Ashgate’s Human Factors in Defence Series

Series Editors: Dr. Don Harris, Managing Director of HFI Solutions Ltd, Professor Neville Stanton, Chair in Human Factors of Transport at the University of Southampton, UK and Dr Eduardo Salas, University of Central Florida, USA

Human factors is key to enabling today’s armed forces to implement their vision to ‘produce battle-winning people and equipment that are fit for the challenge of today, ready for the tasks of tomorrow and capable of building for the future’ (source: UK MoD). Modern armed forces fulfil a wider variety of roles than ever before. In addition to defending sovereign territory and prosecuting armed conflicts, military personnel are engaged in homeland defence and in undertaking peacekeeping operations and delivering humanitarian aid right across the world. This requires top class personnel, trained to the highest standards in the use of first class equipment. The military has long recognised that good human factors is essential if these aims are to be achieved.

The defence sector is far and away the largest employer of human factors personnel across the globe and is the largest funder of basic and applied research. Much of this research is applicable to a wide audience, not just the military; this series aims to give readers access to some of this high quality work.

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This booklet brings together all of the books in Ashgate’s Human Factors in Defence Series.
Human Factors in Defence
New and Key Titles 2012

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The Human Factors of Fratricide

Laura A. Rafferty and Neville A. Stanton, both at the University of Southampton, UK and Guy H. Walker, Heriot-Watt University, Edinburgh, UK

HUMAN FACTORS IN DEFENCE SERIES

‘...Thanks to Laura, Neville and Guy we have a one-of-a-kind source that lays the road to understanding the complex interactions involved in fratricide. This book is full of insights, approaches, theories and examples of how to ameliorate and understand fratricide. Those who study human error where the stakes are high – this is a must read!’

Eduardo Salas, University of Central Florida, USA

Fratricide has been defined as firing on your own forces, when mistaking them for enemy forces, which results in injury or death. Rates of fratricide incidence have been steadily increasing and the complexity of the contemporary operating environment may lead to a continuation of this trend. Although the majority of research into fratricide has focused on the development of technological decision aids, recent explorations highlight the need to emphasise the social aspects within a socio-technical framework.

This book presents and validates, via the use of case studies, a model of teamwork and decision-making factors that are associated with incidents of fratricide. In summary, it offers a review and evaluation of contemporary theoretical perspectives on teamwork and fratricide, as well as a range of accident analysis approaches. A novel theory of fratricide is then presented followed by a new methodology for assessing fratricide. Naturalistic case studies of teams are undertaken in the military domain. These studies illustrate the approach and offer early validation evidence. In closing, the book presents a series of principles designed to reduce the likelihood of fratricide in the future.

• Examines the core factors in fratricide incidents and how these factors interact.
Contents
Introduction; Fratricide, expectations, situation awareness and teamwork; Application of the F3 Model to a case study of fratricide; FEAST: fratricide event analysis of systemic teamwork; It’s good to talk: explorations into the communications surrounding shoot, no-shoot decisions; The communication masking effect: why it’s not always good to talk; Is it better to be connected?; Comparison of populated models; Conclusion and recommendations; References and bibliography; Index.

About the editors
Dr Laura Rafferty completed her undergraduate studies in 2007 graduating with a BSc in Psychology (Hons) from Brunel University. In the course of this degree Laura completed two industrial placements, the second of which was working as a Research Assistant in the Ergonomics Research Group. During this seven month period Laura helped to design, run and analyse a number of empirical studies being run for the Human Factors Integration Defence Technology Centre (HFI DTC) at Brunel. Within this time Laura also completed her dissertation exploring the qualitative and quantitative differences between novices and experts within military command and control. From April 2009 Laura has been employed in the Transportation Research Group at the University of Southampton as a Project Assistant for the HFI DTC working on projects including Naturalistic Decision Making in Teams, Contemporising the Combat Estimate and compiling a Human Factors Methods Database. In July 2011 Laura was awarded a PhD in Human Factors from the University of Southampton.

Professor Stanton holds a Chair in Human Factors in the School of Civil Engineering and the Environment at the University of Southampton. He has published more than 150 peer-reviewed journal papers and 20 books on Human Factors and Ergonomics. In 1998, he was awarded the Institution of Electrical Engineers Divisional Premium Award for a co-authored paper on Engineering Psychology and System Safety. The Ergonomics Society awarded him the Otto Edholm medal in 2001 and The President’s Medal in 2008 for his contribution to basic and applied ergonomics research. In 2007, The Royal Aeronautical Society awarded him the Hodgson Medal and Bronze Award with colleagues for their work on flight deck safety. Professor Stanton is an editor of the journal Ergonomics and on the editorial boards of Theoretical Issues in Ergonomics Science. Professor Stanton is a Fellow and Chartered Occupational Psychologist registered with The British Psychological Society, and a Fellow of The Ergonomics Society. He has a BSc (Hons) in Occupational Psychology from the University of Hull, an MPhil in Applied Psychology and a PhD in Human Factors from Aston University in Birmingham.

