

# 18

## UNCONVENTIONAL ESSAYS ON THE NATURE OF MATHEMATICS

Reuben Hersh



# 18 Unconventional Essays On The Nature Of Mathematics

**Timothy Gowers, June Barrow-Green, Imre Leader**



## **18 Unconventional Essays On The Nature Of Mathematics:**

**18 Unconventional Essays on the Nature of Mathematics** Reuben Hersh, 2006-01-16 This book comes from the Internet Browsing the Web I stumbled on philosophers cognitive scientists sociologists computer scientists even mathematicians saying original provocative things about mathematics And many of these people had probably never heard of each other So I have collected them here This way they can read each other's work I also bring back a few provocative oldies that deserve publicity The authors are philosophers mathematicians a cognitive scientist an anthropologist a computer scientist and a couple of sociologists Among the mathematicians are two Fields Prize winners and two Steele Prize winners None are historians I regret to say but there are two historically oriented articles These essays don't share any common program or ideology The standard for admission was Nothing boring Nothing trite nothing trivial Every essay is challenging thought provoking and original Back in the 1970s when I started writing about mathematics instead of just doing mathematics I had to complain about the literature Philosophy of science was already well into its modern revival largely stimulated by the book of Thomas Kuhn But philosophy of mathematics still seemed to be mostly foundationist ping pong in the ancient style of Rudolf Carnap or Willard Van Ormon Quine The great exception was Proofs and Refutations by Imre Lakatos But that exciting book was still virtually unknown and unread by either mathematicians or philosophers I wrote an article entitled Introducing Imre Lakatos in the Mathematical Intelligencer in 1978

**18 Unconventional Essays on the Nature of Mathematics** Reuben Hersh, 2006 This book collects some of the most interesting recent writings that are tackling from various points of view the problem of giving an accounting of the nature purpose and justification of real mathematical practice mathematics as actually done by real live mathematicians What is the nature of the objects being studied What determines the directions and styles in which mathematics progresses or perhaps degenerates What certifies its claim to certainty or to a priori status to independence of experience Why is mathematics the same for all times and places or is it really the same or in what senses is it the same and in what senses different Many of these writings were read at conferences in Europe and America under the heading of history or cultural studies as well as philosophy It is the editor's hope to help foster healthy interdisciplinary mutual aid in this young and fertile area I was pleasantly surprised to find that this book does not treat mathematics as dessicated formal logic but as a living organism immediately recognizable to any working mathematician Sir Michael Atiyah University of Edinburgh A wonderful collection of essays on the philosophy of mathematics some by mathematicians others by philosophers and all having significant things to say Most readers will be informed some will be infuriated but all will be stimulated John H Conway John von Neumann Distinguished Professor of Mathematics Princeton University

**Loving and Hating Mathematics** Reuben Hersh, Vera John-Steiner, 2010-12-13 An exploration of the hidden human emotional and social dimensions of mathematics Mathematics is often thought of as the coldest expression of pure reason But few subjects provoke hotter emotions and inspire more love and hatred than

mathematics And although math is frequently idealized as floating above the messiness of human life its story is nothing if not human often it is all too human Loving and Hating Mathematics is about the hidden human emotional and social forces that shape mathematics and affect the experiences of students and mathematicians Written in a lively accessible style and filled with gripping stories and anecdotes Loving and Hating Mathematics brings home the intense pleasures and pains of mathematical life These stories challenge many myths including the notions that mathematics is a solitary pursuit and a young man s game the belief that mathematicians are emotionally different from other people and even the idea that to be a great mathematician it helps to be a little bit crazy Reuben Hersh and Vera John Steiner tell stories of lives in math from their very beginnings through old age including accounts of teaching and mentoring friendships and rivalries love affairs and marriages and the experiences of women and minorities in a field that has traditionally been unfriendly to both Included here are also stories of people for whom mathematics has been an immense solace during times of crisis war and even imprisonment as well as of those rare individuals driven to insanity and even murder by an obsession with math This is a book for anyone who wants to understand why the most rational of human endeavors is at the same time one of the most emotional

*Natural Kinds and Classification in Scientific Practice* Catherine Kendig, 2015-12-22 This edited volume of 13 new essays aims to turn past discussions of natural kinds on their head Instead of presenting a metaphysical view of kinds based largely on an unempirical vantage point it pursues questions of kindness which take the use of kinds and activities of kinding in practice as significant in the articulation of them as kinds The book brings philosophical study of current and historical episodes and case studies from various scientific disciplines to bear on natural kinds as traditionally conceived of within metaphysics Focusing on these practices reveals the different knowledge producing activities of kinding and processes involved in natural kind use generation and discovery Specialists in their field the esteemed group of contributors use diverse empirically responsive approaches to explore the nature of kindness This groundbreaking volume presents detailed case studies that exemplify kinding in use Newly written for this volume each chapter engages with the activities of kinding across a variety of disciplines Chapter topics include the nature of kinds kindness kinding and kind making in linguistics chemical classification neuroscience gene and protein classification colour theory in applied mathematics homology in comparative biology sex and gender identity theory memory research race extended cognition symbolic algebra cartography and geographic information science The volume seeks to open up an as yet unexplored area within the emerging field of philosophy of science in practice and constitutes a valuable addition to the disciplines of philosophy and history of science technology engineering and mathematics

