Complexity and the Arrow of Time

There is a widespread assumption that the universe in general, and life in particular, is "getting more complex with time." This book brings together a wide range of experts in science, philosophy, and theology and unveils their joint effort in exploring this idea. They confront essential problems behind the theory of complexity and the role of life within it. What is complexity? When does it increase, and why? Is the universe evolving towards states of ever greater complexity and diversity? If so, what is the source of this universal enrichment? This book addresses those difficult questions, and offers a unique cross-disciplinary perspective on some of the most profound issues at the heart of science and philosophy. Readers will gain insights into complexity that reach deep into key areas of physics, biology, complexity science, philosophy, and religion.

Complexity and the Arrow of Time

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CAMBRIDGE
UNIVERSITY PRESS

Shaftesbury Road, Cambridge CB2 8EA, United Kingdom

One Liberty Plaza, 20th Floor, New York, NY 10006, USA

477 Williamstown Road, Port Melbourne, VIC 3207, Australia

314–321, 3rd Floor, Plot 3, Splendor Forum, Jasola District Centre, New Delhi – 110025, India

103 Penang Road, #05–06/07, Visioncrest Commercial, Singapore 238467

Cambridge University Press is part of Cambridge University Press & Assessment, a department of the University of Cambridge.

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www.cambridge.org
Information on this title: www.cambridge.org/9781107027251

First published 2013

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

Library of Congress Cataloging-in-Publication data
Complexity and the arrow of time / edited by Charles H. Lineweaver, Paul C. W. Davies and Michael Ruse.
pages cm
Includes bibliographical references and index.
ISBN 978-1-107-02725-1 (hardback)
1. Complexity (Philosophy) 2. Science – Philosophy. I. Lineweaver, C. H. (Charles H.) II. Davies, P. C. W. III. Ruse, Michael.
Q175.32.C65C64 2013
003 – dc23 2013007433

ISBN 978-1-107-02725-1 Hardback

Additional resources for this publication at www.cambridge.org/9781107027251

Contents

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DAVID C. KRAKAUER is Professor of Genetics at the University of Wisconsin-Madison, Director of the Wisconsin Institute for Discovery, and an external professor at the Santa Fe Institute. His research focuses on the evolutionary history of information processing mechanisms in adaptive systems. The current emphasis of his work is on robust information transmission and signaling dynamics, particularly their role in constructing novel, higher level structures, such as social systems and language. He moved on to the Santa Fe Institute as a professor in 2002 and was made faculty chair in 2009. He is a member of the editorial boards of the *Journal of Theoretical Biology*, *Theory in Biosciences*, *Biology*

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MICHAEL RUSE is a philosopher of science who has found in evolution a kind of *Weltanschauung*, a world picture that gives meaning to life. He is one of the foremost contemporary Darwin scholars. Ruse currently teaches at Florida State University. He has honorary degrees from the University of Bergen in Norway and McMaster University, and is a fellow of both the Royal Society of Canada and the American Association for the Advancement of Science (AAAS). The founding editor of *Biology and Philosophy*,

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DAVID WOLPERT is currently in the Information Sciences Division of Los Alamos National Laboratory and an external professor at the Santa Fe Institute. Previously he was Ulam Scholar at the Center for Non-linear Studies in Los Alamos. Earlier in his career, he was at the NASA Ames Research Center and a consulting professor at Stanford University, where he formed the Collective Intelligence group. He has worked at IBM and at a data mining startup, and been an external faculty member at numerous institutions. His current research focuses on game theory, the application of machine learning to both optimization and Monte Carlo methods, complexity measures, modeling evolution of technology, information theory, and the foundations of physics and inference. He is the author of three books, three patents, and more than one hundred refereed papers, and has won numerous awards.