Dr Guy Walker is a lecturer Guy Walker is a Lecturer in the School of the Built Environment at Heriot-Watt University, Edinburgh, and his research focuses on human factors issues in infrastructure and transport. He is a recipient, with his colleagues, of the Ergonomics Society’s President’s Medal for original research. He is also author/co-author of nine books on diverse topics in human factors, including a major text on human factors methods, and is author/co-author of over fifty international peer-reviewed journals.

SEE ALSO
Human Factors Issues in Combat Identification................. Page 9
Trust in Military Teams
Neville A. Stanton,
University of Southampton, UK

HUMAN FACTORS IN DEFENCE SERIES
‘More than any other occupation or organization, military endeavours are completely dependent upon trust. However, trust has many dimensions to it: trust in your comrades; trust in your allies and trust in your equipment. This book with contributions from experts from both sides of the Atlantic examines all these aspects of trust. This volume is set to become the definitive reference source for all researchers and practitioners working in this area.’
Don Harris, HFI Solutions Ltd

The objective of this book is to report on contemporary trends in the defence research community on trust in teams, including inter- and intra-team trust, multi-agency trust and coalition trust. The book also considers trust in information and automation, taking a systems view of humans as agents in a multi-agent, socio-technical, community. The different types of trust are usually found to share many of the same emotive, behavioural, cognitive and social constructs, but differ in the degree of importance associated with each of them.

Trust in Military Teams is written by defence scientists from the USA, Canada, Australia and the UK, under the auspices of The Transfer Cooperation Programme. It is representative of the latest thinking on trust in teams, and is written for defence researchers, postgraduate students, academics and practitioners in the human factors community.

• Addresses a major socio-cultural issue facing and inhibiting joint/coalition operations.
• Conclusion summarises the contributions and offers a set of recommendations for the development and maintenance of trust in teams.
About the author
Professor Neville A. Stanton holds a Chair in Human Factors and has published more than 150 international peer-reviewed journal papers and 20 books on Human Factors and Ergonomics. In 1998 he was awarded the Institution of Electrical Engineers Divisional Premium Award for a co-authored paper on Engineering Psychology and System Safety. The Ergonomics Society awarded him the President’s medal in 2008 and the Otto Edholm medal in 2001 for his contribution to basic and applied ergonomics research. The Royal Aeronautical Society awarded him the Hodgson Medal and Bronze Award with colleagues for their work on flight deck safety. Professor Stanton an editor of Ergonomics and on the editorial board of Theoretical Issues in Ergonomics Science and the International Journal of Human Computer Interaction. Professor Stanton is a Fellow and Chartered Occupational Psychologist registered with The British Psychological Society, and a Fellow of The Ergonomics Society. He has a BSc in Occupational Psychology from Hull University, an MPhil in Applied Psychology from Aston University, and a PhD in Human Factors, also from Aston.

Performance Under Stress
Peter A. Hancock and James L. Szalma, both at the University of Central Florida, USA

HUMAN FACTORS IN DEFENCE SERIES

‘The book is useful to anyone who desires a better understanding of stress and its ability to influence human performance. It is particularly relevant to the military community given the nonconventional challenges in today’s battlefields and their increasing complexity. Performance under Stress addresses the subject in a pragmatic way and also offers a detailed and perceptive account of the current limited understanding and prospective future directions of this field of study.’

Military Review

This book is derived largely from a multiple-year, multiple university initiative (MURI) on stress and soldier performance on the modern, electronic battlefield. It involved leading researchers from many institutions who have brought their individual expertise to bear on these crucial, contemporary concerns. United by a common research framework, these groups attacked the issue from different methodological and conceptual approaches, ranging from traditional laboratory modeling and experimentation, to realistic simulations; from involved field exercises to personal experiences of actual combat conditions. The insights generated have been distilled and presented as a benchmark of current understanding and provide future directions for research in this arena. Although this work focuses on soldier stress and soldier performance, the principles that are derived extend well beyond this single application. Their findings can be applied to people facing the demands of the business world or research as much as to those who meet life or death situations, such as homeland security, first responders, and law enforcement personnel.

