

THE EVOLVING HUMAN THREAT IN CYBER



15 AUGUST 2011
MARSHALL HALL, ROOM 155
NATIONAL DEFENSE UNIVERSITY
FORT LESLEY J. MCNAIR





The Evolution of Human Threats in Cyber



A Transforming National Security Series Event
Marshall Hall, Room 155, Fort Lesley J. McNair, Washington, DC
August 15, 2011

A Center for Technology & National Security Policy and Potomac Institute for Policy Studies event.

Monday, August 15th

0745-0800 **Welcome: The Evolution of Human Threats and Cyber**

- **Dr. Alenka Brown**, Senior Research Fellow, Center for Technology & National Security Policy, National Defense University

0800-0845 **Morning Keynote Speaker:**

Theme: Neurocognitive / interoceptive approach to sense-making and situation awareness: Matching narrative and neural processing cadence in optimizing narrative manipulation.

- **Professor Carey D. Balaban**, Director, Center for National Preparedness and Professor, Departments of Neuroscience, Engineering, and Otolaryngology University of Pittsburgh (*Presentation: Neurocognitive /interoceptive approach to sense-making and situation awareness: Interpreting data in evolving narratives.*)

0845-0900 **Break**

0900-1000 **Implications of Neurological Presence Residing in Cyber**

- **Moderator: Dr. Alenka Brown**, Senior Research Fellow, Center for Technology & National Security Policy, National Defense University (*Presentation: Psycho-Metric Indicators of Cyber Human Behavior*)
- **Professor Carey D. Balaban**, Director, Center for National Preparedness and Professor, Departments of Neuroscience, Engineering, and Otolaryngology, University of Pittsburgh (*Presentation: A neurocognitive-neurophysiological approach to resilient cyber security: security-based narratives of system health*)
- **Mr. Michael Tiffany**, Entrepreneur-in-Residence, Recursion Ventures

1000-1100 **Human Behavior Affects Cyber Evolution**

- **Moderator: Dr. Joe VanHoozer**, President/CEO, Human Dynamics LLC
- **Dr. Jim Giordano**, Director, Center for Neurotechnology Studies; Vice-President Potomac Institute for Policy Studies (*Presentation: Bio-Psychosocial Implications of Cybertechnology - Reality Checks and Ethical issues*)
- **Dr. Luis Kun**, Professor of National Security, Center for Hemispheric Studies (CHDS), National Defense University (*Presentation: "From Astronauts and War-fighters, to Homecare and Disease Prevention: The Evolution of Human Threats in the Healthcare Cyberspace"*)

1100-1115 **Break**

1115-1200 Open Discussion with Morning Speakers

- **Moderator: Ms. Christine A.R. MacNulty**, CEO, Applied Futures, Inc.

1200-1230 Lunch

1230-1330 Afternoon Keynote Speaker:

Theme: Neuro-Cyber Fusion: Potential for Data Stacking, Tracking and Hacking

- **Dr. Jim Giordano**, Director, Center for Neurotechnology Studies; Vice-President Potomac Institute for Policy Studies

1330-1430 Future Considerations in Cyber Threats

- **Moderator: Mr. Eric Crownover**, Independent Researcher (*Presentation: User-Perpetuated Threats*)
- **Dr. Gordon R. Middleton**, Director, Strategic Intelligence Program, Patrick Henry College (*Presentation Title: Cyber Assurance: Technical Developments and Cognitive Issues*)

1430-1445 Break

1445 -1530 Open Discussions with Afternoon Speakers

- **Moderator: Mr. Eric Crownover**, Independent Researcher

1530-1540 Closing Remarks

- **Dr. Alenka Brown**, Senior Research Fellow, Center for Technology & National Security Policy, National Defense University
- **Dr. James Giordano**, Director, Center for Neurotechnology Studies; Vice-President Potomac Institute for Policy Studies



SPEAKER BIOGRAPHIES



Dr. Carey Balaban

- Presentation: (Keynote): Neurocognitive / interoceptive approach to sense-making and situation awareness: Interpreting data in evolving narratives.
- Presentation (Panel): A neurocognitive-neurophysiological approach to resilient cyber security: security-based narratives of system health

