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THE SECOND MEETING ON ETHICS IN MATHEMATICS
3–5 APRIL 2019
PROGRAMME

Hosted by Maurice Chiodo and Piers Bursill-Hall, as part of the
Cambridge University Ethics in Mathematics Project.
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Contents

1. Schedule

All talks will be held in the Centre for Mathematical Sciences (CMS), Wilberforce Rd, Cambridge, CB3 0WA, in room MR13, except for the morning sessions on Wednesday, which will be held in room MR2. All coffee breaks and lunches will be held in MR21, except for the welcome coffee and registration, which is held in the main core.

1.1. **Wednesday 3 April.**
09:00 Welcome coffee and registration; in the CMS core
10:00 Ethics in Mathematics: a discussion with Lord Martin Rees; in MR2
11:15 The Cambridge EiM Project launch: Maurice Chiodo and Piers Bursill-Hall; in MR2
12:30 Lunch
13:45 Doing something!: Tam, Catherine Buell
14:45 Discussion
15:30 Coffee break
16:00 A perspective from philosophy: Colin Jakob Rittberg and Fenner Stanley Tanswell, Tim Johnson
17:00 Discussion
17:45 End
19:30 Dinner at Wagamama (36a St Andrews Street, Cambridge, CB2 3AR)

1.2. **Thursday 4 April.**
09:30 Coffee
10:30 Teaching EiM: Rishi Vyas, David Leslie
11:30 Discussion
12:20 Pre-recorded message: Vint Cerf
12:30 Lunch
13:45 Independent institutions and representative bodies: Tony Gardiner, Thomas King
14:45 Discussion
15:30 Coffee break
16:00 Calling out bad mathematics: Sam Marsh, Clément Mouhot
17:00 Discussion
17:45 End
19:30 Dinner in the CMS core

1.3. **Friday 5 April.**
09:30 Coffee
10:30 How mathematicians feel: Glenys Wilson, Clemens Schöll
11:30 Discussion
12:30 Lunch
13:45 Mathematics and the law: Ann Kristin Glenster, Victor Piercey
14:45 Discussion
15:30 Coffee break
16:00 How statisticians understand ethics: Jane L Hutton, David Spiegelhalter
17:00 Discussion
17:45 End
19:30 Dinner in the CMS core

2. Titles and abstracts

2.1. **Ethics in Mathematics: a discussion with Lord Martin Rees.**

We begin with an opening address, discussion, and Q+A, with Lord Martin Rees on the importance of ethical considerations in all areas of science, and how this might relate to mathematics.

2.2. **The Cambridge EiM Project launch: Maurice Chiodo & Piers Bursill-Hall.**

The first Ethics in Mathematics seminar in Cambridge was given by Maurice Chiodo on 22 April 2016, with the support and assistance of Piers Bursill-Hall. And it was hard. We had no academic resources to draw from, no support among colleagues, and no idea what we were doing. A lot has changed and developed in these past 3 years, and we are proud to announce the launch of the Cambridge University Ethics in Mathematics Project. We have created easy-to-use resources, so that other mathematicians elsewhere can re-create this sort of teaching in a way that is tailored to their surrounds. We have won over many of our colleagues, and convinced them that yes, this is an important issue that needs to be addressed. And we have created a new academic discipline and community, producing new and original output and bringing together other like-minded people. This session aims to describe what we've produced, how we got here, the challenges we faced along the way, and what our plans are for the future. This is new. This is real. This is here. Welcome.

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2.3. **Doing something!**

2.3.1. *Tam.*
Title: CaSPAR - Cambridge Summer Programme in Applied Rationality
Abstract: A new week long intensive summer camp for undergraduates in mathematics at Cambridge, aiming to provide a small growth minded group of students with tools to increase their agency, break compartmentalisation and solve the problems they care about.

