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ARTICLE

Ladies, Gentlemen, and Scientific Publication at the Royal Society, 1945–1990

Camilla Mørk Røstvik¹ and Aileen Fyfe²

¹ School of Art History, University of St Andrews, UK

² School of History, University of St Andrews, UK

Corresponding author: Camilla Mørk Røstvik (cmr30@st-andrews.ac.uk)

This article extends the scholarship on gender and scientific authorship by exploring women's involvement in editorial decision-making. Prior to 1945, women scientists could submit their work to the journals of the Royal Society, but they were excluded from all editorial and evaluation roles: such gate-keeping roles were reserved for Fellows of the Society. We draw upon the Society's archive to examine the experiences of female authors, referees, and communicators in the period after women were admitted to the Fellowship. We investigate the involvement of women in anonymous roles (e.g. as referees), and in publicly-visible positions of editorial responsibility (e.g. as communicators, and committee chairs). We reveal that women were better represented in both types of roles in the 1950s than in the 1970s and 1980s. These findings are pertinent to current debates about bias in the peer review system, and the gendering of academic reward and recognition structures.

Introduction

It is often argued that one of the issues underlying women's limited success in terms of promotions and publication rates in academia is the paucity of women participating in the processes by which scholarship is evaluated (Kasten, 1984; Park, 1996; de Groot, 1997; Hancock & Baum, 2010; Baker, 2012; Bosquet, Combes & Garcia-Penelosa, 2013; King et al., 2016; Helmer et al., 2017). This article will focus on the editorial and reviewing work that is key to academic publishing. Our analysis of women's participation in the editorial and publication processes of the Royal Society of London adds a historical dimension to contemporary debates about the role of gender in the peer review system, and in academic knowledge-production more generally (Wennerås & Wold, 1997; Katz, Gutierrez & Carnes, 2014; Bernstein, 2015).

Efforts have been made recently to achieve gender balance in publicly-visible roles of scholarly evaluation, such as university recruitment, promotions, and grant-funding panels. Schemes such as Athena SWAN and Juno have helped raise awareness, but they have no leverage over the world of scholarly publishing, where journals are managed by a myriad of learned societies, university presses and commercial firms. Many organisations have voluntarily improved diversity on their journal editorial boards, but boards are merely the tip of the iceberg. Hidden behind scholarly norms of confidentiality and anonymity, numerous academics act as referees, or peer reviewers, of papers submitted for editorial consideration (Scholarly Communication and Peer Review, 2015).

This confidentiality also means that little is known about the gendered aspects of refereeing. However, a growing number of studies suggest that editorial decisions are implicitly biased towards papers by apparently-male authors, regardless of the gender of the editors, board members or referees themselves (Lee et al., 2013; Holroyd, Scaife & Stafford, 2017). Such findings are a particular concern for those disciplines in which 'single-blind' review is the norm (e.g. most of the natural sciences), and is leading to experiments both with 'double-blind' review (anonymisation of the author, as is the norm in many humanities disciplines) and 'open' peer review (where the

names of author and referee are both made public, along with the report) (Tennant et al., 2017).

We consider an editorial process where women had been structurally excluded from positions of editorial decision-making until 1945. We examine what happened once women were (theoretically) admitted to positions of editorial responsibility. Our behind-the-scenes story reveals two historical phases in women's participation in the editorial processes of scholarly journal publishing, and indicates that progress fluctuates.

The Royal Society, founded in 1660, is one of the oldest learned societies in the world, and election to the Fellowship has been seen as a significant accolade for scientists since the mid-19th century (Hall, 2002, Collins, 2015). By the 1940s, the growing competition from faster and more specialised disciplinary journals meant that the Society's *Philosophical Transactions* (f.1665) and *Proceedings* (f.1831) were no longer the most efficient way to communicate research to one's disciplinary colleagues. However, their historic prestige and reputation for selecting high-quality original works ensured that they remained a high-status option (Fyfe et al., 2015).

Publishing at the Royal Society was routinely assumed to be a masculine enterprise, as is clear from a 1938 anniversary address by the then-President of the Society, Sir William Henry Bragg:

When a man submits a paper to the Society he is, in the first place and quite rightly, anxious for the satisfaction of showing what he has done to those who will understand it. Another reason, which has certainly grown in strength of recent years, is that he wants to establish his reputation and position. Doubtless, he has also the wish that his work may be of service, though this desire may be relatively less obvious even to himself.
(1938: 14)

Bragg was certainly well aware of the growing number of women scientists in the early 20th century, not least because many of his research students were female

(Glazer, 2015: 2).¹ Nevertheless, he was addressing the all-male Fellowship of the Royal Society, and was well aware that almost all of the papers the Society published were still written by men. The editorial decisions were also made by men, because these roles were restricted to Fellows of the Society.

Our article investigates the period after 1945, when the first two women were elected to the Fellowship: biochemist Marjory Stephenson and Bragg's former student, the crystallographer Kathleen Lonsdale. They were followed by a small number of other women (including, in 1947, mathematician Mary Cartwright and crystallographer Dorothy Crowfoot Hodgkin); thus creating a select group of women scientists with the right to participate in the various aspects of the Society's editorial gate-keeping and evaluation. We investigate the extent and manner of these women's participation in editorial roles.

The early women Fellows quickly became involved in the invisible role of refereeing, and both Cartwright and Lonsdale took on positions of public responsibility within the Society's publishing affairs in the 1950s. Later women, however, appear to have been both less visible and less involved in the Society's publishing activities. In the 1970s and 1980s, the increasing number of women in the Fellowship actually coincided with a proportional decline in the involvement of women both as authors, and as referees or communicators of papers submitted to the Royal Society. And although the late 1980s and 1990s saw some women take on senior roles in the Society at large, including the Vice-Presidency of the Society, no women Fellows held a senior role of public responsibility for publishing until the 21st century. We explore this particular combination of visibility and invisibility by problematising the 'gentlemanly' self-perception of the Royal Society, its Fellowship and staff.

¹ Bragg's own laboratory at the Royal Institution was, judging by Lonsdale's files of correspondence received, one of the few to recognise that it might wish to recruit scientists of either gender. Letters to Lonsdale from President of Industrial Cellulose Research Ltd Sigmund Wang (9 April 1957), the European Research Association (8 May 1957), and William L. Bragg from the Davy Faraday Laboratory (undated). File H335-336 in Box K. Lonsdale H330-H352, UCL Collection.

Women and Science

Historical scholarship on women's involvement in scientific publishing has focused on their role as authors, particularly of popular science in the long 19th century (Gates & Shteir, 1997; Gates, 1998; Lightman, 2007). Very few women are known to have had decision-making responsibilities in any area of non-fiction publishing, not least, in science (Fahnestock, 1973). Much of what is known about the publishing activities of women scientists in the early and mid-20th century is scattered among biographical studies of individual women (Hodgkin, 1975; Ferry, 1998; Maddox, 2003; Ogilvie, 2004; Strbánová, 2016).

Since the 1990s, there has been growing interest from sociologists in women's involvement in scholarly publishing, as part of a wider investigation of gender inequality in academic – especially scientific – careers. Authorship, i.e. the list of publications, is widely treated as a measure of research productivity and a key determinant of career success (Grant & Ward, 1991; Ward, Grant & Gast, 1992; Stack, 2002; Fox, 2005; Frietsch et al., 2009; Fox, Fonseca & Bao, 2011; Moore et al., 2017). The more recent awareness of 'implicit bias' in evaluation and selection processes – including peer review of grant applications and journal papers – has generated a substantial number of case studies using statistical analysis to identify gender bias (Lee et al., 2013). What we are still missing, however, is a detailed understanding of how women gain access to editorial decision-making roles, and how they act in those roles.