Includes 27 b&w illustrations

2008 Hardback 978-0-7546-7059-9 406 pages £55.00 ebook 978-0-7546-8475-6

www.ashgate.com/isbn/9780754670599
Human-Robot Interactions in Future Military Operations
Michael Barnes, Army Research Laboratory (ARL-HRED), USA and Florian Jentsch, University of Central Florida, USA

HUMAN FACTORS IN DEFENCE SERIES

‘Surprisingly, the more robots can do on their own, the more important becomes the ability to coordinate those activities with other people and groups. Barnes and Jentsch have assembled a comprehensive treatment of the latest data, concepts and interfaces needed to coordinate people and robots in demanding dynamic and uncertain situations.’

David Woods, Ohio State University, USA

Human-Robot Interactions in Future Military Operations provides an opportunity for scientists investigating military issues related to HRAI to present their results cohesively within a single volume. The issues range from operators interacting with small ground robots and aerial vehicles to supervising large, near-autonomous vehicles capable of intelligent battlefield behaviors. The ability of the human to “team” with intelligent unmanned systems in such environments is the focus of the volume. As such, chapters are written by recognized leaders within their disciplines and they discuss their research in the context of a broad-based approach. Therefore the book allows researchers from differing disciplines to be brought up to date on both theoretical and methodological issues surrounding human-robot interaction in military environments.

The overall objective of this volume is to illuminate the challenges and potential solutions for military HRI through discussion of the many approaches that have been utilized in order to converge on a better understanding of this relatively complex concept. It should be noted that many of these issues will generalize to civilian applications as robotic technology matures.

• Unique and comprehensive treatment of human-robot interaction (HRI) in military applications.

• Explores the challenges and potential solutions for military HRI.
Contents

Part I Introduction to HRI: An introduction to human-robot interaction in military applications; Soldier-robot teams in future battlefields: an overview; The safe human-robot ratio. Part II Foundations of HRI: The cognitive psychology of human-robot interaction; Social factors in human-robot interactions; Robots in space and time: the role of object, motion and spatial perception in the control and monitoring of uninhabited ground vehicles; Automation strategies for facilitating human interaction with military unmanned vehicles; An analytical approach for predicting soldier workload and performance using human performance modeling. Part III UAV Research: Introducing cognitive and co-operative automation into uninhabited aerial vehicle guidance work systems; Situation awareness in human-robot interaction: challenges and user interface requirements; Imperfect reliability in unmanned air vehicle supervision and control; Remotely operated vehicles (ROVs) from the bottom-up operational perspective; Unmanned aerial vehicles: enhancing video display utility with synthetic vision technology. Part IV UGV Research: Telepresence control of unmanned systems, Chris Jansen and Jan B.F. van Erp; Multimodal research for human robot interactions; Robotics operator performance in a multi-tasking environment; A cognitive systems engineering approach for human-robot interaction: lessons from an examination of temporal latency; Robotic control systems for dismounted soldiers; Part V Cross-Platform Research: Lessons learned from human-robotic interactions on the ground and in the air; On maximizing fan-out: towards controlling multiple unmanned vehicles; Coordination and automation for controlling robot teams; Model world: military HRI research conducted using a scale MOUT facility. Part VI Future Directions: The future of HRI: alternate research trajectories and their influence on the future of unmanned systems; Index.

ALSO OF INTEREST

NEW

In Business and Battle
Strategic Leadership in the Civilian and Military Spheres
Charles Style, Nicholas Beale and David Eller

In Business and Battle is the synthesis of the expert analysis and experience of participants in the UK’s Royal College of Defence Studies annual programme, tested and sharpened by extensive international field work and coupled with contributions by first-rate external presenters. It deals with strategy and top level strategic leadership together and views them from multinational, multicultural and multisectoral perspectives. In so doing, it pushes the boundaries beyond a mere description of commercial, civilian and military strategic environments; it provides extensive and deep insights into how to interpret and shape those environments.

Killer Robots
Legality and Ethicality of Autonomous Weapons
Armin Krishnan, University of Texas, USA

Military robots, and potentially autonomous robotic systems, could soon be introduced to the battlefield, meaning that humans may one day be largely excluded from both the battlefield and the decision cycle of warfare. Krishnan explores the technological, legal and ethical issues connected to combat robotics, examining both the opportunities and limitations of autonomous weapons. He also proposes solutions to the future regulation of military robotics through international law.

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Neurocognitive and Physiological Factors During High-Tempo Operations
Steven Kornuth and Rebecca Steinberg, both at the University of Texas, USA and Michael D. Matthews, United States Military Academy, USA

HUMAN FACTORS IN DEFENCE SERIES

'This book brings the fruits of four decades of basic neuroscience research on how the brain adapts to stress into the real world of military operations. The evidence collected here makes clear that methods are now at hand to determine who is vulnerable to such stresses and what pharmacology may some day be able to do for them. A “must read” for strategists.'

