BRITISH SOCIETY FOR THE HISTORY OF MATHEMATICS

Birkbeck UNIVERSITY OF LONDON

The History of Logic

27th May 2017, Birkbeck

Thank you for participating in this conference on the History of Logic. It has been organised by the British Society for the History of Mathematics (BSHM), with support from the Department of Economics, Mathematics and Statistics at Birkbeck College, University of London. This is our third one-day conference at Birkbeck, and these events are now a regular fixture in the BSHM calendar. This year's event is particularly special because we are honouring Ivor Grattan-Guinness, former president of the BSHM, who died in 2014. If you are not already a member of the BSHM, we hope you will consider joining. You can go to the website www.bshm.ac.uk for more information.

On Arrival

- The conference will be in the main Birkbeck Building (building number 1 on the map here: http://www.bbk.ac.uk/downloads/centrallondon.pdf). For journey planning, the postcode is WC1E 7HX. Nearby stations include Euston, Russell Square and Warren Street.

- Registration and all tea/coffee breaks through the day will be in room B04; this is on the basement level near the main lecture room. It will be clearly signposted.

- All lectures will be in room B36, again on the basement level and clearly signposted.

- The full programme with abstracts is on pages 2 and 3.

- To keep registration fees to a minimum, lunch is **not** provided. There are numerous cafes, restaurants and shops nearby; a few suggestions are given on page 4.

Programme

9:30 Registration and Coffee (Room B04)

10.00 Introduction and appreciation of Ivor Grattan-Guinness

10.20 Apostolos Doxiadis
First there is no proof, then there is.

Historian of mathematics Reviel Netz has written that mathematical proof was invented somewhere in Greece, at "430 BCE plus or minus twenty years". But the problem with origins is, precisely, that they are origins: what was there before something was there? What could proof have come from, other than from the head of a bearded Greek shouting "eureka"? In an exploration of the cultural milieu of the archaic and classical Greek world, both within but, mostly, outside mathematics, I try to create a cohesive narrative of the genesis of deductive proof, that makes it seem as something less than a miracle.

11.00 Tea/Coffee

11.20 Susanne Prediger
Learning the logical structures of deductive reasoning – insights into mathematics education research

Deductive reasoning is one of the major mathematical practices. It is crucial to assure the validity of conjectures and a deductive theory generation. However, empirical studies have shown that many students in secondary and tertiary mathematics have serious difficulties with deductive reasoning. A reason was identified in students' challenges to understand the logical structures. The talk offers insights into mathematics education research, which does not only document difficulties but also develop approaches for fostering students' competencies in deductive reasoning. The approach makes explicit the logical structures and offers scaffolding for composing and expressing formal argumentations. The investigation of students' process can enhance our understanding of mathematical and linguistic characteristics of deductive reasoning.

12.00 **John Dawson**
How relevant has logic been to mathematical practice?

For centuries mathematics has been regarded as the most secure realm of knowledge, the exemplar of rigorous deductive reasoning. Yet for much of its history it has not been such; the logicist view that mathematics is subsumed within logic is now no longer accepted; and few universities today require their mathematics graduates to have had a course in logic. What accounts for this seeming incongruity, and to what extent have results in formal logic actually affected progress in mathematics?

12.40 – 14:00 Lunch
(See page 4 for lunch suggestions.)

14:00 Volker Peckhaus
Convolutions of 19th Century Logic

Among Ivor Grattan-Guinness's everlasting merits we find that he has opened our eyes for the complexity of the development of modern logic, starting from different mathematical needs. His distinction of the two traditions, the tradition of the Algebra of Logic represented by the British mathematician George Boole and the tradition of Mathematical Logic with the German logician Gottlob Frege as the champion, became very influential. In lectures and presentations Ivor Grattan-Guinness always stressed that there was a wall between these traditions precluding interrelations between them. In the paper presented it is shown that the wall had holes. It will focus on German-British interactions in 19th century logic.

14:40 Adrian Rice
"Everybody makes errors": The intersection of De Morgan's logic and probability, 1837-1847.

The work of Augustus De Morgan on symbolic logic in the mid-nineteenth century is familiar to historians of logic and mathematics alike. What is less well known is his work on probability and, more specifically, the use of probabilistic ideas and methods in his logic. The majority of De Morgan's work on probability was undertaken around 1837-1838, with his earliest publications on logic appearing from 1839, a period which culminated with the publication of his Formal Logic in 1847. This talk examines the overlap between his work on probability theory and logic during the earliest period of his interest in both.

15:20 Coffee/Tea

15:40 Michel Serfati
The search for Laws of Thought. Some mathematical and psychological aspects in the work of Boole

In the middle of the nineteenth century (1854), Georges Boole published an outstanding work of mathematical logic, entitled *An investigation of The Laws of Thought* (...). His objective was to describe the organization of human thought by means of a new algebra of which he was the inventor. Accordingly, he writes in the opening lines of the book, "*The design of the following treatise is to investigate the fundamental laws of those operations of the mind by which reasoning is performed; to give expression to them in the symbolic language of a Calculus, and upon this foundation to establish the science of Logic and construct its method*". Such a project was unprecedented, even with the possible exception of Leibniz. Boole's work and logical construction were the object of numerous studies, in particular by Ivor Grattan Guinness and myself. My presentation at this conference will describe the contexts, both mathematical and psychological, in which Boole worked.

16:20 Amirouche Moktefi
Why make things simple when you can make them complicated? An appreciation of Lewis Carroll's symbolic logic

Contrary to his contemporary colleagues, British logician Lewis Carroll (1832–1898) notoriously developed a symbolic logic without dropping the existential import of universal affirmative propositions. This constraint complicated his investigations and the workability of his logic. The object of this talk is to determine the motivations that led Carroll in this direction, the difficulties he faced due to this choice and the benefits he gained from it. It will be argued that Carroll's decision reflected his belief in the social utility of symbolic logic and allowed him to tackle more efficiently some logical problems that resisted the efforts of early symbolic logicians.

17:00 Close

Places to Eat near Birkbeck

- We have **an hour and twenty minutes** for lunch.

- Within Birkbeck, on the ground floor by the foyer, there is a **Costa Coffee** open from 9am which has a range of sandwiches, hot paninis and snacks.

- The **Birkbeck Student Union Shop** (Room B28) is located in the basement of the main building, below the foyer, and is open from 11am – 5pm on Saturdays. It sells hot beverages, sandwiches, wraps, bagels, confectionary and snacks.

- Externally there are several shops where you can buy sandwiches and snacks - you can bring these back and have them in room B04 if you wish. The nearest are the Paradise Deli and the Co-op Local on **Store Street**, (South-West of Birkbeck on the map here http://www.bbk.ac.uk/downloads/centrallondon.pdf) or the Pret-a-Manger and Tesco Metro opposite Russell Square Tube. Store Street and Russell Square are marked on the map.

- The **Marlborough Arms** (36 Torrington Place – turn left out of Birkbeck, then left again, passing Waterstones on your left) is the nearest pub; it serves standard pub food. The **College Arms** on Store Street is an alternative. It's also where we will likely go for a post-conference drink.

- **Planet Organic** on Torrington Place (left out of Birkbeck then left again, passing Waterstones and the Marlborough Arms on your left, and crossing Gower Street) sells vegetarian and vegan food to eat in or take away.

- **Olivelli** on Store Street has a cheapish set lunch.

- The **Russell Square Café** in Russell Square is also reasonable and close at hand.