In order to understand women's involvement in Royal Society publishing activities, we need to understand the overall context of gender at the institution. From its beginnings in 1660, its Fellows had been male. During the 18th and 19th centuries, a handful of women were acknowledged in work reported to the Society, and two women – Caroline Herschel in 1787 and Mary Somerville in 1826 – published papers in *Philosophical Transactions*. Some of the later, and more specialised, learned societies – including the Zoological Society (founded 1826) and the Geographical Society (1830) – admitted women to their membership from their foundations; and more societies followed suit in the later 19th century. The Royal Society did not.

There was no rule explicitly excluding women from the Royal Society, but powerful cultural traditions ensured that no women were proposed for Fellowship until Hertha Ayrton's (unsuccessful) nomination in 1902 (Mason, 1991). Sex or marital status ceased to be a bar to admission to chartered societies after the 1919 Sex Disqualification (Removal) Act (9 & 10 Geo. 5c. 71), but even so, it was not until 1944 that two more women were finally nominated for the Fellowship.² After a postal vote of the Fellows, Kathleen Lonsdale and Marjory Stephenson were duly admitted in 1945 (Mason, 1992). Stephenson died a few years later, but Lonsdale would go on to become an active referee for the Society.

As is well-recognised, however, the admission of Stephenson and Lonsdale did not mark the start of a flood of women into the Fellowship. As **Figure 1** shows, there was steady but slow growth until the 1970s, and there has been a more recent phase of steeper growth since the 1990s. In 1955, there were just 10 women in the

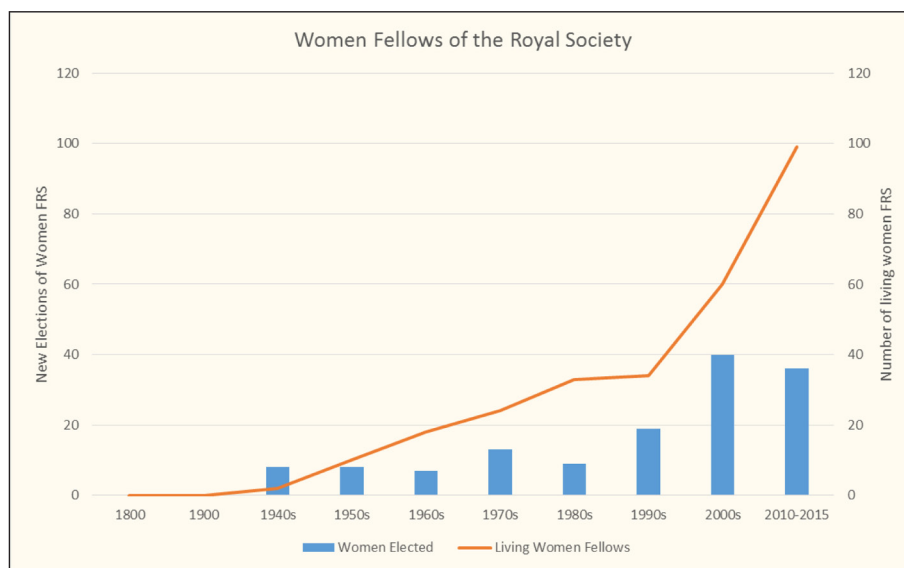


Figure 1: Women Fellows of the Royal Society.

² The Society took a second legal opinion in 1922 which stated unequivocally that both married and unmarried women were eligible for election. This was reported to Council 5 July 1923, minute 16. Four women were nominated in 1944. Harriett Chick's certificate lapsed in 1949 and was not renewed. Irene Joliot-Curie and Frederic Joliot were jointly nominated as Foreign Members in 1944. Both were Nobel Laureates. Frederic was elected in 1946. Irene Joliot-Curie lapsed. See MS/719.

Table 1: Election of women to the Fellowship.

Decade	New Elections of Women FRS	Year	Number of Women FRS Living	Women as % of Fellowship
1940s	8	1945	2	0.42%
1950s	8	1955	10	1.77%
1960s	7	1965	18	2.75%
1970s	13	1975	24	3.04%
1980s	9	1985	33	3.32%
1990s	19	1995	34	2.72%
2000s	40	2005	60	4.24%
2010–15	35	2015	99	6.96%

Source: Royal Society, *Directory of Fellows*.

Fellowship; and that had only risen to 30 something women in the 1980s and 1990s, during which time they made up around 3% of living Fellows. As Joan Mason notes, by far the majority (over 80%) of the women elected in the first 50 years were in the biological sciences (Mason, 1991: 214).

The presence, or not, of women in the Royal Society Fellowship matters to our investigation of their role in editorial evaluation practices because, until the late 20th century, the Royal Society's editorial system restricted key roles to its own Fellows.

- Authors could only submit papers to the Society with the support of a Fellow, known as a 'communicator' (until 1990).
- Referees were virtually always Fellows of the Society (until the late 1960s).
- The committee chairs (later, Associate Editors) responsible for editorial management, in particular subject disciplines, were always Fellows.³

³ After 1990, editors were appointed for each journal. The editors of the scientific journals have continued to be Fellows (but since 2008, it has been recognised that the history of science journal, *Notes & Records*, ought to be edited by a historian of science, and thus, not by a Fellow).

This system was central to the identity of the journals as *the Royal Society's* journals, and it intentionally kept editorial responsibility within the 'club' (Potts et al., 2016). The exclusion of scientists who were not Fellows of the Society undoubtedly affected many male scientists and most non-British scientists. It also structurally prevented women scientists participating in decision-making at one of the most prestigious publication outlets in science.

Methodology

We seek to investigate how, and to what extent the new women Fellows after 1945 were able to take advantage of the roles now accessible to them, and what their experiences of those roles were. More generally, we consider the effects of the gendered editorial system in use at the Royal Society until 1990. We do this by drawing upon historical archival material in the Royal Society's rich archives. The editorial registers allow us to trace the general trends of female participation, and to identify the most active individuals. The official minutes, memoranda and officers' reports tend to preserve the polite atmosphere of the Society, and rarely shed much light on the subjective processes (gendered or not) involved in editorial evaluation and knowledge-production. We have used the referees' reports, on both accepted and 'withdrawn' (including rejected) papers, to gain a closer insight into the gendered aspects of refereeing. References to archival documents used and their location in the Royal Society archive are provided in notes.

To understand the Royal Society's attitude towards its women authors, referees and Fellows, we find it helpful to problematise it as a 'gentlemanly' space. The significance of gentlemen in the making of modern science has long been recognised by historians of science, most notably in Steven Shapin's work on the importance of gentlemanly qualities of civility and virtue among the Fellows of the 17th century Royal Society (Shapin, 1994: 42–65); and in Jack Morrell and Arnold Thackray's work on the British Association of the Advancement of Science, founded partly as an alternative to the Royal Society in providing leadership for British science in the early 19th century (Morrell & Thackray, 1981). These, and more recent works, emphasise both the social background and the codes of polite behaviour of the 'gentlemen of science' involved in the Royal Society (Ellis, 2016).