2.3.2. *Catherine Buell.*
Title: Doing Something in Mathematical Ethics: Working with Peers and Administration
Abstract: During this session, we will involve the participants in an exercise to develop actionable tasks and ideas. As part of the presentation, I will present a variety of work that has been done and the effects, in particular with academic peers and administration, and motivate the reasoning behind these small yet impactful actions. We will discuss various space-making activities and the importance of this work perhaps over lofty academic endeavors, while encouraging participants to think widely throughout the conference about action and creating space.

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2.4. A perspective from philosophy.

2.4.1. *Colin Jakob Rittberg (discussion including Fenner Stanley Tanswell).*
Title: On epistemic injustice in mathematics
Abstract: In this talk I will rely on exemplar cases to make four ways in which mathematics may come into contact with ethics visible. My focus will be on one of these: the social interactions between research mathematicians. One dimension of these social interactions are publication practices. I will present parts of my joint work with Fenner Stanley Tanswell and Jean Paul Van Bendegem on "Epistemic Injustice in Mathematics" to engage with these. In particular, I will rely on a detailed case study of Olivia Caramello's attempt to publish some of her work to make the case that a certain kind of folk theorem can act as a barrier to participation in mathematical practices in harmful ways.

2.4.2. *Tim Johnson.*
Title: Pointing to answers
Abstract: Mathematicians make choices about mathematical representations: they choose how to describe phenomena. These choices have an impact as to how phenomena are understood and direct people to answers to problems. My talk will begin by highlighting the impact of representing the "Golden Ratio" as a continued fraction, to introduce the theme. I will then discuss the use of Euclid's First Common Notion in the film "Lincoln" as an introduction to my work on reciprocity in mathematics and how this affects economics. Finally, I will finish by talking about the relationship between the idea of utility in the context of the Petersburg Game, highlighting the politics of utility. These examples highlight that mathematicians, often without realising it, are constantly making ethical, social, choices.

2.5. Teaching EiM.

2.5.1. *Rishi Vyas.*
Title: How should you teach ethics?

Abstract: Recent (and not so recent) developments in governance, science, technology, industry, education, and countless other domains suggest that ethical contexts form an increasingly fundamental frame for the manner in which we work and live. As such, should ethics be explicitly taught at the undergraduate level? If so, how, and with what focus? How do the ethical needs of all students correspond to those studying technical disciplines like mathematics? In this talk, the speaker will discuss his perspectives on these questions, based on his experiences constructing curriculum for ethics courses for undergraduate students.

2.5.2. *David Leslie.*
Title: Alan Turing as Teacher: Intellectual Search and the Unbounded Community of Mathematicians

Abstract: In this talk, I will explore the much deprived legacy of Alan Turing as a teacher of the humane and socially-consequential vocation of mathematics. Focusing on how Turing's pragmatic and normative insights set the field of metamathematics and computability theory on its head in the 1930's, I will show that Turing's incalculable contributions to downstream thinking and innovation derived from his sensitivity to the human stakes and the ethical character of the practices of mathematics itself. The legacy that Alan Turing as teacher leaves us is one that stewards the importance not only of teaching ethics to mathematicians but also of teaching that the most elemental dimensions of the practice of mathematics itself involves a moral grammar that must be better understood and more widely embraced.

2.6. Independent institutions and representative bodies.

2.6.1. *Tony Gardiner.*
Title: Ethical concerns for the mathematics community

Abstract: The days of GH Hardy's philosophy of innocence (when there was no obvious need to consider the wider impact of mathematics) are long gone. But - like the banks response to CDSs in the noughties - the mathematics community has been slow to do more than merely embrace increased funding and the privilege of being closer to centre-stage. I shall highlight some of the issues facing the community and learned societies.

