Workshop. She was co-editor of the journal *Cognition and Instruction* and is a member of the National Academy of Education. She completed her PhD at the University of Illinois at Urbana-Champaign.

# Daniel Schwartz

## Member

Daniel L. Schwartz is the Nomellini & Olivier Professor of Educational Technology and Director of the AAA Laboratory at Stanford University. Dr. Schwartz has been a professor at Stanford since 2006. Dr. Schwartz was previously an Associate Professor of Education at Stanford and an Associate and Assistant Professor at Vanderbilt University. Dr. Schwartz studies student understanding and representation, and the ways that technology can facilitate learning. He works at the intersection of cognitive science, computer science, education, and recently cognitive neuroscience, examining learning and instruction in laboratory, classroom and informal settings. Informed by eight years as a middle-school teacher in Los Angeles and Alaska, a theme throughout Dr. Schwartz's research is how people's facility for spatial thinking can inform and influence processes of learning, instruction, assessment and problem solving. He finds that new media make it possible to exploit spatial representations and interactivity in fundamentally new ways, offering an exciting complement to the verbal approaches that dominate educational research and practice. He has published extensively on learning, assessment, technology, and the relation between perceptual-motor systems, physical environments, and higher order cognition. His recognitions include the Stanford Graduate School Advisor of the Year, Article of the Year by American Educational Research Association (AERA), Research Article of the Year by the Association for Educational Computing and Technology, five best-of-conference paper awards with his students, Benefactor of the Commons at Peabody College at Vanderbilt University, Lilly Teaching Fellow at Vanderbilt University, the first Ben D. Wood Fellow at Columbia University, and Outstanding Young Teacher Award from the Alumni of the School of Education at the University of Southern California. He has served as a Member on the NRC Committee on Learning Science: Computer Games, Simulations, and Education, and the PCAST committee on STEM education in the first two years of college. Dr. Schwartz earned his Ph.D. in Human Cognition and Learning from Columbia University.

# Zewelangi Serpell

## Member

Zewelangi N. Serpell is an Associate Professor of Psychology at Virginia Commonwealth University. Dr. Serpell's research focuses on developing and evaluating school-based programs for underperforming students. Her work harnesses advances in cognitive science to develop and test interventions that target students' executive functioning. She has a collaborative project funded by the IES exploring whether cognitive activities associated with playing chess enhance executive functions, and whether improvements transfer to academic outcomes in African American elementary school students. She also studies ways to optimize learning experiences using computer-based programs with African American students from middle school to college. She is a fellow of the American Psychological Association's Minority Fellowship Program, and was awarded post-doctoral research fellowships from the National Science Foundation through the Quality Education from Minorities Network (QEM), and from the National Center for Research on Early Childhood Education at University of Virginia's Curry School of Education. Prior to her position at VCU, she held academic positions at Virginia State University and James Madison University (JMU). At JMU she also served as the Associate Director of the Attention and Learning Disabilities Center, and in 2007 held the Alvin and Nancy Baird Professorship in Psychology. In addition to her published research, Dr. Serpell has co-edited two seminal books on school mental health, including *Advances in School-Based Mental Health Interventions* (2010) and the *Handbook of Culturally Responsive School Mental Health: Advancing Research, Training, Practice, and Policy* (2015). Dr. Serpell earned her M.S. and Ph.D. in Developmental Psychology from Howard University.