BRITISH SOCIETY FOR THE HISTORY OF MATHEMATICS

BSHM Christmas Meeting

7 December 2019

Department of Computer Science, University of Warwick, Coventry, CV4 7AL

PROGRAMME & ABSTRACTS

Programme

09.30 Coffee and Registration

09.55 Welcome (Mark McCartney, President)

10.00 Helen Ross (Stirling): *Dicuil and triangular numbers*

10.40 Steve Russ (Warwick): *Visions in the Night: Bolzano's Anticipations of Continuity*

11.20 Coffee

11.40 Jane Wess (Independent): *From Newton to Newcomen: Mathematics and Technology 1687-1800*

12.20 BSHM AGM and lunch

13.50 Short member talk: Troy Astarte (Newcastle): *On the Difficulty of Describing Difficult Things*

14.10 Short member talk: Catalin Iorga (ENTC, romania): *Known and Unknown In Al-Kashi's Mathematics*

14.30 Robin Wilson (Open): *Hunting and counting trees: the world of Cayley and Sylvester*

15.10 Tea

15.30 Chris Pritchard (Independent): *From collecting coins to searching the archives: Personal reflections on becoming a historian of mathematics*

16.10 Martin Campbell-Kelly (Warwick): *Victorian Data Processing*

17.15 Finish

Organised jointly with the Departments of Computer Science and Mathematics, University of Warwick

ABSTRACTS

Helen Ross (Stirling): ***Dicuil (9th century) on triangular and square numbers***

Dicuil was an Irish monk who taught at the Carolingian school of Louis the Pious. He wrote a Computus or Astronomical Treatise in Latin in about 814-16, which contains a chapter on triangular and square numbers. Dicuil describes two methods for calculating triangular numbers: the summation of the natural numbers, and the more complex method of multiplication, equivalent to the formula $n(n+1)/2$. He also states that a square number is equal to twice a triangular number minus the generating number, equivalent to $n^2 = [2n(n+1)/2] - n$. He regarded the multiplication formula as novel. It was in fact described in the third century AD by the Greek authors Diophantus and Iamblichus. It was also known as a solution to other mathematical problems as early as 300 BC. It reappeared in the West in the sixteenth century. Dicuil thus fills a gap in our medieval knowledge.

Steve Russ (Warwick): ***Visions in the Night: Bolzano's Anticipations of Continuity***

Much of the mathematical work of Bernard Bolzano (1781 - 1848) presents a challenge to historians. How should we best integrate into the mainstream of historical narrative what appear to be original and well-documented insights which were unknown, or unrecognised, in their own time, but which were rediscovered decades later? Three examples from the early 19C will be reviewed: neighbourhood definitions of geometric continua (line, surface, solid), the construction of a non-differentiable but continuous function, and the concept of 'measurable number' which justified the so-called 'axiom of continuity' and identified what later became known as real numbers. Rising to this challenge for history, and rendering accurately the results of Bolzano's thinking, can nevertheless be an inspiration (if not an influence) for later mathematicians. Two examples from Bolzano's work on infinite collections will be offered. Finally, some observations will be attempted on the role of context in assessing what constitutes an anticipation.

Jane Wess (Independent): ***From Newton to Newcomen: Mathematics and Technology 1687-1800***

This talk presents a small contribution to a large project involving about fifty historians of mathematics globally. It will form a chapter in volume four of a six-volume set on the Social History of Mathematics. My small part in this is ‘Mathematics and Technology 1687 to 1800’.

The 18th century was a time of developing industrialisation and imperialism, which were changing the nature of the physical and cultural landscape in Europe. For both purposes mathematics was increasingly applied to ‘technology’, a word implying the use of tools and machines. The talk will explore technologies to which the new calculus was applied, and technologies which involved large numbers of people becoming mathematically literate for the first time.

The topics covered have been divided into those which served the purposes of industrialisation and those which served imperialism. Under the former came land management, construction, water supply, transport and power. Under the latter came navigation, ship design, ballistics, and alcoholomtery. The talk will take four examples from these topics, arguing that the new calculus was not effective in many real situations. On the other hand the number of people competent at mathematical manipulation increased considerably.

Troy Astarte (Newcastle): ***On the Difficulty of Describing Difficult Things***

In the 1960s, a full formal description was seen as a crucial and unavoidable part of creating a new programming language. A key part of that was a thorough and rigorous description of the semantics. However, in the decades since, the focus on providing this has somewhat diminished. Why was formal semantics once seen as so critical? Why did it not succeed in the ways hoped? My PhD was spent researching the early history of programming language semantics, with a particular focus on the IBM Laboratory Vienna under Heinz Zemanek, and the Programming Research Group at Oxford University under Christopher Strachey. It could also be seen as an history of model-based (rather than algebraic or axiomatic) semantics. In this talk, I will present the key findings of my research, as a way to whet my audience's appetite for my thesis, and argue that formal description was a crucial part of the formation of theoretical and formal computer science in the European tradition.

Catalin Iorga (Edmond Nicolau Technical College, Romania): ***Known and Unknown In Al-Kashi's Mathematics***

This paper is focused on the magnificent mathematical work of Jamshid Al-Kashi, one of the most important scholars of Islam.