Carey D. Balaban received a B.A. in History (High Honors) from Michigan State University in 1975 and a Ph.D. in Anatomy at the University of Chicago in 1979. After postdoctoral training at the First Department of Physiology, University of Tokyo (1979-1982), he served as Assistant Professor of Anatomy and Surgery (Division of Ophthalmology) at the Pennsylvania State University School of Medicine (1982-1988). Dr. Balaban has been a faculty member at the University of Pittsburgh since 1988, where he is Professor of Otolaryngology, Neurobiology, Communication Sciences & Disorders, and Bioengineering and is Director of the Center for National Preparedness. He is also Academic Fellow and Co-director, Consortium for Integrative Scientific Convergence at the Potomac Institute for Policy Studies. Dr. Balaban possesses extensive experience conducting multidisciplinary research across biomedical and engineering disciplines, including emerging fields of augmented cognition and neurotechnology. His collaborative efforts have included academic, industrial and military partners. He uses conceptual (heuristic) or mathematical models and data from basic science experiments to explain behavioral and clinical phenomena. He has participated in developing decision support software and technologies to gauge situation awareness. In addition to more than 150 peer-reviewed basic research and scholarly articles, he is an author of two books on seventeenth century medicine. In 1997, Dr. Balaban was selected to present the first James B. Snow, Jr. Anniversary Lecture at the National Institute on Deafness and Other Communication Disorders. He has served extensively on NIH, NSF, DoD and NASA workshops, strategic planning panels and grant review panels.

Dr. Alenka Brown

- Presentation: Psycho-Metric Indicators of Cyber Human Behavior

Dr. Alenka Brown is a Senior Research Fellow on the Senior Executive Staff for the National Defense University. She is the Program Lead for the Human Interoperability Enterprise under the Center for Technologies and National Security Policy (NDU-CTNSP), and is the Assist Chair for Energy and Environmental Security Policy under the Center for Strategic Research. She is the innovator of an information process service - the Unified Process Environment. Dr. Brown has held many positions within Department of Defense: Chief Scientist, Sr. Science Advisor, Special Advisor, Sr. Mentor, Sr. Instructor, and Subject Matter Expert. Positions were in support of the Joint Staff-J39; the Undersecretary for



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Defense for Advanced Technology and Logistics-Special Assistant for Concepts and Plans; Strategic and Tactical Systems, Office of the Assistant Secretary of Defense, Networks ; Information Integration, the Undersecretary of Defense for Acquisition, Technologies and Logistics-Dept. of Defense for Research and Evaluation-Software and System Engineering-Human Capital (Human-System Integration); the Office of the Assistant Secretary of Defense for Special Operations and Low Intensity Conflict; the Defense Threat Reduction Agency-Innovation and Systems Engineering Directorate, US Northern Command, NATO-Allied Command Transformation, and Sr. Director of Human System Development in the National Security Directorate at the Department of Energy-Oak Ridge National Laboratory. Dr. Brown's expertise ranges from exploratory research and studies to applied approaches for operations and innovative concept development. The work ranges from cross-cultural communication strategies; human/social interoperability dynamics for sharing of information and behaviors; human/social-system interoperability; policy for operational energy, energy conservation, and renewable energy involving technology and behavioral change; behavioral patterns and cyber threats, building partnerships and partnership capacities for Humanitarian Efforts, Disaster Relief, and Irregular Warfare efforts to traditional human factors; virtual environments; instrumentation, command and controls; neuro-linguistics; collective consciousness across cyber domains; adaptive learning and human/social networks; cognitive-behavioral assessments for interoperability of cross cultural domains; cog-behavior and asymmetric threats; information operation and underground facilities; critical infrastructure vulnerabilities, maritime situational/domain awareness, and human network attack. Within DoE, her expertise ranged from instrumentation and controls for nuclear processing and power, sensor design, biometrics, remote sensing, to human factors and cognitive analysis for advanced and adaptive human system integration. Her current work is focused on human/social-knowledge interoperability, cognitive-psychometric forensics, and innovative changes for energy and environmental security and operations. Dr. Brown has published extensively ranging from her book Say it Right; co-author of chapters of the books, The Future of Foreign Language Education in the United States: The Entangled Future of Foreign Language Learning and IEEE High Assurance Systems: Human Interoperability and High Assurance Systems to QDR issues papers on Human Interoperability and Building Partnerships and terms of reference for the Human Dynamics in the 21st Century Study for the Defense Science Board. She has been a member of boards and committees ranging from Defense Science Boards, General Officer Steering Committee for Maritime Domain Awareness, OSD Senior Steering Committee for Human-System Integration to the Joint IED Defeat-Senior Executive Integrated Process Team. Dr. Brown earned a Ph.D. in Human Factors Engineering (with an emphasis in Cognitive Engineering); M.S. in Electrical Engineering, and a B.S. in Computer Science. She is a Certified Human Factors Professional and Neuro-Linguistic Practitioner. She has training in Negotiation and Technologies and in Negotiation and Difficult People from Harvard Law University.



