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# Peer review in scholarly journals: Perspective of the scholarly community – an international study

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The Publishing Research Consortium is a group of publishing societies and individual publishers, which supports global research into scholarly communication in order to enable evidence-based discussion. Its objective is to support work that is scientific and pro-scholarship. Overall, it aims to promote an understanding of the role of publishing and its impact on research and teaching.

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# Executive summary

This global survey reports on the attitudes and behaviour of 3040 academics in relation to peer review in journals.

Peer review is seen as an essential component of scholarly communication, the mechanism that facilitates the publication of primary research in academic journals. Although sometimes thought of as an essential part of the journal, it is only since the second world war that peer review has been institutionalised in the form we know it today. More recently it has come under criticism on a number of fronts: it has been said that it is unreliable, unfair and fails to validate or authenticate; that it is unstandardised and idiosyncratic; that its secrecy leads to irresponsibility on the part of reviewers; that it stifles innovation; that it causes delay in publication; and so on. Perhaps the strongest criticism is that there is a lack of evidence that peer review actually works, and a lack of evidence to indicate whether the documented failings are rare exceptions or the tip of an iceberg.

The survey reported here does not attempt directly to address the question of whether or not peer review works, but instead looks in detail at the experiences and perceptions of a large group of mostly senior authors, reviewers and editors (there is of course considerable overlap between these groups). Respondents were spread by region and by field of research broadly in line with the universe of authors publishing in the journals in the Thomson Scientific database, which covers the leading peer reviewed journals. The survey presents its findings in two broad areas: attitudes to peer review and current practices in peer review

## Attitudes to peer review

1. **Peer review is widely supported.** The overwhelming majority (93%) disagree that peer review is unnecessary. The large majority (85%) agreed that peer review greatly helps scientific communication and most (83%) believe that without peer review there would be no control.
2. **Peer review improves the quality of the published paper.** Researchers overwhelmingly (90%) said the main area of effectiveness of peer review was in improving the quality of the published paper. In their own experience as authors, 89% said that peer review had improved their last published paper, both in terms of the language or presentation but also in terms of correcting scientific errors.
3. **There is a desire for improvement.** While the majority (64%) of academics declared themselves satisfied with the current system of peer review used by journals (and just 12% dissatisfied), they were divided on whether the current system is the best that can be achieved, with 36% disagreeing and 32% agreeing. There was a very similar division on whether peer review needs a complete overhaul. There was evidence that peer review is too slow (38% were dissatisfied with peer review times) and that reviewers are overloaded (see #13 below).
4. **Double-blind review was preferred.** Changes to peer review in recent years (such as the growth of double-blind review, and the introduction of open and post-publication review) have attempted to improve the system. Asked which of the four peer review types was their most preferred option, there was a preference for double-blind review, with 56% selecting this, followed by 25% for single-blind, 13% for open and 5% for post-publication review. Open peer review was an active discouragement for many reviewers, with 47% saying that disclosing their name to the author would make them less likely to review.

5. **Double-blind review was seen as the most effective.** Of the four types of peer review discussed, double-blind review had the most respondents (71%) who perceived it to be effective, followed (in declining order) by single-blind (52%), post-publication (37%) and open peer review (26%). Respondents did not have personal experience of all types of review and tended to rate more highly the systems they had experienced. It is notable, though, that although 37% of respondents said that post-publication review was effective, only 8% had had experience of it as authors.
6. **Double-blind review faces some fundamental objections.** Double-blind review was primarily supported because of its perceived objectivity and fairness. Many respondents, including some of those supporting double-blind review, did however point out that there were great difficulties in operating it in practice because it was frequently too easy to identify authors from their references, type of work or other internal clues.
7. **Post-publication review was seen as a useful supplement to formal peer review.** In terms of recent developments facilitated by technology advances, some 37% thought that post-publication review was effective but only 5% preferred it over other approaches. It is clear that this was because researchers tended to see it as a useful supplement to formal peer review rather than a replacement for it (53% agreed compared to 23% disagreeing). Interestingly, they saw this usefulness despite a clear view that it tends to encourage instant reactions and discourage thoughtful review.
8. **No support for replacing peer review with metrics.** There was strong opposition to replacing peer review with post-publication ratings or usage or citation statistics to identify good papers, with only 5-7% of respondents supporting these approaches.
9. **Mixed support for review of authors' data.** A majority of reviewers (63%) and editors (68%) say that it is desirable in principle to review authors' data. Perhaps surprisingly, a majority of reviewers (albeit a small one, 51%) said that they would be prepared to review authors' data themselves, compared to only 19% who disagreed. This was despite 40% of reviewers (and 45% of editors) saying that it was unrealistic to expect peer reviewers to review authors' data. Given that many reviewers also reported being overloaded, we wonder, however, whether they would still be as willing when it actually came to examine the data.
10. **Limited support for payment for reviewers.** Respondents were divided on whether reviewers should be paid, with 35% in favour and 40% against payment. A majority, however, supported the proposition that payment would make the cost of publishing too expensive (52% for, 18% against) and the large majority of reviewers (91%) said that they reviewed to play their part as a member of the academic community.

## Current practices in peer review

11. **Single-blind review was the most commonly experienced.** The average respondent had published 60 papers in their career to date, suggesting they were fairly experienced and productive researchers, and 8 papers in the last 24 months. As authors, respondents' experience of peer review was mainly of single-blind reviewing (84% said they had experienced this kind of review), followed at some distance by double-blind reviewing (44%). Less than a quarter (22%) reported experience of open peer review, while experience of post-publication review was limited to 8% of respondents.
12. **Longer review times was a cause of dissatisfaction.** Authors said the peer review of their last published paper took an average of 80 days. They were evenly balanced on whether or not this was satisfactory. There was a clear correlation between the reported time taken for peer review and the author's satisfaction: 67% were satisfied provided the time was under 30 days, but this dropped to 10% for 3-6 months, and to 9% for longer than 6 months.
13. **The most productive reviewers were overloaded.** Some 90% of authors were also reviewers, acting regularly for about 3.5 journals and a further 4.2 journals occasionally. They reported reviewing an average of 8 papers in the last 12 months, compared to the maximum of 9 that they said they were prepared to review. Active reviewers, defined as those doing 6 or more reviews in the last 12 months, completed an average of 14 reviews per year, nearly twice the overall figure. This means that although Active reviewers make up 44% of all reviewers, they are responsible for 79% of all

reviews. So when this group reports it is over-loaded – doing 14 reviews per year compared to their preferred maximum of 13 – there is clearly a problem.

14. **About 20% of invitations to review are declined.** As well as completing 8 reviews per year, the average reviewer declined about 2 invitations to review, mainly because of a lack of time. Active reviewers, despite doing more reviews, if anything decline slightly fewer invitations proportionately.
15. **The average review takes 5 hours and is completed in 3-4 weeks.** Reviewers say that they took about 24 days (elapsed time) to complete their last review, with 85% reporting that they took 30 days or less. They spent a median 5 hours (mean 9 hours) per review.
16. **Altruistic reasons for reviewing were preferred over self-interested ones.** Substantially the most popular given was “playing your part as a member of the academic community”. Self-interested reasons such as “to enhance your reputation or further your career” or “to increase the chance of being offered a role in the journal’s editorial team” were much less frequently advanced.
17. **The average acceptance rate was 50%.** Editors reported that the average acceptance rate for their journals was about 50%, which is consistent with other studies. About 20% are rejected prior to review (either because of poor quality (13%) or being out of scope (8%)) and another 30% are rejected following review. Of the 50% accepted, 40% are accepted subject to revision. Acceptance rates were lower in humanities and social sciences, and higher in physical sciences/engineering journals.
18. **Use of online submissions systems.** Three quarters of editors (76%) reported that their journal used an online manuscript submission and tracking system. Their use was most common in life sciences (85%) and least common in humanities and social sciences (51%).
19. **Access to journals literature.** Some 69% of respondents described their access to the journals literature as good or excellent, with 7% describing it as poor or very poor. This probably represents an improvement in overall access compared to the CIBER 2004 survey (Rowlands et al., 2004), which reported 61% with good/excellent and 10% poor/very poor (though a different geographical distribution of responses makes direct comparison difficult).

The survey thus paints a picture of academics committed to peer review, with the vast majority believing that it helps scientific communication and in particular that it improves the quality of published papers. They are willing to play their part in carrying out review, though it is worrying that the most productive reviewers appear to be overloaded. Many of them are in fact willing to go further than at present and take on responsibility for reviewing authors’ data.

Within this picture of overall satisfaction there are, however, some sizeable pockets of discontent. This discontent does not always translate into support for alternative methods of peer review; in fact some of those most positive about the benefits of peer review were also the most supportive of post-publication review. Overall, there was substantial minority support for post-publication review as a supplement to formal peer review, but much less support for open review as an alternative to blinded review.

# Introduction

The study into peer review reported here was commissioned by the Publishing Research Consortium to investigate the current status of peer review and researcher attitudes towards it. The main objective was to measure the attitudes and behaviour of the academic community in regard to peer review, with a view to establishing evidence that could inform debate concerning peer review, and underpin discussions about its future. We were interested to collect data on the current operation of peer review, such as the average workload of reviewers and the times spent on review, as well as attitudes towards peer review, such as researchers' view on different types of review or their views on how effective peer review is at achieving different goals.

Peer review is seen as an essential component of scholarly communication, the mechanism that facilitates the publication of primary research in academic journals. (We do not consider other kinds of peer review, such as in relation to the award of grants.) Although sometimes thought of as an essential part of the journal, it is only since the Second World War that peer review has been institutionalised in the form we know it today. More recently it has come under criticism on a number of fronts: it is said that it is unreliable, unfair and fails to validate or authenticate; that it is unstandardised and idiosyncratic; that its secrecy leads to irresponsibility on the part of reviewers; that it stifles innovation; that it causes delay in publication; and so on.

Perhaps the strongest criticism is that there is a lack of evidence that peer review actually works: for instance, a 2002 meta-study in *JAMA* by Jefferson et al. concluded that "Editorial peer review, although widely used, is largely untested and its effects are uncertain", and the Cochrane Collaboration's own meta-analysis published in 2003 concluded that there was "little empirical evidence to support the use of editorial peer review as a mechanism to ensure quality of biomedical research, despite its widespread use and costs." And there is a lack of evidence to indicate whether the documented failings are rare exceptions or the tip of an iceberg.

Despite this lack of rigorous evidence of the effectiveness of peer review, for academics it remains the bedrock of the high-quality publication. For example, market research conducted by NOP/CIBER on behalf of the publisher Elsevier found near universal agreement that refereed journals were required, with large majorities disagreeing that readers did not need refereed journals and that peer review did not improve an article's quality. These perceptions are explored in more detail in this current study.

One problem in debates about the effectiveness of peer review is (often unstated) different assumptions about what peer review is supposed to achieve. On the one hand, it can be seen as a process intended to improve quality; on the other it could be thought to provide a seal of approval or "to validate or authenticate scientific work, or guarantee its integrity" (Rennie 2003). Proponents of the first point of view would say that the fact that peer review fails to validate published work is irrelevant because this is not its purpose. There are other viewpoints, too; for instance more publishers tend to see it as a means of selecting the most appropriate manuscripts for a particular journal. One respondent to this survey commented:

*"... [peer review] works as well as can be expected. The critical feature that makes the system work is the skill and insight of the editor. Astute editors can use the system well, the less able who follow reviewer comments uncritically bring the system into disrepute. Peer review should be used to inform the author and the editor; it should not be permitted to play a gate keeper role in publication."*

The issue of blinding in peer review remains a disputed one. (In a single-blind review the reviewer's name is hidden from the author; in double-blind review the author's name is in addition concealed from the reviewer; in open peer review there is no blinding and the author's and reviewer's names are known to each other.) Proponents of double-blinding argue that if the reviewer is aware of the author's identity it will be difficult to avoid bias even if the reviewer makes a conscious effort to do so, and impossible to prove that bias was not involved. Studies have indeed demonstrated such bias (e.g. editors have rejected previously published papers when they were resubmitted with false obscure affiliations).

The arguments against double-blind review are both practical (it is very hard to redact a manuscript in practice so that its authorship cannot be identified by a skilled reviewer), outcome-based (e.g. randomised controlled trials have generally failed to show any benefit (e.g. van Rooyen S. et al., 1998; Justice A.C. et al. 1998)), and ethical (it is seen to be unfair for somebody making an important judgement on the work of others to do so in secret).

Partly as a reaction to these criticisms, support started to grow during the mid-1990s for open peer review, dating (within biomedical publishing at least) from a 1994 article by Fabiato in *Cardiovascular Research*. The *BMJ* was one of the first major journals to adopt open peer review, basing its decision partly on the ethical case and partly on the evidence mentioned above that blinding did not improve review outcomes. Open review, however, remains far from being the norm. The main argument against it is that reviewers will be reluctant to criticise the work of more senior researchers on whom they may be dependent for career advancement or grant awards. During 2006, the journal *Nature* conducted a trial of open peer review; it was not a success – despite interest in the trial, only a small proportion of authors chose to participate, and only a few comments were received, many of which were not substantive. Feedback suggested “that there is a marked reluctance among researchers to offer open comments”.

More recently, electronic publishing technology has allowed a variant of open review to be developed, in which all readers, not just reviewers selected by the editor, are able to review and comment on the paper and even to rate it on a numerical scale following publication. This post-publication review could occur with or without conventional pre-publication peer review. One interesting example is the Public Library of Science journal *PLoS ONE*, which combines post-publication review with a basic level of pre-publication review. At the time of writing, however, there were few successful examples of post-publication review flourishing; at *PLoS ONE* an online community manager had to be engaged with the specific responsibility for encouraging comments and ratings from the hitherto unenthusiastic readers.

A more elaborate variant of open/post-publication review was proposed in an article by Carmi and Koch in *Learned Publishing* in 2007. The authors suggested that following peer review, every article should be published online alongside all the intermediate versions of the manuscript, associated reviews, and author replies to reviewer comments, together with the option for readers to rate manuscripts and reviews online. In their system (dubbed CARMA, or Community-based Assessment of Review Materials), while the reviewer reports were published, the reviewers' identities remained concealed. We test researcher attitudes to some aspects of this in the survey.

A diversity of peer review approaches is probably a good thing. As the 2007 British Academy report on peer review in the humanities and social sciences put it:

“This variety of practice is important in relation to publication. There are many different models of peer review used. It is a considerable merit of the way in which the peer review works in journal publications that there is not one single model of good practice that all should follow, but instead decentralised diversity. Nevertheless, there are principles that good peer review should follow. These include timeliness, transparency and verifiability. These principles cannot guarantee the identification of the best quality work on a fair basis, but without them quality and fairness will suffer.”

It is hoped that this survey will throw some light on the current practice of peer review and on academics' perceptions of and attitudes towards the issues outlined above. Establishing baseline data should not only provide greater understanding of the current position of peer review, but also provide a platform for future studies.

# Survey methodology

## Methodology

The study was based on an online questionnaire with respondents recruited by email. The questionnaire was developed by us in conjunction with the Publishing Research Consortium and underwent several revisions before being pilot tested on a small subset of the sample. The questionnaire was revised in minor ways following the pilot to eliminate some apparently ambiguous wording and modify the scales used to collect numerical data in some instances.

A copy of the final questionnaire is attached at Appendix 1. The questionnaire was comprehensive – there were a total of 120 separate questions or statements to be tested, though the maximum any individual would undertake was 110.

The questionnaire involved several questions that categorised respondents and routed them to different sets of questions:

- Respondents who had not published in the last 24 months and were not journal editors were screened out of the survey (42)
- All other respondents answered questions about peer review generally (Questions 3–9) and the demographics questions (50–55): 3040 respondents

The filter questions then determined whether respondents answered the following questions as

- “Authors” (all who passed the initial screening questions) answered questions specially about authors’ experience of peer review (Questions 10–23): 3040 respondents.
- “Reviewers” (respondents who had reviewed at least one paper in the last 12 months) answered Questions 10c–35 relating to the experience of reviewers: 2165 respondents.
- “Editors” (those identifying themselves as such in the initial screening question or at Question 22) skipped the questions for Reviewers in favour of the editors’ questions (Questions 36–49): 632 respondents

The sample list used to invite respondents was primarily sourced from Thomson Scientific, consisting of approximately 40,000 email addresses of authors who had recently published. (The specification of the list was to provide a geographical spread matching the overall database using the most recent authors.) This list was supplemented with a list of journal editors that was available to the PRC that had been created by “scraping” journal websites. Data was collected in November 2007.

## Response

### Response rate

After the Thomson Scientific list of recent authors was deduplicated against the list of journal editors, we mailed a total of 41,140, of which 1908 bounced, leaving 39,232. A reminder email was sent 10 days after the initial mailing. At the time of closing the survey, a total of 3101 responses had been received. After removing some duplicate and insufficiently complete responses, we were left with 3040 responses. This is an effective response rate of 7.7%, which is excellent for this type of survey, especially given the length of the survey, and indicates a good level of interest in and engagement with the topic.

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The survey demographics are presented in detail at the end of the report (see page 54). There was a broad geographic spread, representing a range of subject disciplines, ages and positions.

### **Impact factor**

We collected the name of the journal that reviewers last acted for, which enabled us to categorise these journals into high, medium and low impact factor groups (using separate definitions of high, medium and low for the four subject groups). Reviewers who last reviewed for a high impact factor journal were more likely than average to be in the Life sciences, and less likely to be in Physical sciences and engineering.

Those who last reviewed for a high impact factor journal were also more likely to be in the Anglophone region and to be Active reviewers and Active authors. There were no differences by age and gender.

### **Publishing role**

The large majority of sample list were authors by definition (they were selected from the Thomson Scientific database as having recently published). The respondents' roles were as follows:

- Current authors (published at least one paper in last 24 months): 3025 (98%)
- Editors: 632 (21%), of which only 14 were not also current authors
- Reviewers (reviewed at least one paper in last 12 months): 2165 (90% of the non-editors (2408)).

There was a higher proportion of editors in the Anglophone respondents (24%) than in Asia (16%) or Rest of world (14%).

### **Access to the journals literature**

We asked researchers how they would describe their current level of access to the journals literature (Q19). The primary reason for asking was to use the data in subsequent analysis of other questions, that is, to be able to group respondents so as to explore whether researchers' views of peer review were related to the level of access to the literature. The results are nevertheless interesting in their own right.

Overall, some 69% described their access as good or excellent, with 7% describing it as poor or very poor. This suggests an improvement in access compared to the CIBER 2004 survey (we used identical wording to CIBER to allow comparisons), which reported 61% with good/excellent and 10% poor/very poor access, though it is hard to be categorical because the geographic distribution of responses was different for the two surveys.

Assuming the apparent increase in accessibility is real, we do not know of course to what extent this was due to the growth in open access literature, programmes like HINARI and AGORA, continuing growth of consortia licensing, or to other reasons.

There were variations by field of study, with 80% of HSS but only 61% of clinical researchers describing their access as good or excellent.

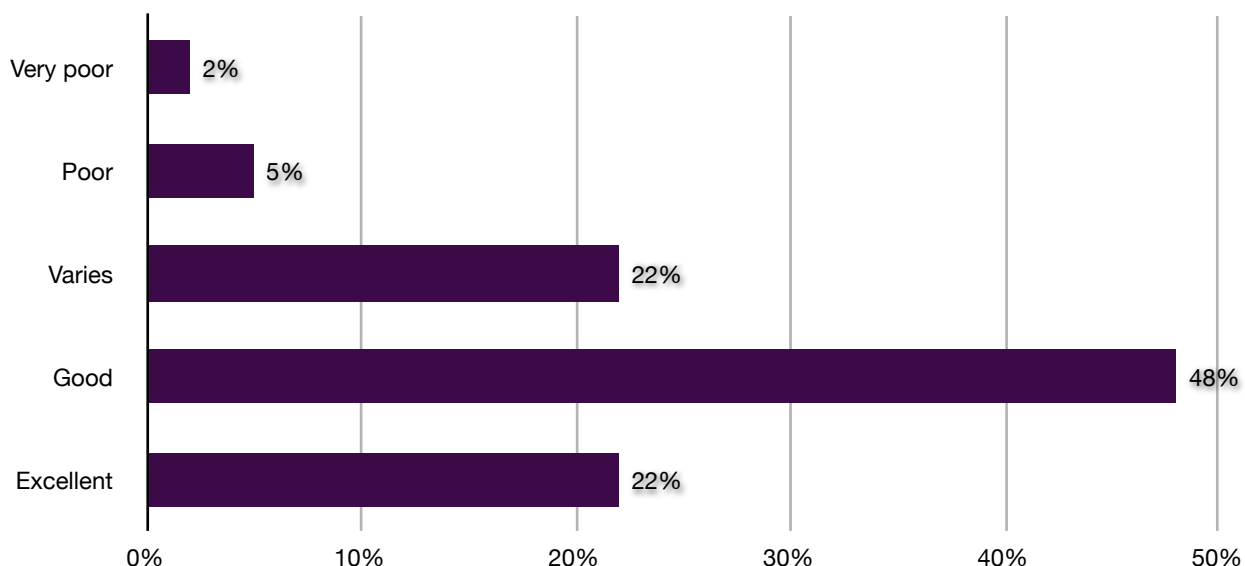


Figure 1: Levels of access to the journals literature (n = 3040)

There was a fairly predictable distribution of responses by geographic region, with USA/Canada, Anglophone and Australasia groups reporting about 85% good or excellent access, dropping to 66% for Europe/M.East, 56% for Asia, and 53% for Rest of world (see graph on following page).