He lived in the 15th century and was a great mathematician and astronomer.His remarkable mathematical book is "The Key to Arithmetic" (Miftah Al-Hisab) which remained untranslated and unknown in Western Europe until the end of 19th century.The law of cosines is known in France as Al-Kashi' s theorem (Theoreme d'Al-Kashi) and his contribution to decimal fractions is so significant that for many years he was considered as their inventor. Al-Kashi obtained accurate values of 2π and sin1o in both sexagesimals and decimals . His aim was to calculate a value which was accurate enough to allow the computation of the boundaries of the universe .Al-Kashi also discovered a very interesting algorithm for calculating the nth roots which is a special example of the techniques given centuries later by Ruffini and Abel .The properties of binomial coefficients were discussed in his "The Key to Arithmetic" of c. 1425 .

The paper also comprises many other mathematical techniques and methods used by Al-Kashi , one of the offsprings of House of Wisdom (Bayt Al-Hikmah) of Baghdad.

Robin Wilson (Open): ***Hunting and counting trees: the world of Cayley and Sylvester***

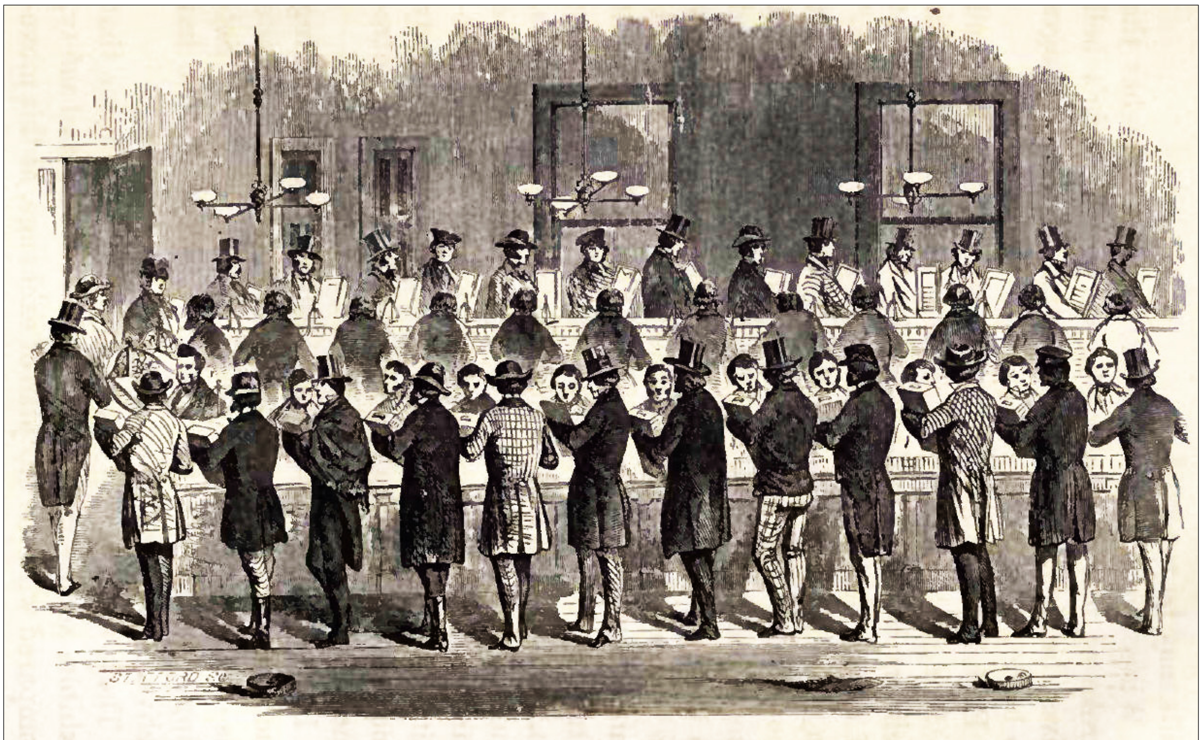
Where did the word 'graph' (in connection with graph theory) come from? How many paraffins are there with a given number of carbon atoms? In this illustrated talk I shall outline some contributions of Arthur Cayley and James Joseph Sylvester, with particular reference to the enumeration of trees and chemical molecules between the years 1857 and 1889. No previous knowledge of graph theory is assumed.

Chris Pritchard (Independent): ***From collecting coins to searching the archives: Personal reflections on becoming a historian of mathematics***

A somewhat self-indulgent look at how someone with a bent for mathematics and a curiosity about the past made that journey towards historical research, with a few well-known characters making an appearance on the way, including Archimedes, Brahmagupta, Cardano, Peter Guthrie Tait, Francis Galton and George Darwin.

Martin Campbell-Kelly (Warwick): ***Victorian Data Processing***

Large-scale data processing did not begin with accounting machines and computers -- it began in the 1860s with the first industrial-scale offices. These offices employed hundreds or thousands of clerks to process countless thousands of transactions per day, entirely by hand. Although these offices did their data processing with nothing more sophisticated than a pen and ledger, they developed astonishingly complex and robust systems perfectly adapted to what could be done with the most primitive technology. This talk will take you on an illustrated tour of some major Victorian offices, including the Bankers Clearing House, the Census Office, the Prudential Assurance Company, the Central Telegraph Office, and the Post Office Saving Bank. The central message of the talk is that while technology evolves, information processing systems and structures are extraordinarily persistent and sometimes have roots that go back 150 years.



Making the Exchange in Six Minutes, at the Clearing House.

The New York Clearing House, c. 1864. The image shows porters and tellers of the 54 New York banks exchanging checks -- each exchange took about 10 seconds.