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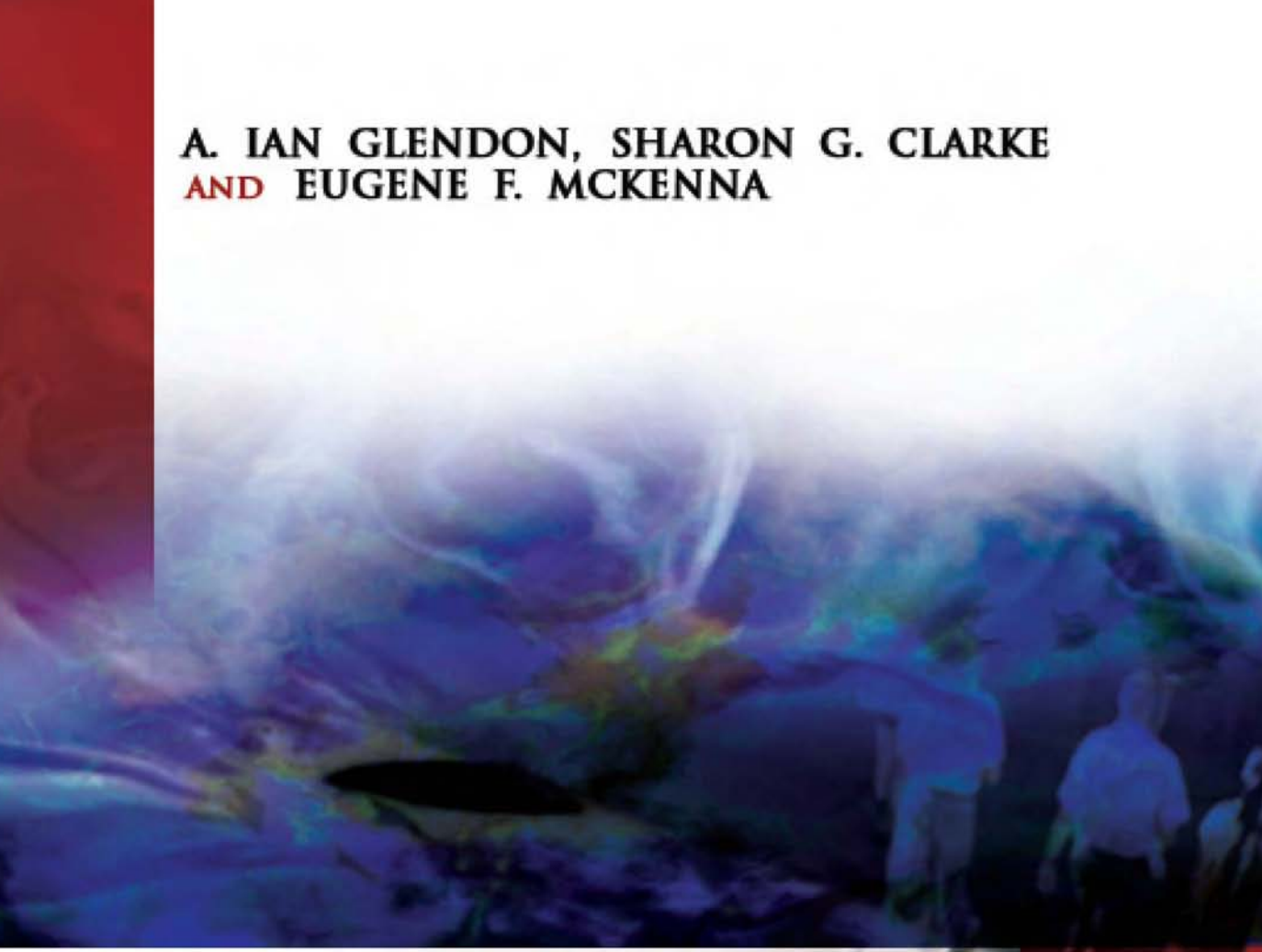
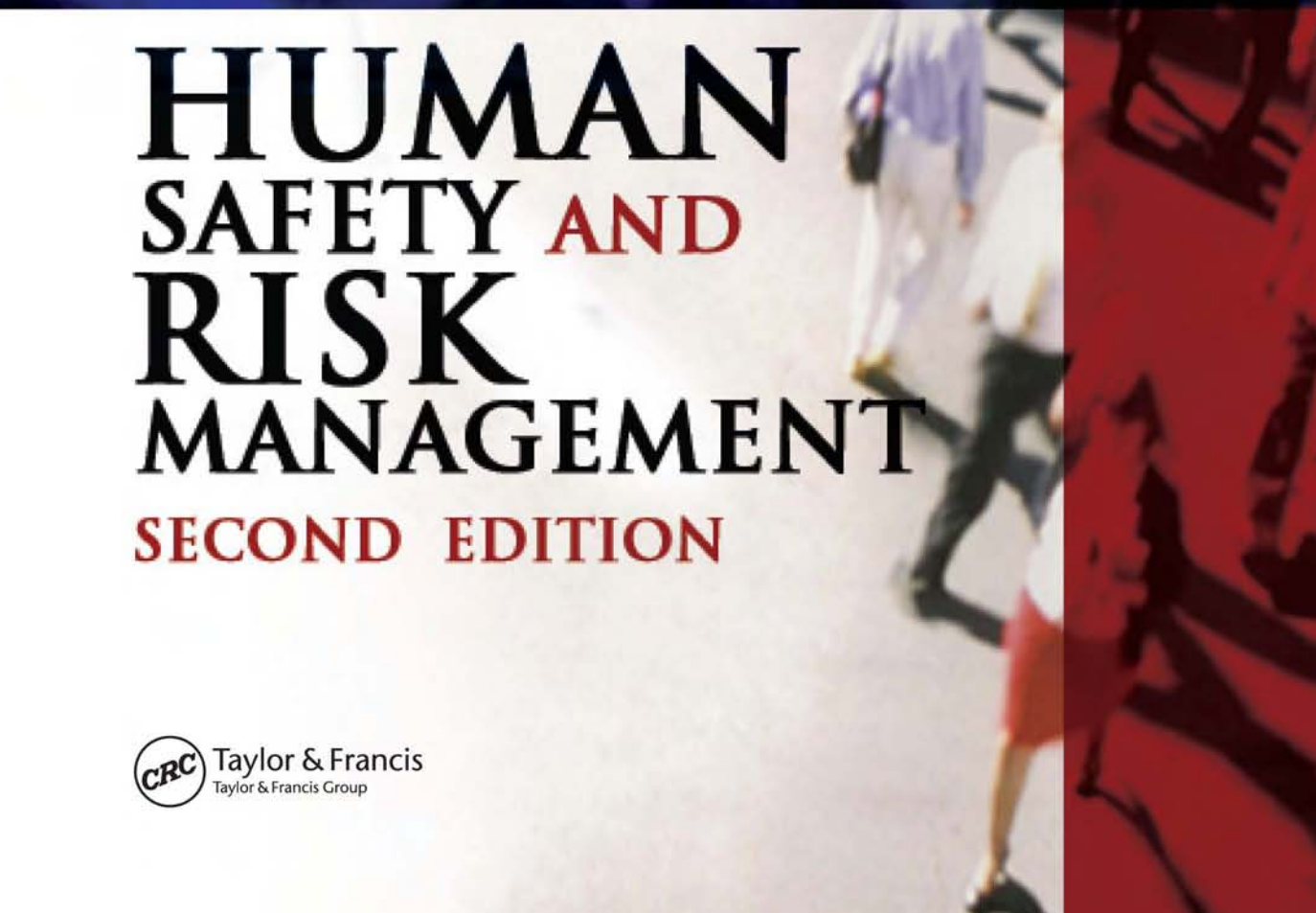