Floyd E. Bloom, The Scripps Research Institute, USA

Neurocognitive and Physiological Factors During High-Tempo Operations features world-renowned scientists conducting ground-breaking research into the basic mechanisms of stress effects on the human body and psyche, as well as introducing novel pharmaceutics and equipment that can rescue or improve maximal performance during stress. Its focus is on the military model as an exemplar for high-stress environments, the best for understanding human performance under stress, both in the short-term as well as in the long-term.

The book differs from many previous human factors publications by presenting state-of-the-art neuroscience data in a format that is comprehensible and informative for readers of diverse backgrounds. It not only details human behaviors and perception, but also provides concise brain imagery and physiological findings to support its conclusions. In addition, the incorporation of the US Army soldier model of extreme stress and extreme performance demands provides a real-life theme that anchors the scientific, organizational, assessment and response aspects of each chapter. This book synthesizes hard facts with real-life accounts of performing under stress and shows how a large oversight institution like the US Army can measure and improve human factors considerations for its members.

2010 286 pages
Hardback 978-0-7546-7923-3 £65.00
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• Multi-disciplinary exploration of soldier performance under stress in high-tempo operations.
• Presents neuroscience data in a readily accessible format.
Contents
Foreword; Introduction: Part 1 Cognition During Real-World Activities: Promises and challenges in translating neurofunctional research for army applications; Modeling the impact of workload in network centric supervisory control settings; Systematic measurements of human behavior in naturalistic settings; Noninvasive monitoring of brain function with near infrared light. Part 2 Cognition During Sleep Deprivation: Individual differences to sleep deprivation vulnerability and the neural connection with task strategy, metacognition, visual spatial attention, and white matter differences; Identification and prediction of substantial differential vulnerability to the neurobehavioral effects of sleep loss; Sustaining performance: the other side of sleep; Factors affecting mnemonic performance in a nonhuman primate model of cognitive workload. Part 3 Cognition during Stress and Anxiety: Systems neuroscience approaches to measure brain mechanisms underlying resilience – towards optimizing performance; The cognitive neuroscience of insight and its antecedents; Decision-making under risk and stress: developing a testable model; Brain processes during expert cognitive-motor performance; the impact of mental stress and emotion regulation. Part 4 Guidance from Military Leadership and Ethical Considerations: Military operations: humans not machines make the difference; Is supraphysiological enhancement possible, and what are the downsides?; The US army future concept for the human dimension: chief human dimension executive summary; Sustaining performance in mass casualty environments; Neuropsychiatry and aviation safety; Closing remarks: realization of existing capabilities in sustaining performance; Index.

Human Factors in Defence Series

Cognitive Work Analysis: Coping with Complexity
Daniel P Jenkins, Sociotechnic Solutions, UK, Neville A. Stanton, Paul M. Salmon and Guy H. Walker, all at Brunel University, UK

‘How do you deal with burgeoning and interactive sources of uncertainty while all the time acting under an ever-stricter imperative to create zero-failure systems? The authors’ solution is to embrace uncertainty and create designs which themselves are responsive, adaptive, and expansive. With careful and explicit exemplars, they elucidate methods to deal with the complexity of advanced socio-technical system problems... This is a resource for all those whose vocation embraces the design of tomorrow. Buy it, read it, and recommend it to others. They will thank you.’

Peter A. Hancock, University of Central Florida, USA

Cognitive Work Analysis (CWA) is a structured framework specifically developed for considering the development and analysis of complex socio-technical systems. Cognitive Work Analysis: Coping with Complexity contains a comprehensive description of CWA, introducing it to the uninitiated. It then presents a number of applications in complex military domains to explore the benefits of CWA and pays particular attention to investigating the CWA framework in its entirety.

Contents: Introduction; It’s a complex world; Interaction design; Application of CWA in familiar domains; Applications of CWA in a complex world; Using CWA to design for dynamic allocation of function; Designing interfaces using CWA; Development of a CWA software tool; Does the tool make the CWA process any quicker or easier?; Conclusions; Appendix; Bibliography; Index.

2008 Hardback 978-0-7546-7026-1 298 pages £55.00 ebook 978-0-7546-9184-6
ebook epub 978-1-4094-8586-3 www.ashgate.com/isbn/9780754670261
Human Factors Issues in Combat Identification

Dee H. Andrews, Air Force Research Laboratory, USA, Robert P. Herz, Air Force Research Laboratory, USA and Mark B. Wolf, Oak Ridge Institute for Science and Education, USA

HUMAN FACTORS IN DEFENCE SERIES

‘The book leverages the best current science to provide the military with a concrete agenda and set of principles to use in mitigating fratricide, in all possible avenues of approach to the problem. One can easily imagine the Department of Defense going from this book to a specific program of research with the potential for many near-term applications. Military organizations can take this book and run with it.’