2.6.2. *Thomas King.*
Title: You Are Not Alone

Abstract: The Royal Statistical Society (RSS) has responsibility to promote statistics, statisticians and the best outcomes for society. New data have, through their uses, various potential impacts on society which discrimination are ethical in nature, and the RSS has taken a leading role in policy on the ethics of data. While the RSS represents its thousands of members, it also facilitates - through constituted groups of members. One such was formed in 2018, on 'Data Ethics', complementing existing activity on the the 'Professionalisation of Data Science'. We have reviewed the landscape of activity and institutions in the UK, thence deriving gaps in activity and developing plans to act in educational, professional and public arenas. The contribution practitioners make to ethical governance of new data is not recognised, even as the practical use of data is not understood in wild enthusiasm for AI.

2.7. Calling out bad mathematics.

2.7.1. *Sam Marsh.*
Title: Why transparency must be demanded of decision makers

Abstract: Last year, higher education in the UK was sent into turmoil when staff took unprecedented industrial action over drastic changes to their pension scheme. It soon became clear that the justifications offered for the changes - large deficits, spiralling costs - were far from black and white, with valuation methods that were highly sensitive to parameters and calculations which were hidden from scrutiny. I will cover the long history of the quest for transparency in the scheme, and the role it played in instigating a major policy reversal.

2.7.2. *Clément Mouhot.*
Title: Not in Our Genes: Bad Mathematics and the Return of Pseudo-scientific Racism and Sexism

Abstract: The far-right is on the rise all over the world and it is often re-branded as the alt-right, mens rights activism, defence of free speech, etc. Behind this political trend are new theories attempting to legitimize old reactionary ideas - racism, sexism, eugenics... - through evolutionary psychology and mathematics. We will focus on a few recent case studies, especially the hiring of a junior research fellow in Cambridge involved in publishing statistical works in pseudo-academic journals researching correlations between race, criminality and IQ, in collaboration with white supremacists and eugenicists.

2.8. **How mathematicians feel.**

2.8.1. *Glenys Wilson.*
Title: Work Life Balance - How Mathematical Thinking Fits With Your Life
Abstract: Why do we all think so differently? How does a Mathematician's way of thinking - so great in the Mathematics environment - affect the other areas of life? What are the pro's and con's of various ways of thinking or personality? How can you best recognise how your thinking and when it needs to be modified? While not expecting to resolve all the issues, this session is aimed to get participants thinking about their thinking - how it works for them and recognising its limitation.

2.8.2. *Clemens Schöll.*
Title: People who write code (or do math)
Abstract: Why do you do math? How does it affect you that you do math? How does it affect others that you do math? "People who write code" is an artistic research project based on a series of interviews in which I ask few and too basic questions. They open a way to untangle the complex financial and political motivations people have for their work, but shows that after all it's mainly their emotional relation to coding that dominates their perception. Has coding changed their personality, or has their personality attracted them to coding? By systematizing anecdotal responses we can get a glimpse on the structural traits of coding (or doing math, which will be shown to be very similar).

2.9. **Mathematics and the law.**

2.9.1. *Ann Kristin Glenster.*
Title: Technological Neutrality in the Law and Mathematicians
Abstract: In this contribution, I would like to explore the concept of 'technological neutrality' and the ethical implications it has for mathematicians. Technological neutrality is an approach taken in the drafting of statutory language where the specific technology is not specified. The purpose is to ensure that the law will not be outdated with technological advancements and to prevent companies from claiming that the law did not apply because they refer to technology by different names than what is enshrined in law. Thus, the tentative thesis I want to explore is that as mathematicians, computer scientists and coders increasingly take on the role of experts in the judicial context, they may become responsible for assessing technology against the normative objectives of the law. As such, the scientific community may become the 'guardians' of technological neutrality, and the authors of its inherent value proposition. What are the implications of this potential shift of ethical and normative responsibility from lawyers to mathematicians? And does it matter?

2.9.2. *Victor Piercey.*
Title: The Role of an Ethics Code in the Legal Profession: What Can Mathematicians Learn?
Abstract: In this talk, we will raise two questions for discussion:
1. What role, if any, could an ethics code play for mathematicians?
2. If there were an ethics code for mathematicians, what should it address?
As a starting point for this discussion, we will examine the role of an ethics code in forming an ethical consciousness in the legal profession. We will identify unique features of the legal profession and their ethical consequences. We will conclude by comparing the legal profession to the mathematics profession in order to identify the possibilities and the shortcomings of having an ethics code for mathematicians.