For the first two centuries of the Royal Society's existence, the majority of its Fellows were aristocrats, independent gentlemen, and members of the professions; they were quite literally 'gentlemen', in the socially-elite sense. Over the course of the 19th and early 20th centuries, the Royal Society's social demographic changed: there were far fewer members of other professions, or members of the nobility;⁴ and its Fellows tended to be employed as university professors or other research scientists. Nonetheless, the Society continued to be seen – and to see itself – as a 'gentlemanly' space in the 20th century, exemplifying such qualities and behaviour as 'chivalrous instincts' and 'fine feelings' (Oxford English Dictionary definition of 'gentlemanly', especially meanings 1a, 1c, 3a & 4a).

Scientist and commentator John Ziman celebrated the gentlemanliness of scientific research in his 1960 BBC 'Third Programme' radio broadcast, 'Gentlemen or players?', when he argued that scientific enquiry 'can never be a job, to be performed at piece rates or by the hour'. Rather, it must 'be done for its own sake'. And thus, according to his cricketing analogy, scientific researchers were gentlemen, not players (Ziman, 1981) (Ziman would become a Fellow of the Society in 1967). The Society's office staff saw the flip-side of this self-image, when they recalled the 'gentlemanly' appearance of certain actions, yet described the atmosphere at the Society as 'a musty old boys club', dominated by 'the old boy network' (interviews with authors, 2015–17).⁵

With its Fellows-only social spaces and activities, the Society shared some features with London private clubs. Its interior was adorned with portraits and busts of eminent deceased men (there are now 25 portraits of female scientists in the Society, with two more being commissioned). Its dining clubs were male-only, by tradition rather than rule, until the mid-1970s; the historian of one such club described the admission of women to the club having 'ended the era of the club

⁴ Some scientists were ennobled (e.g. William Thomson, Lord Kelvin); and there were some aristocrats who were actively involved in the sciences (e.g. the third and fourth Earls of Rosse, and the third and fourth Lords Rayleigh).

⁵ Interviews were undertaken with former staff, who worked at the Royal Society from the 1970s until the present day. All interviews were conducted by Røstvik at the Royal Society in 2015–17, and have been anonymised where deemed necessary.

as a male preserve and thus ends this history' (Allibone, 1976: 429). Women were welcomed as guests at the Society's formal social events, such as the annual soirées and dinners, but this was primarily intended for wives rather than female colleagues, and it was a dispensation that appears to have been granted anew every year.⁶

We are not the first to problematise the term 'gentleman', which has been critically explored in popular culture and by historians of gender.⁷ Scholars of masculinity have debated the emergence of the 'new man' in the 19th century, investigating how manliness became a performance of politeness, style, and proper behaviour, including chivalry towards women (Malchow, 1992; Carter, 2001; Rosenberg, 2004; Tosh, 2004; Cohen, 2005; Connell & Messerschmidt, 2005; Hall, 2013; Williamson, 2016). What we can draw from the scholarship on masculinity is that there is nothing 'gentle' about the history of 'gentlemen' (cf. Cain & Hopkins, 1987 on 'gentlemanly capitalists').

Within the marble hall of the Royal Society, too, the term 'gentlemen' needs to be seen as damaging in its sheltering of obvious power beneath the polish of a stylish, polite man. Fellows of the Society in the 20th century may not have been gentlemen in the socially-elite sense, but they still prided themselves on their gentlemanly behaviour. This included the behaviour appropriate to the reasoned discussion at Society meetings, and to the constructive criticism to be offered in referees' reports. But this public 'gentlemanliness' masked the clear power exerted by Fellows over outsiders, whether defined by gender, nationality or educational standing. This power was concentrated through self-replication, as new Fellows could (and can) only be proposed by existing Fellows. The power tended to be traditional and conservative, whether in the selection of Fellows or, as the Society's secretary admitted in 1892, in the selection of papers for publication (Waterston & Rayleigh,

⁶ See, for instance, Circular notice to the Fellowship, 'Anniversary Dinner 1949' (1949), in Royal Society Archive [hereafter, RS], London.

⁷ For a popular cultural critique, see the *Buffy the Vampire Slayer* episode, 'Hush' (10th episode, season four). Written and directed by Joss Whedon. Originally aired 14 December 1999. Production by Mutant Enemy Productions, US). In this episode, 'the Gentlemen' are silent creatures who steal people's voices, and carry out their crimes with grimacing smiles and in tailored suits. Whedon has since been publically criticised as a 'hypocrite preaching feminist ideals' by his ex-wife.

1892).⁸ We also explore how it had the effect of some women Fellows choosing to ‘become gentlemen’ in order to adapt to the prevailing culture at the Society (Balin et al., 1997).

Institutional Structures

The fact that only two women had published in Royal Society journals before 1880 reflects women’s historical exclusion from higher education and advanced study. By the end of the 19th century, however, women were being admitted to degrees at a small number of universities, and to non-degree studies at other universities. At the Royal Society, the emergence of this new generation of academically-trained female researchers is apparent in the steady trickle of papers submitted from the 1900s onwards by authors whose names were marked by ‘Miss’ (rather than ‘Mrs’).⁹ Many of these women came from the female-only Newnham and Girton colleges and some were involved in suffragette or women’s rights groups, or volunteered for working-class women in some capacity.

By 1939, women comprised a quarter of the total UK student body, though most were studying for arts degrees (Dyhouse, 1995). Women continued submitting papers to the Royal Society in low numbers. After the war, a masculinisation of the technical disciplines resulted in fewer UK and US women studying the sciences at university than there had been in the 1920s (Edgerton, 2005: 177; Schiebinger, 1993: 14–5). Thus, although women authors were no longer a rarity at the Royal Society in the 1940s and 1950s, as **Table 2** shows, there were still very few of them.

In a reversal to the Society’s general patterns of authorship, most of the women submitting papers were in the biological sciences. Far fewer were in the physical sciences, though crystallography was something of an exception to this rule, perhaps

⁸ The secretary, Lord Rayleigh, introduced the belated publication of a paper on kinetic theory of gases that had been rejected by referees in 1845.

⁹ In the 1880s and 1890s, Mrs Sidgwick, Mrs Huggins and Mrs Ayrton were repeated authors at the Society. Eleanor Sidgwick was principal of Newnham College, and wife of philosopher Henry; Margaret Huggins was a spectroscopy expert, and wife of FRS astronomer William; Hertha Ayrton, engineer and mathematician, and wife of FRS engineer William.

Table 2: Papers submitted to the Royal Society.

Sample Year	Total Papers Submitted to Royal Society	Papers Submitted by Women	% Submitted by Women
1925	235	17	7%
1935	335	13	4%
1945	105	4	3%
1955	352	14	4%
1965	362	18	5%
1975	400	28	7%
1980	336	24	7%
1985	309	12	4%

Source: Royal Society, Register of Papers (RS MS/611 ff).

due to the supportive presence in the Society of Lawrence Bragg, J.D. Bernal, Kathleen Lonsdale and Dorothy Hodgkin.

By the time women were admitted in 1945, the Royal Society's editorial system was a complex mix of historic legacy and more recent additions (Moxham & Fyfe, 2018). **Figure 2** represents the editorial process as it operated between 1896 and 1990.