Robert Hoffman, Institute for Human and Machine Cognition, USA

This edited book presents an array of approaches on how human factors theory and research addresses the challenges associated with combat identification. Special emphasis is placed on reducing human error that leads to fratricide, which is the unintentional death or injury of friendly personnel by friendly weapons during an enemy engagement. Although fratricide has been a concern since humans first engaged in combat operations, it gained prominence during the Persian Gulf War. To reduce fratricide, advances in technological approaches to enhance combat identification (e.g., Blue Force Tracker) should be coupled with the application of human factors principles to reduce human error. The book brings together a diverse group of authors from academic and military researchers to government contractors and commercial developers to provide a single volume with broad appeal.

• Offers preventative measures to reduce the occurrence of fratricide incidents.

• Based on real-world, naturalistic studies undertaken in military environments.

SEE ALSO

The Human Factors of Fratricide............. Page 1
Command and Control: The Sociotechnical Perspective

Guy H. Walker, Heriot-Watt, UK, Neville A. Stanton, University of Southampton, UK, Paul M. Salmon, Monash University, and Daniel P. Jenkins, Sociotechnic Solutions, UK

HUMAN FACTORS IN DEFENCE SERIES

Military command and control is not merely evolving, it is co-evolving. Technology is creating new opportunities for different types of command and control, and new types of command and control are creating new aspirations for technology. The question is how to manage this process, how to achieve a jointly optimised blend of socio and technical and create the kind of agility and self-synchronisation that modern forms of command and control promise. The answer put forward in this book is to re-visit sociotechnical systems theory. In doing so, the problems of 21st century command and control can be approached from an alternative, multi-disciplinary and above all human-centred perspective.

Human factors (HF) is also co-evolving. The traditional conception of the field is to serve as a conduit for knowledge between engineering and psychology yet 21st century command and control presents an altogether different challenge. Viewing military command and control through the lens of sociotechnical theory forces us to confront difficult questions about the non-linear nature of people and technology: technology is changing, from platform centric to network centric; the interaction with that technology is changing, from prescribed to exploratory; and complexity is increasing, from behaviour that is linear to that which is emergent. The various chapters look at this transition and draw out ways in which sociotechnical systems theory can help to understand it.

The sociotechnical perspective reveals itself as part of a conceptual toolkit through which military command and control can be transitioned, from notions of bureaucratic, hierarchical ways of operating to the devolved, agile, self-synchronising behaviour promised by modern forms of command and control like Network Enabled Capability (NEC).

• First book to deal with sociotechnical theory from a human factors perspective.

Sociotechnical system theory brings with it a sixty year legacy of practical application and this real-world grounding in business process re-engineering underlies the entire book. An attempt has been made to bring a set of sometimes abstract (but no less useful) principles down to the level of easy examples, design principles, evaluation criteria and actionable models. All of these are based on an extensive review of the current state of the art, new sociotechnical/NEC studies conducted by the authors, and insights derived from field studies of real-life command and control. Time and again, what emerges is a realisation that the most agile, self-synchronising component of all in command and control settings is the human.
Digitising Command and Control
A Human Factors and Ergonomics Analysis of Mission Planning and Battlespace Management

Neville A. Stanton, University of Southampton, UK, Daniel P. Jenkins, Sociotechnic Solutions, UK, Paul M. Salmon, Monash University, Australia, Guy H. Walker, Heriot-Watt University, Edinburgh, Kirsten M. A. Revell, University of Southampton, UK and Laura Rafferty, University of Southampton, UK

HUMAN FACTORS IN DEFENCE SERIES

‘Computerizing complex undertakings is often promoted as a panacea. To be done properly, system designers and system owners must realise that they are building a socio-technical system, and that human factors therefore must be taken into account from the very start. Failing to do so will seriously hamper both the efficiency and the safety of the final product, as amply illustrated by this meticulous evaluation of a complex military system.’

Erik Hollnagel, MINES ParisTech, France

This book presents a human factors and ergonomics evaluation of a digital Mission Planning and Battle-space Management (MP/BM) system. An emphasis was placed on the activities at the Brigade (Bde) and the Battle Group (BG) headquarters (HQ) levels. The analysts distributed their time evenly between these two locations. The human factors team from Brunel University, as part of the HFI DTC, undertook a multi-faceted approach to the investigation, including: observation of people using the traditional analogue MP/BM processes in the course of their work; cognitive work analysis of the digital MP/BM system; analysis of the tasks and goal structure required by the digital MP/BM; assessment against a usability questionnaire; analysis of the distributed situation awareness and an environmental survey.

