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The Mathematical Cultures Network Project

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I bear good news. The UK Arts and Humanities Research Council has agreed to fund a research network on mathematical cultures. Here, I describe this project and what we hope to learn from it.

Why study mathematical cultures? Why now?

Mathematics has universal standards of validity. Nevertheless, there are local styles in mathematics. These may be the legacy of a dominant individual (e.g., the Newtonianism of 18th century British mathematics). Or, there may be social or economic reasons (such as the practical bent of early modern Dutch mathematics). Sometimes, a local style results from deliberate policy. For example, in the 1920s and 1930s, Polish officials identified *foundations of mathematics* in the style of topology and real analysis as something that Polish mathematicians should excel in. Local mathematical cultures can reflect the uneven geographical spread of a methodological division. For example, in theoretical computer science, there are two main directions: *Algorithms and Complexity* and *Logic in Computer Science*. In many countries, the split between those areas is heavily uneven.

These local mathematical cultures are scientifically important because they can affect the direction of mathematical research. They also matter because of the cultural importance of mathematics. Mathematics enjoys enormous intellectual prestige, and has seen a growth in the publishing of popular books (including books by Ian Stewart, Marcus du Sautoy, James Gleick, Simon Singh, Karl Sabbagh and others). There have been films about mathematicians (e.g., *Good Will Hunting* and *A Beautiful Mind*), novels (e.g., *Uncle Petros and Goldbach's Conjecture*) and plays (e.g., *Proof*, *Arcadia* and *A Disappearing Number*). However, this same intellectual prestige encourages a disengagement from mathematics. Ignorance of even rudimentary mathematics remains socially acceptable. Policy initiatives to encourage the study of mathematics usually emphasise the economic utility of mathematics (see,

for example, the 2006 *Science, Technology, Engineering and Mathematics (STEM) Programme Report* of the UK Department for Education and Skills [1]). Appeals of this sort rarely succeed with students unless there is a specific promise of employment or higher remuneration. Insisting on the importance of mathematics to the national economy may convince students that someone should study it – but preferably someone else. Moreover, the policy response to the STEM report has largely focussed on institutional connections, and has not addressed the unhelpful perception of mathematics as remote and forbidding.

What these political anxieties really call for is a re-presentation of mathematics as a human activity, which means, among other things, that it is part of culture. The tools and knowledge necessary for this have been developing in recent years. Historians of mathematics have begun to consider mathematics in its social, political and cultural contexts. There is now an established sociology of science and technology, published in journals such as *Science as Culture*[1] and the *Journal of Humanistic Mathematics*[2]. Mathematics educationalists have begun to draw on some of these developments (particularly historical research).

In the philosophy of mathematics, there is now a sub-field devoted to the philosophy of mathematical practice. So far, this has mostly emerged in continental Europe, and to a lesser extent in North America. The Brussels-based *Perspectives on Mathematical Practice initiative*[3] met in 2002 and 2007 and published proceedings. The PhiMSAMP network[4] (2005-2010; funded by the German research board) was a collaboration of researchers in several countries. The annual *Novembertagung on the history and philosophy of mathematics*[5] serves beginning researchers in philosophy and history of mathematics. In France, there is a thriving Parisian history and philosophy of mathematics scene, and a mathematics thread in the studies of scientific practice at the *Laboratoire d'Histoire des Sciences et de Philosophie (Nancy)*[6].

So far, philosophy of mathematical practice has not focused on mathematics as culture. This has prevented it from elaborating one possible answer to the student's

[1] Journal website at http://www.tandf.co.uk/journals/CSAC, accessed June 7,. 2012.

[2] Journal website at http://scholarship.claremont.edu/jhm, accessed June 7, 2012.

[3] 2007 website available at http://www.vub.ac.be/CLWF/PMP2007/ accessed June 7, 2012.

[4] *Philosophy of Mathematics: Sociological Aspects and Mathematical Practice* website at http://www.lib.uni-bonn.de/PhiMSAMP/ accessed June 7, 2012.

