NEWTON AS PHILOSOPHER

Newton's philosophical views are unique and uniquely difficult to categorize. In the course of a long career from the early 1670s until his death in 1727, he articulated profound responses to Cartesian natural philosophy and to the prevailing mechanical philosophy of his day. *Newton as Philosopher* presents Newton as an original and sophisticated contributor to natural philosophy, one who engaged with the principal ideas of his most important predecessor, René Descartes, and of his most influential critic, G. W. Leibniz. Unlike Descartes and Leibniz, Newton was systematic and philosophical without presenting a philosophical system, but, over the course of his life, he developed a novel picture of nature, our place within it, and its relation to the creator. This rich treatment of his philosophical ideas, the first in English for thirty years, will be of wide interest to historians of philosophy, science, and ideas.

ANDREW JANIAK is Assistant Professor in the Department of Philosophy, Duke University. He is editor of *Newton: Philosophical Writings* (2004).

NEWTON AS PHILOSOPHER

ANDREW JANIAK
Duke University

CAMBRIDGE
UNIVERSITY PRESS

CAMBRIDGE UNIVERSITY PRESS
Cambridge, New York, Melbourne, Madrid, Cape Town, Singapore, São Paulo, Delhi

Cambridge University Press
The Edinburgh Building, Cambridge CB2 8RU, UK

Published in the United States of America by Cambridge University Press, New York

www.cambridge.org
Information on this title: www.cambridge.org/9780521862868

First published 2008

Printed in the United Kingdom at the University Press, Cambridge

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

Library of Congress Cataloguing in Publication data
Janiak, Andrew.
Newton as philosopher / by Andrew Janiak.
p. cm.
Includes bibliographical references (p. 179).
ISBN 978-0-521-86286-8
1. Newton, Isaac, Sir, 1642–1727 – Philosophy. 2. Philosophy of nature – History – 17th century.
3. Philosophy of nature – History – 18th century. I. Title.
B1299.N34J36 2008
192–dc22 2007049998

ISBN 978-0-521-86286-8 hardback

Contents

Preface *page* vii
Note on texts and translations xi

1 Newton as philosopher, the very idea 1

2 Physics and metaphysics: three interpretations 11
Hypotheses non fingo and metaphysical agnosticism 15
Newton's radical empiricism 25
A physical metaphysics: inverting Descartes? 32

3 Do forces exist? contesting the mechanical philosophy, I 50
Newton's dilemma: action at a distance 53
The mathematical treatment of force 58
Forces in Leibniz and Clarke 65
Newton's dilemma resolved 74
The ontology of force 81

4 Matter and mechanism: contesting the mechanical philosophy, II 87
Is gravity an occult quality? 88
Descartes and Newton on matter's essence 102
The epistemology of material objects 113
A new concept: non-mechanical matter 118

5 Space in physics and metaphysics: *contra* Descartes 130
Space and the laws of motion 132
The ontology of space 139
Newton's absolutism revisited 150
Is Newton's view of space metaphysical? 155

6 God and natural philosophy 163

Bibliography 179
Index 190

Preface

This is a work in the history of philosophy. But it analyzes a figure considered first and foremost a mathematician and physicist. In recent years scholars have emphasized the importance of the complex interactions between philosophy and the natural sciences in the modern period. This study adopts a parallel perspective, attempting to shed new light on Isaac Newton by situating him within a rich philosophical milieu. I argue that this approach reflects Newton's own self-conception. He considered Descartes to be his most important predecessor among the myriad natural philosophers of the seventeenth century, and his principal contemporary interlocutors include many prominent philosophical figures, for instance Robert Boyle, Samuel Clarke, Roger Cotes, and John Locke in England, and Christiaan Huygens and Gottfried Wilhelm Leibniz on the Continent. For his supporters and detractors alike Newton single-handedly placed crucial topics on the philosophical agenda of the eighteenth century. It is hoped that this book will illuminate the philosophical aspects of Newton's work, and also bring a fresh perspective to key themes in the development of early modern philosophy.

I did not set out to write a book on Newton. Originally I was working on Kant's theoretical philosophy with Michael Friedman. When I first came to his office about a decade ago, Michael suggested that we read the Leibniz–Clarke correspondence together in preparation for my work on Kant's conception of space. This immediately sparked my interest in all things Newtonian. I eventually wrote a dissertation on what I called Kant's Newtonianism under Michael's direction – its chapter on Newton was my first attempt to understand the issues discussed in this book. Perhaps more than anything else, Michael has shaped my conception of what philosophy is – he taught me that any philosophical progress is tentative, and that our understanding of a text can always be deeper.