• Offers practical improvements to a current digital Mission Planning and Battle-space Management System.

• Actively considers human factors issues for the next generation of such systems.

2009 238 pages
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ebook 978-0-7546-9502-8

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Modelling Command and Control
Event Analysis of Systemic Teamwork
Neville A. Stanton, Brunel University, UK, Chris Baber, University of Birmingham, UK and Don Harris, Cranfield University, UK

HUMAN FACTORS IN DEFENCE SERIES
‘The book provides an excellent overview of the many existing command and control modelling techniques and provides a useful critique of each.’ HFES Newsletter

Command and control environments continue to represent a challenging domain for human factors research. Modelling Command and Control takes a broad view of command and control research, to include C2 (command and control), C3 (command, control and communication), and C4 (command, control, communication and computers) as well as human supervisory control paradigms. The book presents case studies in diverse military applications (e.g. land, sea and air) of command and control. While the domains of application are very different, many of the challenges they face share interesting similarities.


ALSO OF INTEREST
NEW

Precision-guided Munitions and Human Suffering in War
James E. Hickey, US Naval War College, Newport, USA

MILITARY AND DEFENCE ETHICS SERIES
‘Modern war technologies, such as smart bombs, promise to reduce unnecessary suffering—but has that really been the case? Answering that question is critical for current debates, such as the ethics of deploying military robots for targeted strikes. In this book, Professor Hickey masterfully connects the dots between military history and philosophy, using real-world data to support his ethical arguments.’

Patrick Lin, California Polytechnic State University, USA

Today, precision-guided munitions (PGMs) with their high degree of discrimination and accuracy again hold such promise. This book seeks to answer the question: Do PGMs mitigate suffering in war, and have these weapons changed the way decisions regarding war and peace have been made? Answering this question helps us understand possible shifts in emphasis in modern warfare, both in terms of methods employed and of the greater concern placed on limiting human suffering during conflict. This book will help students of ethics, just war and military history and senior military and civilian leaders to understand the possible outcomes and wider implications of their strategic choices to use such technology.

September 2012 254 pages Hardback 978-1-4094-2951-7 £60.00 ebook 978-1-4094-2952-4 www.ashgate.com/isbn/9781409429517

AirLandBattle21
Transformational Concepts for Integrating Twenty-First Century Air and Ground Forces
Ellwood P. Hinman IV, Thomas E. Jahn and James G. Jinnette, all in the US Air Force, USA

The time has come for innovative counter-air and counter-land concepts focused on medium- to large-scale conventional combat operations that will merge air and ground forces even more effectively into a single potent fighting force. Such is the focus of AirLandBattle21.

2009 178 pages Hardback 978-0-7546-7634-8 £60.00 www.ashgate.com/isbn/9780754676348
Macrocognition in Teams
Theories and Methodologies
Edited by Michael P. Letsky, Office of Naval Research, USA, Norman W. Warner, Naval Air Systems Command, USA, Stephen M. Fiore, University of Central Florida, USA and C.A.P Smith, Colorado State University, USA
HUMAN FACTORS IN DEFENCE SERIES
‘...The book advances our theoretical and conceptual understanding of macrocognition and presents empirical results and technological demonstrations showing how applications of macrocognition can enhance the cognitive processes of teams solving problems.’
Verlin B. Hinsz, North Dakota State University, USA

Macrocognition in Teams provides readers with a greater understanding of the macrocognitive processes which support collaborative team activity, showcasing current research, theories, methodologies and tools. It will be of direct relevance to academics, researchers and practitioners interested in group/team interaction, performance, development and training.


ALSO OF INTEREST
Macrocognition Metrics and Scenarios: Design and Evaluation for Real-World Teams
Edited by Emily S. Patterson, Ohio State University, USA and Janet E. Miller, Air Force Research Laboratory, USA
‘Patterson and Miller have synthesised a provocative set of perspectives on the measurement of cognitive processes in team-based work environments. With an authoritative line-up of contributors, this volume provides a wealth of new material on methods of task decomposition for cognitive data gathering in complex team settings. A notable feature is the blend of critical thinking on principles of evaluation with a serious appreciation of real world applications for the emergent techniques.’
Rhona Flin, University of Aberdeen, UK

Macrocognition Metrics and Scenarios: Design and Evaluation for Real-World Teams translates advances in macrocognition into a format that will support immediate use by the software testing and evaluation community for large-scale systems, as well as real-world team trainers. It provides an overview of the theoretical foundations of macrocognition, describes new macrocognitive metrics, and provides guidance on using the metrics in the context of different approaches to evaluation and measurement of real-world teams.

