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A historical and philosophical perspective on probability.

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Summary: This chapter presents a twenty first century historical and philosophical perspective on probability, related to the teaching of probability. It is important to remember the historical development as it provides pointers to be taken into account in developing a modern curriculum in teaching probability at all levels. We include some elements relating to continuous as well as discrete distributions. Starting with initial ideas of chance two millennia ago, we move on to the correspondence of Pascal and Fermat, and insurance against risk. Two centuries of debate and discussion led to the key fundamental ideas; the twentieth century saw the climax of the axiomatic approach from Kolmogorov. Philosophical difficulties have been prevalent in probability since its inception, especially since the idea requires modelling – probability is not an inherent property of an event, but is based on the underlying model chosen. Hence the arguments about the philosophical basis of probability have still not been fully resolved. The three main theories (APT, FQT, and SJT) are described, relating to the symmetric, frequentist, and subjectivist approaches. These philosophical ideas are key to developing teaching content and methodology. Probabilistic concepts are closer to a consistent way of thinking about the world rather than describing the world in a consistent manner, which seems paradoxical, and can only be resolved by a careful analysis.

Classification: A30 K50 K60 E20

Keywords: divination; combinatorial multiplicity; law of large numbers; inverse probability; Bayes' problem; St Petersburg problem; expectation; independence; classical probability; frequentist probability; subjective probability; Bayes; Bernoulli; de Finetti; de Méré; de Moivre; Fermat; Graunt; Huygens; Kolmogorov; Laplace; Pascal; von Mises

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