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Mr. Eric Crownover

- Presentation: User-Perpetuated Threats

Eric Crownover is an incoming analyst and has four years experience as researcher of national security issues particularly cyber security, critical infrastructure protection, counterterrorism, nuclear weapons security, and strategic messaging. His experience includes a counterterrorism analyst with the intelligence community and a contract researcher with the National Defense University under the tutelage of Dr. S. Alenka Brown-VanHoozer. Mr. Crownover is working on several publications. These publications include Cyber Warfare Strategy in the People's Republic of China, Weaponizing Collective Consciousness (under review) co-authored with Dr. S. Alenka Brown-VanHoozer and Dr. Joe VanHoozer, examining the possibility of applying arms control treaty frameworks to a cyber warfare framework (in draft), and strategic messaging and digital forensics of avatars (in draft). He earned his BS in Global Security and Intelligence Studies from Embry-Riddle Aeronautical University and a MS in Defense and Strategic Studies for Missouri State University.

Dr. James Giordano

Prof. James Giordano, PhD, is Director of the Center for Neurotechnology Studies at the Potomac Institute for Policy Studies, Arlington, VA; IGERT Research Professor of Neurosciences at the University of New Mexico, Albuquerque, NM, USA, and Senior Research Associate of the Oxford Centre for Neuroethics and Oxford-Uehiro Centre for Practical Ethics at the University of Oxford, UK. As well, he is 2011-2012 Fulbright Visiting Professor of Neuroethics at Ludwig Maximilians Universität, Munich, Germany. Prof. Giordano is Editor-in-Chief of the journals Philosophy, Ethics, and Humanities in Medicine, and Synesis: A Journal of Science, Technology, Ethics and Policy; Associate Editor for the international journal Neuroethics, and Executive Editor-in-Chief of the book series Advances in Neurotechnology: Ethical, Legal and Social Issues (published by CRC Press). The author of over 170 publications in neuroscience, philosophy, and ethics, his recent books include: Scientific and Philosophical Perspectives in Neuroethics (with Bert Gordijn, Cambridge University Press); and Maldynia: Multi-disciplinary Perspectives on the Illness of Chronic Pain (Taylor-Francis/Informa). His ongoing research addresses the ethical issues that are generated from neuroscientific and neurotechnological research and its applications in medicine, public life and socio-cultural conduct.

Dr. Luis Kun

- Presentation: From Astronauts and War-fighters, to Homecare and Disease Prevention: The Evolution of Human Threats in the Healthcare Cyberspace



