

Time and Causality Across the Sciences

This book, geared toward academic researchers and graduate students from multiple fields, brings together research on all facets of how time and causality relate across the sciences. Time is fundamental to how we perceive and reason about causes. It lets us immediately rule out the sound of a car crash as its cause, and learn which foods lead to illness. That a cause happens before its effect has been a core, and often unquestioned, part of how we describe causality. However, research across disciplines shows that the relationship is much more complex than that, with examples from quantum mechanics testing most existing theories. This book explores what that means for both the metaphysics and epistemology of causes – what they are and how we can find them. Across psychology, biology, physics, and the social sciences, common themes emerge, suggesting that time plays a critical role in our understanding, even when it is not explicitly mentioned. The increasing availability of large time series datasets allows us to ask new questions about causality, necessitating new methods for modeling dynamic systems and incorporating mechanistic information into causal models.

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Cambridge University Press
978-1-108-47667-6 — Time and Causality across the Sciences
Edited by Samantha Kleinberg
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CAMBRIDGE
UNIVERSITY PRESS

University Printing House, Cambridge CB2 8BS, 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
79 Anson Road, #06–04/06, Singapore 079906

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 level of excellence.

www.cambridge.org

Information on this title: www.cambridge.org/9781108476676

DOI: 10.1017/9781108592703

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First published 2019

Printed and bound in Great Britain by Clays Ltd, Elcograf S.p.A.

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

Library of Congress Cataloging-in-Publication Data

Names: Kleinberg, Samantha, 1983–editor.

Title: Time and causality across the sciences / edited by Samantha Kleinberg, Stevens Institute of Technology, New Jersey.

Description: Cambridge, United Kingdom : New York, NY, USA : University Printing House, 2019. | Includes bibliographical references and index.

Identifiers: LCCN 2019009294 | ISBN 9781108476676 (hardback)

Subjects: LCSH: Science–Methodology. | Causation. | Time perception.

Classification: LCC Q175.32.C38 T56 2019 | DDC 501–dc23

LC record available at <https://lcn.loc.gov/2019009294>

ISBN 978-1-108-47667-6 Hardback

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