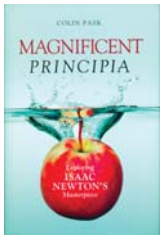
demonstrations expressed in a scientific language that today seems unfamiliar. Passages recognizable as belonging to mathematics or physics are interspersed with metaphysical considerations and theological and historical references. In addition, as most contemporary interpreters acknowledge, Newton deliberately made the *Principia* difficult to read by formulating laws and propositions in a "mathematical way." He made that move partly for reasons having to do with his personal idiosyncrasies, including his desire to avoid philosophical disputations.



Mathematician Colin Pask's *Magnificent "Principia": Exploring Isaac Newton's Masterpiece* belongs to a respectable tradition: books that attempt to translate the abstruse *Principia* for the common reader. However, the common reader differs widely from one author to the next. Niccolò Guicciardini's *Reading the "Principia": The Debate on Newton's Mathematical Methods for Natural Philosophy from 1687 to 1736* (Cambridge University Press, 1999) addresses the professional historian of science. The same historian can also turn to William Harper's *Isaac Newton's Scientific Method: Turning Data into Evidence About Gravity and Cosmology* (Oxford University Press, 2011) for useful insights into the amazing amount of empirical work grounding *Principia*'s theoretical achievements. Subrahmanyan Chandrasekhar's *Newton's "Principia" for the Common Reader* (Oxford University Press, 1995) addresses the student and the scientist with little interest in the historical context of Newton's *Principia*. Chandrasekhar's main purpose is to reconstruct Newton's mathematical physics in contemporary language.

Pask's common reader is the graduate student. His book presents a clear and widely accessible introduction to the *Principia*. The method of exposition is simple: Pask takes Newton's propositions one by one, explains their significance for the development of mechanics, and translates the results into modern scientific language. At each stage, the reader is guided by the following questions: What did Newton do? How did he do it? How does it fit into the scheme of mechanics and its applications? And how do we carry out such things today?

Many chapters contain illuminating examples of Newton's peculiar style: the way he would set a problem, which is then translated to modern terms, or his working methods, which are compared with modern theoretical approaches. On display throughout the book is Newton's liberal and opportunistic use of various mathematical methods, his attempt to reach a maximum of mathematical generalization, his use of interesting limiting cases, and his numerous—and sometimes bewildering—shortcuts.

Pask gives only a sketchy description of the historical context, and he doesn't address at all a number of relevant and thorny philosophical issues. The reader who wants to understand Newton the man will need to supplement Pask's portrait with other writings. That said, *Magnificent "Principia"* certainly provides a useful introduction to Newton. In combination with the original *Principia* and other more historically minded works, it would make an excellent class text that will benefit the graduate student for years to come. And happily, some of that supplemental material is referenced by Pask in the brief but useful lists of further readings that conclude each chapter.

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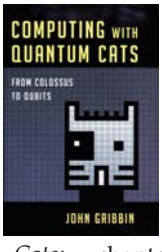
Computing with Quantum Cats
From Colossus to Qubits

John Gribbin
Prometheus Books, 2014. $28.95
(295 pp.). ISBN 978-1-61614-921-5

On a list of the technological developments that made the greatest impact on human civilization in the 20th century, computers must rank near the very top. In less than a century, computers have evolved from dreams of mathematicians to devices essential in almost all aspects of our personal and professional lives. Given such progress, one cannot help but wonder how computers will continue to evolve as we move deeper into the 21st century and what further effects they will have on society.



In *Computing with Quantum Cats: From Colossus to Qubits*, John Gribbin traces the remarkable technological progress of computing, starting with its birth by fire in World War II and ending with a glimpse of its future as quantum computing looms on the horizon. The book spans diverse topics, including the need for code breaking that first motivated computing, the remarkable properties of quantum mechanics, and the practical concerns of how a quantum computer might be built. To discuss those topics in a coherent manner is a truly daunting challenge. Gribbin is a talented science writer with plenty of experience in communicating quantum physics to the public; see, for example, *In Search of Schrödinger's Cat: Quantum Physics and Reality* (Bantam Books, 1984). In his current book, he makes another commendable effort, and with only a few small exceptions, he again succeeds.

Computing with Quantum Cats is divided into six chapters, the first five each focusing on one of five scientists who played a crucial role in the development of computing: Alan Turing, John von Neumann, Richard Feynman, John Bell, and David Deutsch. For the most part, the approach is very effective. By focusing on one protagonist per chapter, Gribbin engages readers through the human element. The book is clearly well researched, and the author details the life of each scientist in significant depth. In doing so, he also paints a convincing picture of the society at the time of each discovery. We see, for example, the urgency for Western powers to break German codes during World War II. By revealing the thoughts and aspirations that drove each scientist and the society that each lived in, Gribbin successfully gives the book broad appeal.

For the nonscientist, the book may be enjoyed as a compilation of biographies and memorable stories about the scientists involved in the computing revolution. For experts in the field, like myself, those stories will also be appealing—and some of them would even lighten the mood during undergraduate lectures. In addition, the scientific concepts are introduced clearly, albeit with not much detail; the emphasis is on why the ideas fascinated the scientists who discovered them.

The human approach, however, does exhibit at least one weakness: It requires a clear scientific protagonist. That is difficult in situations where no such character exists. Thus, the book loses some charm in its final chapter, where it surveys current methods to realize quantum computers. There exist a myriad of different approaches, with no clear winner. In addition, each of them is championed by a different research group, with its own set of scientists, so no human face can tie all the science together. Consequently, the exposition comes off as rather scattered as it jumps from approach to approach; although Gribbin did an ad-

mirable job of explaining each of them, I sometimes felt like I was reading a well-written technical review paper rather than a book meant to elicit excitement. Fortunately, my complaint applies only to the final chapter.

Overall, *Computing with Quantum Cats* is an excellent exposition on quantum computation and the rich tapestry of scientists and discoveries that led to its eventual discovery. Those who want more scientific detail than Gribbin provides will need to look elsewhere—for example, in Deutsch's *The Fabric of Reality* (Penguin Books, 1997). But Gribbin's text is perfect for anyone interested in the history of computing and the individual scientists that drove its evolution. Its distinctly human stories will satisfy readers interested not only in the science of quantum computation but also in the dreams, inspirations, and beliefs that shaped the science.

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