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THE INTUITIVE SOURCES  
OF PROBABILISTIC THINKING  
IN CHILDREN



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# The Intuitive Sources Of Probabilistic Thinking In Children

**Carmen Batanero, Egan J Chernoff**



## **The Intuitive Sources Of Probabilistic Thinking In Children:**

The Intuitive Sources of Probabilistic Thinking in Children H. Fischbein, 2012-12-06 About a year ago I promised my friend Fischbein a preface to his book of which I knew the French manuscript Now with the printer's proofs under my eyes I like the book even better than I did then because of and influenced by new experiences in the meantime and fresh thoughts that crossed my mind Have I been influenced by what I remembered from the manuscript If so it must have happened unconsciously But of course what struck me in this work a year ago struck a responsive chord in my own mind In the past mathematics teaching theory has strongly been influenced by a view on mathematics as a heap of concepts and on learning mathematics as concepts attainment Mathematics teaching practice has been jeopardised by this theoretical approach which in its most dangerous form expresses itself as a radical atomism To concepts attainment Fischbein opposes acquisition of intuitions In my own publications I avoided the word intuition because of the variety of its meanings across languages For some time I have used the term constitution of mathematical objects which I think means the same as Fischbein's acquisition of intuitions indeed as I view it constituting a mental object precedes its conceptualising and under this viewpoint I tried to observe mathematical activities of young children

**The Intuitive Sources of Probabilistic Thinking in Children** H. Fischbein, 1980-11-30 The intuitive sources of probabilistic thinking in children E. Fischbein, 1975 **Probabilistic Thinking** Egan J. Chernoff, Bharath Sriraman, 2013-12-05 This volume provides a necessary current and extensive analysis of probabilistic thinking from a number of mathematicians, mathematics educators and psychologists The work of 58 contributing authors investigating probabilistic thinking across the globe is encapsulated in 6 prefaces, 29 chapters and 6 commentaries Ultimately the four main perspectives presented in this volume: Mathematics and Philosophy, Psychology, Stochastics and Mathematics Education are designed to represent probabilistic thinking in a greater context

**Statistics in Early Childhood and Primary Education** Aisling Leavy, Maria Meletiou-Mavrotheris, Efi Paparistodemou, 2018-07-23 This compilation focuses on the theory and conceptualisation of statistics and probability in the early years and the development of young children's ages 3-10 understanding of data and chance It provides a comprehensive overview of cutting edge international research on the development of young learners reasoning about data and chance in formal, informal and non-formal educational contexts The authors share insights into young children's statistical and probabilistic reasoning and provide early childhood educators and researchers with a wealth of illustrative examples, suggestions and practical strategies on how to address the challenges arising from the introduction of statistical and probabilistic concepts in pre-school and school curricula This collection will inform practices in research and teaching by providing a detailed account of current best practices, challenges and issues and of future trends and directions in early statistical and probabilistic learning worldwide Further it will contribute to future research and theory building by addressing theoretical, epistemological and methodological considerations regarding the design of probability and statistics learning environments

for young children      **Chance Encounters: Probability in Education** R. Kapadia, M. Borovcnik, 2012-12-06 This book has been written to fill a substantial gap in the current literature in mathematical education Throughout the world school mathematical curricula have incorporated probability and statistics as new topics There have been many research papers written on specific aspects of teaching presenting novel and unusual approaches to introducing ideas in the classroom however there has been no book giving an overview Here we have decided to focus on probability making reference to inferential statistics where appropriate we have deliberately avoided descriptive statistics as it is a separate area and would have made ideas less coherent and the book excessively long A general lead has been taken from the first book in this series written by the man who probably more than everyone else has established mathematical education as an academic discipline However in his exposition of didactical phenomenology Freudenthal does not analyze probability Thus in this book we show how probability is able to organize the world of chance and idealized chance phenomena based on its development and applications In preparing these chapters we and our co authors have reflected on our own acquisition of probabilistic ideas analyzed textbooks and observed and reflected upon the learning processes involved when children and adults struggle to acquire the relevant concepts      The Assessment Challenge in Statistics Education Iddo Gal, Joan B. Garfield, 1997 This book discusses conceptual and pragmatic issues in the assessment of statistical knowledge and reasoning skills among students at the college and precollege levels and the use of assessments to improve instruction It is designed primarily for academic audiences involved in teaching statistics and mathematics and in teacher education and training The book is divided in four sections 1 Assessment goals and frameworks 2 Assessing conceptual understanding of statistical ideas 3 Innovative models for classroom assessments and 4 Assessing understanding of probability      Intuition in Science and Mathematics Efraim Fischbein, 2005-12-19 In writing the present book I have had in mind the following objectives To propose a theoretical comprehensive view of the domain of intuition To identify and organize the experimental findings related to intuition scattered in a wide variety of research contexts To reveal the educational implications of the idea developed for science and mathematics education Most of the existing monographs in the field of intuition are mainly concerned with theoretical debates definitions philosophical attitudes historical considerations See especially the works of Wild 1938 of Bunge 1962 and of Noddings and Shore 1984 A notable exception is the book by Westcott 1968 which combines theoretical analyses with the author's own experimental studies But so far no attempt has been made to identify systematically those findings spread throughout the research literature which could contribute to the deciphering of the mechanisms of intuition Very often the relevant studies do not refer explicitly to intuition Even when this term is used it occurs usually as a self evident common sense term      **Exploring Probability in School** Graham A. Jones, 2006-03-30 Exploring Probability in School provides a new perspective into research on the teaching and learning of probability It creates this perspective by recognizing and analysing the special challenges faced by teachers and learners in contemporary classrooms where probability has recently