2.10. How statisticians understand ethics.

2.10.1. *Jane L Hutton.*
Title: Statistics, pensions, and sustainable development goals: what are the effects on privacy and statistical capacity development.

Abstract: Statistics is important in evaluating how progress might be or is being made towards sustainable development goals, and whether policies are fair to different generations. I will consider the interaction between statistics and ethics by exploring questions related to provision for old age: Is increasing life expectancy good? Is smaller family size good? Data to estimate life expectancy in developing countries might be gained from multiple sources, including hospitals, relatives, aerial surveillance and extrapolation from other countries. This raises question of privacy, data ethics and statistical capacity development. With respect to pensions, demographic and economic data are necessary to estimate the value of assets and liabilities. Multiple assumptions biased away from statistically valid estimates can substantially increase an estimated deficit. Consequences of these assumptions affect not only a particular scheme's stakeholders, but wider society. Money used for deficit recovery payments is diverted away from business investment and dividends. A large estimated deficit can bankrupt a company, and put many people out of work. If pension contributions are tax-exempt, the government's income is reduced.

2.10.2. *David Spiegelhalter.*
Title: Ethics and the trustworthiness of statistics

Abstract: The new Code of Practice for the government statistical profession has, as the first of its three 'pillars', that statistics should be trustworthy. This has been strongly influenced by philosopher Onora O'Neill, and I will discuss how her concept of trustworthiness and 'intelligent transparency' have influenced thinking around statistics and open data. I will also argue that ideas of trustworthiness can be applied to the claims made both by and about algorithms used in society.

3. PARTICIPANT LIST

Ross Anderson : Professor of Security Engineering, Cambridge; Chair, Foundation for Information Policy Research; member of Advisory Council, Electronic Privacy Information Center

Tam : Software Engineer

Michael J. Barany : Lecturer in the History of Science at the University of Edinburgh

Catherine Buell : Mathematician from Fitchburg State University

Piers Bursill-Hall : Lecturer in the History of Mathematics at the University of Cambridge, co-founder of the Cambridge University Ethics in Mathematics Project

Andrew Carlotti : Mathematics PhD at University of Cambridge

Maurice Chiodo : Mathematics postdoc at the University of Cambridge, bye-fellow at King's College Cambridge, lead investigator of the Cambridge University Ethics in Mathematics Project

Toby Clifton : Undergraduate student involved with the Cambridge University Ethics in Mathematics Project

Alberto J Coca : Lecturer in Statistics, University of Cambridge

William Cullerne Bown : Maths graduate, politics/science journalist, 55, now developing a modern, quantitative conception of justice that can be applied in law, healthcare, A.I. and other domains in a series of journal articles

Tom Daley : Software developer

Celeste Damiani : Mathematics postdoc from the University of Leeds

Georges-Philippe Gadoury-Sansfaon : Mathematics and Psychology double honours undergraduate student from Bishop's University

Tony Gardiner :

Ann Kristin Glenster : PhD Candidate in Law, University of Cambridge

Jack Harrison : Mathematics undergraduate from the University of Cambridge

Heidi M Hurst : Mathematics graduate student in mathematical modelling and scientific computing, University of Oxford

Jane L Hutton : Statistician who has written several articles on ethics, and contributed to ethics guidelines, from Warwick Statistics

Martin Hyland : Mathematician with interests in education and philosophy

Tim Johnson : Interested in the relationship between mathematics, finance and ethics. RCUK Academic Fellow in Financial Mathematics based at Heriot-Watt/Maxwell Institute for Mathematical Sciences (Edinburgh)

Nathan Johnson-McDaniel : Research associate in gravitational wave physics at DAMTP, University of Cambridge

Arthur Kaletzky : retired after after career in systems software, avionics and telecoms, undergrad Maths and Physics, postgrad CS and Elec.Eng.

