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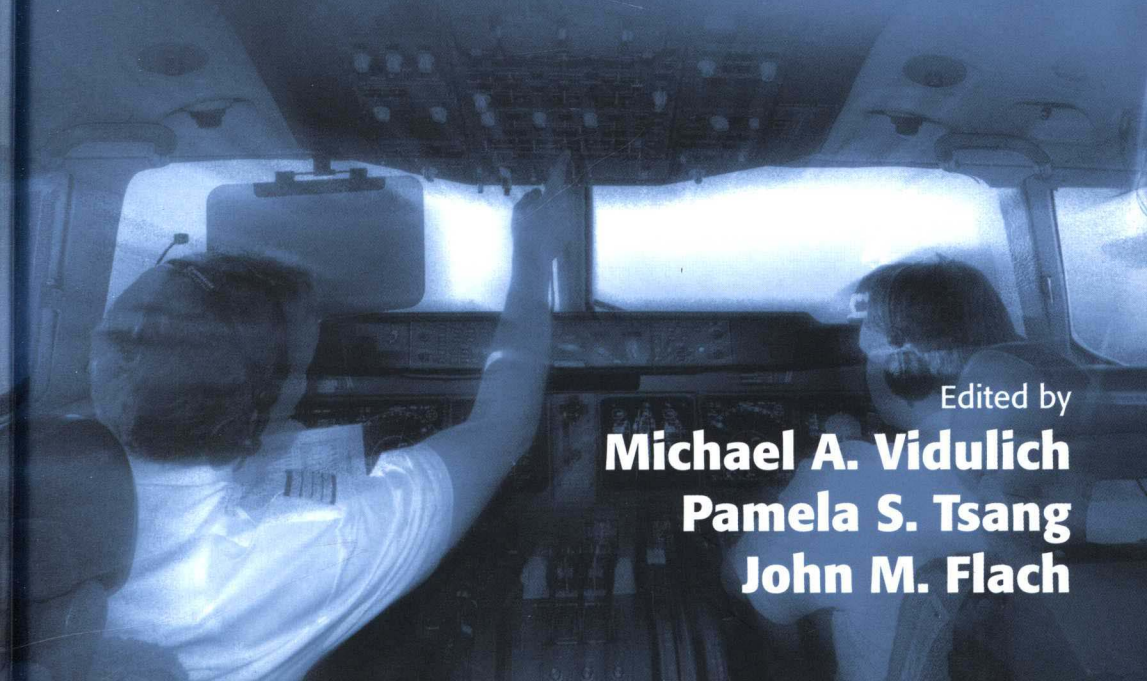

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Advances in Aviation Psychology

Volume 1

Edited by

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In the spirit of
Stanley N. Roscoe, Charles E. Billings, and Earl L. Wiener

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Marthe is a researcher and consultant in the area of Lyon (France). She performed her Ph.D. work in Cognitive Psychology and Human Factors in the military,

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Françoise is a university professor in Cognitive Ergonomics, and heads the Action and Cognition in Operational Situations (ACSO) Department at the French Armed Forces Biomedical Research Institute (IRBA, Institut de Recherche Biomédicale des Armées). The research being conducted in this department aims to place the human factor front and center in the design of complex technological systems. The specificities of the situations faced by the military (whether they are operational or

simulated) call for cognitive-adaptation abilities at the sub-symbolic (for example, visual or auditory perception) or symbolic levels (for example, decision making). In this department, the studies conducted by Françoise are concerned with the analysis and modeling of individual and collective decision-making and problem-solving activities mediated by computers. Françoise is also Executive Director for the journal *Le Travail Humain*.

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Marie-Pierre is a Human Factors and Cognitive Psychology engineer at the French Armed Forces Biomedical Research Institute (IRBA, Institut de Recherche Biomédicale des Armées). Prior to joining the institute, she worked for 13 years in the Flight Test Center, where she was in charge of flight tests for avionic systems and of physiological protection equipment for flight crews. Her research, in the "Action and Cognition in Operational Situations" IRBA Department, focuses on cognitive adaptation and emotion regulation abilities. She studies the relationship between these abilities and aeronautical performance, particularly in complex and unforeseen situations. In addition, she has extensive experience designing training programs and teaching trainers in the field of Human Factors and Crew Resource Management (CRM). She currently co-organizes a think tank on the design of CRM training programs in France, and is the co-editor of the upcoming book: *Crew Resource Management Trainings for Risky Systems*.

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Scott is the Chief of the Applied Neuroscience Branch, Warfighter Interface Division, Human Effectiveness Directorate, 711 Human Performance Wing at Wright-Patterson Air Force Base. Scott leads the Applied Neuroscience sub-Core Technology Competency area and is accountable for strategic planning, development, execution, and reporting of a diverse body of research and development efforts examining the applied neuroscience aspects of decision making spanning the identification of genetic factors influencing stress responses to increasing distributed team performance. As an experimental psychologist, Scott has extensive experience exploring human interaction with complex automated systems, individual and team performance in multiple domains, as well as issues surrounding the supervisory control of multiple uninhabited autonomous systems. Scott is the founder of the Sense–Assess–Augment paradigm used extensively in the Human Effectiveness Directorate to sense operator state, assess that state relative to performance, and provide focused augmentations to assure mission success. He has also worked on projects relating to contextualized adversarial behavior recognition, layered sensing, and developing measures of human–human and human–machine trust in complex environments. Scott holds a Ph.D. in Applied Experimental Psychology from The Catholic University of America (CUA) in Washington, DC, funded under a NASA Fellowship. He is a member of the Human Factors and Ergonomics Society at both the National and Local Chapter levels as well as Sigma Xi.