Decisions were made collectively and not by a single editor. Reports from specialist 'referees' had become part of the editorial process for the Society's *Transactions* in the 1830s (although it would not become standard practice at scientific journals more generally until the 1960s and 1970s [Baldwin, 2015]). Another notable feature arises from the historical insistence that papers were only accepted for consideration if they came from known, trusted sources (Fyfe & Moxham, 2016).¹⁰ In practice, that meant, first, that papers had to be communicated to the Society via one of its Fellows; and second, that the identity and status of the author were evaluated. The Society thus had an explicit gate-keeping system; and it operated what would later become known as single-blind refereeing, rather than double-blind (Pontille & Torny, 2014).

¹⁰ This was a legacy of the Society's tradition of reading papers at meetings and only later considering them for publication.

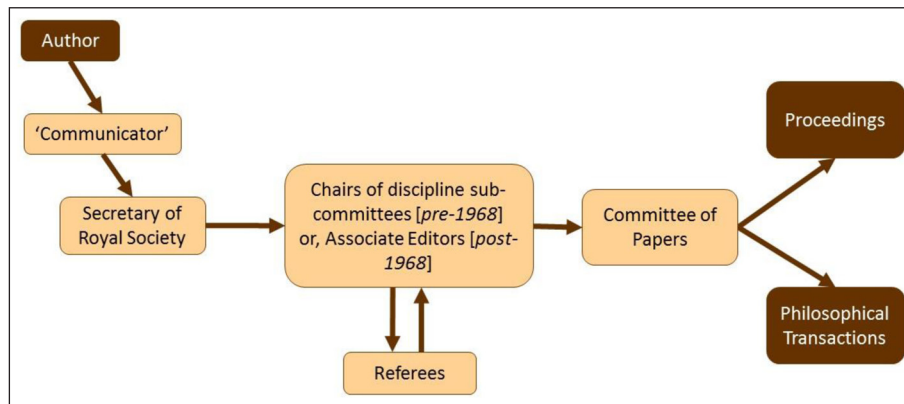


Figure 2: The Royal Society editorial process as it operated between 1896 and 1990.

When a paper was submitted to the Royal Society, its receipt was formally entered in the relevant volume of the ‘Register of Papers’ for the physical or biological sciences. In principle, it was then under the supervision of the appropriate honorary secretary, who took responsibility for the review process and for presenting recommendations to the Committee of Papers (whose membership was identical to that of the Society’s 21-person governing Council). The Committee of Papers was by statute the ultimate decision-making body, but from 1914, it only became directly involved with the most awkward cases (and was abolished in 1990).

The honorary secretaries did not do their editorial work single-handed. The administrative paperwork involved in corresponding with authors and referees was delegated to a paid member of staff, the Assistant Secretary (and by the 1940s, he could delegate it further to the tiny editorial staff). Meanwhile, the intellectual work was delegated to a set of discipline-focused ‘sectional committees’, created in 1896: they selected referees, received the reports, and made recommendations. The chairs of these 10 or a dozen committees could be regarded as subject editors for their fields, and in 1968, a group of Fellows were explicitly designated as Associate Editors.

The mathematician Mary Cartwright was the first woman to serve on a sectional committee, that for mathematics, in 1950 (RS Yearbook, 1950: 8). Cartwright also became the first woman appointed to Council, serving a term from 1956–57 (RS Yearbook, 1956: 8); and was subsequently appointed to the Publications Committee

1959–62, where she served alongside the two secretaries, the treasurer and seven other Fellows (RS Yearbook, 1959: 75; Hayman, 2000).¹¹ Cartwright is also well-known for her roles at the University of Cambridge, as Mistress of Girton College from 1949, and on a variety of high-profile university committees from the 1950s until her retirement in 1968, among them a term as President of the London Mathematical Society in 1951. Cartwright was, however, the exception. No other woman served on the Publications Committee during its period of existence until 1990. No woman became an Associate Editor, while that position existed between 1969 and 1990, nor did any woman chair a publishing-related committee.

There were, in fact, plenty of women working at the Royal Society's premises; as cleaners, cooks and administrative assistants in departments ranging from membership and international relations to accounts (Gay, 2013). By the early 21st century, staff would describe the Society's office as 'dominated by women', and joked that it would have been nice to have a man around once in a while. They were in no doubt that the society they were working for, especially the Fellowship, 'was male' (interview with Debbie Vaughan, 2015).¹² For the male Fellows, the relatively junior female administrative staff were characterised as 'girls': a lively part of the Society, but not quite part of the adult (masculine) crowd, as Lawrence Bragg's poetic response to the arrival of an early electronic computer, in the 1960s, illustrates:

Our brand new computer
Replaces ten girls
The office is muter
but buzzes and whirls

Our brand new computer
By one man is run

¹¹ The next woman to serve on Council was then Dame Kathleen Lonsdale, as Vice-President from 1961–62.

¹² Debbie Vaughan has worked in sales and marketing in Royal Society's publishing department since the 1970s.

Its gender is neuter
The girls are much cuter
And also more fun. (qtd. in Allibone, 1976: 402)

Despite the undoubted presence of women staff, relatively few women appear to have worked specifically in the Publications department. From the 1940s to the 1980s, the Assistant Secretary and the Assistant Editor roles were filled by men. However, in the 1980s, Vivienne Clarke was Head of Sales and Marketing; and Ruth Glynn served as Head of Publishing for about three months, recruiting several of the current senior staff at the Society.¹³

Women Fellows were treated differently (consciously or unconsciously) from the office 'girls'. In some respects, they were 'honorary gentlemen', respected for their scientific achievement. But they were also ladies, to be treated with chivalry. We will now look at the participation of the early women Fellows in the two key decision-making roles: as communicators, and as referees.

Communicators

The 'Explanatory Notes on the Procedure relating to the reading and publication of papers', printed in the Society's *Year-Books* from 1896 onwards, stated that when Fellows communicated papers by outsiders they were expected 'to ascertain that the paper is a fit and proper one to be communicated'. The 'communicator' was, therefore, the gate-keeper to the editorial process. In contrast to the names of referees, the name of the communicator would be printed on the published paper. By the mid-20th century, the Fellows who were most active in communicating papers were those who ran research laboratories, and thus had a steady stream of junior scholars working with them. Such men might communicate four or five papers a year. In the 1940s and 1950s, this group included crystallographer Lawrence Bragg, chemist Eric Rideal and physicist Nevill Mott, all affiliated with Cambridge. Few woman scientists were in this type of position until the late 20th century. Even Kathleen Lonsdale and

¹³ We have unfortunately been unable to talk to either of them about their time at the Society.

Dorothy Crowfoot Hodgkin, who were active as referees for the Society and known supporters of women scientists, rarely (if ever) communicated more than one paper a year in the 1950s and 1960s.

As a researcher, mother and wife, Lonsdale was aware of the positive and negative aspects of a career in science as a woman; she once advised another woman researcher 'not [to] care if she is regarded as a little peculiar' (Hodgkin, 1975). Lonsdale forged strong friendships with men and women in science, often supporting female PhD students and investing emotionally in their success (Baldwin, 2009). Hodgkin fought to get more women into her university (Ferry, 1998), and was 'exceptional in the number of female scientists she trained'.¹⁴ But although both Lonsdale and Hodgkin did occasionally communicate papers to the Royal Society for other women in their field, the numbers are so small that it is difficult to support an argument that either was intentionally promoting female-authored manuscripts.