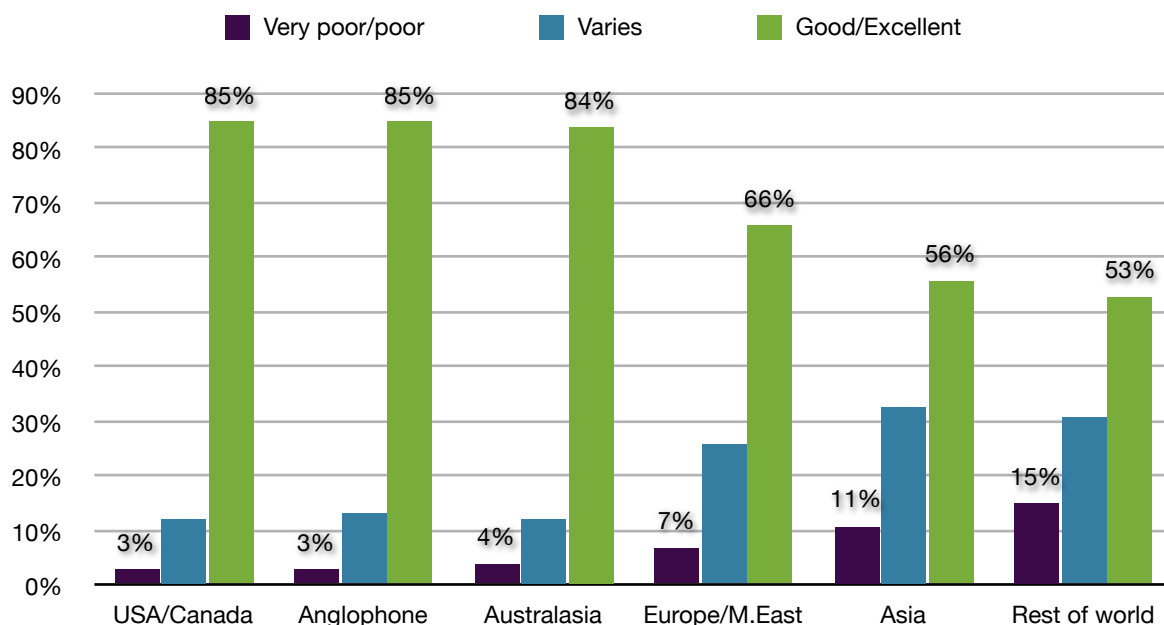


Figure 2: Levels of access to journals literature, by region (n = 3040)

### Use of new technologies

We asked respondents about the use of some new technologies (Q21). The question was primarily to identify potential early adopters of new technologies for subsequent analysis of other questions – for instance, are early adopters of new technology also more likely to support innovation in peer review?

Overall, penetration rates for these technologies are still low, with for instance 13% reading blogs regularly and 7% using social bookmarking services (like Connotea or CiteULike). (These figures are comparable to other surveys of academics; for instance, CERN/APS surveys of high-energy and condensed matter physicists reported in August 2007 by Paul Ginsparg in

CT Quarterly found less than 10% had tried social bookmarking, less than 10% followed blogs regularly, and less than 1% had their own blogs.)

There is an unsurprising negative correlation with age, with the <36 being much more likely to use these technologies than the 56+ age group. The exception is for handheld email devices, where use increases with seniority, possibly reflecting the expense of these devices.

Looking at the variation by field of study, uptake is greatest in Physical sciences/engineering in nearly all categories.

**Table 1: Use of new technologies**

(%)	Total	<36	56+	Clinical	HSS	Life	Phys/ Engng
RSS newsreader	23	26	21	20	17	21	27
Blogs - read regularly	13	22	10	11	17	11	16
Blogs - have own blog	3	7	2	2	3	2	4
Wiki - contribute to work-related wiki	11	17	8	8	7	9	15
Social bookmarking	7	10	7	7	7	5	9
Handheld email devices	12	12	10	14	6	19	15

Analysis of the regional variations show that Web 2.0 technologies have the greatest uptake in Asia, though even there they are still very much minority tools.

**Table 2: Use of new technologies by region**

	Anglophone (%)	Asia (%)
RSS newsreader	16	29
Blogs - read regularly	12	20
Blogs - have own blog	3	4
Wiki - contribute to work-related wiki	11	16
Social bookmarking	4	14
Handheld email devices	10	16

## Definitions

In analysing responses to questions we have defined the following subgroups:

- Editors: those who claimed editorship of at least one publication
- Active authors: 6 or more papers published in the last 24 months
- Active reviewers: 6 or more papers reviewed in the last 12 months
- Satisfied and Dissatisfied: the respondents who said they were satisfied/very satisfied or dissatisfied/very dissatisfied with the peer review system currently used by scholarly journals
- Early adopter: those who met any of the following - used an RSS newsreader; had their own blog; contributed to a work-related wiki; or used social bookmarking systems.

# Attitudes to peer review

## Overall satisfaction

At the start of the questionnaire, before they had been influenced by the content of more specific questions, respondents were asked about their overall degree of satisfaction with the peer review system used by scholarly journals (Q3). The majority, 64%, declared themselves satisfied or very satisfied, while a much smaller number, 12% were dissatisfied or very dissatisfied.

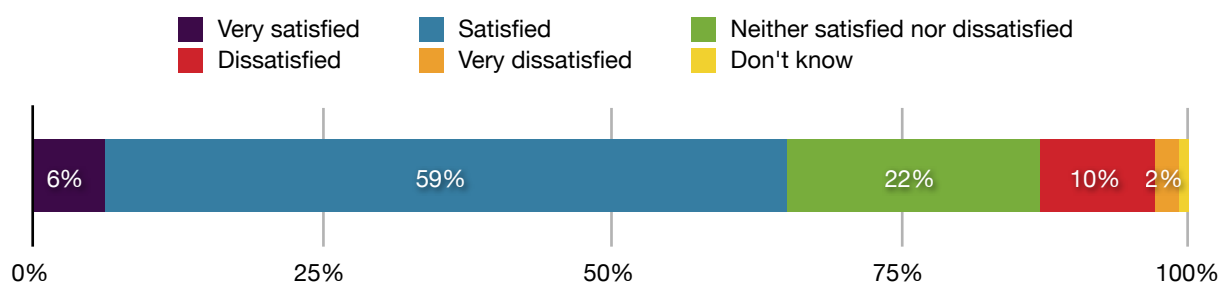


Figure 3: "Overall, how satisfied are you with the peer review system used by scholarly journals?" (n = 3040)

There were very few variations in this picture by demographic variable, and those that did exist were small, except by field of research, with HSS researchers being somewhat less satisfied (59%) and physical sciences/engineering researchers a little more satisfied (69%), and to a lesser extent by region (Asia/RoW 68% versus Anglophones 63%).

There were no other statistically significant differences, e.g. by gender, age, position, which contrasts to views later expressed on particular aspects of peer review.

In particular there were no significant differences by level of access to the journals literature.

The differences in overall satisfaction were also not a function of the number of papers an author had published in their career, with very little difference between the Satisfied and the Dissatisfied groups (63 and 64 papers respectively).

There was, however, a small but potentially interesting variation with regard to the type of peer review system that respondents had experienced as an author: those that reported experience of post-publication review scored significantly lower on overall satisfaction compared to the average, with 60% satisfied/very satisfied and 18% dissatisfied/very dissatisfied. The direction of causality (if any) is of course more likely to be the other way round, that is, we might speculate that those more dissatisfied with peer review might be more likely to experiment with post-publication review.

For reviewers, we were able to group them by the impact factor of the journal for which they last reviewed, into high, medium and low impact factors. There was no significant difference in overall satisfaction between these groups.

## More detailed attitudes to peer review

Respondents' initial attitudes were also tested by asking for their degree of agreement or disagreement towards a number of statements about peer review (Q4, scored using the standard Likert scale from "strongly disagree" to "strongly agree"). The

following table ranks the statements by mean score in declining order (the mean score was calculated using strongly disagree = -2, disagree = -1, neither agree nor disagree = 0, agree = 1, strongly agree = 2).

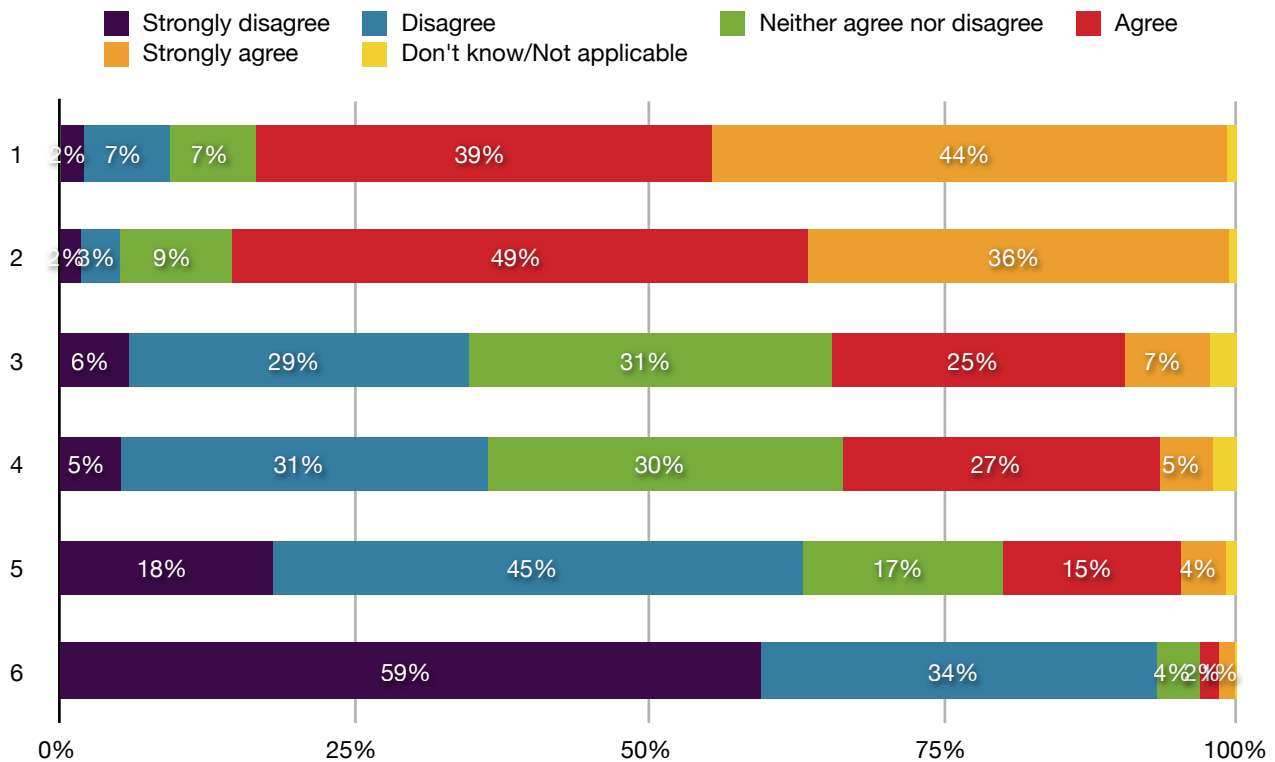


Figure 4: Attitudes to peer review: degree of agreement/disagreement with the following statements. (n = 3040). Key:  
 1 = Without peer review there is no control in scientific communication  
 2 = Scientific communication is greatly helped by peer review of published articles  
 3 = Peer review in journals needs a complete overhaul  
 4 = The current peer review system is the best we can achieve  
 5 = Peer review is holding back scientific communication  
 6 = Peer review is completely unnecessary

On the positive side, there was good support for the proposition that scientific communication is greatly helped by peer review, with 83% agreeing or strongly agreeing. There was very little demographic variation on this, though HSS researchers were somewhat less likely to support it (75%). There was a similarly high level of support (85%) for the idea that scientific communication is greatly helped by peer review.

Given the generally low level of overall dissatisfaction with peer review, though, it is perhaps surprising that a strong statement like “peer review in journals needs a complete overhaul” did not receive more disagreement – in fact respondents were divided, with 35% disagreeing versus 32% agreeing. There were clear regional differences on these questions, with Anglophones expressing net disagreement (43% opposed versus 27% supporting), while Asian respondents expressed net agreement (47% supporting versus 23% opposed), with Europe/Middle East/Row lying between these extremes.

Similarly, respondents were divided on whether the current peer review system is the best we can achieve, with 32% agreeing versus 36% disagreeing. Again, Asian and Anglophone opinion was clearly divided, with the former showing net support (43% for, 27% against) and the latter net opposition (25% for, 45% against).

**Table 3: Attitudes to peer review: degree of agreement/disagreement with the following statements**

Statement	Mean score	A (%)	D (%)	Groups agreeing more	Groups agreeing less
Without peer review there is no control in scientific communication	1.2	83	9	Satisfied (85)	Dissatisfied (71), HSS (75)
Scientific communication is greatly helped by peer review of published journal papers	1.1	85	5	Satisfied (91), Editors (88)	Dissatisfied (65)
Peer review in journals needs a complete overhaul	0	32	35	Dissatisfied (75), Asia (47), Worse access (46)	Satisfied (22), Anglophone (27), Better access (27), 56+ (30)
The current peer review system is the best we can achieve	-0.1	32	36	Asia (43), Satisfied (42), Men (34), Univ/College (33), Physical sci/engng (35),	Dissatisfied (5), Anglophone (25), Women (25), HSS (25), Clinical (29)
Peer review is holding back scientific communication	-0.6	19	63	Dissatisfied (44), Early adopters (24), Asia (23), Worse access (23)	56+ (15), Anglophone (16), Better access (16), Editors (17)
Peer review is completely unnecessary	-1.5	3	93	Dissatisfied (7), Asia (6), Worse access (5)	Anglophone (2), Satisfied (2), Better access (2)

Mean score calculated using Strongly disagree = -2, Disagree = -1, etc. A (%) is the proportion Agree/Strongly agree; D (%) is Disagree/Strongly disagree. Numbers in parentheses are percentages agreeing/strongly agreeing.

There was, however, virtually no support for the radical proposition that peer review was completely unnecessary. As with the other statements, there was a regional difference, though much smaller than for some of the other responses, with 95% of Anglophone and 88% of Asian respondents opposing. Unsurprisingly, the Satisfied group were more likely to disagree with this statement than the Dissatisfied group.

Only a minority overall (19%) agreed that peer review was holding back scientific communication. The Dissatisfied group was the most likely (44%) to support this. Asian respondents were a little more likely to support this, with 23% supporting, compared to 16% in the Anglophone region. Those with poor/very poor access to journals also agreed more (23%) than those with excellent access (16%).

It is worth noting that Active reviewers' responses were not significantly different from the average. That is, any views expressed here are shared by experienced and well-informed reviewers.

## Effectiveness of peer review

Respondents' views on what peer review is effective at achieving were tested (Q5) by asking for their degree of agreement or disagreement towards a number of statements about peer review (scored using the Likert scale from strongly disagree to strongly agree). The following table ranks the statements by mean score in declining order (mean score was calculated using strongly disagree = -2, disagree = -1, neither agree nor disagree = 0, agree = 1, strongly agree = 2).

**Table 4: Effectiveness of peer review degree of agreement/disagreement with the following statements**

Statement	Mean score	A (%)	D (%)	Groups agreeing more	Groups agreeing less
Peer review improves the quality of the published paper	1.2	90	3	Satisfied (95)	Dissatisfied (68)
It effectively determines the originality of the manuscript	0.5	58	17	Satisfied (69), Asia (69)	Dissatisfied (28), HSS (50), Anglophone (52), Clinical (53)
It determines the importance of the findings	0.5	60	16	Satisfied (69), Asia (68)	Dissatisfied (33), Anglophone (57)
Peer review selects the best manuscripts for the journal	0.3	49	22	Satisfied (60), Editors (57)	Dissatisfied (20)
It detects plagiarism	0.3	46	24	Asia (58), <36 (53), Physical sci/engng (53), Satisfied (51), Early adopters (51),	Dissatisfied (32), Clinical (38), Better access (38), Anglophone (39), Hospital/med school (39), Active reviewers (43)
It detects academic fraud or other types of misconduct	0.2	43	26	Asia (63), Physical sci/engng (52), Satisfied (49), Early adopters (49), <36 (49), Worse access (49)	Dissatisfied (28), Clinical (33), Anglophone (33), Better access (33)

Mean score calculated using Strongly disagree = -2, Disagree = -1, etc. A (%) is the proportion Agree/Strongly agree; D (%) is Disagree/Strongly disagree. Numbers in parentheses are percentages agreeing/strongly agreeing.

Respondents strongly believe that peer review is effective at improving the quality of the published paper, and this was easily the most supported statement. The level of support for this statement (90%) is virtually identical to proportion of respondents who said that peer review improved their last published paper. It seems clear that the academic community see this as the principal benefit of peer review.

There was also reasonably good support for the statements that peer review is effective at determining the originality of the manuscript and the importance of the findings (58% and 60% respectively).

There was less support for peer review being effective at detecting plagiarism and academic fraud, though some might think the degree of support given to these was actually rather high, given some high-profile examples to the contrary in recent years. Anglophone and Clinical researchers tended to give less support to these statements, while Asian and Physical sciences/engineering researchers were more positive.

The Satisfied group consistently rated peer review as more effective at achieving all of the proposed objectives compared to the Dissatisfied group.

Overall, the Anglophone group tended to be less convinced than average of the effectiveness of peer review, while the Asian group was more positive.

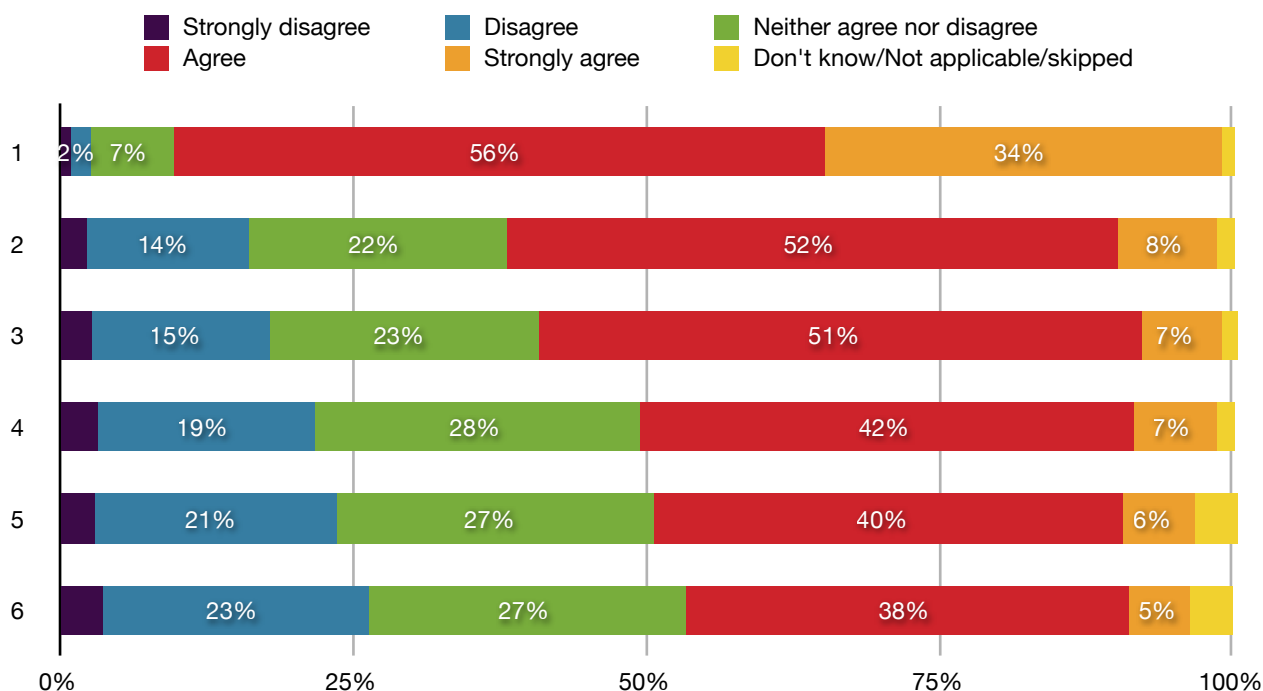


Figure 5: Effectiveness of peer review; degree of agreement/disagreement with the following statements (n = 3040). Key:  
 1 = Peer review improves the quality of the published paper  
 2 = It determines the importance of the findings  
 3 = It effectively determines the originality of the manuscript  
 4 = Peer review selects the best manuscripts for the journal  
 5 = It detects plagiarism  
 6 = It detects academic fraud or other types of misconduct

## Regional differences on attitudes to peer review

There are substantial regional differences expressed, primarily between the Anglophone and Asian regions, on the questions of overall satisfaction (Q3), statements about the need for reform etc. (Q4) and the effectiveness of peer review (Q5). These differences are somewhat hard to understand, as they appear contradictory:

- in terms of overall satisfaction (Q3), Asian were slightly *more* satisfied than Anglophone respondents;
- but looking at Q4, Asian respondents were more likely to support critical statements about peer review, such as their net agreement for “peer review needs a complete overhaul” or “peer review is holding back scientific communication” compared to net opposition in other regions.
- On the question of the effectiveness, though, Asian respondents were more likely to agree that peer review was effective, especially regarding the detection of academic fraud and plagiarism.

## Type of peer review thought effective

The survey explored experience of, and attitudes towards four different approaches to peer review: single-blind (where the reviewers’ names are not known to the author), double-blind (where the reviewers’ and author’s names are not disclosed to the other), open peer review (where the author’s and reviewers’ names are known to each other), and post-publication review.

## Attitudes as authors

There was a clear perception that double-blind peer review was more effective than the other choices (Q6). It is somewhat less strongly supported compared to single-blind review by what could be seen as the peer review “establishment” – editors, Active reviewers, Active authors, the 56+ age group, Heads of department – but even in most of these groups there is pretty

strong support. The least supportive were the 56+ age group and even there 60% agreed/strongly agreed it was effective. There were only small regional differences.

