The true shortcoming of this book is that, despite Rose's attempts to penetrate Heisenberg's "German mentality", the author's prosecutorial analysis gives the reader little understanding of Heisenberg as a human being, or of how difficult it was to live and work under such a regime. □

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The science of patterns?

The Language of Mathematics: Making the Invisible Visible
by Keith Devlin
W. H. Freeman: 1998. 344 pp. $24.95, £14.95

Jeremy Gray

In recent years there has been a profusion of books aimed at making mathematics comprehensible and interesting to the general reader. Keith Devlin is the successful author of *Mathematics: The Science of Patterns* and this book is a spin-off from that one, aimed at a larger audience. Devlin has taken the opportunity to add two new chapters, one on chance and one on space-time, but has had to manage without the profusion of artwork and colour photographs that adorned the earlier book.

He covers a wide range of topics with an enviably light touch. The fact that there are infinitely many prime numbers sits alongside tests to see if a number is prime, and leads into a discussion of public key encryption systems (unhappily the details of the system are not explained). There is a chapter on logic and set theory, topics on which Devlin is an expert, and this leads to a hint or two about Noam Chomsky's ideas on linguistic structures. There is some calculus and Newtonian mechanics, some geometry, including Desargues's theorem and the idea of spaces in any number of dimensions.

We get some discussion of groups, including wallpaper patterns and lattices, which leads to the unresolved question of the densest packing of spheres. Topology leads to the theory of knots, the Jones polynomial which almost classifies them, and their relation to the study of DNA. Fermat's Last Theorem passes by, as does a discussion of chance, from Quetelet's 'average man' to the Black-Scholes formula much used in the derivatives market. The book closes with a quick trip through gravity, electromagnetic theory, and the idea of space-time.

Point of infinity: Renaissance artists discovered how to create a sense of depth in a painting.

All this is done with clarity and wit, a novel collection of puns, and a willingness to cut corners. The history of mathematics is taken up when it helps and dropped when it does not; it is accurate when it is easy and less so when simplification is judged appropriate to the greater aim. The same is true of the mathematics, and the subjects to which it is applied. The book is weakest when discussing these applications. Devlin sometimes stops short, for fear of becoming too hard, before he has really become comprehensible. Inevitably, some of the topics are familiar in the genre, while others are new, but even the old ones are deservedly popular. Even mathematics has only so many greatest hits. But it would be a churlish reader who did not find that mathematics is much more diverse than might be suspected, and much more useful in all sorts of ways.

As with his earlier book, Devlin pushes the quick definition that mathematics is the science of patterns. Readers may not be persuaded, but they should certainly come away thinking that mathematicians have something attractive to say about their subject, and about many others besides. Sadly, they will not find notes and a bibliography documenting where all this information came from, nor are they provided with suggestions for further reading. □

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