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Dr. Luis Kun is a Senior Research Professor of Homeland Security at the iCollege of the National Defense University where he developed and is the Course Manager for the following curricula: Homeland Security Information Management (HLS), Homeland Security Information Management: Tools & Techniques (HST), Protection of Critical Infrastructures and Key Assets (CIP), Geographical Information Systems (GIS), and Intelligent Agents. He graduated from the Merchant Marine Academy in Uruguay and holds a BSEE; MSEE and Ph.D. degree in Biomedical Engineering all from UCLA. He spent 14 years at IBM, where he developed the first six clinical applications for the IBM PC; was one of the pioneers on bedside terminals for Intensive Care; and a developer of a semi-expert, real-time, clinical decision support system: PC/PATSS. He was also the technical manager of the Nursing Point of Care System at IBM. Dr. Kun was the biomedical engineer in the team of four that developed the first Teleradiology system and the first Picture Archival and Communications Systems to run on an IBM platform. Later he was Director of Medical Systems Technology and Strategic Planning at Cedars Sinai Medical Center in LA. As the Senior IT Advisor to the Agency for Health Care Policy and Research (AHCPR) he formulated the IT vision and was the lead staff for HPCC program and Telehealth. He prepared AHCPR's program descriptions in three consecutive: "Supplement to the President's Fiscal Years 1997-1998 and 1999 Budgets" published in the President's HPCC Implementation Plan and a co-writer of the following Committee on Computing, Information and Communication (CCIC) Blue Books: "Advancing the Frontiers of Information Technology"; "Technologies for the 21st Century" and "Networked Computing for the 21st Century", NSTC/ Executive Office of the President (97, 98 and 99). He co-authored the Reports to the Congress on Telemedicine (1997) and on HIPAA Security. In July of 1997, he was invited speaker to the White House. He was largely responsible for the Telemedicine portion of the bill that became part of the Balanced Budget Act of 1997. Dr. Kun represented the DHHS Secretary at a Pan American Forum of Health Care Ministers on Telecommunications and the Health Care Industry in Mexico in 1997. As a Distinguished Fellow at the CDC (1999-2001) he was the Senior Computer Scientist for the Health Alert Network for Bioterrorism and later the Acting Chief Information Technology Officer for the National Immunization Program (NIP) where he formulated their IT vision on 10/2000. Dr. Kun has made numerous seminal contributions to the information technology, healthcare and public health disciplines and received many awards including: the 2009 American Institute for Medical and Biological Engineering's (AIMBE) first-ever Fellow Advocate Award which is presented to "a Fellow who has made outstanding contributions to advancing federal policies assisting the medical and biological engineering field"; the "2002 - IEEE-USA Citation of Honor Award": "For exemplary contributions in the inception and implementation of a health care information technology vision in the United States and the 1998 "Administrator's Award of Merit" presented by the US Surgeon General: "For exceptional dedication and professional achievement that have greatly enhanced the



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recognition of AHCPR's research in the High Performance Computing and Communications Program." He is a Fellow of the Institute of Electrical and Electronic Engineers (IEEE) and the American Institute of Medical and Biological Engineering (AIMBE). He is the Founding Chair of the IEEE-USA: Critical Infrastructure Protection Committee (CIPC); Founding and current Chair of the Bioterrorism & Homeland Security WG (for the Medical Technology Policy Committee) and Founding Chair of the Electronic Health Record and High Performance Computers and Communications WG (former HCEPC in 1991). He is currently the Associate Editor for Government Affairs for the IEEE EMBS Magazine and Editor of the (2010 4th Edition) Medical Informatics Section of the CRC Press, Handbook of Biomedical Engineering. Co-editor of Springer's 2008 Career Development in Bioengineering and Biotechnology. In the summer of 2010 he became Co-Editor in Chief for the new Springer Journal: Health and Technology. He was in AIMBE's Executive Board and the Board of Directors and is on the Board of Directors of the American Association of Engineering Societies (AAES). He also is an Advisor to many National and International diverse organizations such as: Advisory Board (AB) to Caring Technologies /TalkAutism; AB the Boston Children's Hospital (at Harvard and MIT) Biodefense Project (Information Systems for Bioterrorism Preparedness project); AB to Spain's Telemedicine Networks (ISCIII); Member of the Joint WG on Telemedicine; Scientific AB – Medical and Care Compunetics (Netherlands); Chair of the International Committee of Australia's Asia Pacific Ubiquitous Healthcare (APuHC), Advisory Committee of Collaborative Communications Summit (Health and IT) He has lectured on medical and public health β , information technology and biomedical engineering in over 75 countries. He was in the IEEE Computer Science and is in the Engineering in Medicine and Biology Distinguished Visitor Program and is in the advisory board of many magazines and professional journals. He has served as an invited: Conference, track, session, tutorial, special symposia chair and/or publications, speaker / keynote speaker and in conference scientific committees, etc. over 300 times. He is an elected member of the IEEE –Society of Social Implications of Technology Board of Governors (2008-2010), the IEEE – Computer Society Board of Governors (2010-2012) and the International Federation of Medical and Biological Engineering (IFMBE) Administrative Council (2009-2015).

