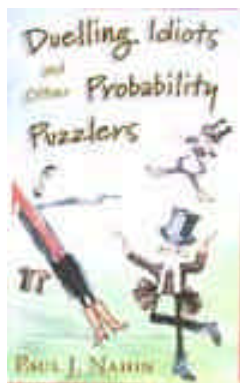


BOOK REVIEWS



Duelling Idiots and Other Probability Puzzlers. Paul J. Nahin. Princeton University Press. 2002. 280 pp. Price: US\$ 19.95.

Paul J. Nahin, the author of this book succeeds entirely in conveying the insight of the great Polish mathematician, Stanislaw Ulam: *In a sufficiently complicated problem, actual sampling is better than an examination of all the chains of possibilities.* One of the contributing factors to this is the mix of examples: humorous, mundane, intriguing, practical; yet every problem is challenging and yields startling results.

In the introduction, the following illustration really brings home the importance and utility of solving problems in probability. The Pentagon claimed that Patriot missiles had 80% success in shooting down Scuds in the Gulf War. This is shown to be false, by a simple calculation of probability starting from a set of sample observations, thanks to Postol, a physicist from MIT.

The reader's interest is captured right away in the very first problem *How to ask an Embarrassing Question*, by its challenge and the ingenuity of the solution. The next problem posed around an amusing situation *When Idiots Duel* establishes the method of listing the sample space and its simulation by a computer program, with the results drawing quite a few exclamations from the reader. Just when one has patted oneself on the back for having digested what has been served, the author dishes out a modification to complicate the problem (apparently) just a little. This technique is consistently maintained throughout the book, which keeps the reader on his/her toes and his/her intellect in awe of the puzzles in the realm of probability.

The logic-circuit problem *Will the Light Bulb Glow?* is a beautiful introduction to Markov chains. The author further

captivates us with interesting events and situations in the life of the great mathematician Markov, who first worked out this area of probability theory. There are similar references to great persona in other places in the book too, which help the reader gain the perception of how a variety of unpredictable circumstances are involved in the progress of the pure sciences. Problems from science such as *The Random Radio* are brilliant examples of the practical application of the *Monte Carlo* method.

Who Pays for the Coffee? is a problem from a well-known situation; *The Curious Case of the Snowy Birthdays* an intriguing one, and *The Blind Spider and the Fly* lets us relax as *It is the Spider's Problem*. The last problem *When all fails there is always the Computer*, is a superb introduction to CPM and PERT, required for the management of complex projects, and of interest even to non-academics who are only interested in 'getting things done'.

The problem statements occupy 66 pages and the solutions 121 pages; the solutions are presented with clarity and in a compact form, achieved through diagrams and graphs. Those who do not wish to grapple with the puzzlers can treat themselves to each solution straight after reading the puzzle. However, understanding the processing algorithms of the accompanying computer programs (listed in an appendix), which generate the sample space of chains of possibilities for the various puzzles, is necessary for digesting the approach to solving such probability problems.

The closing chapter on Random Number Generators puts an important aspect in perspective. The quote from von Neumann *There is no such thing as a random number* says it all. Add to that the author's exposition of the fact that a computer is a predictable machine which is used to produce a copious supply of random numbers rapidly, to be used by the programs which implement the methods of solution of probability problems expounded in the book. Finally, the story *Some Things Just Have to be Done by Hand* on God throwing dice (borrowed from the *Analog Yearbook 1984* and modified by the author) makes hilarious reading.

One further aspect, which the author has not discussed, relates to the physical world and is worthy of note. Probability theory, as applied to the physical world, rests on the assumption that the laws of physics are deterministic. We illustrate

through an example. The statement that a given coin is 'fair' for tossing is based on our accepted model of the world and the laws of physics. If these laws are deterministic, as in classical physics, the statement is a definite one, and we can use fair coins in a probability puzzler. If these laws are probabilistic, as in quantum physics, the coin is fair only with a probability, and it may be 'not-fair' to varying degrees with various probabilities at various times. All these probabilities must be known to use the coin in a probability puzzler with tossing of the coin. How does one verify these probabilities of varying degrees of fairness, as the verification itself depends on the tossing experiment? The reviewer feels that perhaps, the community of mathematicians and physicists working in the area of foundations of quantum theory have addressed and resolved this question; perhaps, they have not.

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Measuring Biological Diversity. Anne E. Magurran. Blackwell Publishing, Massachusetts, USA. 2003. 256 pp. Price US\$ 57.95.

For its size and population, India has a despairingly small number of ecologists studying the patterns and processes of biodiversity distribution. Fortunately, awareness that such studies are lacking but urgently needed, is on the rise. Along with professional ecologists, an increasing number of students still in their Bachelor and Masters degree programmes have started documenting biodiversity and studying seasonal community and species dynamics¹⁻⁴. For such students and other newcomers to the field in India, the problem is always finding the right resource that will acquaint them or bring them up-to-date with the field of diversity measurement. There is good news for them.

Those in the know are familiar with Anne Magurran's 1988 *Ecological Diversity and its Measurement*. This was an excellent reference that students like me went