**Table 5: Authors' perceived effectiveness of different types of peer review**

Type of peer review	Mean score	A (%)	D (%)	Groups agreeing more	Groups agreeing less
Single-blind	0.3	52	30	Editors (64), Satisfied (61), Active reviewers (59), Physical sci/engng (59), 56+ (58), Life sciences (58)	Dissatisfied (30), HSS (35), RoW (41), Clinical (43), Asia (43), Worse access (44), Women (45)
Double-blind	1.0	71	11	HSS (84), Clinical (80), Women (78), Researchers (77)	56+ (60), Dissatisfied (61), Editors (65)
Open	-0.4	27	52	Dissatisfied (38)	
Post-publication	0.1	37	27	Asia (50), Dissatisfied (46), Clinical (45), Early adopters (44), Worse access (42)	HSS (30)

*Mean score calculated using Strongly disagree = -2, Disagree = -1, etc. A (%) is the proportion Agree/Strongly agree; D (%) is Disagree/Strongly disagree. Numbers in parentheses are percentages agreeing/strongly agreeing.*

Single-blind review was the most polarising of opinion, in that there were subgroups agreeing and disagreeing that it was effective. HSS researchers on balance disagreed it was effective (52% disagreed) while Life sciences and Physical sciences/engineering agreed (58/59% agreed). The Satisfied group saw it as effective (59% agreed) while the Dissatisfied group disagreed (51% disagreed). Regionally, 57% of Anglophones supported compared to 43% of Asians.

Open peer review was seen to be the least effective, with 51% overall disagreeing that it was effective (compared to 26% agreeing). There were no sub-groups where those who saw it as effective outnumbered those who disagreed. It is perhaps surprising that respondents rated it substantially less effective than post-publication review, a newer approach of which only 8% had personal experience.

Opinion on post-publication review was rather more evenly divided, with 37% agreeing and 27% disagreeing it was effective. Asian respondents had the highest proportion (50%) supporting. There was a correlation with level of access to journals: those with poorer access were more likely to support it than those with excellent access.

### Attitudes versus experience

An obvious question to ask is how respondents' opinions on the effectiveness of the different peer review options were related to their own experience of the options in question.

The table shows how the proportions of respondents agreeing each type of review was effective (in rows) vary according to whether the respondent had personal experience of the option as an *author* (in columns). Note that the columns showing experience are not exclusive; respondents could have experienced all options in principle.

Since most respondents (84%) have experience of single-blind it is not surprising that the size of the differences between the single-blind column and the total column are fairly small. Those with experience of double-blind review, however, are substantially less likely to rate single-blind review as effective compared to those with experience of single-blind (44% versus 58%).

**Table 6: Variation in view of effectiveness of different peer review systems by experience of the systems**

Type of peer review thought effective:	Total (%)	Methods experienced:			
		Single-blind (%)	Double-blind (%)	Open (%)	Post-publication (%)
Single-blind	52	58	44	52	51
Double-blind	71	70	80	67	65
Open	27	26	26	46	36
Post-publication	37	36	38	39	61

Similarly those who had experience of open peer review and post-publication review as an author were considerably more likely to rate them as effective than the average. At this point, the numbers of researchers who have personal experience of open and post-publication review are still small.

### Preferred option

After expressing their opinion on how effective each type of peer review was, respondents were asked to say which was their single most preferred option (Q7a). (Note, this question was asked of all respondents, not specifically of reviewers.)

**Table 7: Preferred type of peer review**

Type of peer review	Number	Percentage
Single-blind	770	25
Double-blind	1703	56
Open	392	13
Post-publication	160	5

A clear preference was expressed for double-blind compared to single-blind review. There were some marked variations in the level of preference between subgroups, as shown in the following table. The highest levels of support were in HSS (where it is much more commonly used) and in Asia. The lowest level of support for double-blind review was in the 56+ age group (is this because they see it as an unnecessary innovation, because their greater experience has revealed the flaws, or because they have such better knowledge of the workers in the field that they can almost always identify the authors of blinded manuscripts from internal clues?).

Within Physical sciences/engineering, support for double-blind reviewing was lowest in earth & planetary sciences (38%), astronomy (41%) and mathematics (43%), and highest in chemical engineering (67%), computer science/IT (64%) and materials science (61%).

In the Life sciences group, support for double-blind review was lowest in neuroscience (42%) and highest in agriculture (59%).

Respondents reversed the ranking of open peer review and post-publication review compared to the previous question on the effectiveness of each type. This is not inconsistent if respondents believed that post-publication review was effective but only as a supplement to some other choice, and hence not likely to be their preferred option. To put this another way, there was substantial (if minority) support for post-publication review, but only as a supplement to either single-blind or double-blind conventional review.

**Table 8: Preferred type of peer review, by discipline**

Discipline	Single-blind (%)	Double-blind (%)	Margin (%)
HSS	12	72	60
Clinical	19	63	44
Physical sci/engng	29	53	24
Life sciences	30	50	20
<36	20	62	42
36–55	23	60	37
56+	36	43	7
Anglophone	30	51	21
Asia	16	64	48
Excellent access	33	49	16
Poor/very poor access	16	60	44

It is not clear to what extent these statements would be translated into action in the real world. Evidence from some trials of open and post-publication peer review suggest otherwise.<sup>1</sup>

### Preferred option versus experience

The table below compares the preferred options (in rows) for the groups that had experience of different types of peer review (in columns). In each case, respondents who had experience of a particular kind of peer review were more likely to make it their preferred option than those who did not.

**Table 9: Preferred peer review system compared to experience of the systems**

Preferred option:	Overall (%)	Experienced:			
		Single-blind peer review (%)	Double-blind peer review (%)	Open peer review (%)	Post-publication review (%)
Single-blind peer review	25	29	18	24	23
Double-blind peer review	56	53	65	46	45
Open peer review	13	13	11	24	17
Post-publication review	5	5	5	6	14

<sup>1</sup> For example, see the account of Nature's open peer review trial (<http://www.nature.com/nature/peerreview/debate/nature05535.html>), or the difficulties the online journal PLoS ONE appears to have in persuading readers to use the commenting or ratings facilities.

## Reasons for preferred option

Respondents were asked to give the reason for the preferred option (Q7b). This was an open question, with the responses coded by this report's authors into the categories described below.

### Single-blind review

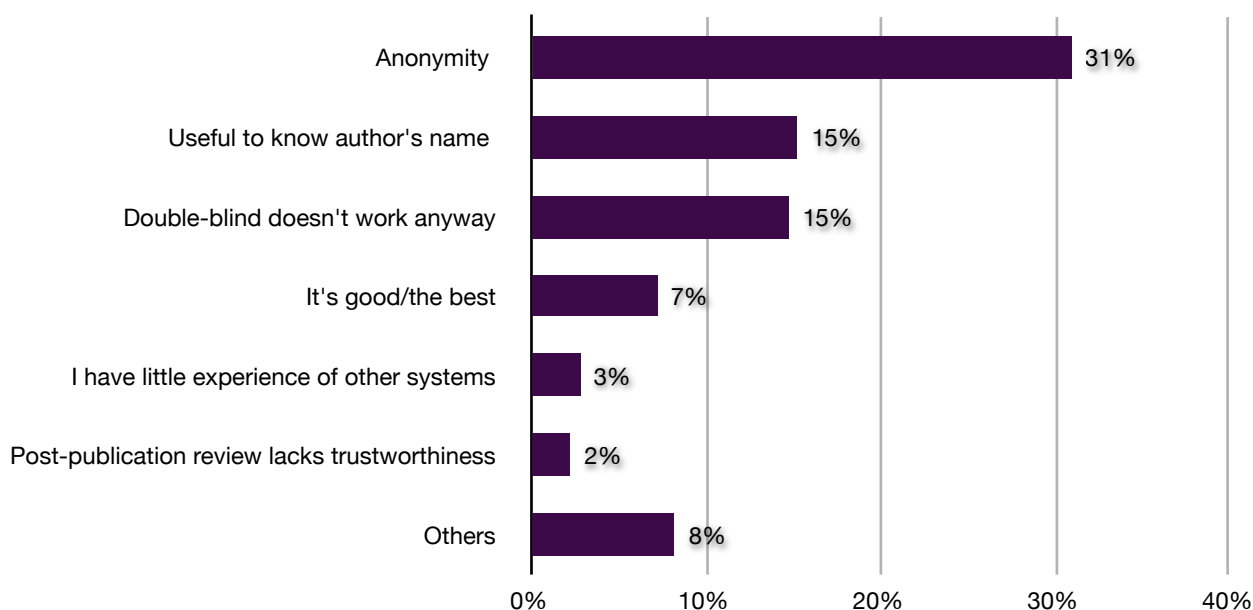


Figure 6: Reasons given for preferring single-blind review (n = 770)

The three most popular types of reason given for supporting single-blind review were:

- Anonymity of the reviewer allows them to act freely and independently, without fear of having to deal with comeback from the author, for example:
  - *"Anonymity is good to elicit forthright responses from reviewers, especially early career researchers reviewing established researchers."*
  - *"By not knowing who the reviewers are, the authors are less likely to develop personal animosities to the persons critiquing their work."*
  - *"Allows the reviewer to determine if he/she may have a conflict of interest with the group who publishes."*
  - *"Blinding of reviewers leaves them open to be honest in their critique without worrying that authors who may currently or in the future be in a position of power or authority over them will have their judgement clouded by a review that rejects or seriously questions their work."*
- Conversely, it is useful for the reviewer to know the author's identity because it can be used to look at other work by the author and check their research programme/institution, which are useful to assess credibility.
  - *"Referees need to check that the authors haven't published the work previously."*
  - *"Single blinding means that the reviewer can more readily consider other work by the same author(s) in their assessment. At times I have reviewed a paper that is predominantly a rewording of an earlier paper published by the same author(s). I may not have discovered this if I wasn't able to do a quick search and reading of the earlier work."*
  - *"By knowing who the authors are, the reviewer can assess the degree of previous expertise they have using the techniques and in the research topic of the paper. That knowledge helps when trying to sort out whether something has been explained unclearly versus being likely to have been done incorrectly."*

- The only other serious option is double-blind review but in practice it is very often possible to deduce the name of the author from internal clues, so that in these cases double-blind is really single-blind anyway.
  - *“Double blind is pointless because a referee can usually determine (from the cited work) which lab the paper came from.”*
  - *“Double blind peer review does not exist. We know the people in our field and we know what they do. We would guess two out of three times who the authors are.”*
  - *“Double blinding really doesn't work in many cases as the preprints of the paper are readily available during the review and it takes just a quick Google search to figure out who is the author of the paper. So it's really a hypocrisy.”*

### Double-blind review

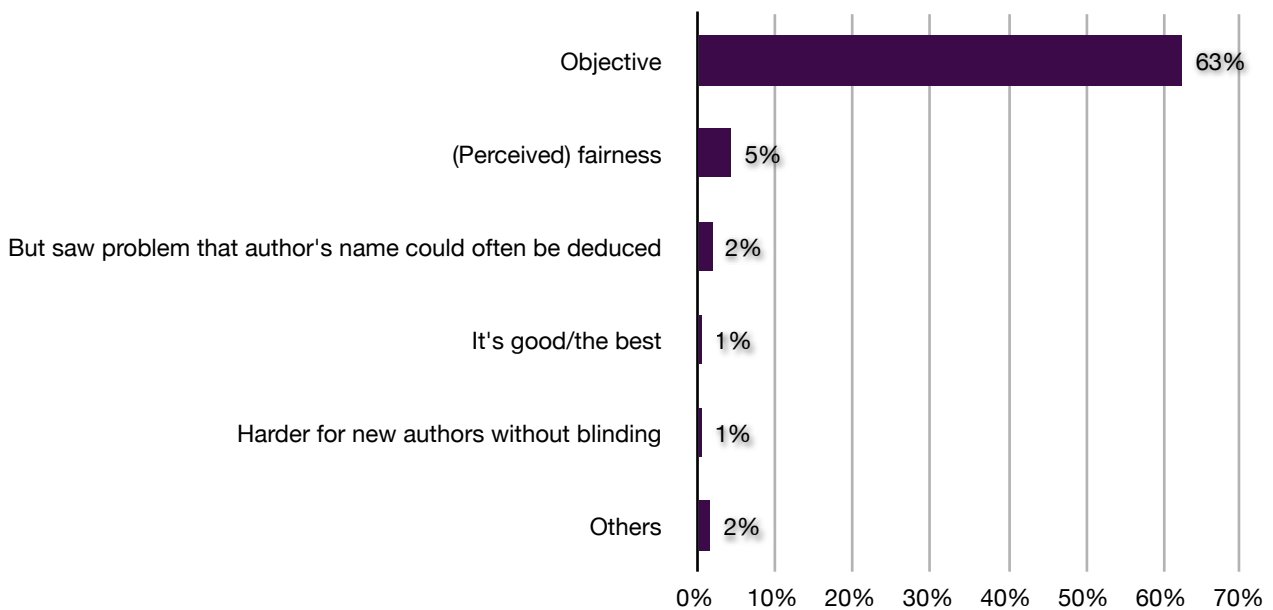


Figure 7: Reasons given for preferring double-blind review (n = 1703)

The overwhelmingly most popular reason for preferring double-blind review was that it was seen as a more objective process, removing potential biases due for example to the author's institution, race or country, or personal biases:

- *“As a reviewer it is critical to have complete anonymity because everyone knows everyone. As a writer, it's important so that the reviewers don't base their opinions or are not swayed by previous notions of the author's work (either positive or negative).”*
- *“I feel discrimination in the report of some referees specially when authors from developing countries (like Egypt) try to publish their work in high-impact-factor journals.”*
- *“As much as we would like it not to be the case, many authors are motivated strictly by publishing their own work. They would prevent others from being published as revenge for comments to their manuscripts. Also, there have been numerous studies that show that papers by women are far less accepted than those by men (and I have seen this happen where reviewers take this into consideration). Therefore the double blind review is the ONLY FAIR way to review manuscripts. It also significantly increases the credibility of the journal.”*
- *“Avoids response-set effects, whether based on institutional affiliation, gender, heterodoxy of subject matter, etc.”*
- *“Decreases risk of bias/prejudice by reviewer. Decreases risk of embarrassment to reviewer who has to reject paper from a 'friend'.”*

- *“Double blind is the most objective way to force reviewers and authors to focus on the science only, without any regard for personal consideration, conflict of interest, and reputation of the person in the field (a known author has always much more facility, most of the time at the expense of the science, to get their paper accepted than a young new author).”*

### Open peer review

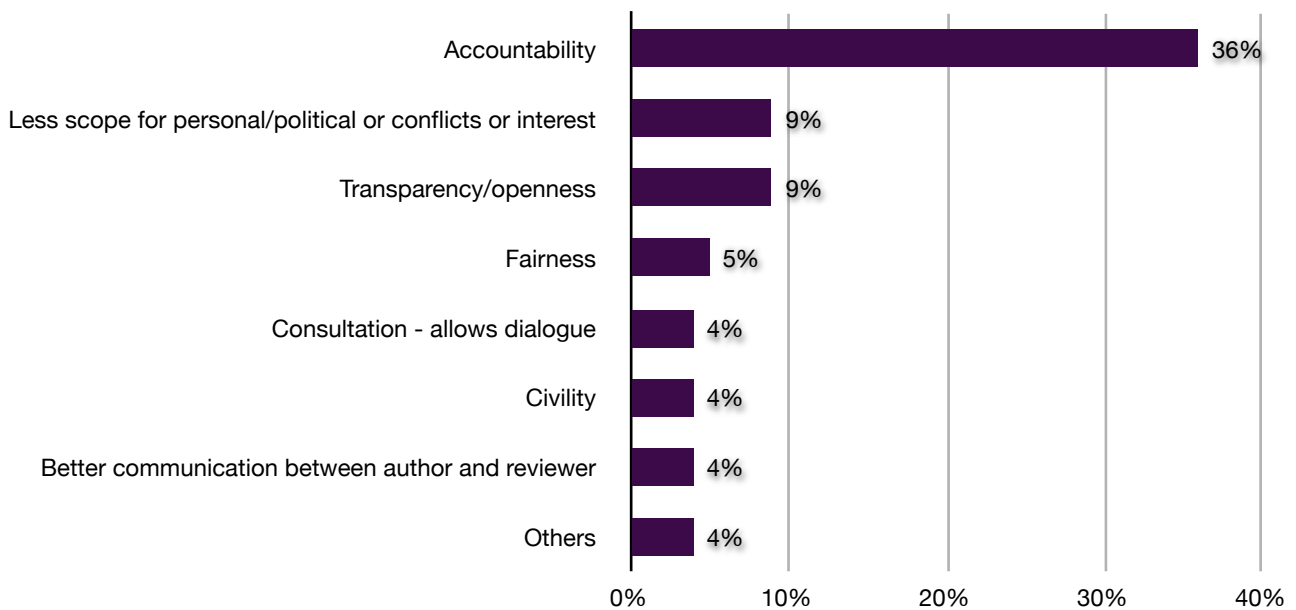


Figure 8: Reasons given for preferring open peer review (n = 392)

The numbers of respondents preferring open peer review (392) were open peer review were smaller than for single- or double-blind peer review but still substantial. The reasons given for preferring it were:

- Accountability was easily the most popular reason – the sense that the reviewer does not hide behind anonymity but is open and can be held to account for their report:
  - *“A person should stand behind his own critique and not hide behind anonymity: It will force the reviewer to do his job on the best side he can. If the reviewer is not capable of it or doesn’t understand what he read, this shame will be attached to his name.”*
  - *“Accountability. It’s good for a reviewer to be on his/her best behavior when reviewing a paper. I know I do a better job on reviews when I sign my name (and I almost always do, nowadays).”*
  - *“Critical and possibly harsh judgments should not be hidden behind anonymity.”*
  - *“I always sign my name as a reviewer. By doing this, I believe that it tends to encourage the reviewer to be more considered in their comments, more positive, and to take more effort in the review. If the reviewer is anonymous, it is too easy for them to do a quick and dirty and ill-considered review (and we’ve all be on the receiving end of such reviews!).”*
- Smaller numbers made a related point, that because the reviewer’s name was known, there was less likelihood for personal or political considerations to come into the reviewer’s report, because they could be held to account for them.
  - *“The “fear of embarrassment” is probably more powerful than the motivation of holding up the integrity of the field and certainly can make obvious biases.”*
- It was also thought that open review made reviewers more civil, made the process more of a dialogue with the author and generally improved author/reviewer communication.

- *"I think it increases tendency for constructive criticism."*
- *"It forces reviewers to be polite and to think again as to whether their comments are appropriate and reasonable."*
- *"Open peer review would increase constructive comments and decrease nasty cheap shots."*

A lengthier comment made the case for openness and dialogue in peer review:

- *"I think we should use internet communication more of an informal conversation about the scientific questions, rather than the formalized and aggressive duel that the referee process often falls into. For any kind of new ideas, peer review requires back and forth discussion of questions PRIOR to the referee issuing a judgment. The problem is that the current review system forces referees to express a definite judgment before getting a chance to have any of their questions answered. But once they commit to a judgment, admitting any other possibility would imply that the referee was "wrong", making most referees just dig in their heels. The current review system assumes that the referee is an expert authority on all aspects of the manuscript, and can therefore immediately issue a judgment. In reality, the referee is just a peer, who may understand the research questions in the manuscript less well than the authors do, and who therefore needs to educate him/herself by asking lots of questions, BEFORE issuing any decision."*

### Post-publication review

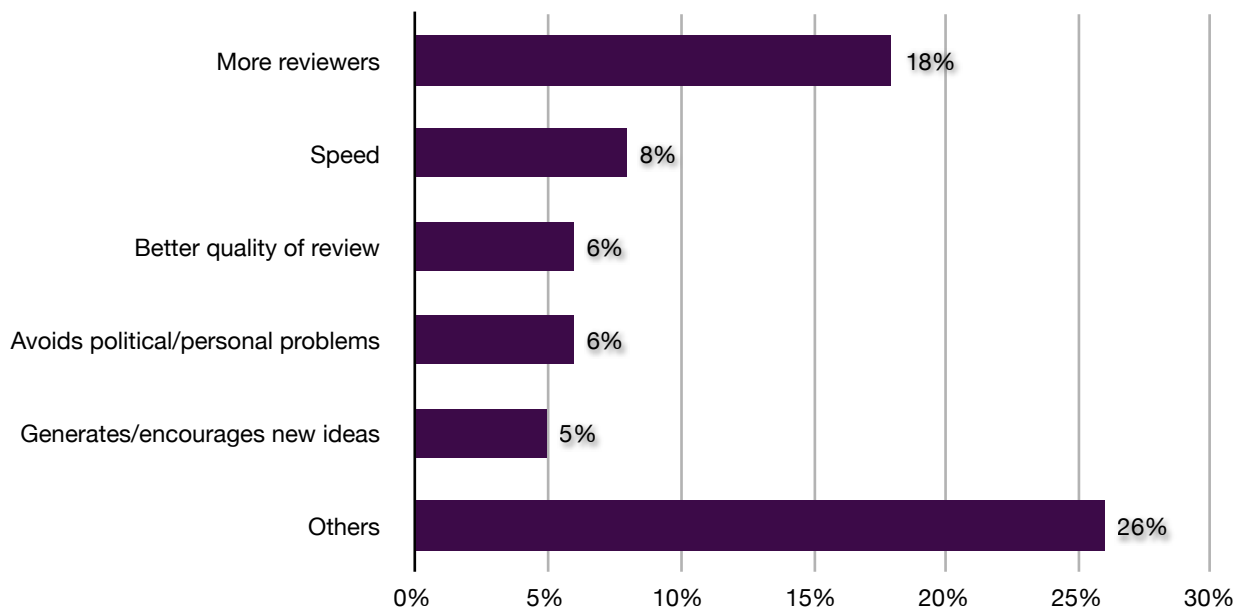


Figure 9: Reasons given for preferring post-publication review (n = 160)

Only a small minority gave post-publication peer review as their single most preferred option. There was a more disparate set of reasons given than for the other systems, giving a proportionately larger "Other" category below. The most popular reason was that having more reviewers is better than fewer. Speed was also cited.

