

## FORESIGHT

How do attempts to foresee the future actually change it? For thousands of years, humans have called upon foresight to shape their own actions in order to adapt and survive; as Charles Darwin revealed in his theory of natural selection, the capacity to do just that is key to the origin of species. The uses of foresight, however, can also be applied to help us further our understanding across a variety of realms in everything from warfare, journalism and music, to ancient civilizations, space weather and science. In a thought-provoking new addition to the Darwin College Lecture Series, eight distinguished authors each present an essay from their area of expertise devoted to the theme of 'foresight'. This provocative read reveals foresight as a process that can be identified across all areas of human endeavour; an art which can not only predict the future, but make it anything but inevitable.

# Contributors

Geoffrey Lloyd, Bridget Kendall, Robert J. Sawyer, Hasok Chang, Nicholas Cook, Jim Wild, Terrie E. Moffitt and Francesca Rochberg.

LAWRENCE W. SHERMAN is Director of the Institute of Criminology at the University of Cambridge, where he has served as Wolfson Professor of Criminology since 2007. He is also Director of the Jerry Lee Centre for Experimental Criminology and Chair of the Cambridge Police Executive Programme.

DAVID FELLER holds a PhD in the History and Philosophy of Science from the University of Cambridge, as well as a law degree from Georgetown University Law Center, Washington D.C. His work at the universities of Cambridge and of Manchester, particularly regarding use of dogs as models in evolutionary and genetic science, has created new discussion in both Darwinian Studies and concepts of cultural influences in biology. Most recently he has lectured in Law and Science at Cambridge, discussing how law and science combine to guide notions of the future. He is currently the senior contracts manager for the Physical Sciences for the University of Cambridge.



#### THE DARWIN COLLEGE LECTURES

These essays are developed from the 2013 Darwin College Lecture Series. Now in their twenty-ninth year, these popular Cambridge talks take a single theme each year. Internationally distinguished scholars, skilled as popularisers, address the theme from the point of view of eight different arts and sciences disciplines.

Subjects covered in the series include

#### 27 FORESIGHT

eds. Lawrence Sherman and David Allan Feller pb 9781107512368

#### 96 LIFE

eds. William Brown and Andrew Fabian pb 9781107612556

#### 25 BEAUTY

eds. Lauren Arrington, Zoe Leinhardt, Philip Dawid 9781107693432

# 24 RISK

eds. Layla Skinns, Michael Scott, Tony Cox pb 9780521171977

#### 23 DARWIN

eds. William Brown and Andrew Fabian pb 9780521131957

#### 22 SERENDIPITY

eds. Mark de Rond and Iain Morley pb 9780521181815

#### 21 IDENTITY

eds. Giselle Walker and Elizabeth Leedham-Green pb $9780521897266\,$ 

# 20 SURVIVAL

ed. Emily Shuckburgh pb 9780521718206

#### 19 CONFLICT

eds. Martin Jones and Andrew Fabian hb 9780521839600

### 18 EVIDENCE

eds. Andrew Bell, John Swenson-Wright and Karin Tybjerg pb $9780521710190\,$ 



#### 17 DNA: CHANGING SCIENCE AND SOCIETY

ed. Torsten Krude hb 9780521823784

#### 16 POWER

eds. Alan Blackwell and David Mackay hb 9780521823717

#### 15 SPACE

eds. Francois Penz, Gregory Radick and Robert Howell hb 9780521823760

#### 14 TIME

ed. Katinka Ridderbos hb 9780521782937

#### 13 THE BODY

eds. Sean Sweeney and Ian Hodder hb 9780521782920

#### 12 STRUCTURE

eds. Wendy Pullan and Harshad Bhadeshia hb 9780521782586

#### 11 SOUND

eds. Patricia Kruth and Henry Stobart pb 9780521033831

#### 10 MEMORY

eds. Patricia Fara and Karalyn Patterson pb 9780521032186

#### 9 EVOLUTION

ed. Andrew Fabian pb 9780521032179

# $8\,$ THE CHANGING WORLD

eds. Patricia Fara, Peter Gathercole and Ronald Laski unavailable

# 7 COLOUR: ART AND SCIENCE

eds. Trevor Lamb and Janine Bourriau unavailable

#### 6 WHAT IS INTELLIGENCE?

ed. Jean Khalfa pb 9780521566858



- 5 PREDICTING THE FUTURE ed. Leo Howe and Alan Wain pb 9780521619745
- 4 UNDERSTANDING CATASTROPHE ed. Janine Bourriau pb 9780521032193
- 3 WAYS OF COMMUNICATING ed. D. H. Mellor pb 9780521019040
- 2 THE FRAGILE ENVIRONMENT ed. Laurie Friday and Ronald Laskey pb 9780521422666
- 1 ORIGINS ed. Andrew Fabian pb 9780521018197



# Foresight

Edited by Lawrence W. Sherman and David Allan Feller

Darwin College, Cambridge





# CAMBRIDGE UNIVERSITY PRESS

University Printing House, Cambridge CB2 8BS, United Kingdom

Cambridge University Press is part of the University of Cambridge.