HUMAN SAFETY AND RISK MANAGEMENT

SECOND EDITION



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Preface

Much has happened in the 10 years or so since the first edition of *Human Safety and Risk Management* was published. New journals on risk and safety have appeared — for example, *Health, Risk & Society; Journal of Risk Research; Policy and Practice in Health and Safety; Risk, Decision and Policy*; *Risk Management: An International Journal*; and *Transportation Research Part F: Traffic Psychology and Behaviour*. Longer established journals in the risk and safety field have gone from strength to strength, including: *Accident Analysis and Prevention, Journal of Safety Research, Risk Analysis, Safety Science*, and *Work & Stress*. The large amount of recent research literature that has been generated in the risk and safety field is reflected in two completely new chapters in this second edition. Over 56% of more than the 300 works referenced in Chapter 2 have appeared since the first edition of this book was published, while well over 70% of the 200 referenced works in the new chapter on safety culture have appeared since the publication of the first edition. Nearly 500 references cited within the book have appeared since 2000. In addition to including the new substantive chapters in this edition (though it is inevitable that our attempts to access and include the considerable volume of potential new material fall short in many areas), we have updated our text in numerous ways and have reworked material from the earlier edition. In these endeavors, we are delighted that Dr. Sharon Clarke joined the author team, adding her expertise and knowledge to that of the authors of the first edition.