Comments included:

- *"A thousand interested reviewers are better than three."*
- *"Brings in more views than just that one of their reviewers which may have interest due to potential competition among research groups."*
- *"Comments from a wider audience are preferred than a few selected reviewers who are often biased and may not be true experts in the field."*
- *"Considering online publication, that allows for assessing the value of the paper without slowing communication."*

Peer review in scholarly journals: Perspective of the scholarly community – an international study

- *“Current reviewing holds up publication by random amounts impossible to sustain in a web-based era. I think we will evolve toward a two fold system of initial posting for a few weeks, then mandatory revised posting, as organized by journals or societies.”*
- *“I think that the post-publication review (while not the best) will be the future of peer review for economic reasons. Post-publication review (e.g. filtering of ArXiv preprints, virtual journals, etc.) more evenly splits the effort of finding useful scientific information between the publisher and the reader and also allows an easy entry of third parties to the scene. This is why it is going to be more economically efficient (at the expense of readers, who may have to spend more time sifting through the low-quality papers to find the gems). In my opinion readers will be willing to pay such a price.”*

Other respondents criticised post-publication review in their comments supporting other systems. Typical comments were:

- *“Online readers do not usually have the expertise to correctly assess an original work. The majority of people who know a little bit about a field usually get a lot of important stuff wrong. In science, majority vote does not get you to the truth. The majority believed the world was flat, not that long ago.”*
- *“Post-publication reviews leave authors open to personally or professionally motivated attacks unrelated to the quality of the work. Replying to them would take so much time that any decent researcher's productivity would suffer – for no good purpose.”*

## Supporters of open and post-publication review

We compared the profile of those who chose open or post-publication review as their most preferred type of peer review to that of the others.

Perhaps surprisingly, there were almost no differences by the demographic variables (age, position, gender, region, field of research) or by the other descriptive variables (early adopters, access to journals, numbers of papers published or numbers of papers reviewed). The only differences apparent were that proponents of open and post-publication review were more likely to be dissatisfied with peer review overall (the converse has already been noted in the profile of the Dissatisfied group) and less likely to be satisfied overall, and that they were a little less likely to be based at a university/college and a little more likely to be at a research institute.

## Attitudes towards post-publication review

Respondents' attitudes towards post-publication review were tested (Q17) by asking for their degree of agreement or disagreement towards a number of statements (using the Likert scale from strongly disagree to strongly agree). Post-publication review was defined here as “the suggested system of post-publication review, where online readers comment on the paper after publication”. The table on the following page ranks the statements by mean score in declining order (mean score was calculated using strongly disagree = -2, disagree = -1, neither agree nor disagree = 0, agree = 1, strongly agree = 2).

Overall, researchers see post-publication review as a useful supplement to formal peer review in quite large numbers – 53% agree with this statement, compared to 23% disagreeing. They see this usefulness despite a clear view that it tends to encourage instant reactions and discourage thoughtful review. There is less support for the idea that it could be an acceptable alternative (31% support versus 43% opposing) and fairly strong opposition to the idea that it could be an equally powerful alternative to formal peer review (57% oppose versus 19% supporting).

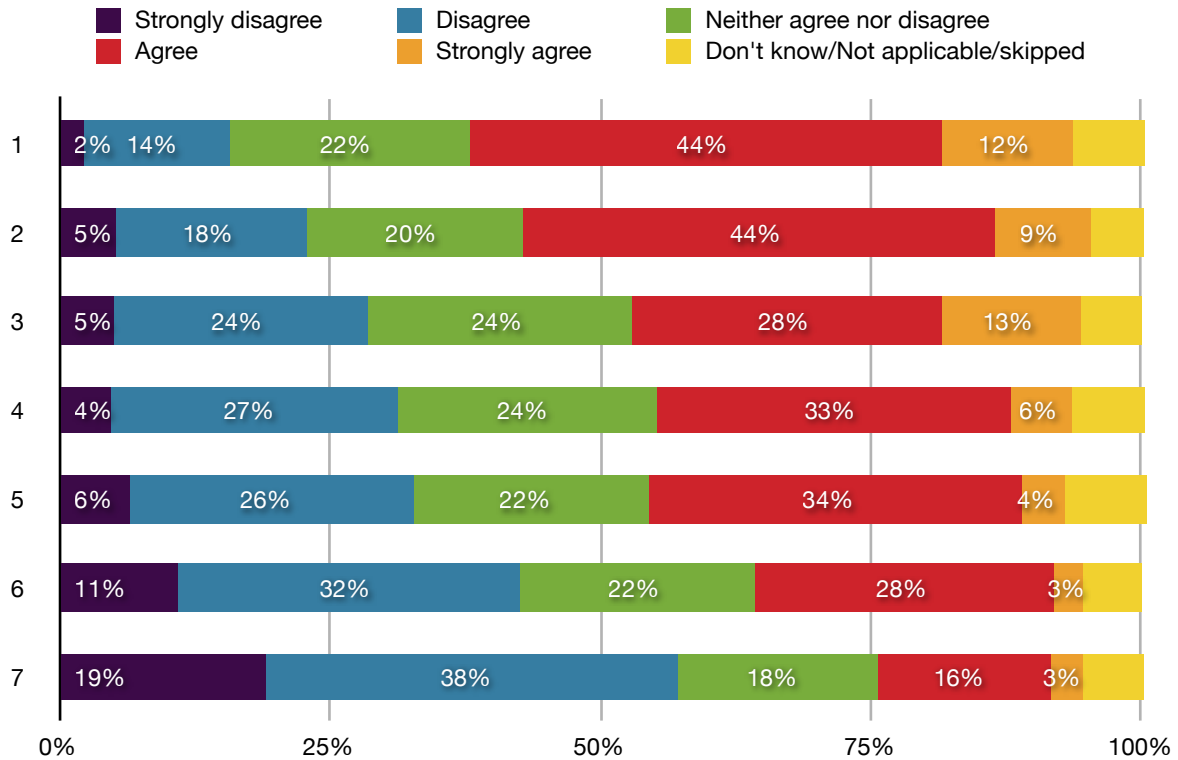


Figure 10: Post-publication review: degree of agreement or disagreement towards the following statements (n = 3040). Key:  
 1 = Such a system encourages instant reaction and discourages thoughtful review  
 2 = This would be a useful supplement to formal peer review  
 3 = As an author, the adoption of such a system by a journal would make me less likely to submit to it  
 4 = Readers will be unwilling to offer substantial criticism for fear of offending the author  
 5 = Adoption of this system would relieve the load on reviewers  
 6 = The system is not as good as formal peer review but would be an acceptable alternative  
 7 = This would offer an equally powerful alternative to formal peer review

There were substantial differences between Anglophone and Asian respondents on two of these statements:

- “Equally powerful system”: 35% of Asian respondents supported this, compared to 12% of Anglophones
- “An acceptable alternative”: 52% of Asians supported, compared to 18% of Anglophones.

The Asian respondents were clearly much more positive towards the idea of post-publication review.

For publishers considering experimenting with post-publication review, however, there might be concern that 41% of respondents say this would make them less likely to submit a paper. Substantial numbers of respondents (39%) also believed that readers would be unwilling to offer substantive criticism for fear of offending the author.

**Table 10: Post-publication review: degree of agreement or disagreement towards the following statements**

Statement	Mean score	A (%)	D (%)	Groups agreeing more	Groups agreeing less
Such a system encourages instant reaction and discourages thoughtful review	0.5	56	16	Better access (63), Anglophone (61)	Rest of world (47), Dissatisfied (48)
This would be a useful supplement to formal peer review	0.4	53	23	Dissatisfied (59), <36 (58), Researchers (58), Asia (57)	Better access (46), 56+ (47), Editors (50)
As an author, the adoption of such a system by a journal would make me less likely to submit to it	0.2	41	29	Better access (49), Anglophone (46)	Dissatisfied (31)
Readers will be unwilling to offer substantial criticism for fear of offending the author	0.1	39	31	Editors (45)	Dissatisfied (34), Clinical (35)
Adoption of this system would relieve the load on reviewers	0	38	32	Dissatisfied (47), Asia (44), Early adopters (42), Physical sci/engng (42)	HSS (31), Anglophone (34)
This system is not as good as formal peer review but would be an acceptable alternative	-0.2	31	43	Asia (52), Worse access (45), Early adopters (39)	Anglophone (18), Better access (18), HSS (19), Editors (27)
This would offer an equally powerful alternative to formal peer review	-0.6	19	57	Asia (35), Worse access (30), Dissatisfied (28), Early adopters (26), Physical sci/engng (23), Researchers (22),	Better access (10), Anglophone (12), HSS (13), Women (15), Clinical (17), Editors (20/62)

Mean score calculated using Strongly disagree = -2, Disagree = -1, etc. A (%) is the proportion Agree/Strongly agree; D (%) is Disagree/Strongly disagree. Numbers in parentheses are percentages agreeing/strongly agreeing.

## Peer review versus usage & citation data

One of the tenets of the “Web 2.0” viewpoint is the “wisdom of the crowds” – the idea that the aggregated opinions of large numbers of non-experts could be as good as, or even better than, the experts. This is the idea behind Wikipedia, for instance, and it has also been suggested that a similar process could be used to filter scientific papers. Chris Anderson, the editor of Wired magazine, writing in Nature in 2006 <sup>2</sup> made the case for making more use of such methods (in addition to conventional peer review).

Researchers in this survey certainly do not see such methods as being capable of replacing conventional peer review (Q18). None of the suggested alternatives – citation data, usage data or reader ratings – was supported as an alternative to peer review by more than 5-7% of respondents overall.

There was very little difference between the responses regarding citation and usage statistics, with fractionally less opposition to reader ratings.

<sup>2</sup> Scientific publishers should let their online readers become reviewers, *Nature* (2006) doi:10.1038/nature04992

The Dissatisfied group disagreed less strongly than the total on each option but this was most marked for the last one – about a fifth (21%) of them supported reader ratings as an alternative to peer review.

As on other topics, there was a marked difference between Anglophone and Asian respondents, with the former disagreeing more than average, and the latter disagreeing less.

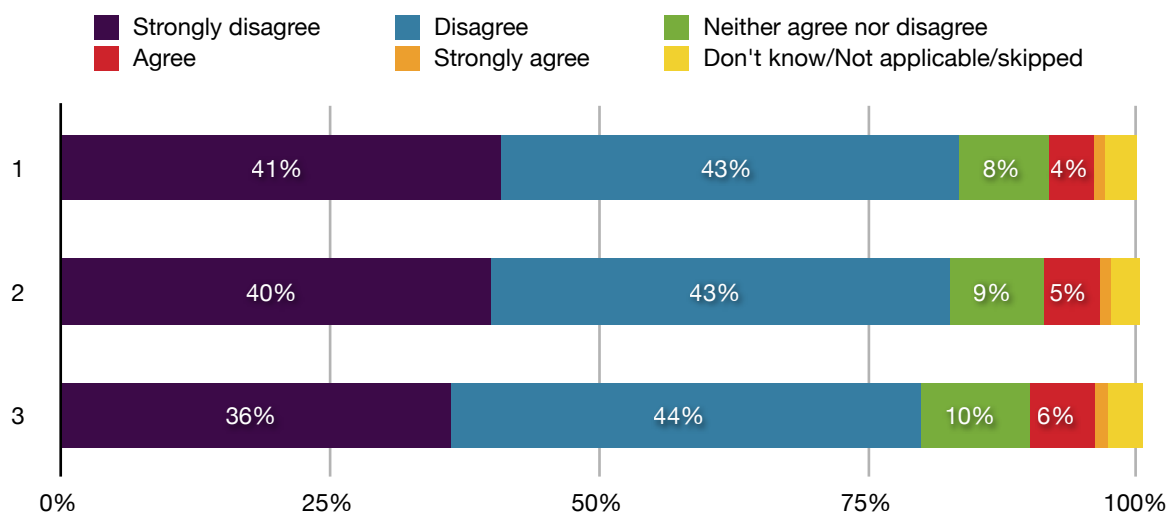


Figure 11: Usage/citation data: degree of agreement/disagreement with the following statements (n = 3040). Key:  
 1 = Peer review is unnecessary and could be replaced by usage statistics ...  
 2 = Peer review is unnecessary and could be replaced by citation data ...  
 3 = Peer review is unnecessary and could be replaced by post-publication ratings

**Table 11: Usage/citation data: degree of agreement/disagreement with the following statements**

Statement	Mean score	A (%)	D (%)	Groups disagreeing less	Groups disagreeing more
Peer review is unnecessary and could in principle be replaced by utilising usage statistics (for instance the number of times a paper is downloaded) to identify good papers	-1.2	5	84	Dissatisfied (73), Asia (73), Physical sci/engng (80), Worse access (81)	Better access (92), HSS (89), Women (89), Editors (88), Anglophone (88), Satisfied (87)
Peer review is unnecessary and could in principle be replaced by utilising citation data to identify good papers	-1.2	6	83	Asia (69), Dissatisfied (72), Worse access (77)	Better access (90), Anglophone (88), Women (87), HSS (87), Editors (86), Satisfied (86)
Peer review is unnecessary and could in principle be replaced by utilising post-publication ratings given by readers to identify good papers	-1.1	7	80	Dissatisfied (67), Asia (69), <36 (74), Worse access (74), Physical sci/engng (76)	Better access (89), Editors (87), Satisfied (84), HSS (84), Anglophone (84),

Mean score calculated using Strongly disagree = -2, Disagree = -1, etc. A (%) is the proportion Agree/Strongly agree; D (%) is Disagree/Strongly disagree. Numbers in parentheses are percentages agreeing/strongly agreeing.

## Reviewing authors' data

The development of online publishing means that it is increasingly feasible to include authors' data (for instance, data tables, video files, etc.) with the paper, either as supplementary materials or potentially as an integrated part of the paper. The survey explored reviewers' and editors' views on the need for peer review of this data and their willingness to become involved.

### Reviewers' perceptions

A majority of reviewers say (Q35) that it is desirable in principle to review authors' data (63% support versus 12% opposing). At the same time reviewers are divided on whether it is unrealistic (40% agree versus 30% disagree).

Perhaps surprisingly, a majority (albeit a small one, 51%) say that they would be prepared to review authors' data themselves, compared to only 19% who disagreed. (There is, of course, another obstacle to data review that we did not explore in this survey, namely that authors are reported to be very reluctant to provide data when requested by journals<sup>3</sup>.) Given that the core group of Active reviewers also reported themselves to be overloaded, we wonder however whether they would still be as willing when it actually came to examine the data.

For each statement there are substantial numbers, around a quarter of reviewers, who have yet to make up their minds.

The responses to these statements were mostly uniform across the demographic groupings. In particular there was little variation by field of research, except that HSS researchers were less likely to be willing to undertake data review (30% disagreed, compared to 19% for the total response). There was also no significant correlation with age on the desirability in principle of data review or the unrealistic nature of review. Younger researchers were more willing to undertake data review than older researchers (perhaps because they had more availability for review overall). And Active reviewers, who we should expect to have a well-informed perspective on the issues involved, held views that were not statistically different from the average on all three statements.

Another negative finding was that the Early adopters among the reviewers were no less likely to say data review was unrealistic than others, and no more willing to undertake data review, when we might have expected technology users to see fewer technical obstacles.

There was substantially less support for data review in principle from Asia and Europe/M.East compared to the Anglophone region, but when it came to views on how realistic it was, there was no difference between these groups.

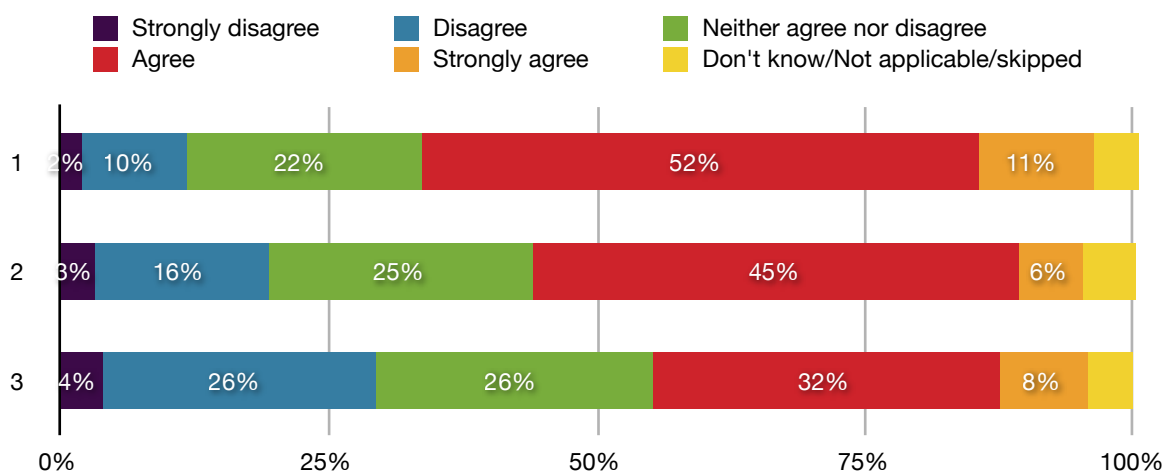


Figure 12: Reviewing authors' data: degree to which reviewers agreed/disagreed with the following statements (n = 2165).

Key:

- 1 = Peer review of author's data is desirable in principle
- 2 = I would be happy to review author's data if requested by the journal
- 3 = It is unrealistic to expect peer reviewers to review author's data

<sup>3</sup> e.g. see this Editorial in *BMJ*: *BMJ* 2004;328 (12 June), doi:10.1136/bmj.328.7453.0-g

**Table 12: Reviewing authors' data: degree to which reviewers agreed/disagreed with the following statements**

Statement	Mean score	A (%)	D (%)	Groups agreeing more	Groups agreeing less
Peer review of authors' data is desirable in principle	0.6	63	12	Anglophones (72), Better access (71)	Europe/ME (54), Asia (57), Heads of dept (59)
I would be happy to review authors' data if requested by the journal	0.4	51	19	Asia (61), <36 (59)	Women (47), HSS (41)
It is unrealistic to expect peer reviewers to review authors' data	0.2	40	30		Hospital/med school (38/35)

Mean score calculated using Strongly disagree = -2, Disagree = -1, etc. A (%) is the proportion Agree/Strongly agree; D (%) is Disagree/Strongly disagree. Numbers in parentheses are percentages agreeing/strongly agreeing.

### Editors' perceptions

Editors were more convinced than reviewers that peer review was desirable in principle (Q44), with 68% supporting (cf. 63% of reviewers) and 10% opposing (19% of reviewers). Some 43% had no plans to introduce peer review of data at their journals and only 17% said they did have such plans. (This compared to 40% of reviewers who said they were prepared to review data.)

The scores on whether or not it is realistic to expect reviewers to review authors' data were also very similar to those of reviewers (45% of editors agreeing and 29% disagreeing it was unrealistic, compared to 40% and 30% respectively for reviewers).

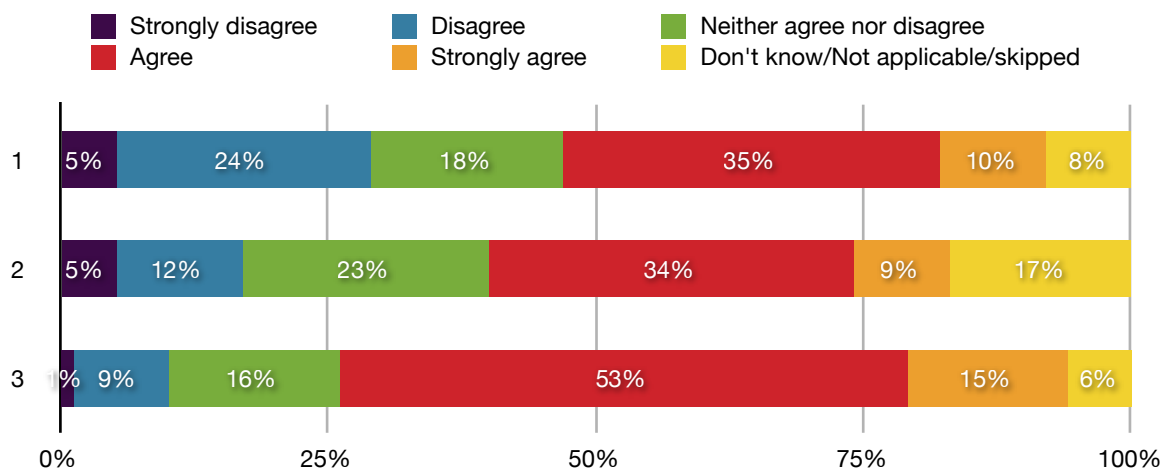


Figure 13: Reviewing authors' data: degree to which editors agreed/disagreed with the following statements (n = 632). Key:  
 1 = It is unrealistic to expect peer reviewers to review author's data  
 2 = We have no plans to introduce the reviewing of author's data at our journal  
 3 = Peer review of author's data is desirable in principle

**Table 13: Reviewing authors' data: degree to which editors agreed/disagreed with the following statements**

Statement	Mean score	A (%)	D (%)	Groups agreeing more	Groups agreeing less
Peer review of authors' data is desirable in principle	0.8	68	10	USA/Canada (74)	Hospital/med school (64)
We have no plans to introduce the reviewing of authors' data at our journal	0.4	43	17	HSS (57)	Early adopters (37)
It is unrealistic to expect peer reviewers to review authors' data	0.2	45	29	–	–

Mean score calculated using Strongly disagree = -2, Disagree = -1, etc. A (%) is the proportion Agree/Strongly agree; D (%) is Disagree/Strongly disagree. Numbers in parentheses are percentages agreeing/strongly agreeing. n = 632

## Payment for reviewers

Respondents' views on the option of paying reviewers were tested by asking them to state the degree to which they agreed or disagreed with the following statements (Q8).