Even after the admission of female Fellows in 1945, virtually all women scientists wishing to submit to the Royal Society were still required to do so through a male intermediary, either as co-author or as communicator. For instance, in early 1960, the Society received a paper on cell differentiation in the developing eye of the fruit fly. It was by two Edinburgh researchers: the professor of animal genetics, Conrad Hal Waddington FRS; and a relatively young researcher named Margaret Perry, who had graduated from Edinburgh University in the mid-1950s. The paper was short enough for the Society's *Proceedings*, and so UCL cell biologist Michael Abercrombie FRS was the only referee consulted. He approved it for publication, and it duly appeared in *Proceedings B* later that year (Waddington & Perry, 1960).¹⁵ This was Perry's first paper, and it became one of a series of career-defining moments for her. Her friends described her as 'extraordinarily modest' and 'quiet', but her favourable reception at the Royal Society encouraged her; by the late 1980s, she had succeeded in hatching genetically-modified chickens at the Roslin Institute (Perry, 2009).

¹⁴ Paul Newman (cataloguer of Hodgkin's papers, Bodleian, Oxford), note to Section H of the Dorothy Hodgkin papers.

¹⁵ Referee report by Michael Abercrombie (29 February 1960), RS RR/1960.

A few months after Perry, another paper by a female researcher arrived at the Society. It was the sixth in a series of analyses of the structure of myoglobin by a team working under Lawrence Bragg at the Royal Institution's Davy Faraday Laboratory. This instalment discussed seal myoglobin and was by Helen Scouloudi. It was communicated to the Society by Bragg, who may have joked about girls being cuter than computers, but, like his father, supported and employed women scientists at his laboratory (Rayner-Canham & Rayner-Canham, 2001). This was another short paper for *Proceedings*, and was similarly sent to just one referee, in this case, Oxford-based Dorothy Crowfoot Hodgkin, who wrote: 'I do not at all want to hold up publication of this paper'; it appeared in *Proceedings A* in October (Scouloudi, 1960).¹⁶

The paper's association with a well-known research group surely eased its passage through the editorial system, along with the fact that Scouloudi had published in *Proceedings* before (Carlisle & Scouloudi, 1951). This paper had been based on her doctoral research, and was co-authored with her PhD supervisor, C. H. (Harry) Carlisle. Neither Scouloudi nor Carlisle were Fellows, but Carlisle had asked J.D. Bernal (FRS 1937) to communicate the paper for them. Bernal had previously communicated a paper that Carlisle had co-authored with Bernal's former student, Hodgkin, demonstrating tight links between authors, communicators and referees in the post-war crystallography community (Carlisle & Crowfoot, 1945).¹⁷

In 1960, however, Scouloudi was sole author of the paper on seal myoglobin, and it was Bragg, her laboratory head, who communicated her paper. In his covering letter, Bragg (a seasoned communicator) assured the Society's secretary that 'the results are of considerable interest'. He also clarified that, '[t]he research has been carried out in the Davy Faraday Laboratory where Miss Scouloudi is a member of the staff'. This comment may have been meant to emphasise her status as an established staff member (not student), but at the same time, it casually denied Scouloudi's PhD credentials.¹⁸

¹⁶ Hodgkin report on A78, 1960-05-02, Referee Reports 1960A, RS RR/1960.

¹⁷ Crowfoot was Hodgkin's maiden name.

¹⁸ Bragg to WVD Hodge, 1960-04-05, with Referee Reports 1960A, RS RR/1960.

Perry's and Scouloudi's experiences show that female scientists could have a smooth experience of publishing at the Royal Society. Like male scientists who were not (yet) Fellows of the Society, they had to rely on a supportive Fellow as co-author or communicator. The substantial number of submissions to the Society from non-Fellows (outnumbering the submissions from Fellows themselves) indicate that plenty of male scientists had the networks to do this. The small and relatively stable number of submissions from female scientists, despite evidence of a growing number of women working in scientific research, suggests that most women were not so well-networked.

Referees

To our surprise, the very first women we have found acting as referees for the Royal Society actually pre-date the admission of female Fellows in 1945. Botanist Agnes Arber (Packer, 1997) refereed a paper in 1939, as did cell biologist Honor Fell in 1945.¹⁹ These instances do, however, fit a wider pattern. Scattered through the Society's 'Register of Papers' are a handful of examples of non-Fellows being called upon as referees in the late 19th and early 20th centuries. These were almost all men who became Fellows shortly afterwards, and whom we may, therefore, surmise to have been well-networked with existing Fellows of the Society.²⁰ Arber and Fell both went on to become Fellows, in 1946 and 1952 respectively.

As **Table 3** shows, very few papers were refereed by women. Much of the refereeing activity by women in the 1950s and 1960s was single-handedly due to Kathleen Lonsdale. She wrote eight reports in 1955 (of 10 written by women) and 10 reports the following year (of 12 written by women). This level of refereeing activity stands out, even among the male Fellows. In any given year most male Fellows did no refereeing, and the most common number of reports (for those who did any at all) was just one.

¹⁹ Arber refereed an unpublished paper, 'Triassic inflorescences from South Africa and their significance in the floral morphology of the angiosperms'. Fell refereed a paper that was published in *Proceedings: 'Effects on Embryonic Development of X-Irradiation of Rabbit Spermatozoa in vitro'*.

²⁰ For instance, physicist Charles Galton Darwin refereed in 1921 and was elected in 1922; and chemist Ronald Norrish refereed in 1935 and was elected in 1936.

Table 3: Women Referees.

Sample Year	Papers Refereed by Women	% Of all Papers Refereed by Women
1945	1	0.95%
1955	10	2.84%
1960	4	1.19%
1965	10	2.76%
1975	1	0.25
1980	0	0
1985	1	0.32

Source: Royal Society, *Register of Papers* (manual and automated counts).

The fact that Lonsdale (as a crystallographer) was a physical scientist may be significant. The Society received far more submissions (almost three times as many) in the physical sciences as in the biological sciences at this time; and the Fellows in charge of the editorial process for the physical sciences tended to consult more referees per paper. There was, therefore, more refereeing work needing to be done in the physical sciences. The most active referees in 1950 included the physicists Rudolf Peirls (19 reports) and Paul Dirac (12 reports); and the chemists Meredith Gwynne Evans and Harold W. Thompson (11 reports each). None of the biological scientists that year wrote more than three reports: this might explain why the botanists Agnes Arber and Helen Porter and biochemist Rosalind Pitt-Rivers appear to have done relatively little refereeing. But even so, Lonsdale's level of activity sets her apart from her disciplinary colleague Hodgkin, and from Mary Cartwright. Hodgkin and Cartwright, like Helen Porter and Rosalind Pitt-Rivers, were in many ways far more typical of the Fellowship at large, writing only a report or two from time to time.