It furthers the University's mission by disseminating knowledge in the pursuit of education, learning and research at the highest international levels of excellence.

www.cambridge.org Information on this title: www.cambridge.org/9781107512368

© Darwin College, 2017

This publication is in copyright. Subject to statutory exception and to the provisions of relevant collective licensing agreements, no reproduction of any part may take place without the written permission of Cambridge University Press.

First published 2016

A catalogue record for this publication is available from the British Library

Library of Congress Cataloging-in-Publication data
Sherman, Lawrence W., editor. | Feller, David Allan, editor.
Foresight / edited by Lawrence Sherman and David Allan Feller.
Cambridge, United Kingdom: Cambridge University Press, 2016. |
Series: Darwin college lectures
LCCN 2016023668 | ISBN 9781107512368 (paperback)
LCSH: Forecasting. | Prediction (Psychology) | BISAC: SCIENCE / General.
LCC CB158 .F67 2016 | DDC 303.49–dc23
LC record available at https://lccn.loc.gov/2016023668

ISBN 978-1-107-51236-8 Paperback

Cambridge University Press has no responsibility for the persistence or accuracy of URLs for external or third-party internet websites referred to in this publication, and does not guarantee that any content on such websites is, or will remain, accurate or appropriate.



# **Contents**

	List of Figures Notes on Contributors	<i>page</i> viii ix
	Introduction: The Foresight Dialectic LAWRENCE W. SHERMAN AND DAVID ALLAN FELLER	1
1.	Foresight in Ancient Civilisations GEOFFREY LLOYD	10
2.	Foresight in Journalism BRIDGET KENDALL	32
3.	Foresight and Fiction ROBERT J. SAWYER	58
4.	Foresight in Scientific Method HASOK CHANG	82
5.	Music and Foresight NICHOLAS COOK	101
6.	Foreseeing Space Weather JIM WILD	123
7.	How Individuals' Future Orientation Makes a Difference to Their Society: Self-control in	
	a Four-decade Study of 1000 Children TERRIE E. MOFFITT	137
8.	Foresight in Ancient Mesopotamia FRANCESCA ROCHBERG	157
	Index	176

vii



# **Figures**

1.1	Turtle Shell Divination	page 13
1.2	Babylonian Model of a Liver Used in Divination	15
1.3	Tamsyn Barton's Horoscope for Prince Charles	17
1.4	Hexagram Caldron	18
1.5	Prometheus Bound by Peter Paul Rubens	26
2.1	The Famous Lunchtime Broadcast by BBC Weather	
	Forecaster Michael Fish on 15 October 1987	35
4.1	The Bending of Starlight by the Gravitational Field	
	of the Sun	86
4.2	A Graphic Representation of a Lakatosian Research	
	Programme	87
6.1	Solar Eclipse, 1999	124
6.2	Magnetosphere	126
6.3	Auroral Oval	129
6.4	Space Weather Effects	134
7.1	Adult Health	143
7.2	Adult Wealth	144
7.3	Adult Crime	146
7.4	Adolescent Mistakes	148
7.5	Adolescent Mistakes and Adult Health	149
7.6	Adolescent Mistakes and Adult Wealth	149
7.7	Adolescent Mistakes and Adult Crime	150
8.1	Assyrian Empire Map	158
8.2	Lachish Relief Reign of Sennacherib	158
8.3	Sphinx of Taharqa	170
8.4	Zincirli Stele of Esarhaddon	172

viii



# **Notes on Contributors**

Geoffrey Lloyd received the Dan David Prize in 2013 for his contribution to our understanding of the modern legacy of the ancient world; the latest in an august career of academic achievements. Throughout his university career he has been based chiefly at Cambridge, holding various university and college posts, first at King's College and then at Darwin College. From 1983 onwards he held a personal chair in ancient philosophy and science, and from 1989 to his retirement in 2000 he was Master of Darwin College. He is a fellow of the British Academy, and among his many other posts and awards, he has received the Sarton Medal (1987); foreign membership the American Academy of Arts and Sciences (1995); and the Kenyon Medal for Classical Scholarship from the British Academy in (2007). He was knighted for "services to the history of thought" in 1997, having published over twenty books and over one hundred and fifty articles.

Bridget Kendall became Master of Peterhouse, Cambridge in 2016. She joined the BBC in 1983 as a radio production trainee for BBC World Service. She rose to the post of the BBC's Moscow correspondent from 1989 to 1995, witnessing the power struggles in the Soviet Communist Party as Mikhail Gorbachev tried to introduce reform, reporting on the break-up of the Soviet Union and the internal conflicts in Chechnya, Georgia, and Tajikistan. She sent reports of the coup in August 1991 and covered Boris Yeltsin's rise to power. She moved to the BBC's Washington, D.C. desk from 1994, and became the Corporation's diplomatic correspondent in 1998. Kendall speaks fluent Russian and has interviewed world leaders including Vladimir Putin live from the Kremlin as part of an internet webcast in March 2001. She is the host of the talk show *The Forum* on BBC World Service radio.