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Jean-Yves is a senior officer of the French Air Forces. He has been working at the French Armed Forces Biomedical Research Institute (IRBA, Institut de Recherche Biomédicale des Armées) since 2008. There, he heads a team in charge of CRM training (training program design and training of trainers) for all governmental aeronautical units, as well as submarine personnel. He was a fighter pilot for ten years, and he took part in the Gulf War as well as in several peace-keeping operations throughout the world. More recently, he has been supervising flight units in the Air Force, in particular, flying schools, and has received training in the areas of social psychology and human factors. He has served on the French Defense Air Accident Investigation Board. In addition to his work at the IRBA, he also participates in the training of investigators for organizations involved in risky activities, and he organizes CRM training for health institutions. Currently, he co-organizes a think tank on the design of CRM training programs in France, and he is the co-editor of the upcoming book: *Crew Resource Management Trainings for Risky Systems*.

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Nancy, of Massachusetts Institute of Technology (MIT), is a world leader in the field of system safety; a field she has worked in for the past 30 years. She has published over 200 research papers and consults extensively in many industries, including aerospace, transportation, chemical plants, nuclear power, medical devices, hospitals, oil and gas, and many others. Nancy conducts research on all aspects of system safety including design and development, operations, management, and culture. A common element throughout her work is an emphasis on applying systems thinking and sophisticated system engineering techniques to complex systems. She is author of a 1995 book, *Safeware*, and a new book, *Engineering a Safer World*, published in January 2012. In her new book, she revisits and updates the System Safety concept pioneered by 1950s aerospace engineers and presents her new "Systems-Theoretic Accident Model and Processes" (or "STAMP") approach. STAMP's extended model of causation creates a new approach to safety that is more effective, less expensive, and easier to use than previous techniques.

Nancy is currently a professor at MIT in the Aeronautics and Astronautics Department and the Engineering Systems Division. Previously she held faculty appointments in Computer Science at the University of Washington and the University of California. She is an elected member of the National Academy of Engineering (NAE) and has received many awards for her research and industrial work.

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Christopher's research interests focus on understanding how arguably distinct cognitive systems, such as perception, attention, planning, and memory, interact to produce efficient, effective, and adaptive behavior. The key theoretical assumption underlying much of his research is that humans are *boundedly optimal*—human performance can be considered optimal when the constraints imposed on performance from the cognitive system, environment, and task are considered. Christopher uses empirical (for example, dual-task paradigms, eye tracking, and so on) and modeling techniques (for example, computational cognitive process modeling and ideal performer analyses) to research human adaptation in dynamic and non-stationary environments. Christopher obtained his Doctorate of Philosophy from the Cognitive Science Department at Rensselaer Polytechnic Institute while working with Professor Wayne D. Gray. Christopher is currently a research cognitive scientist in the Cognitive Models & Agents branch of the Human Effectiveness Directorate, Air Force Research Laboratory.

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Axel received his university diploma degree in Aerospace Engineering (focus on control engineering) in 1990 and his doctor of engineering (focus on aviation human factors) in 1996, both from the University of the Bundeswehr Munich (UBM). From 1995–2002 he worked in the aviation industry as a systems engineer and project manager in several research and technology projects in the fields of pilot assistant systems, mission management systems, and cockpit avionics of military aircraft. Since 2002 he is full professor of aircraft dynamics and flight guidance at the Aerospace Engineering Department of UBM and head of the Institute of Flight Systems. His research interests are in the areas of cognitive and

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Kathleen is a doctoral student at the Institute of Cognitive Science at Carleton University, Ottawa, Canada. Kathleen's doctoral work examines the effect of individual pilot factors on simulated flight performance. She has presented findings on the topics of situation awareness, incursion management, and flight examiners' perceptions of younger and older pilot competency at the 2011 and 2013 International Symposia of Aviation Psychology. Kathleen has a Master's degree in Health Studies and undergraduate degree in occupational therapy. Kathleen has a strong interest in policy development and believes that well-designed studies pertaining to aviation psychology can have important implications for standards and regulatory issues in aviation. That said, the *raison d'être* for her doctoral research is to understand pilot performance issues across the lifespan and to support an overarching goal of keeping older pilots flying for as long as safely possible.

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Christopher received his bachelor's degree in Physical Sciences from Harvard College in 1967 and his Ph.D. in Experimental Psychology from the University of Michigan in 1974. From 1969 to 1972 he served in the US Navy. He had a long career at the University of Illinois at Urbana-Champaign as professor of both Psychology and Aviation. From 1983 to 2005 he served as head of the Human Factors Division at the University of Illinois. He is currently a senior scientist at Alion Science Corporation, Micro Analysis & Design Operations, Boulder, Colorado, and professor emeritus at the University of Illinois. He has co-authored two textbooks in engineering psychology and in human factors, two books on air traffic control human factors, a book on applied attention theory, and is the author of more than 200 research articles in refereed journals. His research interests focus on applications of attention models and theories to the design of complex displays (particularly in aviation) and to the understanding of human multitasking capabilities. He is a fellow of the Human Factors & Ergonomics Society and received the society's annual award for education and training of human factors specialists, along with the University Aviation Association President's Award (2005), Flight Safety Foundation Airbus Human Factors Award (2005), Federal Aviation Administration Excellence in Aviation Award (2001), Henry L. Taylor Founder's Award, and Aviation, Space & Environmental Medicine Human Factors Association Award (2000). He is an avid mountain climber.

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