The normal work of a referee included reading the enclosed manuscript and responding to questions on a pre-printed form. It might have also involved offering feedback to the author; or further correspondence with the Secretary, Assistant Secretary or Committee Chair. From our examination of surviving referees' reports, it seems that women and men carried out these duties in broadly similar fashion. There

are, perhaps, some remarks worth making about the words used. Dorothy Hodgkin in particular often declared herself unsure of her own expertise, and was apologetic. In a note to the Assistant Secretary, D. C. Martin, in 1951 she wrote:

I feel myself rather incompetent about this paper – it seems to me worth while but rather longer than necessary for the matter in it. But Professor Randall [the communicator] is so much the expert in this field. I would entirely accept his view. I am so sorry. I have kept it so long.²¹

Hodgkin operated in a new, cross-disciplinary field, but her self-appraising tone is notable. Similarly, her activity notwithstanding, Lonsdale excused herself quickly from papers beyond her field, writing that she did not have time or expertise. Male referees in the early 1950s expressed uncertainty too, but with fewer excuses and certainly fewer statements of ‘incompetency’. For example, physicist Otto Frisch excused himself from refereeing a paper in 1951, writing that:

... the paper by Miss Power on Meson Theory, which you sent me to referee, is quite outside my own line. If you agree, I could pass it on to either Dr J. Hamilton, who is an expert in that field, or, in case he is not available, to Dr N. Kemmer. Please let me know what I should do.²²

Hodgkin was also more cautious about expressing her opinion: in 1951 she expressed uncertainty about the length of a paper by Rosalind Franklin, and wrote ‘possibly yes’ in answer to the question about publication.²³ Yet the first referee (admittedly, Franklin’s mentor Bernal) had found it ‘admirable and clear’, recommending it for publication without any large changes.²⁴ Of course, there are also plenty of instances of two male referees disagreeing.

²¹ Note from Dorothy Hodgkin to DC Martin (12 April 1951), Referee’s Report box 1951.

²² Letter from O.R Frisch to DC Martin (9 June 1951), Referee Reports and letters regarding paper no. A118 by Miss Power, Referee’s Report box 1951.

²³ Hodgkin report on A55, 1951-04-12, RS RR 1951.

²⁴ Bernal report on A55, 1951-03-15, RS RR 1951.

Refereeing at the Royal Society was historically single-blind, meaning that the form that was sent to referees with the manuscript had the author's name filled in, along with the manuscript title. On these forms, as in the 'Register of Papers' and in the published version of the article, men's first names were usually marked with initials. Women who were sole authors routinely had their first names given in full, while women in a list of co-authors were identified by the use of 'Miss' (or 'Mrs') in front of their initials. There should rarely have been any doubt as to the author's gender, which created a power imbalance between referees and authors, even before the referee started reading the manuscript.

However, not all referees paid attention. It is not at all clear why Frisch's (typed) letter declining to referee the paper on meson production should have referred to its author as 'Miss' Power, given that Edwin Albert Power's identity was recorded as 'E. A. Power' in both the 'Register of Papers' and on the printed paper. In another instance, in 1951, a male referee complained furiously about a paper he 'did not understand', and repeatedly held forth against the shortcomings of an author he assumed was male.²⁵ The authors were actually Miss D.M. (Doris) Jones, Miss P.M.E (Moira) Martin and C. K. (Charles) Thornhill, all reduced by the referee to 'him'. The mistaken pronoun suggests either that the referee paid no attention to the names written on the referee form, or that he assumed Thornhill was the responsible party. Such mistakes happened here and there during the years, but we have not spotted this type of gender confusion in the reports written by female referees.

In contrast to author's names and gender, referees' own identities were kept confidential. In guidance to referees in use from 1894 until the 1930s, the Society had allowed them to 'state whether you wish such criticisms to be transcribed before communication to the author', to avoid the risk of their handwriting being recognised (Letter to referees, quoted in Royal Society Council Minutes, 6 December 1894). This protection was believed to be important for the referee to assert his or her honest opinion, and it also enabled the Society to build a perception of a collective corporate decision-making process, as opposed to individual decisions (Moxham & Fyfe, 2018).

²⁵ Referee's report (9 May 1951), RS RR 1951.

The Assistant Secretary would excerpt and paraphrase parts of the referee report intended 'for the author', in addition to deleting any aggressive language, and any information that could reveal the referee's name.

On an institutional level it is interesting to note the care with which the Society chivalrously identified its female authors and accorded them their titles, and contrast this with the casual neglect visible in the failure to correct male pronouns applied to women serving in editorial roles. For women like Lonsdale, who both published and refereed papers for the Society, a strange double-burden effect often occurred. As an author, her gender was clearly marked; but as a referee and communicator in the 1950s and 1960s, she regularly received letters and forms addressed 'Dear Sir'.²⁶ We can perhaps appreciate a disinclination to reprint the standard forms addressed to gentlemen referees, but the lack of action suggests that the Society's officers and staff did not seem to think that many women would need the forms. There is no evidence of how Lonsdale, or other female Fellows, experienced this constant micro-aggression; nor any evidence of an attempt to correct it. The forms changed to add 'Dear Sir or Madam' in the mid-1960s, after a review of referee duties led to streamlining of the referee report forms.²⁷

The combination of casual neglect of female Fellows and scrupulous demarcation of female authors are aspects of the same bias, so neatly tied up to the Society's own gentlemanly practices, that they can hardly be untangled from the intention of behaving politely to the ladies.

What Happened in the 1970s and 1980s?

For women authors submitting to the Royal Society in the 1970s or 1980s, as **Table 3** showed, it was actually *less* likely that any women would be involved in their editorial process than had been the case in the 1950s or 1960s. This is despite a relaxation of editorial guidelines in 1969 that allowed Associate Editors to select referees who were not Fellows of the Society, and despite the larger number of women in the

²⁶ See, for example, referee's report (9 May 1951), RS RR 1951. The same is evident from her archives at UCL.

²⁷ See for example RS Referee Reports withdrawn A-side 1964–1965.

Fellowship itself. We do not have any information on the number of women scientists (Fellows or not) who may have been asked, but declined to act.

In the 1970s, almost twice as many women were elected to the Fellowship as in the 1960s (**Table 1**), creating a pool of just over 30 living female Fellows. However, it is unclear how many of these women were still active. Hodgkin, Cartwright, Pitt-Rivers, Fell and Porter were all still alive, but retired. Four of the new elections in the 1970s were of women who were older than Hodgkin.²⁸ The mature age of the living women Fellows may help to explain why so few women were involved in refereeing or communicating papers in the 1970s and 1980s.

The women Fellows who did get involved in Society editorial work from time to time included Patricia Clarke (biochemist), Winifred Watkins (biochemist), Brigitte Askonas (immunologist), Mary Lyon (geneticist), Anne McLaren (developmental biology), Helen Muir (rheumatologist) and Janet Watson (geologist), all of whom were born in the decade after the Great War and were then in their 50s. Clarke, Askonas and McLaren became heavily involved in Society administration, sitting on Council in the 1980s and holding the role of Vice-President of the Society. As such, they all technically served on the Committee of Papers – but by this period, that had little editorial relevance.

Almost all of these non-retired female Fellows were in the biological sciences. The number of submissions to the Society in biological science had been increasing through the 1970s, so there was – in principle – plenty of refereeing work available for the female Fellows to do. And some of these papers were from female scientists: in 1980, for instance, 19 of the biological science submissions had a woman as author or co-author (but only five of the physical science submissions).

The small number of submissions from women is part of the wider story of the lack of encouragement and recognition of women in the sciences that continued until at least the 1990s (Rossiter, 2001). It may also be connected to the Society's continuing insistence on papers being submitted via a communicator. We found

²⁸ Florence Rees (b.1906), Mary Parke (b.1908), Elsie Widdowson (b.1906) and Janet Vaughan (b.1899).

very few women listed as communicators in the 'Register of Papers' in the 1970s and 1980s: there were none at all in 1975 or 1985; rheumatologist Helen Muir (FRS 1977) and developmental biologist Anne McLaren (FRS 1975) were the only women communicators in 1980 and 1981 respectively.