2010 340 pages Hardback 978-0-7546-7578-5 £55.00 ebook 978-1-4094-0687-7
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Naturalistic Decision Making and Macrocognition
Edited by Jan Maarten Schraagen, TNO Defence, Human Factors, The Netherlands, Laura Miliello, University of Dayton Research Institute, USA, Tom Ormerod, Lancaster University, UK and Raanan Lipshitz, The University of Haifa, Israel

This book presents the latest work in the area of naturalistic decision making (NDM) and its extension into the area of macrocognition. It contains 18 chapters relating research centred on the study of expertise in naturalistic settings, written by international experts in NDM and cognitive systems engineering. The objective of the book is to present the reader with exciting new developments in this field of research, which is characterized by its application-oriented focus.

2008 432 pages Hardback 978-0-7546-7020-9 £65.00 ebook 978-0-7546-8019-2 ebook epub 978-1-4094-8569-8
www.ashgate.com/isbn/9780754670209
Distributed Situation Awareness
Theory, Measurement and Application to Teamwork
Paul M. Salmon, Monash University, Australia, Neville A. Stanton, University of Southampton, UK, Guy H. Walker, Heriot-Watt University, UK and Daniel P. Jenkins, Sociotechnic Solutions, UK

HUMAN FACTORS IN DEFENCE SERIES

Having an accurate understanding of what is going on is a key commodity for teams working within military systems. ‘Situation awareness’ (SA) is the term that is used within human factors circles to describe the level of awareness that operators have of the situation that they are engaged in; it focuses on how operators develop and maintain a sufficient understanding of ‘what is going on’ in order to achieve success in task performance. Over the past two decades, the construct has become a fundamental theme within the areas of system design and evaluation and has received considerable attention from the human factors research community. Despite this, there is still considerable debate over how SA operates in complex collaborative systems and how SA achievement and maintenance is best supported through system, procedure and interface design.

This book focuses on the recently developed concept of distributed situation awareness, which takes a systems perspective on the concept and moves the focus on situation awareness out of the heads of individual operators and on to the overall joint cognitive system consisting of human and technological agents. Situation awareness is viewed as an emergent property of collaborative systems, something that resides in the interaction between elements of the system and not in the heads of individual operators working in that system.

The first part of the book presents a comprehensive review and critique of existing SA theory and measurement approaches, following which a novel model for complex collaborative systems, the distributed SA model, and a new modelling procedure, the propositional network approach, are outlined and demonstrated. The next part focuses on real-world applications of the model and modelling procedure, and presents four case studies undertaken in the land warfare, multinational warfare and energy distribution domains. Each case study is described in terms of the domain in question, the methodology employed, and the findings derived in relation to situation awareness theory. The third and final part of the book then concentrates on theoretical development, and uses the academic literature and the findings from the case study applications to validate and extend the distributed SA model described at the beginning of the book. In closing, the utility of the distributed SA model and modelling procedure are outlined and a series of initial guidelines for supporting distributed SA through system design are articulated.

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Human Factors for Naval Marine Vehicle Design and Operation
Jonathan M. Ross

‘Human Factors for Naval Marine Vehicle Design and Operation offers an excellent discussion of the importance and process of incorporating human factors into ship design from an application-oriented perspective. The book, suitable for a wide audience, discusses issues relevant to the acquisitions community, operators and maintainers.’

Ergonomics in Design

There is a driving need for naval professionals to focus on human factors issues. The number of maritime accidents is increasing and the chief cause is human error, both by the designer and the operator. Decreasing crew size, lack of experienced operators, operations in higher sea states and fatigue worsen the situation. Automation can be a partial solution, but flawed automated systems actually contribute to accidents at sea.

Up to now, there has been no overarching resource available to naval marine vehicle designers and human factors professionals which bridges the gap between the human and the machine in this context. Designers understand the marine vehicle; human factors professionals understand how a particular environment affects people. Yet neither has a practical understanding of the other’s field, and thus communicating requirements and solutions is difficult.

This book integrates knowledge from numerous sources as well as the advice of a panel of eight recognized experts in the fields of related research, development and operation. The result is a reference that bridges the communications gap, and stands to help enhance the design and operation of all naval marine vehicles.