My early work was greatly advanced by a history of science seminar on Newton taught by Nico Bertoloni Meli: with his significant help, my paper

in his seminar eventually became my first article, on Newton's atomism and conception of divisibility. As a graduate student at Indiana I also had the pleasure of working closely with Fred Beiser and Paul Franks. It was Fred who encouraged me to study German more intensely in Berlin, and his astonishing range of historical and philosophical knowledge served as an inspiration to me. I first met Paul Franks while I was a graduate student at Michigan – his philosophical depth and originality immediately sparked my interest in Kant, and I was blessed to continue working with him after we both moved to Indiana. I owe my original interest in Kant not only to Paul, but also to the incomparable David Hills, whose knowledge will never be plumbed. Both Fred and Paul have publicly acknowledged the extraordinary constellation of faculty and graduate students working on Kantian topics in Bloomington in the late 1990s – I benefited greatly from participating in this group. The Kant reading group in Bloomington, run by Graciela De Pierris, was very important for my work. Among many other interlocutors I would especially like to thank Hess Chung and Christian Johnson, the two most insightful and knowledgeable graduate students I have ever known – I learned immensely from our almost nightly discussions over mediocre Chinese food and endless lukewarm tea at the famous Dragon restaurant. David Finkelstein, Karen Hanson, and Hindy Najman were also sources of philosophical wisdom in Bloomington. While I held a graduate fellowship at Tel Aviv University I learned much about Kant from Susan Neiman, who was a generous host during my year in Israel. I gave my very first public lecture at Tel Aviv, on Kant and Newton (of course). Once my graduate work was over, I was fortunate to receive a postdoctoral fellowship at the Dibner Institute at MIT while George Smith was its acting director. No one who knows George will be surprised to learn that he often took two or three hours out of his busy schedule to discuss Newton with me. There is no better interlocutor anywhere for discussing Newton. While at the Dibner I learned a great deal from the history of mechanics reading group, which included Moti Feingold, Al Martinez, Jim Voelkel, George, and Nico.

My colleagues at Duke have been extremely supportive – because of their open-mindedness, I was able to bracket my research on Kant and write this book. Among my many helpful Duke colleagues I would especially like to thank Robert Brandon, Fred Dretske, Tim Lenoir, Alex Rosenberg, David Sanford, Laurie Shannon, Barbara Herrnstein Smith, and Susan Sterrett for their comments on my work. For his official mentorship, and constant fruitful advice, I thank Tad Schmaltz; whenever I have a perplexing question, I simply walk next door.

Various aspects of this book have been presented at the following venues: the joint meeting of the History of Science Society and the Philosophy of Science Association in Vancouver; the fifth and sixth international congresses of the History of Philosophy of Science Group (HOPOS) in San Francisco and in Paris; the Cartesian circle at Irvine; early modern philosophy workshops at the University of Pennsylvania and Mansfield College, Oxford; Newton conferences at Leiden University and at the Van Leer Institute in Jerusalem; and the philosophy departments at Toronto and Tufts. Numerous colleagues and friends have given me helpful criticism and feedback over the years – in addition to those mentioned above, I would like to thank Donald Ainslie, Lanier Anderson, Liz Anderson, Jeffrey Barrett, Zvi Biener, Katherine Brading, Justin Broackes, Janet Broughton, Anjan Chakravartty, Graciela De Pierris, Karen Detlefsen, Rob DiSalle, Mary Domski, Lisa Downing, Katherine Dunlop, Mordechai Feingold, Alan Gabbey, Daniel Garber, Don Garrett, Niccolo Guicciardini, Bill Harper, Sally Haslanger, Gary Hatfield, Barbara Herman, Nick Huggett, Rob Iliffe, Andrew Jainchill, Dana Jalobeanu, Lynn Joy, Sukjae Lee, Martin Lin, Paul Lodge, Jeff McDonough, Ernan McMullin, Scott Mandelbrote, Mohan Matten, Sy Mauskopf, Christia Mercer, Alan Nelson, Bill Newman, Eric Schliesser, Alison Simmons, Ed Slowik, Chris Smeenk, Kyle Stanford, Howard Stein, Friedrich Steinle, Daniel Sutherland, Jackie Taylor, Karin Verelst, Daniel Warren, Jessica Wilson, and John Young.