The Society's officers were not unaware that its insistence on gate-keeping might dissuade certain authors from submitting to the Society's journals. But a brief experiment in 1974, allowing direct submission to the editorial office, resulted in more 'troublesome' papers than good papers, and suggested that there were still advantages to insisting on 'proper' communication.²⁹

As with communicating, some women Fellows did referee papers in this period, but years could go by without a single female recorded in the 'referee' column of the 'Register of Papers'. This is especially true of the volume covering the physical sciences. The volume for the biological sciences lists geneticist Mary Lyon as the only female referee in 1975, and cell biologist Anne Warner as similarly unique in 1985. Most papers, by women and by men, continued to be communicated and refereed by men only well into the 1980s.

Some referee's reports on papers by women reveal unconscious biases. Bearing in mind that relatively few papers from women arrived at the Society, we have found only occasional instances of gendered language; maybe only once a year, on average; and in several instances, gender bias may be caught up in wider disciplinary or methodological biases. One such instance concerns a paper on historical climate change by the UCL palaeontologist, Pamela L. Robinson (1919–94).³⁰ Robinson made her reputation in the late 1950s as a vertebrate palaeontologist, but subsequently became interested in the evidence for global temperature rises and glacial melting (Milner, 2004). Her 1971 paper outlining a 'new approach to palaeoclimatology'³¹ was sent for review to the founding professor of the School of Chemical Sciences at the University of East Anglia, Norman Sheppard (FRS 1966), whose obituarist described

²⁹ Meeting of the A- and B-side Associate Editors about Standing Order 32, 28 January 1977, Royal Society Archives off-site material, RS box RMA/729 (11/2/7/2).

³⁰ Paper number A222 for series A 1971, RS Referee Reports withdrawn 1970s.

³¹ A222 – 1971 'A New Approach to Palaeoclimatology'.

him as a noted ‘gentleman’ (Grinter, 2015). He recommended against publication – and Robinson subsequently withdrew her paper.

The interest in this case comes from the referee’s choice of adjectives, applied to a paper in a controversial topic, from an author whose identity he knew (her name was on the referee report form). He cautioned the author that she ‘should adopt a somewhat less ambitious plan’. He also critiqued her writing style, suggesting that ‘the author should be reminded that colourful or emotional expressions are rarely helpful to a scientific thesis’. (The examples he pulled out were ‘winds unfurl, poor and good solar receipt, march of, monotonous climate, beautiful autumnal colours, etc.’) The choice of adjectives such as ‘ambitious’, ‘colourful’ and ‘emotional’, suggest that at least some of the Royal Society’s referees exhibited unconscious bias against papers by women.

It was in 1980 that the only case (that we have found) of a complaint by female authors against the Society’s editorial process occurred. Two US-based female scientists, Cynthia Lance-Jones and Lynn Landmesser, submitted (though a Foreign Member of the Society) a pair of papers on chick embryology. The referee (who was not a Fellow) described it/them as ‘rather anecdotal’, ‘marginal’ and ‘too enthusiastic’ in tone. He admitted that he found ‘the solipsistic approach’ and ‘natural enthusiasm’ of the two authors ‘distasteful’; and advised that a substantial section of the paper was ‘uninteresting and does not particularly extend our knowledge’.³² The Assistant Secretary admitted that the evaluation was potentially being affected by the methodological gulf between European and US developmental biologists, but he claimed the Society was unable to locate a neutral referee. He gave the authors the opportunity to rewrite.

Landmesser recalls that she and Lance-Jones were shocked by the review, but they did rewrite (personal communication with author, 2017). With the rewritten papers, they sent a long letter complaining about what they perceived to be a biased review process. They acknowledged that their data conflicted with the views held by one school of thought in the UK, and presented a detailed argument to defend their data. The Assistant Editor (i.e. a staff member) sought advice from Fergus W.

³² Report on papers B97 and B98, RS RR/1980B.

Campbell (1924–93; FRS 1978), a neurophysiologist who acted as an Associate Editor for the Society (Westheimer, 1995). Campbell acknowledged the 'slight international feud over the interpretation of these methods' but argued that 'the only way truth comes out in science is to let both sides publish and await the passage of time'.³³ He recommended the rewritten papers be published, and they appeared in *Proceedings B* in 1981 (Lance-Jones & Landmesser, 1981). Landmesser has since used this episode to train graduate students not to give up if they receive negative reviews (personal communication with author, 2017).

There were, at the time, no guidelines about the appropriate behaviour, tone, or address for Royal Society referees at the time. Usually, the staff editor managing the process would strip out abusive or unhelpful language before passing the gist of the report on to the authors. This case stands out for the explicit accusation of bias against the referee and/or the process. The formal grounds of that accusation were the international differences in methodology, but it is striking that the only instances we have found of referees expressing their opinions so bluntly about 'emotional', 'anecdotal' and 'enthusiastic' language come in cases involving female authors. It is also striking that the authors did not simply withdraw their paper and take it elsewhere, but complained. (And even more so that they did this without the support of their communicator, who had died in the meantime.) Landmesser does not recollect worrying about overt gender bias in getting papers published (personal communication with author, 2017); but it may be significant that she and Lance-Jones were based in the USA, where female academics were debating the feminist Second Wave and the Equal Pay legislation (Rossiter, 1982). Developmental psychologist Uta Frith (FRS 2005) remembers that in the UK in the 1960s and 1970s 'there was not the slightest suspicion that women authors were unfairly treated by reviewers' (personal communication with author, 2016).

By the 1970s, the long-standing preference at the Royal Society for using initials instead of forenames for men had hardened into a standard practice (knights remained exceptions). Developmental neuropsychologist Dorothy Bishop (FRS 2014)

³³ Campbell in undated note to to Evans, 1980, in RS RR/1980B, file for B97 and B98.

recalled that in the 1970s she had read an article about bias toward women authors – ‘which I just happened upon by chance’ – and decided to start publishing as ‘D.V.M. Bishop’ rather than ‘Dorothy’: ‘it just seemed a sensible way of avoiding possible bias’ (personal communication with author, 2016). The Royal Society’s editorial staff received complaints about the discrimination of female authors, but understood it as a ‘gentlemanly’ attitude (interviews with former Royal Society staff, 2015–16).³⁴ The stimulus to change appears to have come from male authors, rather than women. On Valentine’s Day 1990, a member of staff wrote to one of the newly-appointed editors: ‘Will it be acceptable, please, for authors to be allowed the form of name they prefer (i.e. men allowed forenames, or even Nick for Nicholas), although still excluding degrees and sundry names after their names?’ This would help disambiguate authors, but would also mean that women would not be singled out with first names anymore. The response from the editor was quick and clear. He wrote in capital letters: ‘YES’.³⁵

1990 and Beyond

The years around 1990 marked great changes for the Society’s publishing division, with a relaunch of all the journals and a new management structure. The communicator-role was abolished, and separate editors were appointed for each journal. In principle, submission to the Royal Society’s journals was easier and more open than ever before. There was no more default gendering of names, either in the published version or during the editorial process, and standard letters were addressed ‘Dear Sir or Madam’. By the early 21st century, the Society started examining its own lack of diversity, and contributed more actively to debates about diversity in STEM.

