



Probability and its Calculation Terms

Priya, Department of Mathematics, KUK

Abstract: In the topic study group on probability at ICME 11 a variety of ideas on probability education were presented. Some of the papers have been developed further by the driving ideas of interactivity and use of the potential of electronic publishing. As often happens, the medium of research influences the results and thus -not surprisingly -the research change its character during this process. This paper provides a summary of the main threads of research in probability education across the world and the result of an experiment in electronic communication. For convenience of international readers, abstracts in Spanish and German have been supplied, as well as hints for navigation to linked electronic materials.



Background: Whether probability education needs to be seen as discrete and separate from statistics has been an ongoing debate for many decades. Nowadays, statistics seems to be dominant in school education and data handling has been a key theme as part of the movement of mathematics for all. Conversely probability is thought to be harder and less relevant. Nevertheless, probability is an important discipline in its own right, and does contain the key underpinning concepts to understand and use data sensibly. This paper focuses on the international research on probability issues in education, mainly derived from ICME 11 (2008) in Mexico. This study group, also linked to IASE included all the major themes being studied internationally in probability education. A thorough system of peer review, using an international panel of experts, ensured that the papers at ICME 11 were both well written and also covered the key areas of research being undertaken across the world. The full papers from the conference are available on the ICME 7 site in the links below. Most of the papers have been developed further, including many interactive features (such as links to related and background research ideas) and can be found in Borovcnik & Kapadia (2009)¹, which can also be accessed electronically. These themes of international research provide a valuable bridge between international research and themes in Britain on the teaching of probability, which is often subsumed under data handling or statistics. Probability education has not been a central focus of the research community in the last three decades since the theoretical framework espoused by Kapadia & Borovcnik (1991)² appeared. Jones (2005) on “Exploring probability in Schools” has largely followed the new paradigm in educational research, which is empirically oriented. Designs of teaching sequels are administered to students and analysed. Sometimes, beliefs and attitudes of teachers are empirically investigated. Only one of the contributions in Jones is philosophically oriented: Batanero, Henry, & Parzysz (2005)³ give a summary of the philosophical debate on the interpretations of probability and discuss its implications on teaching. Analysis of the subject matter is still dominated by Heitele’s fundamental ideas (1975)⁴, which seem to be more a description of the main chapters of a probability textbook than an analysis of the concepts from a more general perspective and their purpose. The educational debate is being revived by the more recent endeavours to explain the concepts of risk (see Gigerenzer 2002)⁵, which comes from societal needs taken up by cognitive psychologists and thereby attracts more attention in the community of educationalists. However, the fundamental ideas of probability, in line with those discussed for statistics by Wild & Pfannkuch (1999) are still awaiting elaboration. Some starting points may be found in Pratt (2005)⁶ though the CERME working group, too, is mainly devoted to the empirical paradigm. The authors support the ideas and results of Fischbein (1987)⁷ who elaborates on intuitions and their impact on understanding (and accepting) probabilistic concepts. Raw primary intuitions of individuals are revised

¹ Borovcnik & Kapadia (2009), . Judgement under Uncertainty: Heuristics and Biases. Cambridge University Press.

² Kapadia & Borovcnik (1991)², 'Bayesian Statistics: An Introduction,

³ Quite a good account of Bayesian statistics, but still not for the faint hearted (Lindley's book is better for beginners).

⁴ Heitele’s fundamental ideas (1975)⁴, . Something of a classic book. Argues that Bayesian probability is the natural basis for decision making in all walks of life.

⁵ Wilson A.G. Cognitive Factors Affecting Subjective Probability Assessment. Institute of Statistics and Decision Sciences Discussion Paper No. 94-02. Duke University, Durham, USA (1994).

⁶ Pratt (2005)⁶ . Cognitive Factors Affecting Subjective Probability Assessment. Institute of Statistics and Decision Sciences Discussion Paper No. 94-02. Duke University, Durham,

⁷ Fischbein (1987)⁷ Subjective Probability. John Wiley & Sons Ltd., (1994).