The greatly increased volume of relevant material has been accompanied by changes in the way in which some concepts associated with risk and safety have been understood and presented. Controversies that have developed since the first edition was published include use of the term accident. While still in widespread public use, many authorities and sources increasingly eschew this term as being value laden and potentially prejudging blame through ascribing exclusive or prime personal agency at an event's location by attribution of emotional content. Workplace accidents typically involve one, or occasionally more, workers being injured as a result of encountering some energy force — for example, gravity, pressure, and heat — often exacerbated by other factors. We consider a more objective referent to be injuries — an undesired outcome that is frequently the object of prevention activity. Personal injuries can usefully be distinguished from incidents (a broader term that could involve plant or equipment damage), disasters — which are large-scale and could involve multiple fatalities, and near-hits (also called near-misses). The term accident has similarly come under critical scrutiny in the road transport domain, where it is increasingly being replaced by the more accurate and less emotive term crash. Wherever possible in this edition, we adopt this terminology. Exceptions include occasions when we describe the work of others whose use of the term accident cannot readily be reassigned.

This book's orientation is primarily, though not exclusively, psychological. Understanding risk and safety issues inevitably involves many disciplines, as does their effective management, and we acknowledge that an approach from any single discipline will be inadequate in addressing the full gamut of relevant issues. Thus, in Chapter 2, we explore a

wide range of approaches to risk, only some of which have their origins within psychology and cognate fields. In subsequent chapters, individual differences, but also some of the many ways in which human beings are alike, are explored within a risk and safety context. Throughout the book we draw on a range of disciplines as appropriate, with the overriding aim of increasing understanding of this important field of scientific study and professional practice.

We have identified the core audience for this book by the generic term scientist practitioner, primarily, although not exclusively those who work in safety, risk, and related fields. This term is used in the United States, Australia, and elsewhere to refer to those who straddle the divide between research and practice, and whose orientation has been considered as under threat within the broader organizational psychology domain, particularly within the United Kingdom (Anderson et al., 2001). Our reference to safety and risk scientist practitioners throughout the book should be taken to imply that all those who consider themselves to be, or who aspire to become, scientists or researchers in the broadest sense, and those who have an interest in health, safety, risk, and related topics are also to an extent practitioners — again in the broadest sense, including for example, the practice of teaching and writing as well as other forms of practice, such as training and consultancy. Similarly, practitioners in any field of health, safety and risk, in whatever form, should have the option of basing their practice upon scientific findings, even if they themselves do not consider themselves primarily to be scientists. To this extent, the term could encompass all those who work in the health, safety, and risk field, in whatever guise. We occasionally use an alternative synonym health and safety professional. One of our hopes is that the combination of scientific evidence, practical examples, and case studies presented in this book will go some way toward bridging the practitioner–researcher divide described by Anderson et al. (2001), at least within the safety and risk domain of organizational psychology.

Acknowledgments

Ian Glendon expresses his deep appreciation of the enduring love and continuing support from his wife Mimi. He thanks his sons Oliver and Roland for their tolerance in seeing slightly less of him than he would have liked during the production of this book. He is also grateful to his Griffith colleagues, particularly Professor Peter Creed and Dr. Glenda Andrews, for facilitating his study leave and teaching relief that were essential for completing the book.

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Eugene McKenna appreciates the support of his children and coauthors. In particular he would like to express his thanks to Tony Moore, senior editor at Taylor & Francis, who played a major role initially by his enthusiastic support and decision to publish.

Our appreciation extends to our publishers and their staff at Taylor & Francis for their continued patience and support.

We would also like to thank Dr. Alan Waring and Anders af Wåhlberg for reading and commenting on draft sections of the book, and Courtney Jackson-Carroll for background research. Very special thanks to Anthony Ho for his expertise in designing the book cover.

