From the shelves of the National Library ...

Ivar Ekeland, *The broken dice and other mathematical tales of chance*, translated from the French by Carol Volk, University of Chicago Press, Chicago and London, 1993, ISBN 0-226-19991-6.

Reviewed by Leong Yu Kiang

This is a book about chance and is written in a style which you would not normally associate with science or mathematics. If you had not been alert enough to notice the word "mathematical" in the title, you would have thought that the book is in the genre of "Tales of the unexpected". Out of its six chapters (six because a die has six faces), the first five, with titles like "Chance", "Fate", "Anticipation", "Chaos" and "Risk", give you the impression that they are lifted out of a novel by the Russian writer F.M. Dostoyevsky (1821 - 1881). Only the sixth chapter with the title of "Statistics" portends the intrusion of mathematical symbolism. In principle, you can turn to any chapter and read it on its own. Like a reader of game books, you could toss an ordinary die to decide which chapter to read.

Each of the first five chapters begins with an episode from Norwegian mythology. The first describes the myth of how King Olaf of Norway won his bet (and hence his settlement) by a toss of two dice, one of which broke into two (hence the title of the book). These and other episodes are chosen to highlight how improbable events have decided the fate of individuals and the destiny of nations. The sixth chapter begins with the biblical story of Joseph's interpretation of the Egyptian Pharoah's dream of the impending seven-year famine.

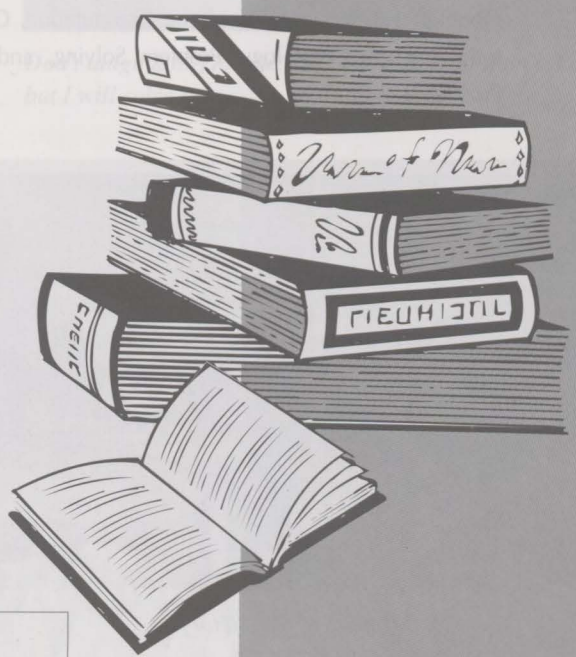
Interspersed in between stories from Norwegian mythology and from ancient history (such as the Athenians' battles at Salamis and Marathon) are some intuitive ideas arising from random phenomena. Perhaps inescapable (or even mandatory) are some excursions into mathematical notations, particularly in the brief exposition on the attractors of the Fields Medallist Stephen Smale (1930 -) and the meteorologist E. Lorenz (1917-). If you are familiar with some elementary probability, you will be intrigued by the role which chance plays in the stories recounted by the author. If you are unfamiliar with probabilistic ideas, you can skim over the few mathematical symbols and still enjoy the stories and get some feel of "randomness". For instance, if you are familiar with the concept of "expectation", you will appreciate the short discussion on the famous "wager" argument of the French mathematician, scientist and philosopher Blaise Pascal (1623 - 1662) for the belief in God. And, even if you were totally lost on the mathematical subtleties of

the stability of dynamical systems, you will appreciate the synopsis of a science fiction story of Isaac Asimov (1920 -1993) given as an illustration of a phenomenon commonly encapsulated in the statement: "The flapping of a butterfly's wing can cause a cyclone at the end of a year."

There is a little introduction (commonsensical and non-mathematical) to rational expectation theory which is what the work (which has been developed into a sophisticated mathematical theory) for the 1995 Nobel Prize in economics is about. There is also a probabilistic rumination of the mathematically-inclined goal-keeper which will amuse the football fan but which will make any Singapore League manager hesitate to take in any major in mathematics with emphasis in statistics!

This book deals with a wide range of ideas on "randomness" applied to concrete scenarios and offers a glimpse of "randomness" as a fascinating concept and a pervasive phenomenon. A first reading leaves you amazed at the continuity of the "random" thread which runs through historical events and through different areas of human knowledge. The wealth of details in the book makes a second reading just as refreshing to the mind. M²

(This book is available from the Central Lending Library, Tampines Regional Library and Ang Mo Kio, Bedok, Bukit Merah, Chua Chu Kang, Geylang East, Jurong East, Marine Parade, Queenstown and Toa Payoh Community Libraries.)



Errata

Mathematical Medley, Vol 23(2) Sept. 1996.

1. Page 70, line 21, the cubic function should be $f(x) = x^3 - 6x^2 + 13x$ instead of $f(x) = x^3 - 6x^2 + 13x - 10$. On the same page, line 22, $f(-x)$ should then be $f(-x) = -x^3 - 6x^2 - 13x$.
2. Page 64, line -17, insert "e_1, e_2" after "let" and "e_3" after "and".