With only 8% of the current Fellowship identifying as female, the Society would have a very limited pool if it still restricted all editorial roles to Fellows (Royal Society, 2017). The editors of the scientific journals are still normally Fellows, but the other roles have been opened up (or abolished). Referees have been chosen from beyond the

³⁴ These interviews were conducted with former staff who had worked on the Society’s publications from the 1970s–91.

³⁵ RS CAX/other/06 Editor of *Transactions A*: Professor Frank Smith’s papers from the 1990s: Letter to Smith from Goatly (14 February 1990).

Fellowship since 1969, and the editorial boards created for the relaunched journals in 1990 are mostly composed of non-Fellows. Yet the relatively high proportion of women on the editorial boards now contrasts starkly with the very low proportion of women referees in the 1970s and 1980s, and suggests that formal rule changes alone do not necessarily shift tacit behaviours.

Even with permission to select referees from the entire world of science, the Royal Society's editorial team appear to have used that licence to choose even more male referees in the 1970s and 1980s. The confidentiality of the process meant that the gender balance of referees was not generally known, and was certainly not a matter of public concern until very recently. In contrast, the proportion of women on editorial boards has become a matter of public concern in the early 21st century, and editors are actively striving to make changes. When ecologist Spencer C.H. Barrett (FRS 2004) became editor of *Proceedings B* in 2015, he thought the 24% of women on the editorial board was not good enough. By purposefully recruiting 24 women for the 25 vacant positions in 2017, he increased the proportion to 39% in 2017 (Barrett, 2017; correspondence with authors, 2017). Barrett was able to find well-qualified women scientists, but he noted that 'many qualified females are overcommitted. Some very suitable women turned us down for editorial positions because they were already departmental chairs or were otherwise busy with committee work'. (correspondence with authors, 2017). The Society's diversity statistics now report that 26% of members of publishing committees identify as female (Royal Society, 2017).

The Society appointed its first female editor in 2008, when Georgina Mace (FRS 2002) became editor of *Transactions B*. She was followed by Linda Partridge (FRS 1996). As of 2018, however, all nine of the scientific journals again have male editors; historian Anna Marie Roos became editor of *Notes & Records* in 2017. In the same year, the computer scientist Wendy Hall (FRS 2009) was elected as the new chair of the Publishing Board. She is the first woman ever to head a publication-related committee, board, or sub-committee at the Royal Society.

Both staff and senior Fellows claim to have been trying to recruit more female editors, but without success. The chair of the Publishing Board in the 2010s, Michael

Brady (FRS 1997), said 'I'm very, very much aware of it, Council is too.' But, like Barrett, he noted that senior women were often over-committed:

I've tried on several occasions ... When someone stepped down as a journals editor ... our first port of call was to bring in a woman ... With [one journal], we approached 3 women all of whom turned it down. They turned it down on the perfectly good reason that they were already busy as hell. I wanted [XXX] to do it and she thought about it and said she couldn't take it on. (interview with Michael Brady, 2017)

Reflecting on this, Brady remarked: 'It's generally easier to twist a bloke's arm, than to twist a woman's. I'm always reluctant to twist a woman's arm'. Gentlemanly chivalry has not disappeared.

Conclusions

This article has analysed the gendering of the Royal Society's editorial processes, through exploring the participation of women Fellows in such roles as communicator and referee, as well as the experiences of women authors. Unpicking the complex networks of personal and institutional relationships, biases, and subjectivity embedded in peer review and publishing is a difficult task. However, we wish to point to a couple of findings that stand out.

The first is related to the idea of the 'gentleman', a label that seems at once to protect and promote any person connected to it. In the Royal Society's vision of itself as a 'gentlemanly space', we observe an excuse. Often, when invoking the gentlemanly atmosphere or attitude in the Royal Society's history, what is really meant is a men's club. Chivalry does not excuse biased behaviour; and the 'gentlemanly' label should ring warning bells, rather than be taken as a symbol of respectability. Claims of chivalry have historically distracted attention from inequality and bias on a personal and institutional level, as is clear in the Society's historical lack of action towards matters of diversity. Although the individuals and institutional structures involved with publication at the Society rarely explicitly treated women poorly, they nevertheless

failed to correct micro-aggressions such as presumed gender and paternalistic structures (Ahmed, 2012).

Second, the argument that women's career development has been hindered by the relative lack of women participating in the evaluation process has recently driven a move towards including more women (and minority groups) in the visible stages of editorial evaluation. The Royal Society's historical publishing practices offer ambivalent evidence on this matter. Once elected to the Fellowship, women scientists were able to participate in, and negotiate, the paternalistic, traditional, and hierarchical systems of evaluation at the Society. They approached their evaluating roles at the Royal Society with great care and professionalism, and did not revolutionise the ways in which things were done. In this sense they became 'honorary men' or 'gentlemen', respected for their correct qualities by their male colleagues, whilst acting like most Fellows by not, overall, being very active in the publishing work of the Society at all (Bagilhole, 1993).

Third, the editorial role that women Fellows most often took on was that of referee, rather than that of communicating, although this distinction is more apparent in the 1950s than in the 1980s (when so few women did either). Communicators received some public recognition for their work (by having their name printed on the published paper), but even though some of these women Fellows are known to have been personally supportive of other women scientists, they do not appear to have used their privileged access to push women authors into the Royal Society's editorial system.

Fourth, refereeing is relatively unrewarding in terms of public recognition and reward, because the work done is hidden behind the cloak of confidentiality. The Society's insistence on the anonymity of the referees was part of the creation of a collective, institutional editorial responsibility, but one of its consequences was that most of the involvement of women in the Society's editorial processes in the 1950s and 1960s was invisible.

Fifth, we have found little evidence that women scientists approached their evaluation roles in a radically different way to men, beyond some diffidence in claiming expertise. But we have noted some women authors in the 1980s being critiqued for stereotypical feminine traits of emotion, enthusiasm, and anecdote.

Sixth, we have uncovered evidence to suggest that in the 1970s and 1980s, there was less participation of women Fellows in the editorial process and more gender bias in the evaluation process than there had been in the 1950s. This should cause significant reflection for all those seeking to level the gendered playing field by involving more women in the selection and evaluation processes. There were more women in the Royal Society in the 1980s than in the 1950s. But they seem to have played little role in communicating or refereeing papers, or in serving on publication committees. Whether they were not asked, or whether (like many of the male Fellows) they preferred not to be involved, is not currently clear. It may be the case that the women who were most willing to be involved in Society life were snapped up for roles that were seen as even more important than publications – as with the three women who served as Vice-President in the 1980s and early 1990s. Either way, it suggests that the Society needed a lot more women, to ensure that enough of them were willing and available to perform editorial roles.

Around a quarter of new Fellows of the Royal Society each year are now women, and the Society has a very public commitment to build and develop a world in which studying and working in science is open to all (Royal Society, 2015).³⁶ Yet the history of male-dominated publishing seems to haunt the Royal Society. In the nuance between institutional discrimination (often historically-rooted) and unconscious bias, we may find some answers to why it is that even with the best, most progressive intentions, the Royal Society is still acting like a gentleman.

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³⁶ Royal Society, 'Pride and Prejudice: Breaking Down Barriers in Science', booklet from third annual Diversity conference, 2015.

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Competing Interests

The authors have no competing interests to declare.

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