About the Authors

Dr. Ian Glendon is associate professor in the School of Psychology, Griffith University, Queensland, Australia. His research interests include driver behavior/driver stress, OHS/risk management, and safety climate/culture. He has supervised over 20 research higher degree students to completion and has over 100 refereed publications, including three previous coauthored books. He has consulted for over 60 clients on OHS auditing, safety culture/climate analysis, accident/incident analysis, task analysis, and human error/reliability analysis. He is a registered psychologist in Queensland, a chartered occupational psychologist (U.K.), a Chartered Fellow of the Institution of Occupational Safety and Health, a member of several other professional bodies and president (2006–2010) of the International Association of Applied Psychology Traffic and Transportation Psychology Division.

Dr. Sharon Clarke is senior lecturer in organizational psychology with the Manchester Business School, The University of Manchester, U.K. Her research interests are in health and safety management, and safety culture and managing human risks. She has published widely on these topics, including articles in the *Journal of Occupational and Organizational Psychology, Journal of Organizational Behavior*, and *Safety Science*, amongst others, and is a regular presenter at international conferences. Her book, coauthored with professor Cary L. Cooper, *Managing the Risk of Workplace Stress: Health and Safety Hazards*, was published by Routledge in 2004. She is a member of the British Psychological Society, the American Psychological Association, and the Society of Industrial and Organizational Psychology.

Dr. Eugene McKenna, professor Emeritus, University of East London, is a practicing chartered psychologist, a fellow of the British Psychological Society, a Fellow of the Royal Society of Medicine, and is on the visiting faculty of the Graduate School of Business, University of Strathclyde. He is a member of the council of the National Conference of University Professors — a body representing U.K. university professors. His academic and consultancy interests cover organizational psychology and human resource management, and he has a particular interest in training and developing managers. He has published widely and is the author of *Business Psychology and Organisational Behaviour* (Psychology Press, 2006) and *Human Resource Management — A Concise Analysis* (coauthored with Professor Nic Beech, Prentice Hall/Pearson Education, 2002).

Glossary

AA	Automobile Association (U.K.)
ABS	Advanced braking system
ACAS	Advisory, Conciliation, and Arbitration Service (U.K.)
ACSNI	Advisory Committee on the Safety of Nuclear Installations (U.K.)
ACTH	Adrenocortico tropic hormone
AET	Affective events theory
AIDS	Acquired immune deficiency syndrome
ALARA	As low as reasonably achievable
ALARP	As low as reasonably practicable
AS	Australian Standard
ATP	Automatic train protection
AUD	Australian dollar
AVM	Air vibration monitor
AWA	Australian workplace agreement
AWS	Automatic warning system (for trains)
BACT	Best available control technology
BBC	British Broadcasting Corporation
BBS	Behavior-based safety
BRPM	Basic risk perception model
BS	British Standard
BSI	British Standards Institution
BSP	Behavioral safety process
CASA	Civil Airline Safety Authority (Australia)
CBA	Cost benefit analysis
CBI	Confederation of British Industry
CBT	Cognitive behavior therapy
CEO	Chief executive officer
CFIT	Controlled flight into terrain
CFQ	Cognitive Failures Questionnaire
CHD	Coronary heart disease
CO_2	Carbon dioxide
COSHH	Control of Substances Hazardous to Health (U.K. legislation)
CRM	Crew resource management
CST	Climate safety tool
CT	Cultural theory

dB	Decibel
DSE	Display screen equipment
DTA	Dynamic task allocation
EAP	Employee assistance program
EC	European Commission
EC-JRC	European Communities Joint Research Centre
EEC	European Economic Community
e.g.	For example
EPI	Eysenck Personality Inventory
ESP	Extra sensory perception
et al.	et alia (and others)
EU	European Union
f	Feet
°F	Degrees Fahrenheit
FA	Football Association (England)
FFPI	Five-Factor Personality Inventory
FMEA	Failure modes and effects analysis
GB	Great Britain
GDP	Gross domestic product
GEMS	Generic error modeling system
GFT	General failure type
GHQ	General Health Questionnaire
GSK	GlaxoSmithKline
h	Hours
H	High
HAM	Hierarchy of abstraction modeling
H&S	Health and safety
HAZOP	Hazard and operability study
HBM	Health belief model
HFIT	Human Factors Investigation Tool
HGV	Heavy goods vehicle
HIV	Human immuno deficiency virus
HMSO	Her Majesty's Stationery Office (U.K.)
HPWS	High performance workplace system
HR	Human resources
HRA	Human reliability assessment
HRM	Human resources management
HRO	High reliability organization
HSC	Health and Safety Commission (U.K.)
HSE	Health and Safety Executive (U.K.)
HSG	Health and safety guidance
HSL	Health and Safety Laboratory (U.K.)
HTA	Hierarchical task analysis
Hz	Hertz