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COMING SOON

Designing Soldier Systems
Current Issues in Human Factors
Edited by Pamela Savage-Knepshield, U.S. Army Research Laboratory – Human Research and Engineering Directorate, USA; John Martin, MANPRINT, USA; John Lockett III, U.S. Army Research Laboratory, Human Research and Engineering Directorate, USA and Laurel Allender, U.S. Army Research Laboratory – Human Research and Engineering Directorate, USA

HUMAN FACTORS IN DEFENCE SERIES

‘Designing Soldier Systems highlights the benefits of reverse systems engineering case studies, stressing the need for more up-front human systems integration research and user centered design practices for developmental and fielded military systems. US Army human engineering scientists elucidate trials, tribulations, and lessons for bringing soldier-centric design and operational procedures to successful mission accomplishment in the harsh environments of modern technology-centered battlefields.’

Gerald P. Krueger, PhD, CPE, Colonel, US Army (retired)

This book focuses on contemporary human factors issues within the design of soldier systems and describes how they are currently being investigated and addressed by the U.S. Army to enhance soldier performance and effectiveness.

Designing Soldier Systems approaches human factors issues from three main perspectives. In the first section, Chapters 1-5 focus on complexity introduced by technology, its impact on human performance, and how issues are being addressed to reduce cognitive workload. In the second section, Chapters 6-10 concentrate on obstacles imposed by operational and environmental conditions on the battlefield and how they are being mitigated through the use of technology. The third section, Chapters 11-21, is dedicated to system design and evaluation including the tools, techniques and technologies used by researchers who design soldier systems to overcome human physical and cognitive performance limitations as well as the obstacles imposed by environmental and operations conditions that are encountered by soldiers.

The book will appeal to an international multidisciplinary audience interested in the design and development of systems for military use, including defense contractors, program management offices, human factors engineers, human system integrators, system engineers, and computer scientists. Relevant programs of study include those in human factors, cognitive science, neuroscience, neuropsychology, psychology, training and education, and engineering.

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Human Factors Modelling in System Design and Evaluation

Neville A. Stanton, University of Southampton, UK, Daniel P. Jenkins, Sociotechnic Solutions, UK, Paul M. Salmon, Monash University, Australia, Guy H. Walker, Heriot-Watt University, Edinburgh, Chris Baber and Robert J. Houghton, University of Nottingham, UK

HUMAN FACTORS IN DEFENCE SERIES

This book provides the reader with detailed descriptions of how human factors modelling enables human factors integration (HFI) into system analysis, design, procurement and evaluation. The focus is on the interaction of three major qualitative modelling approaches: CWA (Cognitive Work Analysis), WESTT (Workload, Error, Situation awareness, Time and Teamwork) and HTA (Hierarchical Task Analysis).

The book demonstrates how these three approaches can be used in the assessment of a mission planning system, by means of case studies, to depict their contrasting strengths. Also included with the book is a CD-ROM containing software tools developed by the HFI-DTC for the application of all three of the modelling approaches featured. This software can be used in conjunction with the book to model complex systems by each methodology, enabling effective HFI into the crucial planning stages.

About the authors: Professor Neville A. Stanton holds a Chair in Human-Centred Design and has published more than 75 international academic journal papers and 10 books on human-centred design. He was a Visiting Fellow of the Department of Design and Environmental Analysis at Cornell University in 1998.

Dr Chris Baber is a Reader in Interactive Systems Design, a member of the Human Interface Technology Group, Educational Technology Group and the Pervasive Computing Groups within the School of Electronic and Electrical Engineering, and an Associate Member of the Sensory Motor Neuroscience Group in the School of Psychology.

Daniel P. Jenkins graduated in 2004 from Brunel University with MEng (Hons) in Mechanical Engineering and Design. Part of his degree involved designing and developing a system to raise driver situational awareness and reduce lateral collisions.

Dr Robert J. Houghton is currently a Research Fellow in the Human Interface Technologies research group at the University of Birmingham, working on projects for the HFI DTC. He holds an MA (Hons) and PhD in Experimental Psychology.

Paul M. Salmon is a Human Factors specialist and has a BSc Honours degree in Sports Science and an MSc in Applied Ergonomics, both from the University of Sunderland in the UK. He worked as a Human Factors researcher at Brunel University in the UK between 2001 and 2004.

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ebook 978-0-7546-9188-4
The Human Factors of Simulation and Assessment Series

Series Editors: Dr Michael Lenné, Monash University Accident Research Centre, Melbourne, Australia and Dr Mark Young, School of Engineering and Design, Brunel University, London, UK

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There is an urgent and growing need for all those involved in matters of national defence – from policy makers to armaments manufacturers to members of the armed forces – to behave, and to be seen to behave, ethically. The ethical dimensions of making decisions and taking action in the defence arena are the subject of intense and ongoing media interest and public scrutiny. It is vital that all those involved be given the benefit of the finest possible advice and support. Such advice is best sought from those who have great practical experience or theoretical wisdom (or both) in their particular field and publication of their work in this series will ensure that it is readily accessible to all who need it.
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