**Robert J. Sawyer** is one of only eight writers in history to win all three of the world's top awards for science fiction novel of the year: the World Science Fiction Society's Hugo Award, won in 2003 for his novel *Hominids*; the

ix



Notes on Contributors

Science Fiction and Fantasy Writers of America's Nebula Award, for *The Terminal Experiment* (1996); and the John W. Campbell Award in 2006 for *Mindscan*. His influence in the genre extends well beyond his award-winning example, though, as his work with young writers and public engagement has made him one of Canada's most influential publishing industry figures. Over his twenty-two novels, he has looked at science and its meaning in culture across a vast array of disciplines and applications, and his contributions culminated in October 2013 in the Canadian Science Fiction and Fantasy Association's Lifetime Achievement Award, only the fourth time in thirty years the award has been given to an author.

**Hasok Chang** is the Hans Rausing Professor of History and Philosophy of Science at Cambridge. His research interests include the history and philosophy of chemistry and physics from the eighteenth century onward; philosophy of scientific practice; other topics in the including measurement, realism, evidence, pluralism, and pragmatism. He was President of the British Society for the History of Science (2012–14) and is a founding member of the Committee for Integrated History and Philosophy of Science. His intriguing publications include *Is Water H*<sub>2</sub>*O? Evidence, Pluralism and Realism* (2012) and *Inventing Temperature: Measurement and Scientific Progress* (2004).

Nicholas Cook took up the 1684 Professorship in 2009. He was formerly Professorial Research Fellow at Royal Holloway, University of London, where he directed the AHRC Research Centre for the History and Analysis of Recorded Music (CHARM), and before that he taught at the universities of Hong Kong, Sydney, and Southampton, where he also served as Dean of Arts. A musicologist and theorist, he holds separate degrees in music and in history/art history. His articles have appeared in leading British and American journals, and cover topics from aesthetics and analysis to psychology and popular culture. His books include *A Guide to Musical Analysis* (1987) and *Music, Imagination, and Culture* (1990). Cook's current work is turning toward social and intercultural perspectives on music, and in 2014 he took up a British Academy Wolfson Research Professorship to work on a three-year project entitled "Musical Encounters: Studies in Relational Musicology." He is a Fellow of the British Academy and of the Academy of Europe.

Jim Wild is a physicist studying the space environment and the links between the Sun, the Earth, and other planets. He has a doctorate in solarterrestrial physics at the University of Leicester and is now Professor of



#### **Notes on Contributors**

Space Physics at Lancaster University's Department of Physics. His research investigates the physics behind the aurora borealis (sometimes known as the northern lights), the impact of space weather on human technology, and the interaction between the Martian atmosphere and the interplanetary environment. In 2010, he was awarded a Science in Society fellowship by the UK Science and Technology Facilities Council. Wild is a fellow of the Royal Astronomical Society and a member of the European Geosciences Union and American Geophysical Union.

Terrie E. Moffitt is the Knut Schmidt Nielsen Professor at Duke University's Department of Psychology & Neuroscience and Department of Psychiatry & Behavioral Sciences. Her main course of research looks at the interplay between nature and nurture in the origins of problem behaviors with particular interest is in antisocial and criminal behaviors. She is Associate Director of the Dunedin Multidisciplinary Health and Development Study in New Zealand, and she also directs the Environmental-Risk Longitudinal Twin Study ("E-risk"), which follows a 1994 birth cohort of 1116 British families with twins. For her research, she has received the American Psychological Association's Early Career Contribution Award (1993), Distinguished Career Award in Clinical Child Psychology (2006), and the Stockholm Prize in Criminology (2007). She is a fellow of the Academy of Medical Sciences (1999), the American Society of Criminology (2003), the British Academy (2004), and Academia Europaea (2005).

Francesca Rochberg is the Catherine and William L. Magistretti Distinguished Professor of Near Eastern Studies at the University of California at Berkeley. Her early academic career included honors as a fellow with the John Simon Guggenheim Memorial Foundation and the John D. and Catherine T. MacArthur Foundation. Her current research focuses on Assyriology, with an emphasis on Akkadian scholastic texts of the second and first millennia BCE, Babylonian astronomy and astrology, and the impact of the philosophy of science on the historiography of ancient science. In 2010, she was posted at the Ludwig-Maximilian Universität, München as a research fellow, and is a member of the American Philosophical Society. In 2007 she became a member of the Princeton, Institute for Advanced Study, School of Historical Studies, and has received the John Frederick Lewis Award for *Babylonian Horoscopes* (American Philosophical Society, 1998).