### **Mathematical Representation at the Interface of Body and Culture**

Wolff-Michael Roth, 2009-05-14 In the past 2 decades mathematics education has shifted to focus on the relationship between individuals and their social context and the embodied nature of mathematical knowing This volume explores the intersection of these perspectives emphasizing mathematical knowledge as performance and the role of culture and the body in cognition

The Princeton Companion to Mathematics Timothy Gowers, June Barrow-Green, Imre Leader, 2010-07-18 The ultimate mathematics reference book This is a one of a kind reference for anyone with a serious interest in mathematics Edited by Timothy Gowers a recipient of the Fields Medal it presents nearly two hundred entries written especially for this book by some of the world's leading mathematicians that introduce basic mathematical tools and vocabulary trace the development of modern mathematics explain essential terms and concepts examine core ideas in major areas of mathematics describe the achievements of scores of famous mathematicians explore the impact of mathematics on other disciplines such as biology finance and music and much much more Unparalleled in its depth of coverage The Princeton Companion to Mathematics surveys the most active and exciting branches of pure mathematics Accessible in style this is an indispensable resource for undergraduate and graduate students in mathematics as well as for researchers and scholars seeking to understand areas outside their specialties Features nearly 200 entries organized thematically and written by an international team of distinguished contributors Presents major ideas and branches of pure mathematics in a clear accessible style Defines and explains important mathematical concepts methods theorems and open problems Introduces the language of mathematics and the goals of mathematical research Covers number theory algebra analysis geometry logic probability and more Traces the history and development of modern mathematics Profiles more than ninety five mathematicians who influenced those working today Explores the influence of mathematics on other disciplines Includes bibliographies cross references and a comprehensive index Contributors include Graham Allan Noga Alon George Andrews Tom Archibald Sir Michael Atiyah David Aubin Joan Bagaria Keith Ball June Barrow Green Alan Beardon David D Ben Zvi Vitaly Bergelson Nicholas Bingham B la Bollob s Henk Bos Bodil Branner Martin R Bridson John P Burgess Kevin Buzzard Peter J Cameron Jean Luc Chabert Eugenia Cheng Clifford C Cocks Alain Connes Leo Corry Wolfgang Coy Tony Crilly Serafina Cuomo Mihalis Dafermos Partha Dasgupta Ingrid Daubechies Joseph W Dauben John W Dawson Jr Francois de Gandt Persi Diaconis Jordan S Ellenberg Lawrence C Evans Florence Fasanelli Anita Burdman Feferman Solomon Feferman Charles Fefferman Della Fenster Jos Ferreir s David Fisher Terry Gannon A Gardiner Charles C Gillispie Oded Goldreich Catherine Goldstein Fernando Q Gouv a Timothy Gowers Andrew Granville Ivor Grattan Guinness Jeremy Gray Ben Green Ian Grojnowski Niccol Guicciardini Michael Harris Ulf Hashagen Nigel Higson Andrew Hodges F E A Johnson Mark Joshi Kiran S Kedlaya Frank Kelly Sergiu Klainerman Jon Kleinberg Israel Kleiner Jacek Klinowski Eberhard Knobloch J nos Koll r T W K rner Michael Krivelevich Peter D Lax Imre Leader Jean Fran ois Le Gall W B R Lickorish Martin W Liebeck Jesper L tzen Des MacHale Alan L Mackay Shahn Majid Lech Maligranda David Marker Jean Mawhin Barry Mazur Dusa McDuff Colin McLarty Bojan Mohar Peter M Neumann Catherine Nolan James Norris Brian Osserman Richard S Palais Marco Panza Karen Hunger Parshall Gabriel P Paternain Jeanne Peiffer Carl Pomerance Helmut Pulte Bruce Reed Michael C Reed Adrian Rice Eleanor Robson Igor Rodnianski John Roe Mark Ronan Edward Sandifer Tilman Sauer Norbert Schappacher Andrzej Schinzel Erhard Scholz Reinhard Siegmund Schultze

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**Interfaces between Mathematical Practices and Mathematical Education** Gert Schubring, 2019-01-16 This contributed volume investigates the active role of the different contexts of mathematics teaching on the evolution of the practices of mathematical concepts with particular focus on their foundations The book aims to deconstruct the strong and generally wide held conviction that research in mathematics constitutes the only driving force for any progress in the development of mathematics as a field In compelling and convincing contrast these chapters aim to show the productive function of teaching showcasing investigations from countries and regions throughout various eras from Old Babylonia through the 20th Century In so doing they provide a critical reflection on the foundations of mathematics as well as instigate new research questions and explore the interfaces between teaching and research

Experiencing Mathematics Reuben Hersh, 2013-12-24 Part IV About the author An amusing elementary example Annotated research bibliography Curriculum vitae List of articles Index Back Cover