I owe a special debt of gratitude to the following people, who read the entire draft of the manuscript: Karen Detlefsen, Paul Franks, Michael Friedman, Daniel Garber, Sean Greenberg, Eric Schliesser, Tad Schmaltz, and George Smith. Their comments have proven tremendously helpful. Michael and George provided especially insightful and detailed suggestions.

When I published a collection of Newton's philosophical writings for Cambridge University Press, Hilary Gaskin was a wonderful editor; she has been once again with this volume. I am very grateful for her support of my work. I would also like to thank two anonymous referees who read the manuscript for Cambridge and made many fruitful suggestions. Many thanks to my research assistants, Shame Chikoro and James Abordo Ong.

The research for this book was supported financially by the following sources: the School of Historical Studies at Tel Aviv University; the Dibner Institute for the History of Science and Technology at MIT; the Josiah Charles Trent Memorial Foundation; and, at Duke, the Andrew W. Mellon Faculty Fund, the Franklin Humanities Institute, the Center for European Studies, the Center for Medieval and Renaissance Studies, the Patterson endowment in the Department of Philosophy, the Vice-Provost for

International Affairs, and the Vice-Provost for Interdisciplinary Studies. A grant from Duke's Arts and Sciences Committee on Faculty Research enabled me to use the Dibner Institute's world-class Grace Babson collection of Newton materials on several occasions, and the Institute's staff, especially Anne Battis, were very helpful. I finished this book while on a junior faculty research leave – thanks to Deans George McLendon and Gregson Davis for that crucial support, and to the incomparable staff of Duke's Franklin Humanities Institute for their hospitality during my leave.

Lastly and most importantly: I dedicate this book to Rebecca Luna Stein, my partner, and to Isaac Janiak Stein, our son. Rebecca's intellectual courage inspires me; she is a constant source of insight and also of love. Without her I would have lacked the courage to write this book. True to his name, Isaac brings great laughter to our lives each day. Raising him with Rebecca has been the most philosophically potent experience of my life.

Note on texts and translations

All translations are my own unless otherwise noted. In texts written in English in the seventeenth or eighteenth centuries I have expanded abbreviations and modernized spelling and capitalization (except when the meaning might be altered). All emphasis in quotations is in the original unless otherwise indicated

In citing texts I use the following abbreviations throughout:

Correspondence – *The Correspondence of Isaac Newton*, ed. H. W. Turnbull *et al.*, Cambridge: Cambridge University Press, 1959–77.

De Gravitatione – refers to the new translation by Christian Johnson in *Philosophical Writings* (see below).

Die philosophischen Schriften – *Die philosophischen Schriften von G. W. Leibniz*, ed. C. Gerhardt, Berlin: Weidmann, 1890.

Leibniz-Clarke Correspondence – Many editions are available; cited throughout by reference to letter and section numbers. For example, the tenth section of Leibniz's third letter is cited as "L 3:10," and the eighth section of Clarke's fifth letter as "C 5:8." For Leibniz's French, I use the text in *Die philosophischen Schriften* (see above).

Opticks – Isaac Newton, *Opticks, Or A Treatise of the Reflections, Refractions, Inflections & Colours of Light*, based on the fourth edition of 1730, New York: Dover, 1952.

Philosophical Writings – Isaac Newton, *Philosophical Writings*, ed. Andrew Janiak, Cambridge: Cambridge University Press, 2004.

Principes mathématiques – Isaac Newton, *Principes mathématiques de la philosophie naturelle*, trans. Madame la Marquise du Chatelet, Paris: Desaint & Saillant, 1749.

Principia – Isaac Newton, *The Principia: Mathematical Principles of Natural Philosophy*, trans. and ed. I. Bernard Cohen and Anne Whitman, with the assistance of Julia Budenz, Berkeley: University of California Press, 1999.

Principia Mathematica – Isaac Newton, *Isaac Newton's Philosophiae Naturalis Principia Mathematica*, the third edition (1726) with variant readings, ed. Alexandre Koyré and I. Bernard Cohen, with the assistance of Anne Whitman, Cambridge, MA: Harvard University Press, 1972.

Principia Philosophiae – René Descartes, *Principia Philosophiae*, in *Œuvres de Descartes*, ed. Charles Adam and Paul Tannery, vol. VIII-1, Paris: Vrin, 1982.