**Table 14: Payment for reviewers: degree to which respondents agreed/disagreed with the following statements**

Statement	Mean score	A (%)	D (%)	Groups agreeing more	Groups agreeing less
Reviewers should be paid for each review they complete	-0.1	35	40	Asia (44), Europe (43), Worse access (42)	Anglophone (28), Better access (29)
Monetary payment would reduce the objectivity of peer review	-0.1	28	43	<36 (34)	HSS (18)
Monetary payment would make the cost of publishing too expensive	0.5	52	18		Dissatisfied (45)

Mean score calculated using Strongly disagree = -2, Disagree = -1, etc. A (%) is the proportion Agree/Strongly agree; D (%) is Disagree/Strongly disagree. Numbers in parentheses are percentages agreeing/strongly agreeing. n = 3040

Respondents were divided on whether reviewers should be paid, with a slight majority against: 35% agreeing and 40% disagreeing. The variations among subgroups were not large. Anglophones were the most opposed to payment, with 48% opposed and 28% in favour, while Asians and Europeans were in favour (43-44% for, 31-33% against). Of course, payment has been used on some journals for some time, though these are very much the minority – 5% of editors reported (Q49) that they offered monetary payment for reviewing.

The majority believed that paying reviewers would make publishing too expensive, with 52% agreeing compared to only 18% disagreeing. The table below compares the respondents' views on whether reviewers should be paid with their views on whether this would make publishing too expensive. Perhaps unsurprisingly, respondents thinking reviewers should be paid were much less likely to think this would make publishing too expensive.

**Table 15: Comparison of views on whether reviewers should be paid with views on whether payment would make publishing too expensive**

Reviewers should be paid:	Total	Payment would make publishing too expensive:					
		Strongly disagree	Disagree	Neither agree/disagree	Agree	Strongly agree	Don't know/Not applicable
Strongly disagree	10	15	1	6	9	34	8
Disagree	30	6	10	18	42	42	30
Neither agree nor disagree	23	8	9	34	26	14	20
Agree	28	30	58	36	19	7	28
Strongly agree	7	40	21	6	2	2	6
Don't know/Not applicable	1	0	0	0	1	0	7

For the most part, respondents' views on these questions appear to be personal matters, independent of their field of research. Women throughout the survey tended to express more altruistic positions (see e.g. Q32, Reasons for reviewing); their responses here are consistent with that position, being less inclined than men to think reviewers should be paid, and more inclined to see the downside.

### Payment source

Those who were in favour of payments for reviewers were asked for their preferred source of such payments (Q9).

**Table 16: Preferred source of any payments to reviewers**

Source of payments	Number	Percentage
Subscription fees or licences	690	23
Publication or submission charges	529	17
Don't know/Not applicable	870	29
Other, of which:	167	5
- Advertising/sponsors	28	1
- Publishers	50	2
- Non-monetary payments	17	1
- Funding agencies, grants, government	30	1

The single most popular response was Don't know/Not applicable. Of those who did express an opinion, more would prefer the costs to come from subscription or licence fees rather than publication/submission charges, though the difference was not really decisive.

Those with poor/very poor access to journals were more likely (31%) to suggest payment from subscription fees than those with excellent access (17%). This is probably because they have limited budgets under their personal control for publication charges.

Among the "Other" categories volunteered by respondents, the single most popular option was for publishers to pay for this out of their profits.

# Current practices in peer review

## Authors' experiences

### Papers published

Respondents had published an average of about 60 papers in their careers to date, suggesting they are fairly experienced and productive researchers (Q1)<sup>4</sup>. Editors had published 90 papers, reflecting the fact that they were likely to be more senior.

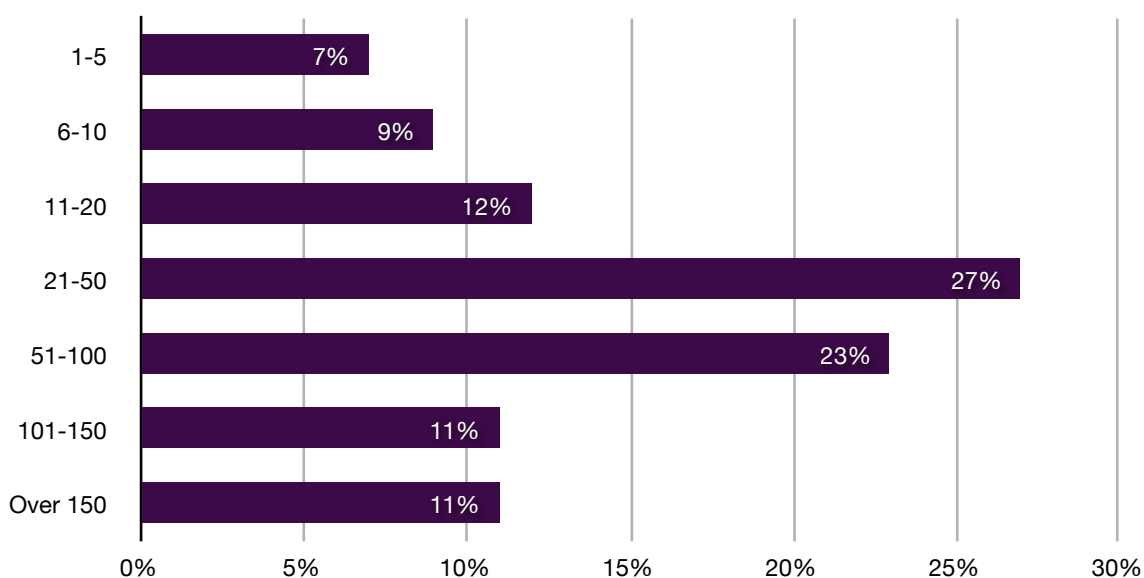


Figure 14: Total number of papers published in career to date (n = 3040)

There was a natural correlation with age, with those under 36 having published an average of 20 papers, and a similar relationship with position (seniority).

Women had published about half as many papers as men. This is not fully explained by the fact that women were on average younger than men.

There were substantial differences between research field, with average career publications totalling around 75 for the life sciences, 70 for clinical, 55 for physical science/engineering and 40 for humanities & social sciences.

There were also clear regional differences, with Anglophone and European respondents publishing the most (70 and 65 respectively), and Asian (50) and Rest of world (45) respondents the least.

Active reviewers (i.e. Reviewers who had reviewed 6 or more papers in the last 12 months) were also more productive authors, with an average 85 papers.

<sup>4</sup> Note: averages were calculated from responses in the bands shown in the figure; because there was a substantial proportion in the open "Over 150" band, the average is somewhat sensitive to the assumption used for this band, and hence the figures have been rounded to the nearest 5 and should be regarded as approximate.

More currently, respondents had published 8 papers in the last 24 months. As with career totals, there were differences between subject fields: clinical 9, life sciences 9, physical sciences/engineering 8, and HSS 5. There was a less strong relationship with age (compared to career totals) but a direct relationship with seniority: research students published 4 papers in the last 24 months, researchers 6.7, senior researchers 9 and heads of department 11.

Interestingly, although there were substantial regional variations between numbers of papers published in their whole careers, there was much less variation in the numbers of papers published in the last 24 months, with all regions publishing between 8 and 9 papers.

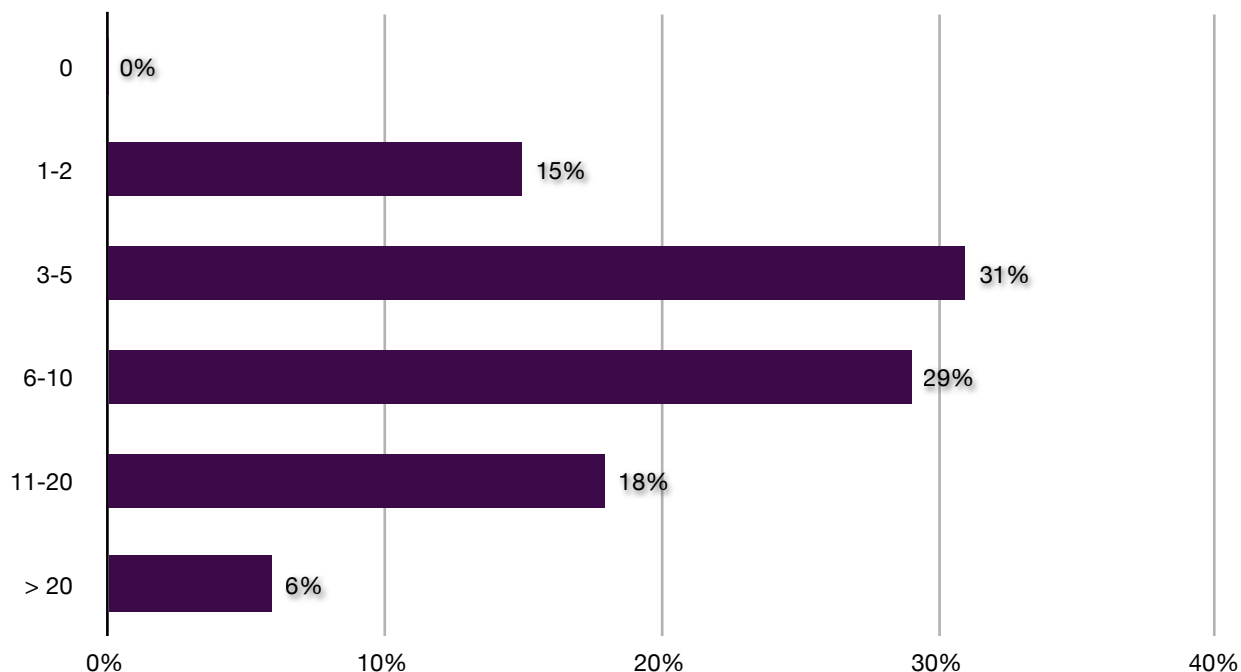


Figure 15: Number of papers published in the last 24 months (n = 3040)

There was a clear correlation between career publishing totals and level of access to the journals literature, with those reporting poor/very poor access publishing 45 papers, rising to 75 papers for those with excellent access. The overall averages are exaggerated by the fact that those with worse access also tend to be a little younger, and hence have less career to publish over, but the effect remains even after allowing for age.) However, there was much less variation for the numbers of papers published in the last 24 months, which varied from 7 (poor/very poor access) to 9 (excellent access). The direction of causality, if any, is not obvious: excellent researchers are likely to migrate to institutions with excellent access, as well as researcher productivity being hampered by lack of access to journals. The fact that current productivity shows less variation than career output suggests that good authors migrating to good institutions may be a part of the explanation.

“Active authors” were defined as those who had published 6 or more papers in the last 24 months and this grouping was used in subsequent analysis.

## Experience of different types of peer review

### Types of peer review experienced by authors

Not surprisingly, the conventional single-blind peer review system was the one most commonly experienced by authors, with 84% saying they had experience of it compared to 44% for double-blind, 22% for open and just 8% for post-publication peer review (Q10).

There was not a lot of variation between subgroups except by field of study and region. The subject splits shows that single-blind is the norm in Life sciences and Physical sciences/engineering, while double-blind review is much more common for

authors in HSS (though compare the results for editors below). Clinical authors had rather more equal experience of both systems.

**Table 17: Types of peer review experienced by authors**

Type of peer review	Total (%)	Clinical (%)	HSS (%)	Life sci. (%)	Physical sci/engng (%)
Single-blind	85	85	66	91	88
Double-blind	45	67	94	34	31
Open	23	31	24	24	18
Post-publication	8	11	9	8	7

The regional splits are shown in the table below.

**Table 18: Regional variations in experience of types of peer review**

Type of peer review	Most experience	Least experience
Single-blind	USA/Canada (90%)	Asia (76%)
Double-blind	Anglophone (52%)	Europe/M.East (38%)
Open	Australasia (38%)	Asia (13%)
Post-publication	USA/Canada (12%)	RoW (4%)

#### As a reviewer

Reviewers' experience of single-blind and double-blind peer review was (not surprisingly) essentially the same as reported by authors (Q10c). They reported lower levels of participation, however, in open and post-publication review.

**Table 19: Types of peer review experienced by reviewers**

Type of peer review	Total (%)	Clinical (%)	HSS (%)	Life sciences (%)	Physical sci/engng (%)	Active reviewers (%)
Single-blind	86	85	59	93	88	91
Double-blind	42	65	94	31	28	49
Open	16	22	14	18	13	20
Post-publication	3	5	3	3	3	5

#### As an editor

Editors reported the same ranking of the different types as did authors and reviewers (Q37). The percentages are not directly comparable with these two groups, however, because this was probably a single-choice response for most editors (i.e. most journals use only one system), whereas it was a multi-choice response for authors and editors.

As for authors and reviewers, single-blind review is the norm in the Life sciences and Physical sciences/engineering, with HSS journals more likely to use double-blind review.

**Table 20: Types of peer review experienced by editors**

Type of peer review	Total (%)	Clinical (%)	HSS (%)	Life sciences (%)	Physical sci/engng (%)
Single-blind	72	64	33	83	81
Double-blind	22	30	63	13	13
Open	3	4	1	3	5
Post-publication	1	0	1	1	1

## Peer review and improvements to the paper

### Does peer review improve the paper?

Respondents were asked to consider specifically their last published paper and then to say whether or not the peer review process had improved it (Q11).

A large majority (89%) agreed that it had done so. This is very similar to the proportion (90%) that agreed to the statement “peer review improves the quality of the published paper”.

There were few variations among demographic or other subgroups, except that the “Dissatisfied” group (those who said they were dissatisfied or strongly dissatisfied with peer review overall) were much less likely to say peer review had improved their paper, with 30% disagreeing. One possible explanation for their overall dissatisfaction with peer review (or for some of it), therefore, may lie in a recent poor publishing experience. There was only small variation by geographic region.

### How was it improved?

Those who agreed peer review had improved their paper were asked which aspects of the paper had been improved, and in each case by how much (using a scale from 1 = No improvement to 5 = Substantial improvement) (Q12.). The table ranks the responses in declining order by the mean score given.

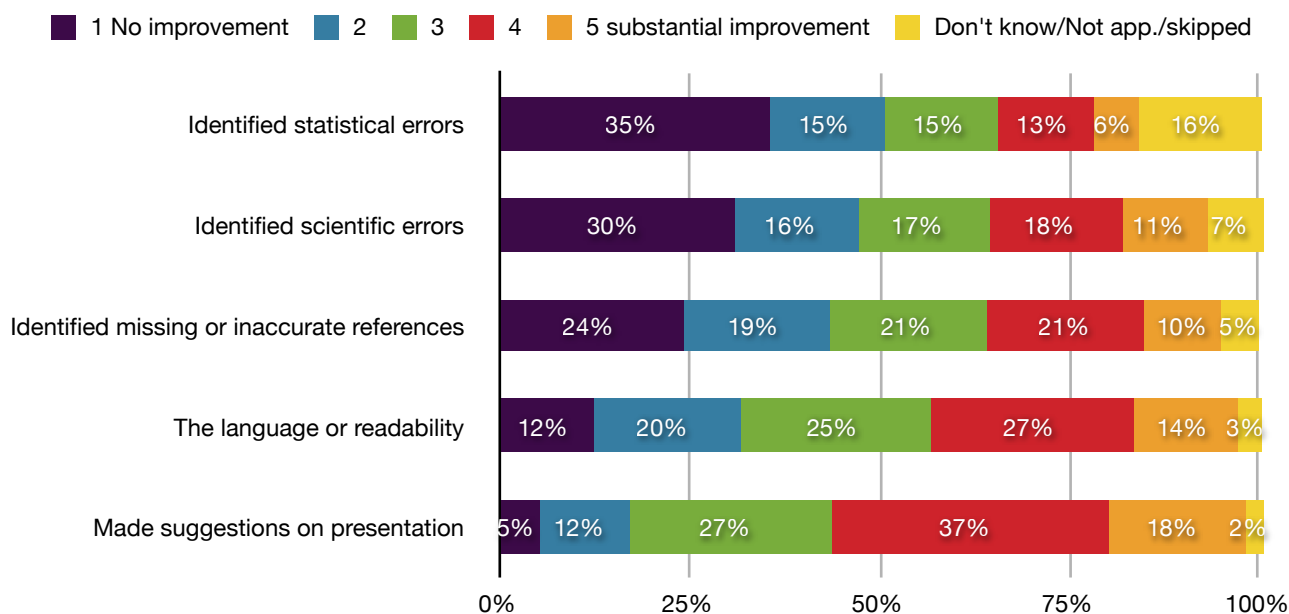


Figure 16: Degree of improvement to the paper (n = 3040)

**Table 21: Improvements made by peer review to respondents' last published papers**

Aspect	Mean score	Groups giving higher scores	Groups giving lower scores
Made suggestions on presentation	3.5	Asia (3.7)	Anglophone (3.4)
The language or readability	3.1	Asia (3.4)	Dissatisfied (2.7), Anglophone (2.9), Excellent access (2.9)
Identified missing or inaccurate references	2.7	Asia (3.2), Early adopters (3.0), Editors (2.9), Physical sci/engng (2.9), Variable access (2.9)	Dissatisfied (2.4), Clinical (2.4), Anglophone (2.4), Hospital/med school (2.5), Excellent access (2.5)
Identified scientific errors	2.6	Asia (3.2), Early adopters (2.9), <36 (2.8), Physical sci/engng (2.8)	Dissatisfied (2.2), Anglophone (2.2), Women (2.4), HSS (2.2), Clinical (2.4)
Identified statistical errors	2.3	Asia (2.8), Early adopters (2.6), <36 (2.5)	Dissatisfied (1.9), Anglophones (1.9), Excellent access (1.9), 56+ (2.0), HSS (2.0), Life sciences (2.1)

*(Numbers in parentheses are mean scores of the respective subgroups.)*

Some 64% of respondents reported that peer review of their last published paper had identified scientific errors, demonstrating real value being added. There were substantial variations by region here, with the Asia region having the highest score – 3.2 – of any subgroup (not just the regional subgroups), compared to 2.2 for Anglophones.

“Made suggestions on presentation” was the most highly rated aspect; 94% of those who said their paper had been improved reported improvement to this area, and 55% rated the improvement at 4 or 5 out of 5. Interestingly there was little variation among subgroups on this point, except for Asian respondents scored it significantly higher. The Dissatisfied did score slightly lower than the Satisfied group, but the difference was small – even among the Dissatisfied group, 94% reported some improvement, even if they were less likely to give the higher scores.

The language or readability was also frequently cited (86% reported some improvement in this area) and as with improvements to language/readability, there were few variations between subgroups except that again Asian respondents reported greater improvement than did Anglophones.

There was somewhat less improvement reported on the statements, “identified missing or inaccurate references”, with 78% of respondents respectively reporting some improvement. There were substantial variations by region here too (in contrast to the preceding questions on presentation and language); in particular Asian respondents scored 3.2 versus 2.4 for Anglophones. There were also large regional differences on “identified statistical errors” (2.8 Asia versus 1.9 Anglophone).

In fact, there was a clear tendency for Asian respondents to report greater improvement on all of the measures, and Anglophone respondents to report somewhat less than average. One might speculate that Asian respondents (who were also younger than average) had less experience of publishing and greater need of assistance with the English language than their Anglophone counterparts. This would also be consistent with them being more likely to report improvements by detecting scientific errors.

Those with good access to the journals literature reported less improvement in identifying missing or inaccurate references than those with worse access. This is what we might expect to find and illustrates one way in which restricted access to literature impacts on researchers.

There was less improvement reported regarding the identification of statistical errors than for other benefits, with 51% reporting improvement. Is this because authors are less likely to make statistical errors than other kinds, or because reviewers are less likely to spot them? Given that some studies have shown that published papers are rife with statistical

errors (e.g. Emil Garcia-Berthou and Charles Alcaraz found statistical inconsistencies in 38% of papers in Nature and 25% in the BMJ<sup>5</sup>.) the latter seems a more likely explanation.

Overall, the Dissatisfied group tended to be somewhat less likely to report an improvement, and to give lower scores to the improvements they did report. We cannot say if there is a causal relationship, that is, were this group dissatisfied with peer review because they have experienced less personal benefit on their own papers, or does their dissatisfaction arise from other causes (e.g. delays) and then lead them to give less positive scores?

### How long did the peer review take?

Respondents were asked how long the peer review process took for their last published paper (Q13)<sup>6</sup>. The overall average was about 80 days. The groups that differed significantly from this average are listed in the table below.

**Table 22: Variations in peer review time by subgroup**

Group	Average (days) (approx.)
<b>Overall</b>	<b>80</b>
Dissatisfied	110
Early adopters	70
Women	90
Men	80
Hospital/medical school	70
Head of department	70
Research student	95
Humanities & social sciences	135
Anglophone	95
Australasia	90
Europe/M.East	70
Asia	70
Excellent access	90
Poor/very poor access	70

The question was possibly ambiguous in that it did not specify exactly what was meant by the peer review process, but we assume that respondents would have taken it to mean from submission to final acceptance by the journal (as opposed to, for instance, submission to first decision). If this is the case, though, the average figures look rather short. For comparison, the editors reported that the average for submission to final acceptance for their own journals was about 130 days (see *Peer review times*).

<sup>5</sup> BMC Med Res Methodol. 2004 May 28; 4:13

<sup>6</sup> Note: averages were calculated from responses in the bands shown in the figure; because there was a substantial proportion in the top open band, the average is somewhat sensitive to the assumption used for this band, and hence the figures have been rounded to the nearest 5 and should be regarded as approximate

## Was this satisfactory?

Respondents were then asked whether they agreed that the length of time from submission to decision was satisfactory (Q15). Overall, respondents were evenly balanced (39% agree/strongly agree versus 38% disagree/strongly disagree).

The Dissatisfied group and HSS researchers were the least satisfied, with 65% and 53% disagreeing/strongly disagreeing respectively.

The 56+ age group, and Life sciences and Physical sciences/engineering researchers were a little more satisfied than the average, but not by much.