Studia Universitatis Babeş-Bolyai Universitatea "Babeş-Bolyai.", 2008

*Mathematical Reviews*, 2006

**The Patentability of Software** Anton Hughes, 2019-02-18 This book explores the question of whether software should be patented It analyses the ways in which the courts of the US the EU and Australia have attempted to deal with the problems surrounding the patentability of software and describes why it is that the software patent issue should be dealt with as a patentable subject matter issue rather than as an issue of novelty or nonobviousness Anton Hughes demonstrates that the current approach has failed and that a fresh approach to the software patent problem is needed The book goes on to argue against the patentability of software based on its close relationship to mathematics Drawing on historical and philosophical accounts of mathematics in pursuit of a better understanding of its nature and focusing the debate on the conditions necessary for mathematical advancement the author puts forward an analytical framework centred around the concept of the useful arts This analysis both explains mathematics and therefore software s nonpatentability and offers a theory of patentable subject matter consistent with Australian American and European patent law

How Our Emotions and Bodies are Vital for Abstract Thought Anna Sverdlík, 2018-06-18 If mathematics is the purest form of knowledge the perfect foundation of all the hard sciences and a uniquely precise discipline then how can the human brain an imperfect and imprecise organ process mathematical ideas Is mathematics made up of eternal universal truths Or as some have claimed could mathematics simply be a human invention a kind of tool or metaphor These questions are among the greatest enigmas of science and epistemology discussed at length by mathematicians physicians and philosophers But curiously enough neuroscientists have been absent in the debate even though it is precisely the field of neuroscience which studies the brain s mechanisms for thinking and reasoning that ought to be at the very center of these discussions How our Emotions and Bodies are Vital for Abstract Thought explores the unique

mechanisms of cooperation between the body emotions and the cortex based on fundamental physical principles It is these mechanisms that help us to overcome the limitations of our physiology and allow our imperfect human brains to make transcendent mathematical discoveries This book is written for anyone who is interested in the nature of abstract thought including mathematicians physicists computer scientists psychologists and psychiatrists Formal Proofs and Refutations Jesse Alama,2009 **Becoming Beside Ourselves** Brian Rotman,2008-07-16 DIVTheoretical study of the relationship between technoscience and the human body that examines the ways in which bodies and machines speak not just through language but also through gesture numbers and other non alphabetic systems of expressio div Math Educ ,2007 Contains abstracts in the field of mathematics education extracted from documents worldwide **Handbook of the History and Philosophy of Mathematical Practice** Bharath Sriraman,2020 The philosophy of mathematics can be traced back in time to the dawn of mathematics itself The axiomatization of Euclid in The Elements did not hinder innovations in mathematical practice to develop outside the realm of the deductive method In fact the history of mathematics shows a rich tapestry of practice that include visual algorithmic experimental probabilistic and computational approaches However the philosophy of mathematics as argued by Imre Lakatos suggests that the innovations and impasses in mathematical practice have remained more or less unacknowledged in philosophy For instance mathematical argumentation was primarily the domain of theologians and medieval and postmedieval scholastics for over 1700 years after Aristotle Similarly the study of logic became the purview of mathematical philosophy criticized by Reuben Hersh as Quinean ping pong In two prior Springer books 18 Unconventional Essays on the Nature of Mathematics Hersh 2006 and Humanizing Mathematics and its Philosophy Sriraman 2017 it is sufficiently clear that the philosophy of mathematics is no longer centered around it origins in theology and logic but influences and is influenced by other domains Today the philosophy of mathematics can be informed by computer scientists historians logicians linguists educators physicists psychologists neuroscientists statisticians and last but not least mathematicians At the dawn of the 21st century we still have a cadre of scholars influenced first hand by the likes of Quine and Brouwer as well as those who were influenced by Imre Lakatos seminal work Proofs and Refutations in the 1970s that espouse the views of practicing mathematicians Pluralism is the avant garde term in vogue today suggesting a post modern view of mathematics that would have been frowned upon a century ago The purpose of this unique Handbook is to unfold the transformation of the philosophy of mathematics from its origins in the history of mathem atical practice In order to do so chapters will describe different mathematical practices in different time periods of history and contrast it with the development of philosophy The contributions will include scholars from other disciplines who have contributed to the richness of perspectives that abound the study of philosophy today The Handbook aims to synthesize what is known and what has unfolded but also offer directions in which the study of philosophy of mathematics as evident in increasingly diverse mathematical practices is headed Different sections of the Handbook will offer insights into the origins debates

methodologies and newer perspectives that characterize the discipline today This Handbook is curated by an editorial advisory board consisting of leading scholars from the disciplines of mathematics history and philosophy Editorial Advisory Board Andrew Aberdein Jody Azzouni William Byers Carlo Cellucci Chandler Davis Paul Ernest Michele Friend Reuben Hersh Yuri Manin Athanase Papadopoulos Ulf Persson Kim Plofker John Stillwell David Tall **La filosofia della matematica del Novecento** Carlo Cellucci, 2007 The Publishers' Circular and General Record of British and Foreign Literature, 1888 *Educational Times and Journal of the College of Preceptors*, 1889 *Publishers' Circular and Booksellers' Record of British and Foreign Literature*, 1888

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