Arts & minds: how the Royal Society of Arts changed a nation by Anton Howes, pp. 387, £30 (hard), ISBN: 978-0-69118-264-3, Princeton University Press (2020)

The Royal Society of Arts (RSA) is a rather peculiar society. Founded in London in 1754, and still in existence, its full title is the Royal Society for the Encouragement of Arts, Manufactures and Commerce.

It has often been said that the British were good at making inventions while others benefitted commercially. The establishment of this society seems be a counterweight to this, as an attempt to steer ideas into practical utility. What was wanted by its founders and members was 'useful knowledge'. The underlying watchword of the RSA, then and now, is turning private enterprise into public well-being.

The RSA was founded by William Shipley (1715-1803) a drawing master and inventor, whose school on the Strand in London became known as 'Shipley's Academy'. (If you line your shoes with tinfoil to keep your feet dry in wet weather, thank Shipley for having had the idea first). Early RSA members were Samuel Johnson, Benjamin Franklin, and William Hogarth. The Society was able to offer 'premiums', monetary awards for useful ideas, thereby answering a complaint of a member of the more august Royal Society (of London for improving Natural Knowledge) (RS) that Science may earn 'praise but not pudding'.

One of the greatest triumphs of the RSA was its part in the organization of the Great Exhibition (of the works of industry of all nations) held in Hyde Park in 1851. A member of the RSA, the Victorian mover and shaker Henry Cole (the supposed inventor of Christmas cards) and Prince Albert joined forces to organize the exhibition to outstanding success. As is well known, the financial achievement of the Exhibition resulted in the establishment of the South Kensington museums, and this certainly answered the ideal of requiring 'public utility'. Prince Albert, who did so much to weld together science and industry, was President of the RSA from 1843 until his death in 1861.

Shorn of 'Manufactures and Commerce' in its title, the Society is now known simply as the Royal Society of Arts, while its modern mission has a wider but amorphous brief: it is 'committed to finding innovative practical solutions to today's social challenges.' There are some thirty 'Royal Societies' in London, but in particular the RSA should not be confused with the Royal *Academy* of Arts (RAA) housed in London's Piccadilly, the society dedicated to the visual arts of drawing, painting and sculpture. Moreover the RSA is not an exclusive club like this or the RS where membership is only made by invitation.

The RSA has enjoyed royal patronage since 1847 when Prince Albert was involved. In the twentieth century Princess Elizabeth was president 1947-52, passing on the role to the Duke of Edinburgh when she became Queen in 1952. Prince Philip served until his retirement from public life in 2011 and now Princess Anne is president.

Like the British Association for the Advancement of Science, the RSA's heyday lies in the past, particularly in its Victorian past. Charles Dickens and Karl Marx were both members, as were some of the great scientists of that era. There is only an indirect connection between mathematics and the RSA (after all, mathematics in London is catered for by the RS and the London Mathematical Society). William Henry Fox Talbot, who book-ended his life with research in mathematics, was connected with the RSA, but his fame derived from being a pioneer of photography.

There is another little-appreciated link. The RSA is linked to OCR, the awarding body for GCSE, A Level and RSA qualifications. The connection with examinations

was forged in the 1850s by Irishman James Booth. He believed that education was advanced by examination, and he would have arrived at this belief by surviving the examination rigours of Trinity College Dublin (including five attempts to become a Fellow through an extra-intensive examination). He was a vigorous campaigner in the field of education, especially in the education of girls. He joined the RSA in 1852 and used it as a vehicle for founding a national examination system, stirring up the Society before wearing out his welcome and being sidelined.

Booth gets ample coverage in the book but the author does not mention that he was an accomplished mathematician. A member of the RS, he contributed work on the theory of curves and surfaces as well as elliptic functions and elliptic integrals, and becoming known for Boothian 'tangential' coordinates. In this written history there is little connection with the mathematical world (neither mathematics nor statistics are present in the Index).

In modern times a practical problem connected with mathematics did arise, and the RSA responded. It co-sponsored a project by Emma Norris with a Report (2012) on 'Solving the mathematics problem: international perspectives on mathematics education' (available online). The problem addressed was that of half the school population failing to achieve GCSE mathematics at secondary school level.

The Royal Society has the Copley Medal as their top level of recognition while the RSA introduced the Albert Medal, struck in in 1863, commemorating Prince Albert who had recently died. In modern times Stephen Hawking was awarded this annual medal for making science more accessible, and Tim Berners-Lee for the invention of the World Wide Web. Other people honoured include, just to give a small selection, Michael Faraday, Charles Wheatstone, G. B. Airy, J. P. Joule, William Thomson, Queen Victoria, H. v. Helmholtz, Thomas Edison, Lord Rayleigh, Joseph Swan, Marie Curie, Orville Wright, Ernest Rutherford, and Claus Moser (who prided himself on being a non-mathematical statistician). A feature of all winners is utility, whether derived from their work or by the agency of patronage. As the author says, unlike the exclusive clubs (for example the RS and the RAA), prize winners do not need to be members and they may even wonder about the identity of the RSA after they had been chosen. The medal can sometimes seem to be awarded for the benefit of the RSA rather than added prestige for its recipients. There is such a thing as reflected glory.

The author of this book is the resident historian of the RSA. It can happen that histories of institutions written by insiders can turn into a whitewashing exercise. But this is not the case here. The book gives a panoramic view of an old and worthy institution, and its story is told with a touch of humour, while the author is unafraid of being gently critical at the RSA's expense.

Frank Ramsey: a sheer excess of powers by Cheryl Misak, pp. 537, £25 (hard), ISBN 978-0-19875-535-7, Oxford University Press (2020)

Dead at 26 years of age, Frank Plumpton Ramsey (1903-1930) is one of the twentieth century's most remarkable intellectuals. With justification he can be seen by mathematicians, logicians, economists, and philosophers as making fundamental contributions to each of their fields. It is strange that he is not better known.

Ramsey's base was Cambridge. He was brought up in this world of academe where his father was a mathematics don at Magdalene, and, after school at