Comparing the mean scores of the responses of this question to the length of time that the peer review took shows very clearly that satisfaction with peer review times correlates negatively with the length of time: for review times of 30 days or less, about two-thirds of respondents were satisfied with the time; this drops sharply at 3–6 months to 19%, and to 9% for review times in excess of 6 months.

**Table 23: Satisfaction levels compared to peer review times**

Time taken for review	Mean score	% satisfied	% dissatisfied
Total	-0.1	39	38
Up to 7 days	0.6	61	12
8 - 14 days	0.6	67	16
15 - 30 days	0.7	67	11
1 - 2 months	0.1	44	29
3 - 6 months	-0.6	19	60
Longer than 6 months	-1.2	9	80

Breaking this table out by subject group shows that HSS researchers are the most tolerant of longer peer review times, followed by physical sciences/engineering and life sciences, with clinical researchers being the most impatient.

**Table 24: Satisfaction levels compared to peer review times, by subject groups**

Time taken for review	Clinical (561)		HSS (327)		Life sciences (819)		Phys sci/engng (1304)	
	A (%)	D (%)	A (%)	D (%)	A (%)	D (%)	A (%)	D (%)
Up to 7 days	58	12	100	0	81	0	55	16
8 - 14 days	75	17	86	0	59	20	68	14
15 - 30 days	65	11	75	0	69	12	66	9
1 - 2 months	42	33	63	21	41	33	44	26
3 - 6 months	11	74	29	51	18	62	20	54
Longer than 6 months	6	91	7	83	7	82	14	72

A = Agreed/Strongly agreed; D = Disagreed/Strongly disagreed

## The reviewers' experience

### Papers reviewed in last 12m

Reviewers (i.e. respondents excluding editors and those who had not reviewed at all in the last 12 months) had reviewed an average of about 8.0 papers in the last 12 months (Q23).

There was an unsurprisingly positive correlation with age and seniority, with for instance Heads of department reviewing nearly twice as many papers (10.8) as Researchers (6.0).

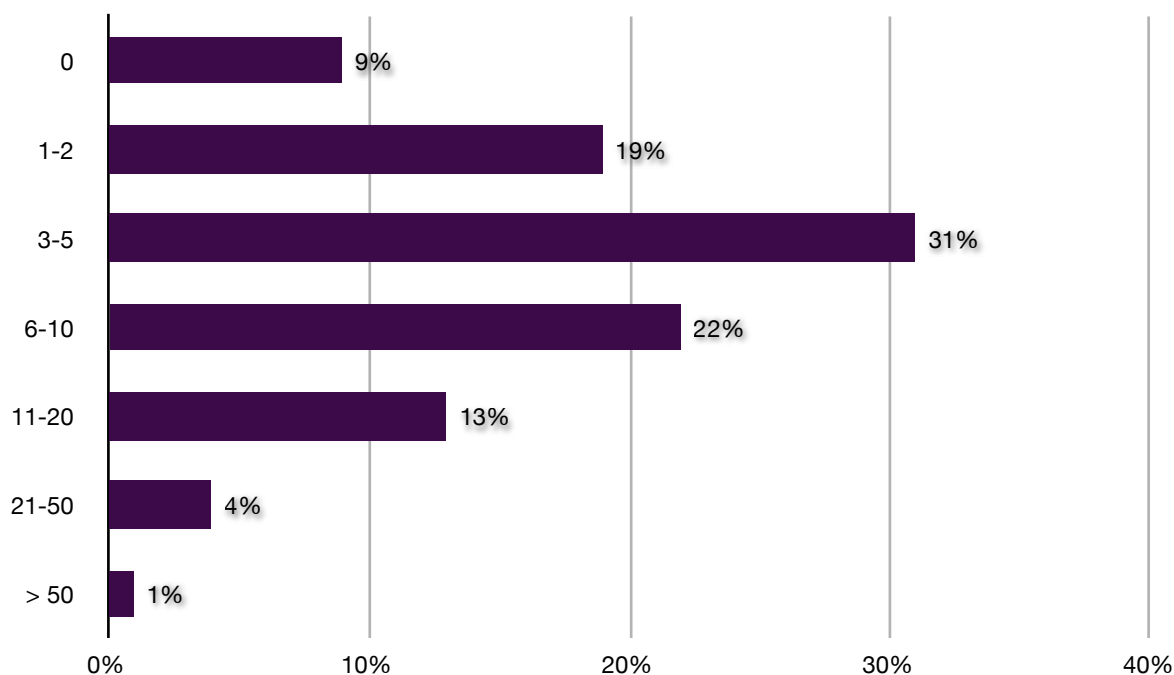


Figure 17: Number of papers reviewed in last 12 months (n = 2408)

We defined Active reviewers for the purposes of cross-tabulations and other analyses as those who had reviewed 6 or more papers in the last 12 months. This comprises about 44% of the reviewer group, and they review about twice as much as average (14.3 papers in last 12 months). This means that Active reviewers do about 79% of all reviews.

Active authors (those who had published 6 or more papers in the last 24 months) were also more active reviewers, with 10.5 papers reviewed in the last 12 months.

There were variations in numbers of papers reviewed between fields of research, with Life sciences and Clinical medicine/nursing reviewing the most (8.8 and 9.1 respectively) and HSS doing the least (6.2), and Physical sciences/engineering falling between (7.5).

Reviewers from the Anglophone regions reviewed somewhat more papers on average than others (8.9), Europeans and Asia about or a little under average, and Rest of world (6.2) less than average. Those with excellent access to journals reviewed 9.6 papers, compared to 6.1 papers for those with poor/very poor access.

### Numbers of journals for which reviewers act

Researchers reported reviewing regularly for a mean of 3.5 journals (median 3.0) and for a further 4.2 journals (median 3.0) occasionally (Q24). The distribution of responses is given in the figure on the following page.

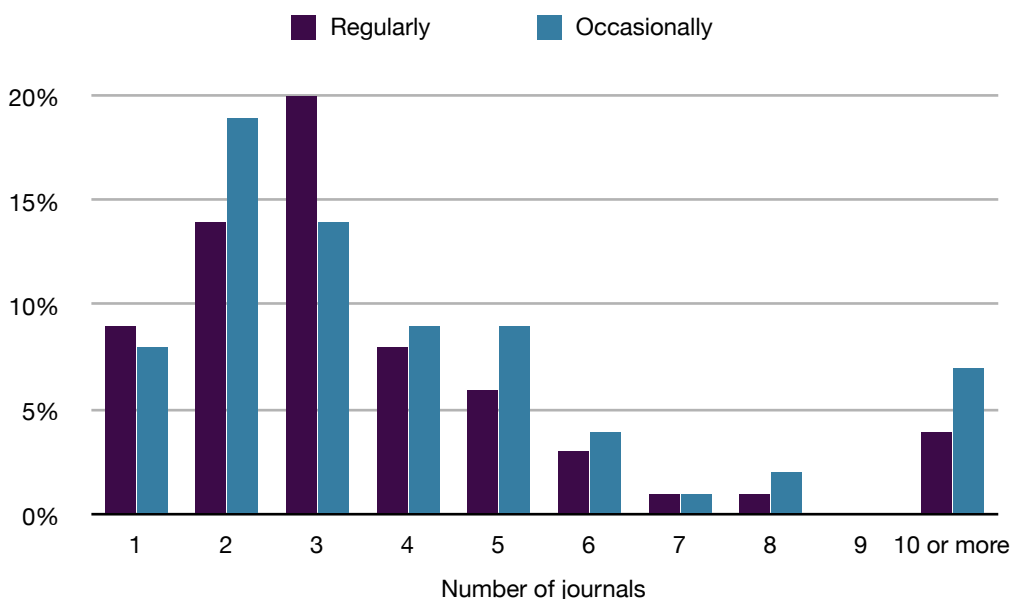


Figure 18: Number of journals for which reviewers act (n = 2165)

Older and more senior respondents reviewed for more journals than their younger and more junior colleagues.

Active authors (those publishing 6 or more papers in the last 24 months) and Active reviewers were also likely to review for more journals.

Interestingly, when considering the numbers of journals regularly reviewed for, there were no significant differences by field of research (unlike for the number of papers reviewed).

### Maximum number of reviews

On average, the maximum number of papers reviewers say they are prepared to review in a year is 9.0 (Q34). This compares to the average 8.0 papers currently reviewed in the last 12 months (Q23). Overall, therefore, although the average is close to the maximum, there would therefore appear to be at least some slack in the system.

There are variations in the stated maximums depending on the reviewer's activity, age, seniority and field of research, as illustrated in the table. Active reviewers appear to have good reason to feel over-loaded, in that they are the only subgroup to report doing more reviews in the last 12 months than their stated maximum. Heads of department and Active authors also report being close to capacity. On the other hand, younger and less senior researchers, who are currently doing less reviewing, report greater unused capacities.

The comfortable position of apparent capacity in the system noted above (average 8.0 reviews done versus a maximum 9.0) breaks down when the proportion of the number of reviews done is taken into account. Active reviewers amount to some 44% of reviewers, but because they average nearly twice as many reviews per year (14.3 versus 8.0), they are responsible for 79% of all reviews. With this group reporting being over-loaded – undertaking 14.3 reviews in the last 12 months compared to their maximum of 13.3 – there is a clear problem. Some other groups are also close to or above their preferred maxima, including Heads of Department, older reviewers, active authors, physical science/engineering reviewers, and Asian reviewers (see table on following page).

Some of the groups giving lower maximum numbers are also the ones who report taking longer to do each review. For example, Anglophones are prepared to do a maximum of 10.3 papers compared to 7.1 for Asian respondents, but given that the former report (see page 42) an average time of 6.4 hours compared to 13.4 hours for the latter, the Asian respondents are actually reporting a preparedness to accept a larger time commitment, 95 versus 66 hours.

**Table 25: Papers reviewed in last 12 months compared to preferred maximum**

Subgroup	Maximum	Last 12 months
Active authors	10.8	10.5
Active reviewers	13.3	14.3
<36	7.9	5.7
56+	9.6	9.3
Researcher	7.9	6.0
Head of dept	10.9	10.8
HSS	7.6	6.2
Physical sciences/engineering	7.9	7.5
Life sciences	10.2	8.8
Clinical	10.7	9.1
Anglophone	10.3	8.9
Asia	7.1	7.4
Rest of world	7.3	6.2
Excellent access	10.7	9.6
Poor/very poor access	7.1	6.1

## Selection of reviewers

### Match of subject expertise

How well do editors match the subject matter of papers to reviewers' expertise?

Reviewers in the survey report very good levels of matching, with only 1% of the last invitations received being outside their areas of expertise entirely (Q25). 74% of invitations were reported to fall within the reviewer's core area of expertise, and 24% within peripheral areas of expertise.

There was very little demographic variation in responses to this question.

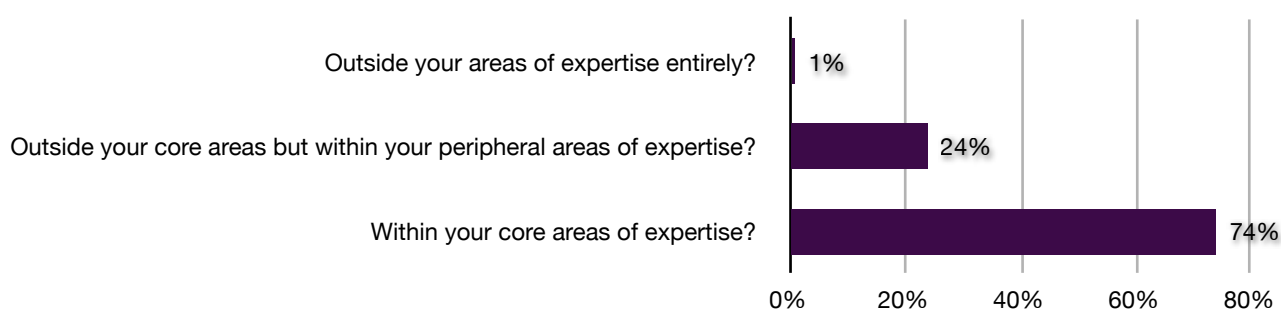


Figure 19: Match of subject expertise. "Thinking about the last invitation to review you received, was this paper:" (n = 2165)

## Declining invitations to review

On average, reviewers reported (Q26) declining 2.1 invitations to review manuscripts within the last 12 months (this compared to an average of 8.0 manuscripts that they did review over the same period).

Active reviewers declined more invitations but they also reviewed more, so their proportion of invitations declined was in fact lower than average. Conversely, older reviewers both review more and decline more invitations proportionately than younger researchers. Clinical researchers appear to decline invitations more often than other groups when measured as a proportion of the total number of invitations (i.e. papers reviewed plus those declined).

**Table 26: Invitations to review declined, compared to numbers of papers reviewed**

	Overall	Active authors	Active reviewers	Clinical	Physical sci/engng	<36	56+
Papers reviewed	8	10.5	14.3	9.1	7.5	5.7	9.3
Invitations declined	2.1	2.8	3.4	3.1	1.7	1.1	2.7
Proportion declined	21%	21%	19%	25%	18%	16%	23%

**Table 26 (cont.): Invitations to review declined, compared to numbers of papers reviewed**

	Anglophone	Asia	RoW	Europe/ME	Poor/very poor access	Excellent access
Papers reviewed	8.9	7.4	6.2	7.6	6.1	9.6
Invitations declined	2.7	1.5	1.1	2	1.4	2.8
Proportion declined	23%	17%	15%	21%	19%	23%

### Reasons for declining invitations to review

The main reasons for declining invitations to review were all related to time available, whether that was because of the reviewer's own commitments or because of the too-short deadline proposed by the journal (Q27).

Declining to review because of the poor quality of the paper was not a common reason, with 6% declining because of the poor scientific quality of the paper and 4% because of the poor quality English. (This is presumably because editors and editorial offices do a good job at screening such papers out. Editors reported they rejected 21% of initial submissions because of poor quality or because they were out of scope).

As noted above, the Clinical researchers were the most likely to decline an invitation to review. Their reasons given were the same as for overall (primarily being too busy) and again, the proportion of papers declined because of poor quality was small (5-6%).

Similarly, Anglophone researchers were more likely to decline invitations than Asia or Rest of world. A higher proportion of them also gave busy/committed as the reason for declining (though this begs the question of whether Asia/RoW respondents are less likely to be busy or less likely to give that as a reason).

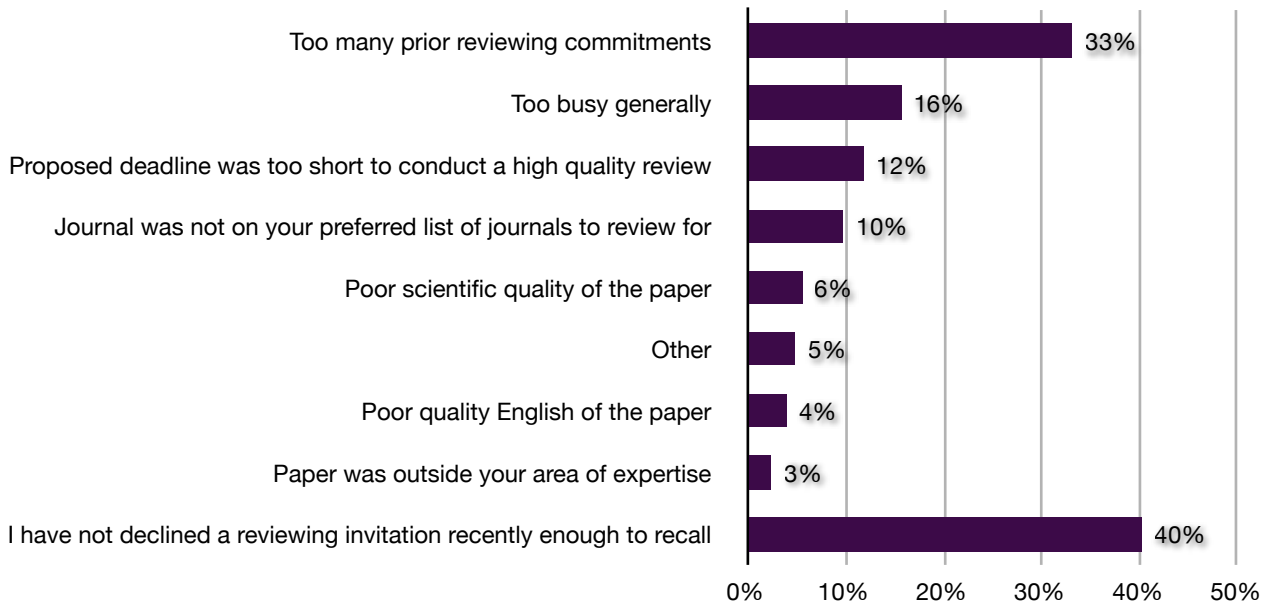


Figure 20: Reasons for declining invitations to review (n = 2165)

### Time elapsed for review

The average elapsed time to complete a review was roughly 24 days; 85% of respondents reported that the review took 30 days or less (Q30).

The fastest reviewing was by Clinical researchers at an average of 17 days, compared to 19 days for Life sciences, 26 days for Physical sciences/engineering, and 37 days for HSS.

Less senior researchers may take longer than more senior ones: Researchers reported an average of 26 days compared to 21 days for Heads of department.

There were only minor variations by geographic region.

We had also grouped reviewers according to the impact factor of the journal they last reviewed for. Reviewers working for high impact factor journals reported significantly lower review times, at 20 days compared to 22 days for medium and 30 days for low impact factor journals.

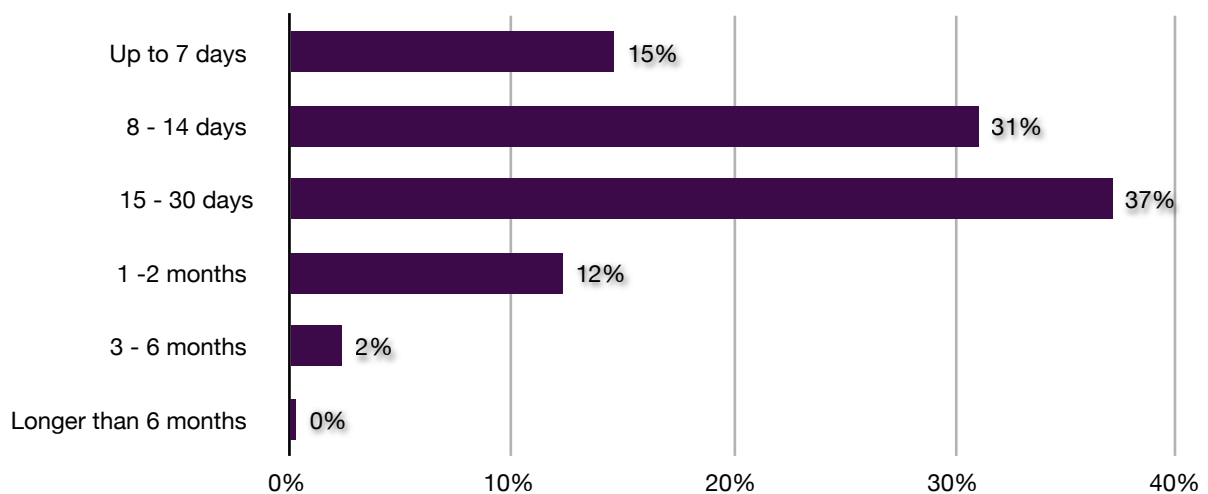


Figure 21: Time elapsed to complete the last review undertaken (numbers do not total 100% because respondents skipping question are omitted) (n = 2165)

### Time spent on review

The average (mean) amount of time spent on a review was 8.5 hours (median 5 hours). The frequency distribution of responses is shown below; standard deviation was 12 (Q29).

Younger reviewers spent much longer than older reviewers (10.9 versus 6.5 hours respectively).

Active reviewers spent less time, averaging 6.8 hours.

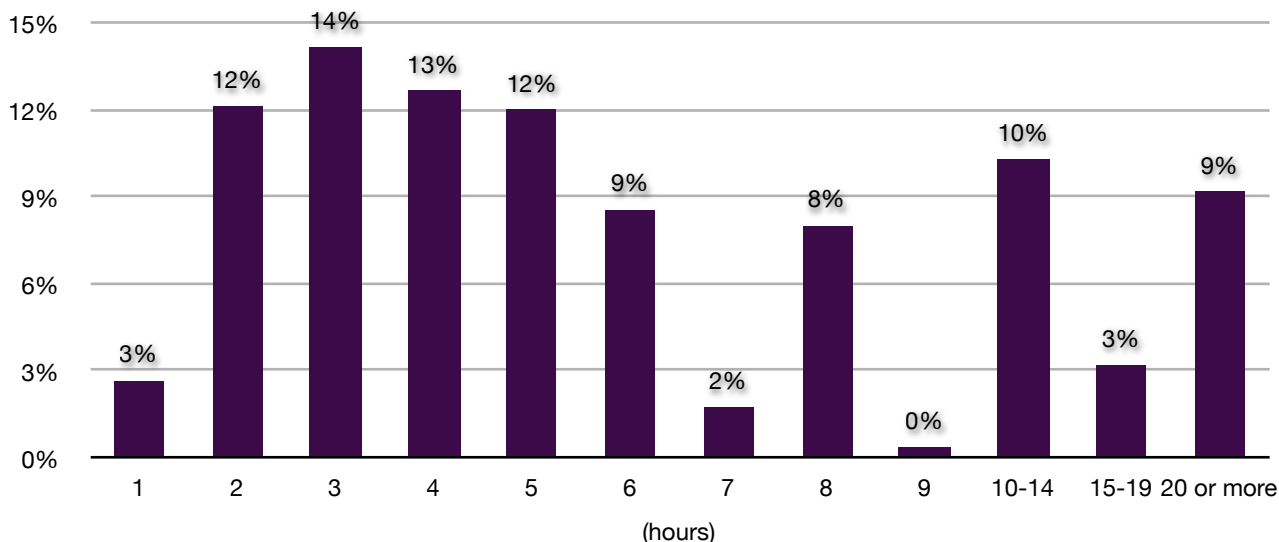


Figure 22: Time spent on reviewing the last paper reviewed (n = 2165)

Reviewers in Physical sciences/engineering reported spending the longest on their reviews, at 10.4 hours. Interestingly, there did not seem to be any correlation with the time spent on the review and the elapsed time to complete the review when comparing the different fields of research:

**Table 27: Duration and elapsed time for peer review, by discipline**

	Clinical	HSS	Life sciences	Physical sci/ engng
Elapsed time (days)	17	37	19	26
Duration (hours)	5.3	7.9	7.8	10.4

Asian and Rest of world respondents reported times over twice as long (13.4 and 12.5 hours respectively) as Anglophone reviewers (5.6 hours).