Frank Kelly :

Thomas King : Mathematician with social statistics training working on longitudinal social inequalities; Hon Sec RSS Data Ethics SIG

Hitesh Kumar : Mathematical computation postgraduate student at Imperial College London

David Leslie : Ethics Fellow, The Alan Turing Institute and Fellow, Massachusetts Institute of Technology, Dalai Lama Center for Ethics and Transformative Values

Guy Lipman : PhD Researcher in sustainable energy markets, University College London

Ems Lord : Director of NRICH and research fellow at Clare Hall, Cambridge

Christopher Markou : Leverhulme Fellow and Lecturer at Cambridge Faculty of Law researching the computability of law and legal reasoning

Sam Marsh : University Teacher in the School of Mathematics and Statistics at the University of Sheffield, UCU elected negotiator on USS

Tom McLeish : Theoretical physicist with strong interdisciplinary experience in humanities and social sciences, University of York

Paulo Moniz : (Quantum) Cosmologist and Sabbatical visitor

Arvo MM : Mathematics and Philosophy student at St Andrews, deputy editor of Aporia journal and EA committee member

Clément Mouhot : Mathematician

Dennis Müller : Mathematics student with training in computer science, president of CUEiMS, from Cambridge University

Leonie Neuhuser : Mathematics graduate student in mathematical modelling and scientific computing with training in psychology, University of Oxford

Zain Patel : Mathematics Undergraduate at the University of Cambridge

Mukul Patel : Maths and Social and Political Sciences graduate, writer, consultant

Jonnie Penn : PhD in History and Philosophy of Science, University of Cambridge; Affiliate, Berkman Klein Center, Harvard

Victor Piercey : Former Attorney, now an Associate Professor of Mathematics at Ferris State University

Martin Rees : Cosmologist and astrophysicist at the University of Cambridge, Astronomer Royal, former president of the Royal Society

Colin Jakob Rittberg : Postdoctoral researcher at the Vrije Universiteit Brussel, specialising in virtue-theoretic approaches to the philosophy of mathematical practices.

Calliope Ryan-Smith : Current mathematics undergraduate from University of Cambridge with history of research in Ethics in Mathematics

Clemens Schll : Media artist with a background in computer science, currently at HGB Leipzig and based in Berlin

Roger Sewell :

Paula Siemek :

Christopher Smith : Third year maths student at Imperial College London

David Spiegelhalter : Statistician from University of Cambridge working on trustworthy communication of risk and evidence

Shaun Steenkamp : PhD student in Type Theory at the University of Cambridge

Nicola Stingelin-Giles : PhD Medical Ethics from University of Basel / Switzerland; focus innovative research ethics; commercial pharmaceutical background; active in big data/algorithms/AI in academic and commercial research: ethics issues

Fenner Stanley Tanswell : Lecturer in Mathematics Education at Loughborough University, specialising in the philosophy of mathematics

Jonny Tsang : PhD student in applied mathematics from the University of Cambridge

Rishi Vyas : Assistant Professor in the Division of Mathematics and Computer Science at Krea University

Mustafa Warsi : Quantitative Researcher at JP Morgan

Alex Wendland : PhD student in Mathematics at the University of Warwick, currently undertaking a 3-month UKRI-funded internship in the Centre for Science and Policy, University of Cambridge

Glenys Wilson : Senior Clinical Psychologist with specialty in three areas-Neurodiversity, trauma and youth

Phoebe Young : Mathematics undergraduate from the University of Cambridge

4. ACKNOWLEDGEMENTS

Finally, we wish to thank all speakers and participants for taking time out of their busy schedules to come and contribute to this new and important community; your participation is the key to the success of the Ethics in Mathematics Project, and we hope that you will take these ideas away with you and promote EiM in whatever way you can.

The Organisers:
Maurice Chiodo and Piers Bursill-Hall

𝔼i𝕄 2 **SCHEDULE**

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