become a mainstream part of the curriculum from early childhood through high school The authors of the book discuss the nature of probability look at the meaning of probabilistic literacy and examine student access to powerful ideas in probability during the elementary middle and high school years Moreover they assemble and analyse research based pedagogical knowledge for teachers that can enhance the learning of probability throughout these school years With the book s rich application of probability research to classroom practice it will not only be essential reading for researchers and graduate students involved in probability education it will also capture the interest of educational policy makers curriculum personnel teacher educators and teachers

**Children's Logical and Mathematical Cognition** C.J. Brainerd,2012-12-06 For some time now the study of cognitive development has been far and away the most active discipline within developmental psychology Although there would be much disagreement as to the exact proportion of papers published in developmental journals that could be considered cognitive 50% seems like a conservative estimate Hence a series of scholarly books to be devoted to work in cognitive development is especially appropriate at this time The Springer Series in Cognitive Development contains two basic types of books namely edited collections of original chapters by several authors and original volumes written by one author or a small group of authors The flagship for the Springer Series will be a serial publication of the advances type carrying the subtitle Progress in Cognitive Development Research Each volume in the Progress sequence will be strongly thematic in that it will be limited to some well defined domain of cognitive developmental research e g logical and mathematical development semantic development All Progress volumes will be edited collections Editors of such collections upon consultation with the Series Editor may elect to have their books published either as contributions to the Progress sequence or as separate volumes All books written by one author or a small group of authors will be published as separate volumes within the series A fairly broad definition of cognitive development is being used in the selection of books for this series

The Challenge of Developing Statistical Literacy, Reasoning and Thinking Dani Ben-Zvi,Joan Garfield,2006-02-23 Research in statistics education is an emerging field with much of the work being published in diverse journals across many disciplines Locating and synthesizing this research is often a challenging task as is connecting the research literature to practical issues of teaching and assessing students This book is unique in that it collects presents and synthesizes cutting edge research on different aspects of statistical reasoning and applies this research to the teaching of statistics to students at all educational levels Unlike other books on how to teach statistics or educational materials to help students learn statistics this book presents the research foundation on which teaching should be based The chapters in this volume are written by the today s leading researchers in statistics education This volume will prove of great value to mathematics and statistics education researchers statistics educators statisticians cognitive psychologists mathematics teachers mathematics and statistics curriculum developers and quantitative literacy experts in education and government

Teaching and Learning Stochastics Carmen Batanero,Egan J Chernoff,2018-03-01 This book presents a collection of

selected papers that represent the current variety of research on the teaching and learning of probability. The respective chapters address a diverse range of theoretical, empirical and practical aspects underpinning the teaching and learning of probability, curricular issues, probabilistic reasoning, misconceptions and biases as well as their pedagogical implications. These chapters are divided into THREE main sections dealing with TEACHING PROBABILITY, STUDENTS REASONING AND LEARNING AND EDUCATION OF TEACHERS. In brief, the papers presented here include research dealing with teachers and students at different levels and ages from primary school to university and address epistemological and curricular analysis as well as the role of technology, simulations, language and visualisation in teaching and learning probability. As such, it offers essential information for teachers, researchers and curricular designers alike.

**New Approaches in Reasoning Research** Wim De Neys, Magda Osman, 2013-11-20 Reasoning research has long been associated with paper and pencil tasks in which people's reasoning skills are judged against established normative conventions. However, there has been a recent revolution in the range of techniques, empirical methods and paradigms used to examine reasoning behaviour. *New Approaches in Reasoning Research* brings to the fore these new pioneering research methods and empirical findings. Each chapter is written by a world-leading expert in the field and covers a variety of broad empirical techniques and new approaches to reasoning research. Maintaining a high level of integrity and rigor throughout, Editors De Neys and Osman have allowed the experts included here the space to think big about the general issues concerning their work, to point out potential implications and speculate on further developments. Such freedom can only help to stimulate discussion and spark creative thinking. The use of these new methods and paradigms are already generating a new understanding of how we reason, as such, this book should appeal to researchers and students of Cognitive Psychology, Social Psychology and Neuroscience along with Cognitive Scientists and anyone interested in the latest developments in reasoning, rationality, bias and thinking.