Ms. Christine MacNulty

Christine MacNulty has forty years experience as a consultant in long-term strategic - planning for concepts as well as organizations, technology forecasting, technology assessment and related areas, as well as socio-cultural change. For the last nineteen years, most of her consultancy has been conducted for the Department of Defense, including: The Joint Staff, OSD (OFT), the DON (Under Secretary, Secretariat, OPNAV N3/N5, N6, N7, CNET, NAVSEA, NSWG1, ONR, CNO's SSG), the USMC (HQMC - Commandant), the USCG (HQ - Commandant), the USA (SMDC), JTAMDO, (then) BMDO, SOCOM, (then)



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USACOM, JFCOM J9, and other COCOMs. She has also conducted projects for NATO ACT and NATO NEC, and the British Army's Force Development & Training Command. During the last thirty-five years Christine MacNulty has contributed methods and models for understanding social and cultural change. She developed the European version of SRI International's Values & Lifestyles Program, and worked with the International Research Institute on Social Change. She has applied her knowledge of people and their values and beliefs to strategic planning, marketing planning, advertising, vision development, organizational change, R&D planning, new concepts, technology assessment and business development. In the last eight years she has applied her knowledge of strategy, cultures and cognition to "understanding adversaries" – using that information for planning and assessing non-traditional operations, information warfare, information operations, and strategic communications. She has also used these social models for training in network-centric operations and C2. Her monograph "Truth, Perception & Consequences" was published by the Army War College, September 2007, and "Transformation: From the Outside In or the Inside Out" was also published by the Army War College in September 2008. Her paper, Perceptions, Values & Motivations in Cyberspace appeared in the IO Journal, 3rd Quarter, 2009, and The Value of Values for IO, SC & Intel was published in the August 2010 edition of the IO Journal

Dr. Gordon Middleton

- Presentation: Cyber Assurance: Technical Developments and Cognitive Issues

Dr. Gordon Middleton is the Director of Analysis at BESC, a position he has held since June 2007. He manages analysis for BESC clients in government and commercial organizations for intelligence and business applications. He is also the Director of the Strategic Intelligence Program at Patrick Henry College, Purcellville, VA. In that capacity Dr. Middleton teaches upper division courses, including Intelligence Research and Analytic Methods. Prior to this, Dr. Middleton served in senior positions in the NRO, US Air Force, Office of the Director of National Intelligence, FBI, CIA, and NSA. He is a certified Program Manager (DoD, Level III) and is a graduate of the United States Air Force Academy. He holds advanced degrees in bio-physics and Public Administration, and a Doctorate in Strategic Leadership. His most recent publications include: Avatars or Robots? The Human Factor in Overcoming Information Overload; Paper presented at the Military Operations Research Symposium (MORS), June 2010; A Maturity Model for Intelligence Education. American Intelligence Journal, Winter 2007/2008; Weapons of Mass Destruction and Alternative Futures. Weapons of Mass Destruction Community of Interest Site, INTELINK-U, February 2007.



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Mr. Michael Tiffany

Michael Tiffany is Recursion Ventures' entrepreneur-in-residence. By the time he was eighteen, Michael had already made several recognized advances in network security and published in top journals including 2600. In lieu of university, Michael started an ISP and consulting company, Actaeon West, which he sold at a substantial profit to a larger competitor. Tiffany then joined Western Integrated Networks (WINfirst) as Senior Director of Internet Services. The Denver, CO-based company closed \$900 million in Series A funding and began rollout of the first integrated fiber-to-the-home network, offering advanced cable, telephony and Internet service.

Dr. Joe VanHoozer

Coach/Trainer for various corporations and other organizations. Dr. VanHoozer participates as an Academic Fellow for the Potomac Institute for Policy Studies. He is an Adjunct Fellow for the National Defense University. He is the Founder of a Service Disabled Veteran Owned Small Business, Human Learning Dynamics, LLC. He maintains a behavioral and neurolinguistics consultancy for numerous businesses. Dr. VanHoozer has developed several protocols to aid in the discovery of unique human analog and digital linguistic behavioral patterns and learning strategies to better anticipate, predict, and assess communications attributes, strengths, and vulnerabilities of individuals, groups, and cultures. Dr. VanHoozer is a Certified Master Neuro-Linguistic Programming Practitioner, a Certified Hypnotherapist, a Life Member of the American Association of Professional Hypnotherapists (AAPH), holds a Fellow of Clinical Hypnotherapy from the AAPH, and is a current MENSA member. In the military, he served as White House Liaison for the Secretary of Defense, as Manager of the Special Liaison Office at NATO Headquarters in Brussels, Belgium - he assisted in the conduct of NATO Ministerial meetings, and coordinated with the Department of State visits by the then Vice President of the United States (President George Herbert Walker Bush). Dr. VanHoozer also served in assignments of: Combat Engineer, Administrator, and Drug and Alcohol and Domestic Violence counselor. He is a two-tour Vietnam veteran who earned two Purple Heart Medals, and various other honors, awards, and decorations.