attended, many subscribed, and 150 dined. Ladies filled the seats in the gallery. Forster wrote that:

> Dickens threw himself into the service heart and soul. There was a simple pathos in his address from the chair quite startling in its effect at such a meeting: and he probably never moved any audience so much as by the strong personal feeling with which he referred to the sacrifices made for the Hospital by the very poor themselves.

At the dinner Dickens agreed to give a reading of *A Christmas Carol*, which raised £165 8s to add to the dinner takings of £2850.

Charles West, speaking at the dinner in 1867, paid his tribute to Dickens when he said:

> Charles Dickens, the children's friend, first fairly set her on her legs and helped her to run alone, and in a few eloquent words which none who have heard can ever forget, like the good fairy in the tale, he gave her the gift that she should win love and favour everywhere; and so she grew and prospered.

Mutual Friends: Charles Dickens and Great Ormond Street Children's Hospital. J Kosky. (Pp x+245; figs; £14.95.) London: Weidenfeld and Nicolson, 1989. ISBN 0-297-79673-9.

Everything to a certainty

T D V Swinscow

The human population of the world becomes more numerous every day, we are told, but does it become more numerate? Not fast enough, the author of *Innumeracy* would argue. In fact "mathematical illiteracy" is often flaunted, he declares, and even more ominous, he says, is "the gap between scientists' assessments of various risks and the popular perception of those risks." Add to simple understanding the sheer exhilaration of being numerate, and you have a compelling reason for following Dr Paulos further. He shows, for instance, by a simple calculation that, if the "earth and heavens" are regarded as a sphere with a radius of one trillion miles, 10^{54} grains of sand would be needed to fill it. "There is a sense of power connected with such calculations," he concludes, "which is hard to explain but which somehow involves a mental encompassing of the world."

In contrast William Blake thought of these questions as an augury of innocence rather than of numeracy:

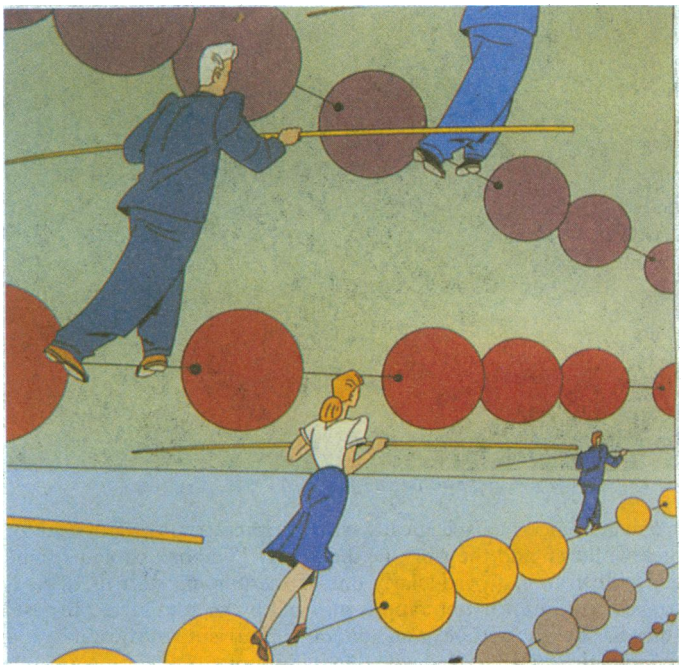
> To see a World in a Grain of Sand,
> And a Heaven in a Wild Flower,
> Hold Infinity in the palm of your hand,
> And Eternity in an hour.

Infinity has stirred the human imagination throughout the ages, and the dawning consciousness of it can be seen in young children wondering what billions and trillions are. But, despite all that, common sense too has had its fling:

> *Boswell:* Sir Alexander Dick tells me that he remembers having a thousand people in a year to dine at his house: that is, reckoning each person as one, each time that he dined there.
> *Johnson:* That, Sir, is about three a day.
> *Boswell:* How your statement lessens the idea.
> *Johnson:* That, Sir, is the good of counting. It brings every thing to a certainty which before floated in the mind indefinitely.

In his forays into innumeracy, which he so charmingly dispels as well as deplores, Dr Paulos concentrates mainly on probability. This is after all a miasma that hangs over much of our lives. What are the chances of this if I do that? Whether in scientific research, in medical treatment, in saying "I will" at the altar, in suing for libel, or in deciding how long to boil an egg, we weigh up chances of baffling complexity. Any degree of numeracy that can be brought to bear on the balancing process (and something generally is counted in all those examples) must surely add clarity to the decision taken. So I am all in favour of Dr Paulos's thesis, and I found his exposition of it entertaining.

The book is written in an informal, conversational style, but in thoroughly American English. I wonder, for instance, how many British readers would understand this statement: "Which two sports have face-offs? Ice hockey and leper boxing." It is true that, though numerate, I have not chosen these words as a random sample of the text; it is not all as quaint as that. But passing to a less recondite example I should mention that British readers need to know exactly what an American author means by the word "trillion" quoted above. The term "billion" is known to have become ambiguous owing to American misuse, but I always thought that the trillion retained its meaning (as the word itself signifies) of a million times a million times a million, or 10^{18}; and so on through quadrillion, quintillion, and the rest (the use of which the world's falling currencies increasingly require). But Dr Paulos pours scorn on duffers like me. According to him "Many educated people have little grasp of these numbers and are even unaware" that a trillion is 1 000 000 000 000, that is, 10^{12}. So British readers need to remember that, despite the deceptive clarity of the text, he is writing in a language slightly foreign to us. But from that indeed one can receive enjoyment, rather as we used to love the French accent overlying the English of the late lamented Yvonne Arnaud.



Except for experienced card players most people distrust probability statistics—and with some justice. Life is not a game of cards. Even in simple enumeration we have to be sure that things of the same sort are being numbered if we are going to add them up. Nobody wants 11 apples and a pear if he has ordered a dozen apples. Yet sometimes in medical papers it is evident that not even this first stage has been acceptably carried out: the things that have been enumerated are not strictly in the same class. And then to start estimating probabilities after abstracting numbers from things is to embark on a perilous journey. Here the traveller needs to carry a flask of common sense with him, and if he takes Dr Paulos's book for an evening's read he will get some amusement too.

Innumeracy: Mathematical Illiteracy and Its Consequences. J A Paulos. (Pp iii+135; £12.95.) London: Viking, 1989. ISBN 0-670-83008-9.