Comparing responses by the impact factor of the journal for which this review was completed showed that reviewers for high impact factor journals spent much less time on the review, 7 hours, than did reviewers for low impact factor journals (12 hours).

### Factors influencing reviewers

#### Reasons for reviewing

Substantially the most popular reason for reviewing chosen by respondents was “playing your part as a member of the academic community”, with 91% agreeing or strongly agreeing (Q32). A very similar statement, “reciprocating the benefit gained when others review your papers” scored significantly less well, illustrating the general trend here for respondents to prefer to give altruistic or disinterested reasons over the more self-interested reasons. It is notable that women tended to

score these altruistic reasons more highly than men, a finding that is repeated in other areas of the survey (e.g. see *Payment for reviewers*). By field, the HSS researchers scored “playing your part as a member of the academic community” highest, with physical sciences/engineering scoring lowest (95% versus 87% agreeing/strongly agreeing).

The second most popular reason was also largely altruistic, namely that they enjoyed being able to improve the paper (since they do not personally benefit from the improvement).

Respondents were more divided on whether they reviewed to enhance their reputations or further their careers (44% supporting versus 28% opposing). They were, however, much less keen on the specific suggestions of ways in which they could benefit personally as reviewers (by becoming a member of the journal’s editorial team or being recognised by the editor).

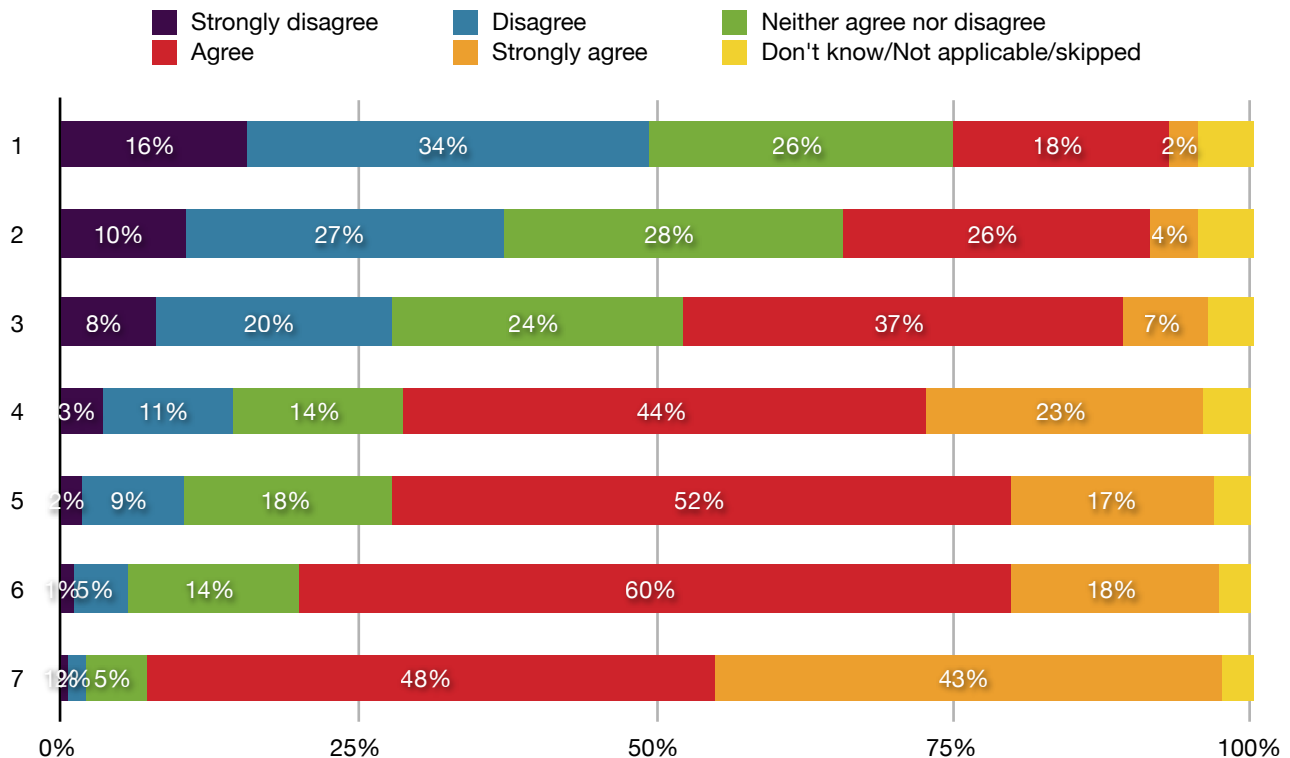


Figure 23: Reasons for reviewing: degree to which reviewers agreed/disagreed with the statements (n = 2165). Key:  
 1 = To increase the chance of being offered a role in the journal's editorial team  
 2 = Personal recognition from, or opportunity to build a relationship with, the editor  
 3 = To enhance your reputation or further your career  
 4 = Reciprocating the benefit gained when others review your papers  
 5 = Enjoy seeing new work ahead of publication  
 6 = Enjoy being able to help improve the paper  
 7 = Playing your part as a member of the academic community

There were big divergences of opinion on whether or not enhancing their reputation or furthering their career was a reason for reviewing. The <36 age group clearly valued this (60% agreeing) while the 56+ group tended not to value it (43% disagreeing). It was also rather more important to women than to men (53% and 42% agreeing, respectively).

There were also differences by age on the value of increasing the chance of being offered a role in the journal’s editorial team: the <36 age group were somewhat more divided, with 40% disagreeing and 25% agreeing, while the 56+ group much more clearly disagreed (63% versus 11%).

**Table 28: Reasons for reviewing: degree to which reviewers agreed/disagreed with the following statements**

Reason	Mean score	A (%)	D (%)	Groups scoring higher	Groups scoring lower
Playing your part as a member of the academic community	1.3	91	3	Anglophone (96), Better access (96), HSS (95), Women (93), Life (93),	Asia (82), Physical sci/engng (87), Worse access (86)
Enjoy being able to improve the paper	0.9	78	6	Other orgs (83), Clinical (83), Hospital/med school (82)	Dissatisfied (70)
Enjoy seeing new work ahead of publication	0.8	69	11	Women (76), Asia (75), Clinical 74), Hospital/med school (74),	Dissatisfied (65), HSS (61)
Reciprocating the benefit gained when others review your papers	0.8	67	14	Anglophone (81), Better access (81), Women (75), HSS, Hospital/med school (74), Clinical (73)	Worse access (57), Physical sci/engng (61), Asia (46)
To enhance your reputation or further your career	0.2	44	28	<36 (60), Women (53), Asia (53), Early adopters (48)	56+ (27), Anglophone (42), Better access (42)
Personal recognition from, or opportunity to build a relationship with, the editor	-0.1	30	37	Asia (35)	56+ (23), Better access (29/43), Anglophone (29/41)
To increase the chance of being offered a role in the journal's editorial team	-0.4	20	50	<36 (25), Asia (33), Early adopters (26)	56+ (11), Dissatisfied (16), HSS (16), Anglophone (16), Better access (16)

(Mean score calculated using Strongly disagree = -2, Disagree = -1, etc. A (%) is the proportion Agree/Strongly agree; D (%) is Disagree/Strongly disagree. Numbers in parentheses are percentages agreeing/strongly agreeing.)

There were also regional differences. Asian respondents were more likely the Anglophones to agree to the self-interested reasons (e.g. 33% of Asians supported “increase the chance of being offered a role in the journal's editorial team” compared to 16% of Anglophones, and 53% agreed that “to enhance your reputation or further your career” was a reason for reviewing, compared to 42% of Anglophones).

### Incentives to review

The idea of being offered a free subscription as an incentive to review is attractive to many reviewers, with 56% saying that this would make them more/much more likely to review for a journal (Q33). Unsurprisingly, those with poor access to the journals literature were significantly more likely to say that a free subscription to the journal would make them more likely to review than those with good access.

Acknowledgement in the journal and payment in kind by the journal would also motivate 43-44% of reviewers.

Older reviewers were less likely to be swayed by the offers of free subscriptions or payment in kind than younger researchers.

Optional accreditation for CME/CPD points was mainly of interest to Clinical researchers, but even so only 37% of them saw this as a positive inducement to review.

All of the options that involved disclosing the reviewer's identity and/or publication of the reviewer's report were seen as significant disincentives to review. Proponents of open peer review will have to overcome the fact that 49% of reviewers say that publishing their signed report would make them less likely to review for a journal and that a similar proportion, 47%, would see disclosure of their name to the author as a disincentive. Respondents who agreed that open peer review was effective were significantly less likely to say that publication of their signed report would be a disincentive than those who disagreed it was effective (32% versus 63%, respectively). Similarly, respondents who had said that open peer review was their single most preferred form of peer review were less likely to say that it would be a disincentive, although 30% still did (compared to 50% and 65% for proponents of double-blind and single-blind review respectively). Most proponents of open review, however, would not be discouraged from reviewing by having their name disclosed to the author (only 11% of them said this would make them less likely to review).

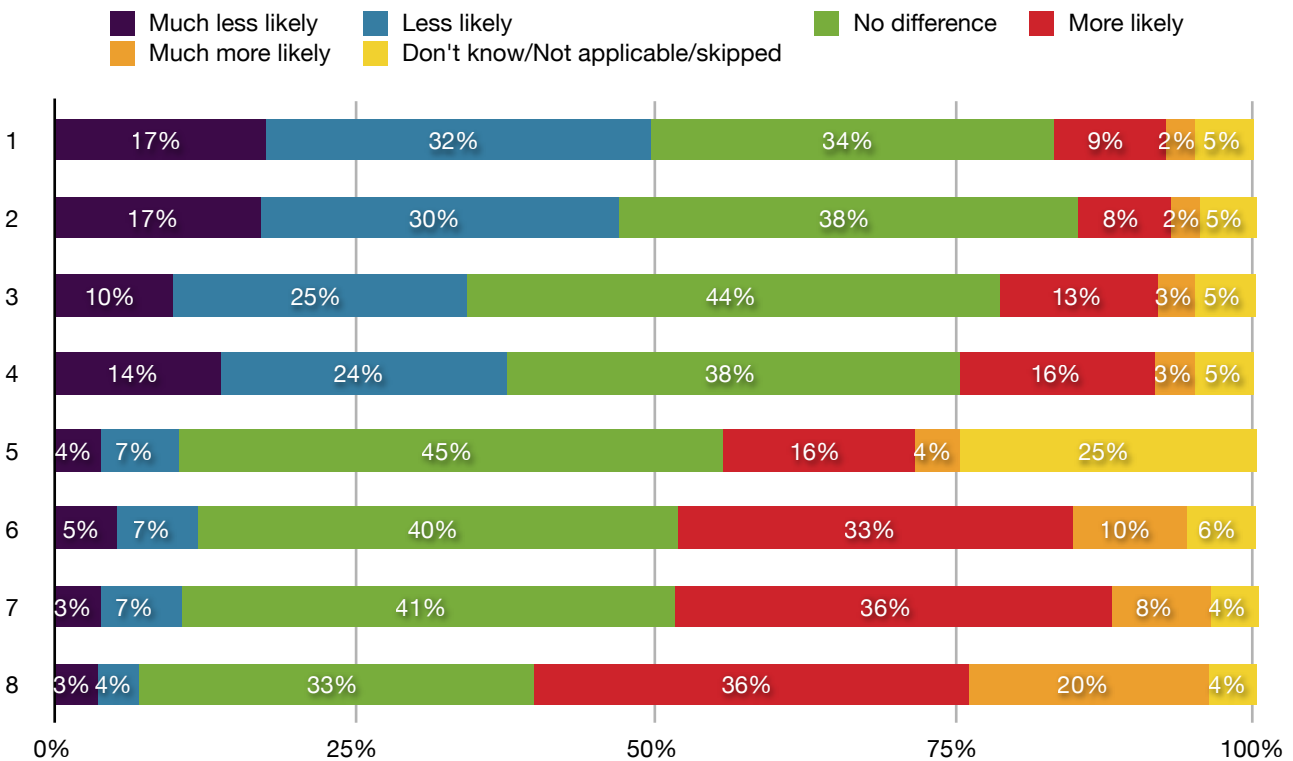


Figure 24: Would the following factors make reviewers more or less likely to review for a journal. (n = 2165). Key:s  
 1 = Your signed report being published with the paper  
 2 = Your name as reviewer disclosed to the author  
 3 = Your reviewer's report being published anonymously with the paper  
 4 = Your name being published alongside the paper as one of the reviewers  
 5 = Optional accreditation for CME/CPD points  
 6 = Payment in kind by the journal (e.g. waiver of colour or other publication charges, free offprints, etc)  
 7 = Acknowledgement in the journal (e.g. appear in list of most frequent reviewers)  
 8 = Free subscription to the journal

**Table 29: Factors that would make reviewers more or less likely to review for a journal**

	Mean score	More likely (%)	Less likely (%)	Groups scoring more likely	Groups scoring less likely
Free subscription to the journal	0.7	56	7	Worse access (68), <36 (66), HSS (66)	Better access (47), 56+ (51)
Acknowledgement in the journal (e.g. appear in list of most frequent reviewers)	0.4	44	10	Clinical (54)	Physical sci/engng (40)
Payment in kind by the journal (e.g. waiver of colour or other publication charges, free offprints, etc.)	0.4	43	12	Dissatisfied (52), <36 (51), Anglophone (47)	56+ (35), Asia (35)
Optional accreditation for CME/CPD points	0.1	20	11	Clinical (37), Women (24)	56+, (14) Life sciences (16), Physical sci/engng (17)
Your name being published alongside the paper as one of the reviewers	-0.3	19	38	Clinical (26), Asia (25), Dissatisfied (24)	HSS (14), Anglophone (16)
Your reviewer's report being published anonymously with the paper	-0.3	16	35	Asia (23), Dissatisfied (20), Clinical (19)	HSS (9)
Your name as reviewer disclosed to the author	-0.5	10	47	Asia (17), Worse access (16)	HSS (3/62), Anglophone (6/54), Better access (7/54)
Your signed report being published with the paper	-0.6	11	49	Asia (19), Dissatisfied (19), Early adopters (14), Clinical (15)	HSS (10)

(Mean scores are calculated using Much less likely = -2, Less likely = -1, etc. Numbers in parentheses are the percentages for more likely/much more likely for each subgroup; where two numbers are give the first is the percentage for more likely/much more likely, the second for less likely/much less likely.)

## Peer review from the Editors' perspective

The survey identified journal editors who then bypassed the questions aimed at reviewers and answered a set of questions specifically for editors. These were primarily factual, to do with the operation of peer review on their journals, but also included attitudinal questions on data review and speed of peer review.

### Number of reviewers used

Editors reported using an average of 2.3 reviewers per paper (Q36). There was no significant variation by field of research, or indeed by any other of the factors considered.

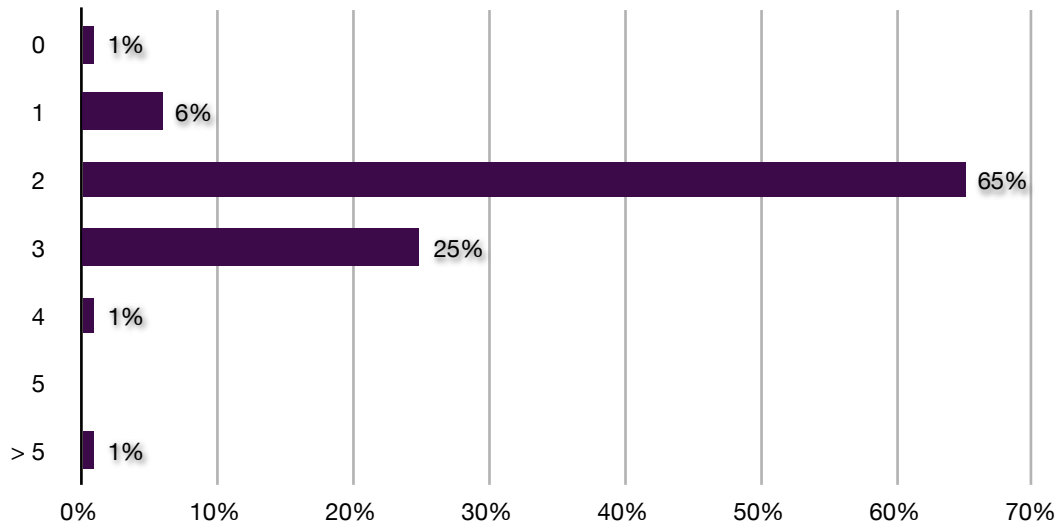


Figure 25: Number of reviewers selected by editors per paper (n = 632)

### Number of papers handled

The average number of papers on which an editor made accept/reject decisions in a year was about 50 (Q38). This seems surprisingly low, especially as the majority (59%) of editors reported handling fewer than 25 papers a year. At the other end of the scale 11% of editors do 150 papers or more.

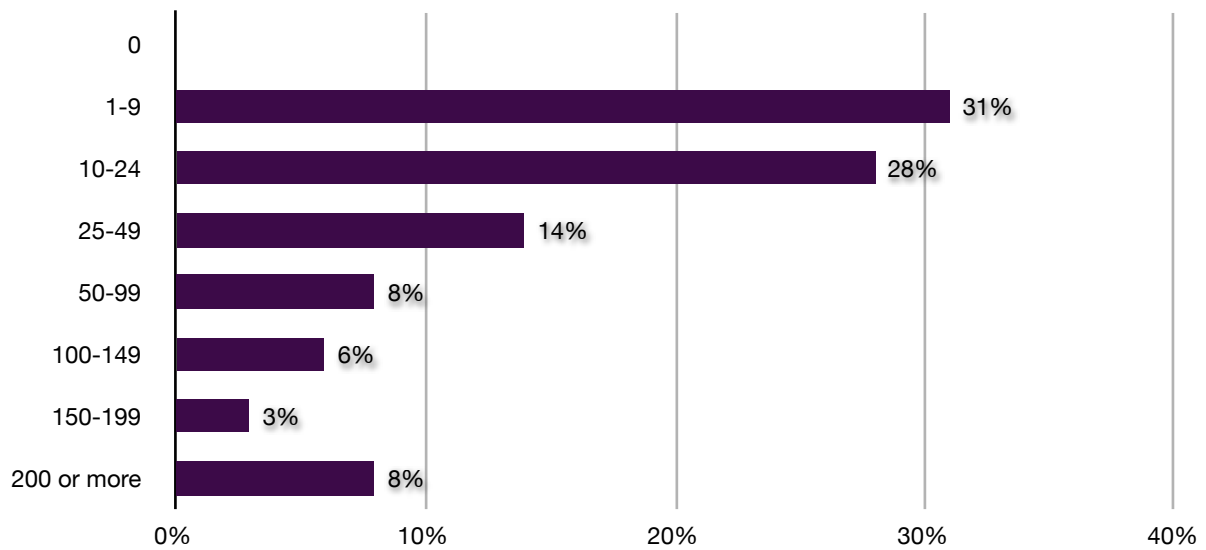


Figure 26: Average number of papers handled by editors per year (n = 632)

Editors who were dissatisfied with peer review overall handled fewer papers than those who were satisfied. There was a positive correlation with age, with older editors handling more than middle-aged or younger ones. Perhaps surprisingly, editors based at universities or colleges handled somewhat fewer papers on average than those at other organisations (primarily hospital/medical schools and research institutions).

As with reviewers, editors based in Anglophone regions handled more papers than those in other regions, especially Asia and Australasia.

**Table 30: Numbers of papers handled by editors**

Subgroup of editors	Number of papers (approx.)
<b>Overall</b>	<b>50</b>
Dissatisfied	30
<36	20
56+	60
Senior researcher	40
Clinical	60
Physical sci/engng	35
Anglophone	60
Asia	25
Australasia	25
Excellent access	65
Poor/very poor	40

(Note: averages are calculated from responses in the bands shown in the figure; because there was a substantial proportion in the top “200 or more” band, the average is somewhat sensitive to the assumption used for this band, and hence the figures have been rounded to the nearest 5 and should be regarded as approximate.)

### Fate of submissions

- Reject prior (poor quality)
- Reject prior (out of scope)
- Accept no revision
- Accept with revision
- Reject after review

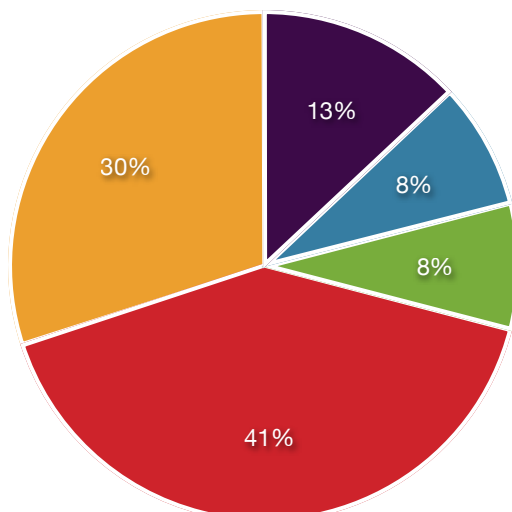


Figure 27: Ultimate fate of manuscripts submitted to journals (n = 632)

The figure shows the overall distribution while the table below shows the reported ultimate fate of manuscripts submitted to the editors’ journals overall and by field of research (Q39). There is an average overall 50% acceptance rate, which is

consistent with other studies (e.g. see Table 2-3 in Editorial Peer Review by Ann Weller (ASIST, 2002)). Acceptance rates are lower in HSS, and higher in physical sciences/engineering journals.