IAEA	International Atomic Energy Agency
ICT	Information and communications technology
i.e.	That is
ILO	International Labor Organization
INSAG	International Nuclear Safety Advisory Group
IPO	Inputs, process, outputs (model)
IQ	Intelligent quotient
IR	Industrial relations
ISO	International Standards Organization
IWO	Industrial, work, and organizational (psychology)
JCQ	Job content questionnaire
KB	Knowledge based
kph	Kilometers per hour
KSA	Knowledge, skills, abilities
L	Low
LMX	Leader–member exchange
LoC	Locus of control
LPC	Least preferred coworker
LTIFR	Lost time injury frequency rate
m	Meters
MAO	Monoamino oxidase
MAUT	Multi-attribute theory
MBE	Management-by-exception
ME	Myalgic encephalomyelitis
MIV	Main inlet valve
MLQ	Multifactor leadership questionnaire
MMR	Mumps, measles, and rubella (vaccine)
MORT	Management oversight and risk tree
MRI	Magnetic resonance imaging
N	Number
NA	Negative affectivity
n-Ach	Need for achievement
NASA	National Aeronautical Space Administration
n.d.	No date
NHS	National Health Service (U.K.)
NIOSH	National Institute for Occupational Health and Safety (U.S.)
NNC	National Nuclear Corporation (U.K.)
NOHSC	National Occupational Health and Safety Commission (Australia)
NPV	Net present value
NSW	New South Wales (Australia)
NZS	New Zealand Standard

OBMod Organizational behavior modification
OCB Organizational citizenship behavior
OECD Organization for Economic Cooperation and Development
OHS Occupational health and safety
OHSC Occupational health and safety committee
OHSM Occupational health and safety management
OHSMS Occupational health and safety management system
OIM Offshore installation manager (company)
OPQ Occupational Personality Questionnaire
OSCI Organizational and safety climate inventory
OSHA Occupational Safety and Health Administration (U.S.)

p Probability
PA Positive affectivity
PBR Payment by results
PE Person–environment (fit)
PhD Doctor of Philosophy
PHEA Predictive human error analysis
PIF Performance influencing factor
PP Precautionary principle
PPE Personal protective equipment
PR Public relations
PRA Probabilistic risk assessment
PRP Performance related pay
PSB Pumped Storage Business (U.K.)
PSF Performance shaping factor
PSV Public service vehicle
PTSD Post traumatic stress disorder

QC Queen's Counsel
QHSE Quality, health, safety, and environment

r Correlation coefficient
RA Risk assessment
RAAF Royal Australian Air Force
RAF Royal Air Force
RB Rules-based
RBR Risk-based regulation
RET Rational emotive therapy
RHT Risk homeostasis theory
RM Risk management
RMS Risk management standard
RMT Risk motivation theory
RP Risk perception
RR Risk resolution
RSI Repetitive strain injury

SARF Social amplification of risk framework
SB Skills-based
SCT Social capital theory
sec Second (time unit)
SEM Structural equation modeling

SHE	Safety, health, and environment
SIOP	Society of Industrial and Organizational Psychology
SME	Small and medium-sized enterprise
SMS	Safety management system
SPAD	Signal passed at danger
SS	Sensation seeking
SSD	System state diagram
SSS	Sensation seeking scale
TA	Task analysis
TABP	Type A behavior pattern
TAFEI	Task analysis for human error identification
TAT	Thematic Apperception Test
THERP	Technique for human error rate prediction
TMI	Three Mile Island
TPB	Theory of planned behavior
TRA	Theory of reasoned action
TRRL	Transport and Road Research Laboratory (U.K.)
TSC	Total safety culture
TV	Television
UCL	University College London
U.K.	United Kingdom
UKAEA	United Kingdom Atomic Energy Authority
UN	United Nations
UQ	University of Queensland
U.S.	United States
USAF	U.S. Airforce
USS	U.S. ship
UWIST	University of Wales Institute of Science and Technology
VALS	Values and lifestyle
VDU	Visual display unit
vs.	Versus
16PF	Sixteen personality factors (Cattell)

Contents