Doris Schattschneider and Michele Emmer, eds.

*M. C. Escher's Legacy:
A Centennial Celebration*

New York: Springer Verlag, 2003

Reviewed by David Reid

The centennial of Escher's birth in 1998 was marked by exhibitions of his prints all over the world as well as an international congress in Rome and Ravello that brought together artists, computer scientists, designers, engineers, mathematicians, museum educators, psychologists, scientists, and teachers, to celebrate Escher's life, work and legacy. Out of the congress emerged this book, *M. C. Escher's Legacy: A Centennial Celebration*, edited by Doris Schattschneider and Michele Emmer. In forty articles, supplemented by twenty-six items on a CD-ROM, conference participants describe the influence of Escher on their lives and work.

Escher was a multifaceted individual with varied interests, and as his work has been influential for a very wide audience; any attempt to describe his legacy must face the problem of how to cover a vast territory. The approach taken in this book is that of multiple perspectives. The many authors relate their personal experiences of Escher and his works. Intersecting, the articles succeed in capturing some essential elements of Escher and his work, and in describing his influence in art, philosophy, psychology, mathematics, etc. The union of all the articles, the book/CD-ROM itself, includes much that is not Escher, but which is also "about Escher" in another sense, describing him and his work by mapping out his many legacies to the authors and their domains of activity.

Many of the articles value Escher's work for its power and utility when used to illustrate a concept not intended by Escher himself. His tilings, for example, have been used to illustrate principles of crystallography, group theory, and topology, and his impossible buildings have been applied to psychology, philosophy, and logic. Is there an Escher print that captures this book? Not just one. Just as the editors of the book drew upon multiple authors' perspectives, so too multiple Escher prints would be required to characterise this book graphically. In many ways reading it was like reading *Metamorphose II* from left to right (as in the Emmer video clip on the CD-ROM). Each article is connected to the previous one, sometimes in surprising ways that force one to stop and think, but at the same time the articles are as different as birds and buildings. The character of the authors' perspectives can also be seen in *Relativity*: They walk around the same place, but looking in different ways, perhaps incapable of seeing what the others see. But the reader, as is the case for the viewer of *Relativity*, has still another perspective and can see something of the structure that is invisible to its occupants.

The book is divided into three sections: Escher's World, Escher's Artistic Legacy, and Escher's Scientific and Educational Legacy. These sections bring as much structure as is possible to such a varied collection of articles. The first section of the book, Escher's World, is more about Escher than about his legacy. It includes articles that introduce aspects of Escher's life, personality, and work. The eclecticism of the book as a whole is reflected in the entries here. His life is described in terms of the places he worked, especially the Amalfi coast of Italy (site of one session of the conference), and the important role played by C.V.S. Roosevelt, a collector of Escher's work and his advisor and informal agent in licensing his works in North America. His personality and work are described through both Zen philosophy and Western metaphysics. Douglas Hofstadter and

Bruno Ernst offer personal reflections on the influence of Escher on their own lives and work. This section also includes an edited discussion among a group of conference participants (all represented elsewhere in the book as well) of the reason for Escher's enduring popularity with the general public and the role (if any) of the mathematical elements of his work in generating that popularity.

It is inevitable in such a collection of different points of view that not every article appeals on the same level. Some of the articles in the second section, Escher's Artistic Legacy, are almost entirely devoted to describing the work of the artists authoring the articles. In some cases these works are related to Escher's only in that they draw on a common influence. In the article "A circle limit in stone," Ferguson is clear about this:

It would be convenient in a volume dedicated to M. C. Escher's Centennial for me to say that my *Circle Limit 7*, a hyperbolic tessellation, was wholly inspired by Escher's *Circle Limit I, II, III, IV* series. This was not at all the case. Both Escher and I responded aesthetically to the same mathematics [2003, p. 166].

As another example, the article by Farkas explicitly claims Escher as an inspiration, but the artworks themselves seem to build directly on Penrose's impossible structures, with no sign of the contribution Escher made to our experience of them. Other articles belong more definitely to Escher's legacy. De May's art is original, but at the same time it is evident that if Escher had never lived, or had lived a different life (possibilities considered in Hofstadter's article), de May's art would have also followed a different path. Furthermore, the transformation of the tiles in non-periodic tilings into animal forms described by Fathauer is something it is easy to imagine Escher doing if non-periodic tilings had been discovered in his lifetime.

Whether individual articles in this section are of interest depends very much on whether the artist's work captures the reader's imagination. As a group, however, these articles make a point that if it had been simply stated in words might not have meant as much to me: "common influences" with Escher can mean many things: Islamic art, impossible objects, polyhedral structures, hyperbolic geometry, animation, tilings, distorting mirrors, perspective systems, lattices, and architecture are suggested by the articles here. There are probably others.

The final section, Escher's Scientific and Educational Legacy, includes articles on topology, trigonometry and transformational geometry, descriptions of the development of museum exhibits and computer software, theoretical studies of the role of symmetry in chemistry, philosophy and semiotics, and typologies of Escher's works, symmetries and tessellations. For an educator with a fondness for typologies, the articles in this section that are most interesting are those that concern both classification and pedagogy. Kevin Lee's description of how he adapted Escher's own system for classifying regular divisions of the plane for use in the software "TesselMania" is especially interesting. Not only does it assist to explain the software better it also helps in understanding Escher's work as well. Scott Kim also describes software based on Escher's work, "Escher Interactive," which include sixteen puzzles designed by Kim.

A very important element of the book is the CD-ROM. It includes articles, sets of illustrations, video clips, and software; indeed the CD-ROM should be read in parallel with the book. The images on the CD-ROM provide a much richer complement to the texts than the figures in the book can. There are more images, they are in colour, and in several important cases, short video clips are included that make points that are impossible to appreciate in the same way through interpreting words or static images. This was especially true of the "termespheres" described by the artist Richard A. Termes. These are images painted on the outer surface of spheres. In reading the

article I was most interested in the laws of perspective involved in painting on a sphere. On the CD-ROM, however there is a video clip of several spheres that captures the magical effect of these images as the spheres rotate.

Another highlight of the CD-ROM is the excerpt from Michele Emmer's video *The Fantastic World of M. C. Escher*. This provides insights into Emmer's article as well as letting *Metamorphoses II* be viewed in a new way. Also included on the CD-ROM is a video, produced by Claude and Dominic Lamontagne, based on two writings by Escher: a letter to illustrator Oey Tjeng Sit; and an article, "White-Gray-Black," that appeared in the journal *De Grafische*. This does not just complement and extend the article by Claude Lamontagne; rather it stands as a contribution in its own right.

It is hard to sum up this book as a whole as each individual article provokes a different reaction. In some cases I learned many new things while in others I wondered whether the things I was learning were worth the time I was taking to decode the equations, diagrams or jargon involved. But that is largely a matter of personal taste. Not everything in this book will interest everyone, but there is a great deal here for anyone who has ever been struck by an Escher print, and been provoked to think about it afterwards.

About the Reviewer

David A Reid is an assistant professor in the School of Education of Acadia University in Nova Scotia, Canada. He teaches courses for future teachers at both the primary and secondary levels, as well as pursuing research into reasoning processes in mathematical activity at all ages. He has a Ph.D. in mathematics education from the University of Alberta. When he applied to study "mathematics and architecture" as an undergraduate he was told he had to pick just one. Since then he has been exploring the connections between mathematics, art and architecture, especially in teaching.