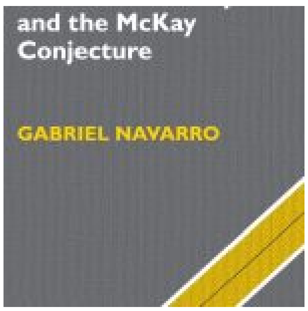
Les comptes-rendus de livres présentent au lectorat de la SMC des ouvrages intéressants sur les mathématiques et l'enseignement des mathématiques dans un large éventail de domaines et sous-domaines.Vos commentaires, suggestions et propositions sont les bienvenues.

Karl Dilcher, *Université Dalhousie (notes-reviews@cms.math.ca)*



Character Theory and the McKay Conjecture

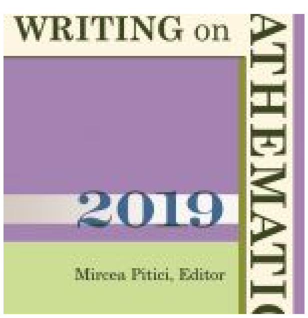
by Gabriel Navarro
Cambridge University Press, 2018
ISBN: 978-1-108-42844-6
Reviewed by Gerald Cliff, University of Alberta

To state McKay's Conjecture, for a prime p and a finite group G, let $m_p(G)$ denote the number of irreducible complex characters of G whose degree is not divisible by p. Let $N_G(P)$ denote the normalizer of a Sylow p-subgroup of G. The conjecture is that

$$m_p(G) = m_p(N_G(P)).$$

This conjecture was made in the early 1970s, and has become one of the main problems in the representation theory of finite groups. In the 2000s, an effort was made by Navarro and collaborators to reduce this problem to the case that G is a finite simple group, and then use the classification of finite simple groups. There is a stronger conjecture which implies McKay's, and which would hold if it holds for all finite simple groups. At this time it is not known that the stronger conjecture does indeed hold for all finite simple groups, except for $p = 2$, so that McKay's conjecture is true for $p = 2$.

In this book, the author gives a good presentation of the theory of characters of finite groups, including some recent interesting results. He shows how to reduce the stronger conjecture to simple groups. The book could be read by graduate students and non-experts.



The Best Writing on Mathematics, 2019

Edited by Mircea Pitici
Princeton University Press, 2019
ISBN: 978-0-691-19835-4
Reviewed by Karl Dilcher

This is the tenth volume in a remarkable series of annual anthologies. A year ago in this space I addressed some general features shared by all volumes. I will not repeat these remarks here; the interested reader will find them in the September 2019 issue. Instead, I will quote from the overview of this volume:

To start the selection, Moon Duchin explains that the Markov chain Monte Carlo method, a geometric-statistical approach to the analysis of political districting, guards against the worst of many possible abuses currently taking place within elective political processes.

Theodore Hill describes the recent history of the fair division of a domain problem, places it in wider practical and impractical contexts, and traces the contributions of a few key mathematicians who studied it.

Paul Campbell examines some of the claims commonly made on behalf of learning mathematics and finds that many of them are wanting in the current constellation of teaching practices, curricula, and competing disciplines.

Roice Nelson introduces several puzzles whose ancestry goes back to the famous cube invented and commercialized by Ernő Rubik.

Kokichi Sugihara analyzes the geometry, the topology, and the construction of versatile three-dimensional objects that produce visual illusions when looked at from different viewpoints.

Kevin Hartnett traces the recent developments and the prospects of mathematical results that establish mirror symmetry between algebraic and simplectic geometry---an unexpected and only partly understood correspondence revealed by physicists.

James Propp presents a fresh approach to problems of discrete probability and illustrates it with examples of various difficulties.

Neil Sloane details some of the remarkable numerical sequences he included in the vast collection of integers he has organized and made available over the past several decades.

Alessandro Di Bucchianico et al. point out specific theoretical advances in various branches of mathematics, which have contributed powerful applications to recent technologies and services.

Toby Cubitt et al. tell us how they explored the connections between certain open questions in quantum physics and classical results on undecidable statements in mathematics formulated by Kurt Gödel and Alan Turing.

Jeremy Avigad places in historical context and illustrates with recent examples the growing use of computation, not only in proving mathematical results but also in making hypotheses, verifying them, and searching for mathematical objects that satisfy them.

With compelling examples and well-chosen arguments, Reuben Hersh makes the case that mathematics is pluralistic on multiple levels: in content, in philosophical interpretation, and in practice.

Mary Leng subtly defends a position highly unpopular among mathematicians and in a small minority among the philosophers of mathematics, namely, the thesis that certain mathematical statements are questionable on the ground that they imply the existence of objects that might not exist at all—for instance abstract numbers.

Tiziana Bascelli and her collaborators discuss an episode of 17th-century nonstandard analysis to argue that clarifying both the historical ontology of mathematical notions and the prevalent procedures of past times is essential to the history of mathematics.

Noson Yanofsky invokes two paradoxes from the realm of numbers and a famous result from the mathematical theory of complexity to speculate about their potential to inform our understanding of daily life.

Andrew Gelman recommends several practices that will make the communication of statistical research, of the data, and of their consequences more honest (and therefore more informative) to colleagues and to the public.

Michael Barany narrates a brief history of the early Fields Medal and reflects on the changes that have taken place over the decades in the award's stated aims, as well as in the manner in which awardees are selected.

To conclude the selection for this volume, Melvyn Nathanson recalls some originalities of one of the most peculiar mathematicians, Paul Erdős.