**Contributions To Information Integration Theory** Norman H. Anderson, 2014-01-02 The theory of information integration provides a unified general approach to the three disciplines of cognitive, social and developmental psychology. Each of these volumes illustrates how the concepts and methods of this experimentally grounded theory may be productively applied to core problems in one of these three disciplines.

Concept Development in the Secondary School Peter Langford, 2016-03-10 Originally published in 1987, this book introduces the reader to work on the intellectual development of adolescents relevant to the secondary school teacher. It covers the teaching of English, history, geography, economics, politics, legal studies, physics, chemistry, biology and mathematics. Although it emphasises the continuing importance of Piaget's thought, the book aims to introduce readers to the non-Piagetian research that had taken place in recent years.

*Thinking with Data* Marsha Lovett, Priti Shah, 2007 First Published in 2007, Routledge is an imprint of Taylor & Francis, an information company.

International Handbook of Research in Statistics Education Dani Ben-Zvi, Katie Makar, Joan Garfield, 2017-12-08 This handbook connects the practice of statistics to the teaching and learning of the subject with contributions from experts

in several disciplines Chapters present current challenges and methods of statistics education in the changing world for statistics and mathematics educators Issues addressed include current and future challenges in professional development of teachers use of technology tools design of learning environments and appropriate student assessments This handbook presents challenging and inspiring international research perspectives on the history and nature current issues and future directions of statistics education and statistics education research

**Oxford Handbook of Numerical Cognition** Roi Cohen Kadosh, Ann Dowker, 2015-07-30 How do we understand numbers Do animals and babies have numerical abilities Why do some people fail to grasp numbers and how we can improve numerical understanding Numbers are vital to so many areas of life in science economics sports education and many aspects of everyday life from infancy onwards Numerical cognition is a vibrant area that brings together scientists from different and diverse research areas e g neuropsychology cognitive psychology developmental psychology comparative psychology anthropology education and neuroscience using different methodological approaches e g behavioral studies of healthy children and adults and of patients electrophysiology and brain imaging studies in humans single cell neurophysiology in non human primates habituation studies in human infants and animals and computer modeling While the study of numerical cognition had been relatively neglected for a long time during the last decade there has been an explosion of studies and new findings This has resulted in an enormous advance in our understanding of the neural and cognitive mechanisms of numerical cognition In addition there has recently been increasing interest and concern about pupils mathematical achievement in many countries resulting in attempts to use research to guide mathematics instruction in schools and to develop interventions for children with mathematical difficulties This handbook brings together the different research areas that make up the field of numerical cognition in one comprehensive and authoritative volume The chapters provide a broad and extensive review that is written in an accessible form for scholars and students as well as educationalists clinicians and policy makers The book covers the most important aspects of research on numerical cognition from the areas of development psychology cognitive psychology neuropsychology and rehabilitation learning disabilities human and animal cognition and neuroscience computational modeling education and individual differences and philosophy Containing more than 60 chapters by leading specialists in their fields the Oxford Handbook of Numerical Cognition is a state of the art review of the current literature

**Reflections on Statistics** Susanne P. Lajoie, 2012-10-12 An issue in the current push for reform in mathematics education is the call to address statistics at the precollege level This volume represents the emerging findings of an interdisciplinary collaboration among a group of mathematics educators cognitive scientists teachers and statisticians to construct an understanding of how to introduce statistics education and assessment for students in elementary and secondary schools A premise shared by the contributors to this volume is that when students are introduced to statistics at the K 12 level and provided with opportunities to do statistics that are related to actual life situations they will be better prepared for decision making in the real world The

interdisciplinary nature of the group of researchers stimulated a lively interchange of ideas for enhancing the learning teaching and assessment of statistical understanding which is reflected in this volume Mathematics educators contribute their insights into how teachers teach mathematical ideas and heighten our awareness of the ecological needs of the current mathematics classroom Cognitive scientists share their understanding of developmental differences in learning and present theoretical perspectives that contribute to the design of effective learning environments Classroom teachers share their ideas about classroom activities and assessment of student learning as well as their concerns for in service training and workshops to help teachers acquire skills in this new content area Statisticians offer their understanding of what is feasible to teach in the early grades and what their view is of statistical literacy The book is organized around four interdependent themes content teaching learning and assessment By focusing their respective chapters on particular themes the authors intend to cultivate a better understanding of how each relates to improvements in statistics education This is the first book to address statistics learning in grades K 12 address issues of statistical curriculum content in grades K 12 address issues of assessment of statistics learning in grades K 12 bring issues of technology instruction and assessment in statistics education in grades K 12 and look at teacher education for statistics instruction in grades K 12 This is a must read book for both practitioners and researchers involved in K 12 mathematics education      **Cognitive Diagnostic Assessment for Learning** Peida

Zhan,Feiming Li,Hong Jiao,2022-01-19



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