[5] The web link for this group, https://www.facebook.com/group.php?gid=36168040288, requires Facebook membership. The website for the 2012 conference is available at http://www.novembertagung2012.uni-wuppertal.de/en.html, accessed June 7, 2012.

[6] Project website (in French) available at http://poincare.univ-nancy2.fr/PratiScienS/, accessed June 7, 2012.

question, "Why should I study mathematics?", namely, "Because it is beautiful, glorious and deep." Grounding this answer requires an exploration of the value of mathematics and the values of mathematicians, and communicating this answer requires an understanding of mathematics as part of our larger contemporary culture.

Therefore, the time is ripe for an interdisciplinary initiative that brings together mathematicians, philosophers of mathematical practice, historians, sociologists, cognitive scientists, mathematics educationalists, popularisers and science journalists to research mathematical cultures, the value of mathematics as culture and its status in culture.

What exactly will this project do?

This project will host three conferences. The **first** (September 2012, at De Morgan House, London, UK) will explore and begin to map the variety of and connections among contemporary mathematical cultures. These can be research cultures, but may also include practitioner cultures (e.g., among engineers, economists, social scientists, etc.) and mathematical cultures among instructor and student groups (e.g., primary/secondary/tertiary teachers, school pupils, mathematics students at all levels).

The **second** (September 2013) conference will articulate and classify mathematical values. When mathematicians award or withhold prizes, scholarships, PhDs and grants, correctness is almost never the decisive criterion. Rather, the question is whether the work is worthwhile, interesting, elegant, promising, insightful, etc. If these judgments are not arbitrary, they should refer to some standards or values. Are these common across all mathematical cultures? How are they taught? How do they evolve? What do mathematicians mean when they use terms such as *deep*, *elegant*, *explanatory*, etc.? What is the rational structure of the deliberations mathematicians use to reach value judgments (in PhD examinations, book reviews, journal referee reports, etc.)? This conference will build on the first conference by referring these questions to the various mathematical cultures identified at that first event.

The **third** conference (Easter 2014) will discuss mathematics in public culture. Amongst other topics, it will explore the question "why should I study mathematics?". This third meeting will build on the first conference by identifying the contributions from and audiences in the various mathematical cultures. It will build on the second conference by drawing on the articulations and explorations of mathematical values.

What will this achieve?

The main aim is to connect researchers on mathematical cultures who may not have encountered each other before. The various disciplines (history, sociology, philosophy, cognitive science) have their distinct circuits and there are national and linguistic barriers too.

We also want to encourage some thinking about the methodological challenges facing the study of mathematics as culture. Mathematics is simultaneously culture and knowledge. Scholars who treat it as culture must respect its status as knowledge; those who engage with it as knowledge must acknowledge that it is a collection of human practices. It is not obvious how to satisfy these demands simultaneously. Indeed, much of the philosophical interest in this area is in the question of how mathematics can be simultaneously culture and knowledge. Jody Azzouni sharpens this question by pointing out that mathematical results and standards last much longer than any social structures, so they cannot be wholly or solely social constructs [2].

The central scholarly results will be detailed studies of particular mathematical cultures and the means by which mathematicians make professional value-judgments. The big prize, however, is an articulation of mathematics as a proper part of the cultural diet of an educated person. The desired contribution to the common good would be a sketch of what an interested amateur can hope to get out of mathematics that goes beyond the obvious facts that it trains the mind and is really cool.

So far, we have established a programme for the first conference (September 2012). Thanks to the AHRC, it will be very cheap to attend. So if you are near London in September, do come along.

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[2] Azzouni, Jody (2006) 'How and Why Mathematics is Unique as a Social Practice' in Hersh (ed.) 18 Unconventional Essays on the Nature of Mathematics. Springer.

[3] Mathematical Cultures website https://sites.google.com/site/mathematicalcultures/home, accessed June 7, 2012.