**Table 31: Ultimate fate of manuscripts submitted to journals**

	Total (%)	Std Dev (%)	Clinical (%)	HSS (%)	Life sciences (%)	Physical sci/engng (%)
Rejected prior to peer review due to poor quality	13	14	15	13	12	13
Rejected prior to peer review due to being out of scope	8	9	8	8	8	8
Accepted for publication after peer review without revision	8	10	6*	8	6	11**
Accepted for publication after peer review but needing revision	41	19	40	31**	42	43**
Rejected after peer review	30	19	31	41**	32	25**

*n* = 632. Statistically significant differences are indicated by \* (95% confidence level) or \*\* (99%)

### How reviewers are selected

Selection of the reviewers (Q40) by the editor themselves was only the third most popular option (reported by 28% of editors), well behind selection by a member of the Editor's team (73%) and by a member of the publisher's staff (43%). Life sciences editors may be more hands-on (39% selected the reviewers themselves).

Computer matching *per se* was reported by only 18% of editors. HSS editors report lower use of computer matching (8%) which correlates with their lower use of online submission systems (see below).

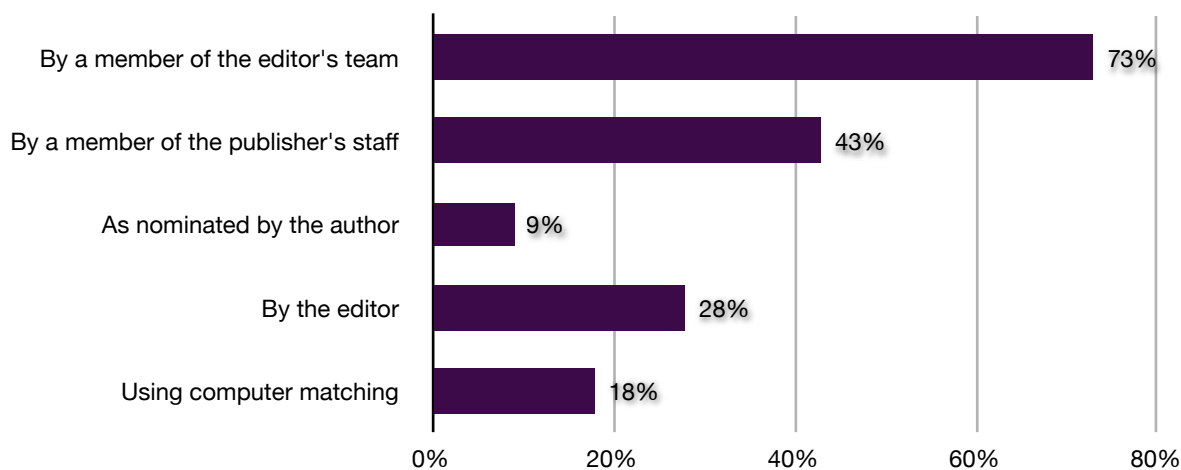


Figure 28: Means used to select reviewers (*n* = 632)

### Use of online submission systems

Three quarters of editors (76%) reported that their journal used an online manuscript submission and tracking system (Q41). Their use was more common in Life sciences (85%) and markedly less common in HSS (51%).

Editors in Anglophone regions were also somewhat more likely (82%) to use online submission systems than average, while those in the Rest of world were less likely (55%). Similarly 85% of editors with excellent access to journals used online submission systems compared to 66% with poor/very poor access.

### Use of reviewer checklists

Two thirds of editors reported providing reviewers with a checklist of questions to answer, while 30% did not. The use of checklists was somewhat less common in HSS journals (45% not using) (Q42).

For those that did provide a checklist, the most common questions involved the study methodology (87%), relevance, importance and paper length (Q43).

Checklist questions regarding ethical issues, quality, language and references were least common. Perhaps “quality” is too vague a term (e.g. compared to relevance and importance) to be useful. We saw earlier that improvements to language and references were the two most commonly reported improvements by authors, so perhaps because reviewers are so used to commenting on these aspects editors see no need to highlight them. It may also be the case that editors do not ask reviewers to comment on language because it is not perceived to be part of the reviewers’ job, but reviewers simply do it anyway.

Questions regarding ethical issues were much more common in Clinical (55%, compared to 26% overall), unsurprisingly, and less common in HSS (13%) and Physical sciences/engineering (12%).

As well as being less likely to use checklists at all, HSS journals also tend to ask fewer questions, and in particular were less likely to ask about originality, language, references and quality than journals in other fields.

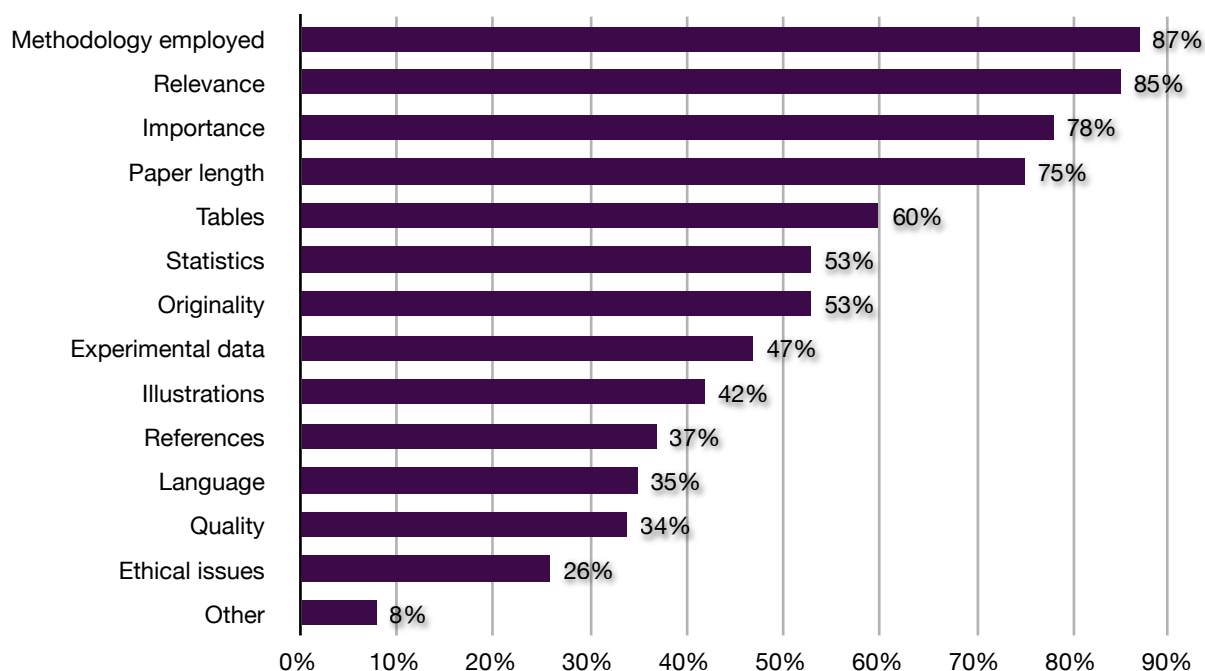


Figure 29: Items included on checklists sent to reviewers (n = 632)

### Use of deadlines

The overwhelming majority of editors (98%) give their reviewers a deadline for responding (Q45). The average deadline was about 34 days, with 63% giving 30 days or less.

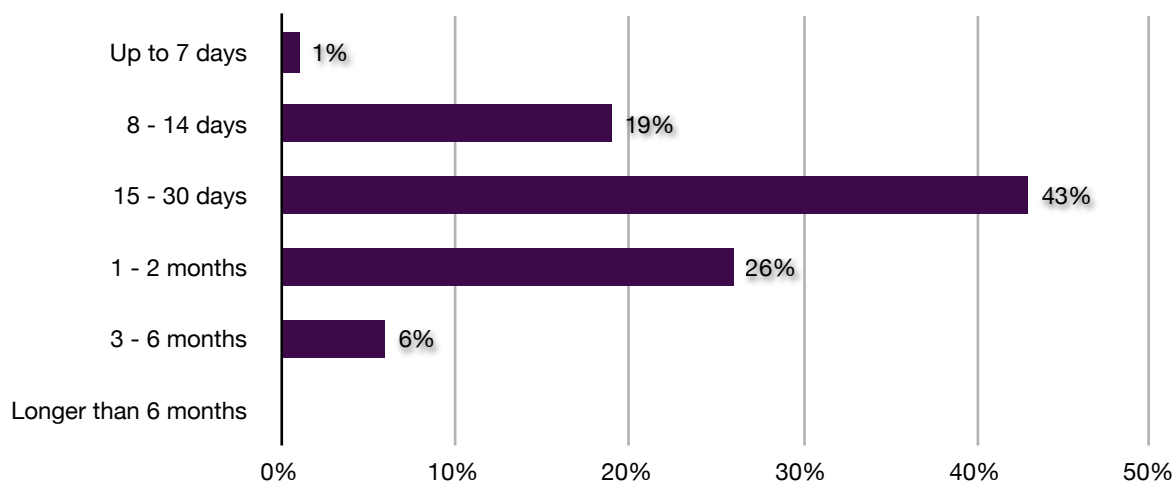


Figure 30: Length of deadlines given by editors to reviewers (n = 632)

Deadlines are shorter in Clinical research, and longest in HSS and physical sciences/engineering.

Table 32: Reviewer deadlines by discipline

Discipline	Average deadline (days)
Clinical	24
Life sciences	25
Physical sciences/engineering	44
HSS	44

### Peer review times

Editors reported average submission-to-acceptance times of roughly 130 days (18 weeks), split roughly equally between the initial peer review stage to first decision, and subsequent revision stages (Q46). Nearly three quarters (72%) reported times of 6 months or below.

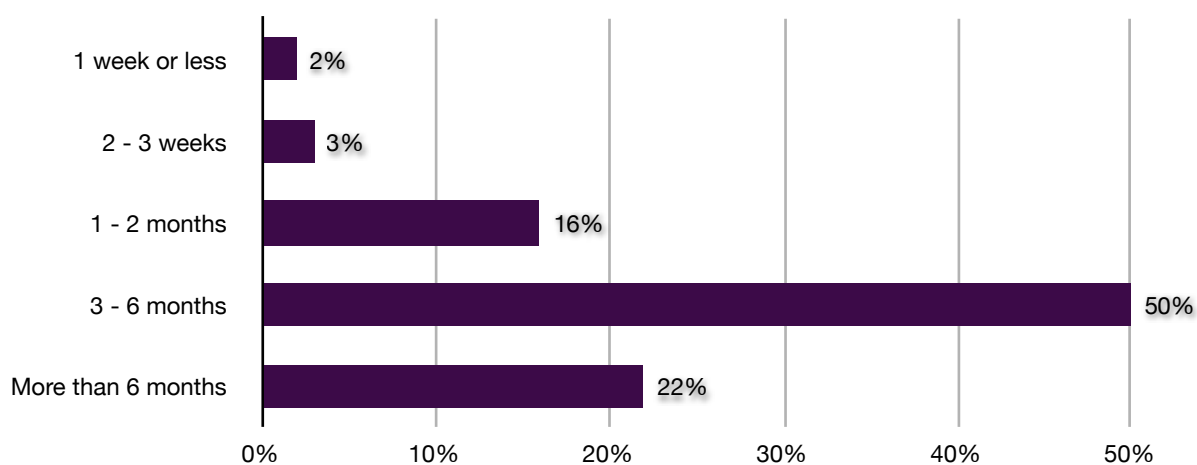


Figure 31: Peer review times (submission to final acceptance) reported by editors (numbers do not total 100% because skipped responses are omitted) (n = 632)

Times were shortest in Clinical and longest in HSS journals.

**Table 33: Peer review times, by stage of review (days)**

	Total	Clinical	HSS	Life sciences	Physical sci/ engng
From submission to first decision	60	40	80	50	75
For any revision stages that were undertaken	60	55	75	60	55
From submission to final acceptance by the journals	130	120	150	125	130

### Editors' views on peer review times

Editors were asked to what extent they agreed that they were happy with the lengths of time from submission to first decision and from submission to final acceptance on their journals (Q47).

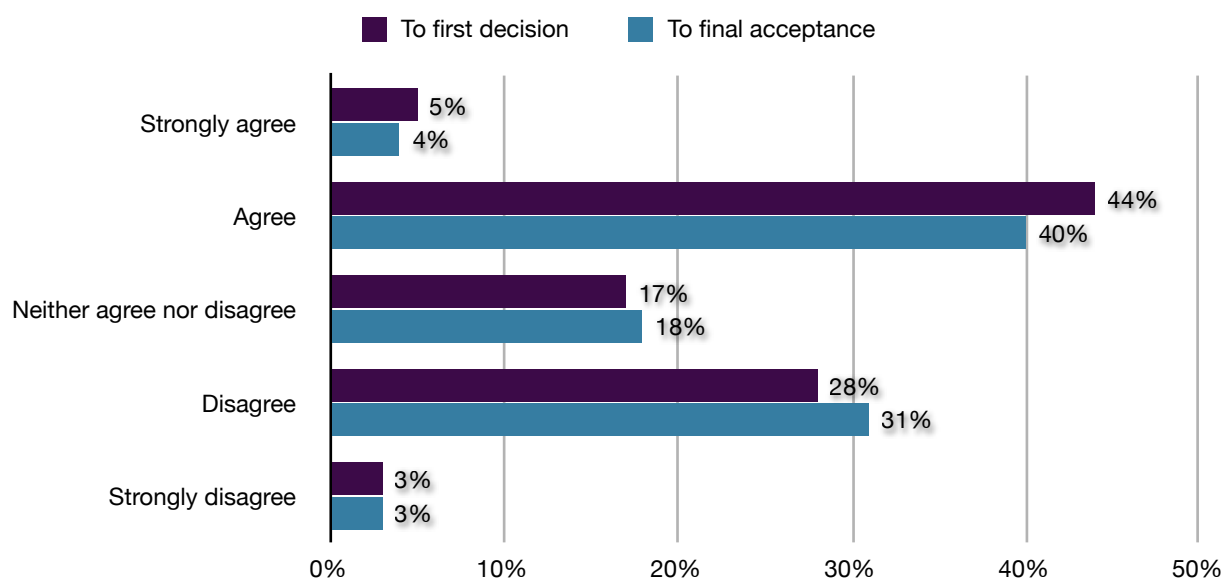


Figure 32: Degree to which editors were happy with the peer review times on their journals (n = 632)

On both measures there were more editors happy with the times than unhappy, but substantial minorities (around a third) were unhappy. There were no significant differences by field of research. However editors who were satisfied with peer review overall were much happier with their peer review times than editors who were dissatisfied overall.

### Feedback given to reviewers

The most common form of feedback to reviewers (used by 58% of editors) is to let them know the publication outcome (Q48). Only 28% of editors give reviewers feedback on the quality of their reports. Nearly a quarter (24%) of editors reported giving reviewers no feedback.

There was little variation by field of research, except that HSS editors were a little less likely, and Physical sciences/engineering editors more likely to give feedback on the quality of the report.

Regionally, Anglophone and Australasian editors were more likely to give publication outcomes than those from Asia or Rest of world. Asia/Rest of world editors were more likely to give feedback on quality of report than average, and European editors less likely.

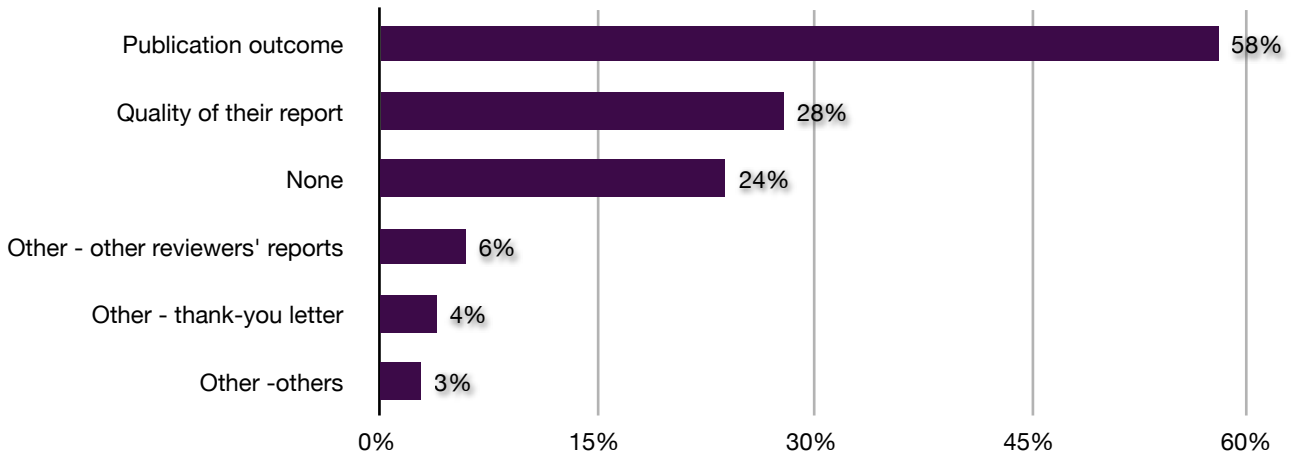


Figure 33: Feedback given by editors to reviewers (n = 632)

### Rewards for reviewing

The most common rewards for reviewing reported by editors (Q49) were reviewer receptions at conferences and waiver of author charges (e.g. publication, page, colour, offprint charges). Monetary payment was rare at only 5% of editors, though more common than CME/CPD points (2%). Payment was commonest in HSS journals (9%).

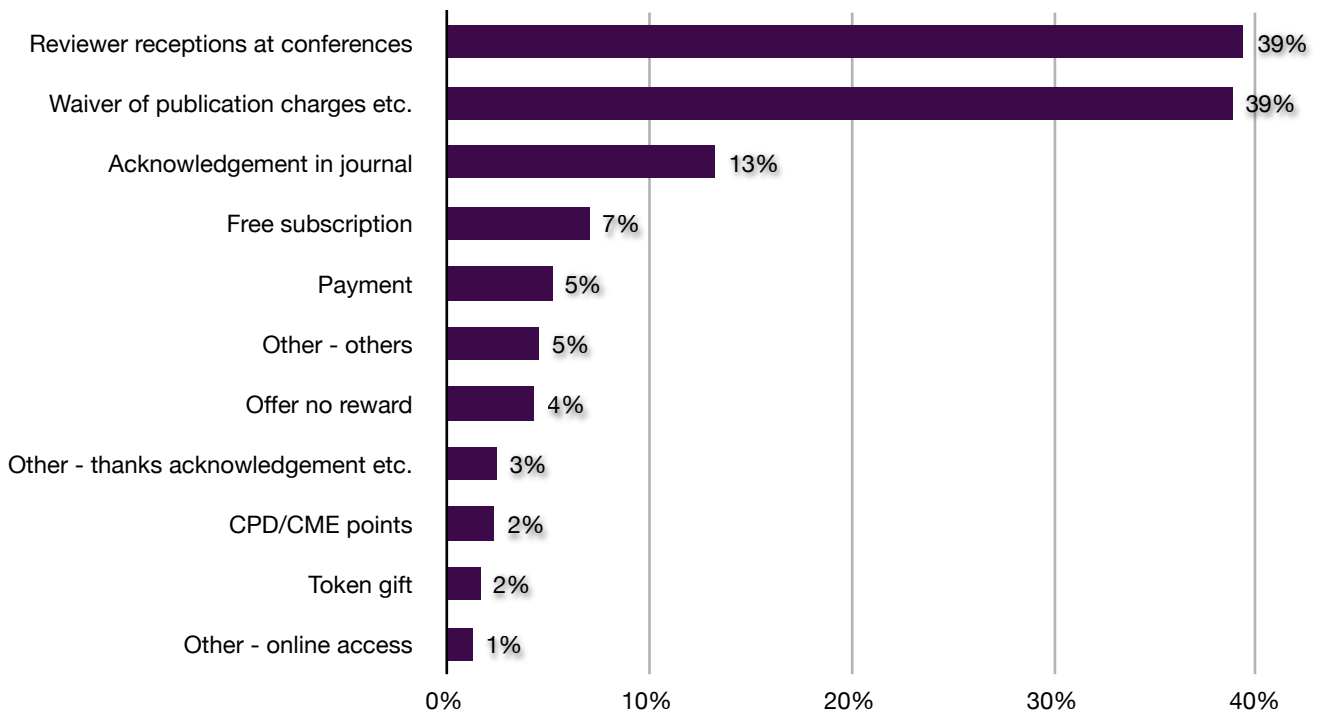


Figure 34: Rewards given to reviewers (n = 632)

# Survey demographics

This section provides an overview of the main demographic variables considered in the survey: subject field, region, age, gender, type of organisation and position. We also describe some non-demographic but descriptive data: publishing role (author, reviewer, editor), level of access to the journals literature, and use of new technologies.

## Regional distribution

The regional distribution of respondents (Q53) is shown in the figure below; all the major regions are well represented. (The data was gathered from respondents at the country level and subsequently grouped into regions to avoid inconsistent definitions of the regions.) The distribution of responses in this survey does appear to under-represent Europe somewhat, and over-represent N. America compared to the Thomson Scientific database. It is possible that this was due to the survey being conducted in English but there is no comparable under-representation of Asia where we expect levels of comfort in using English to be no better than Europe.

There were also regional differences in the level of level of access to journals and in the numbers of papers published and reviewed, and in the proportion of editors (see respective sections below).

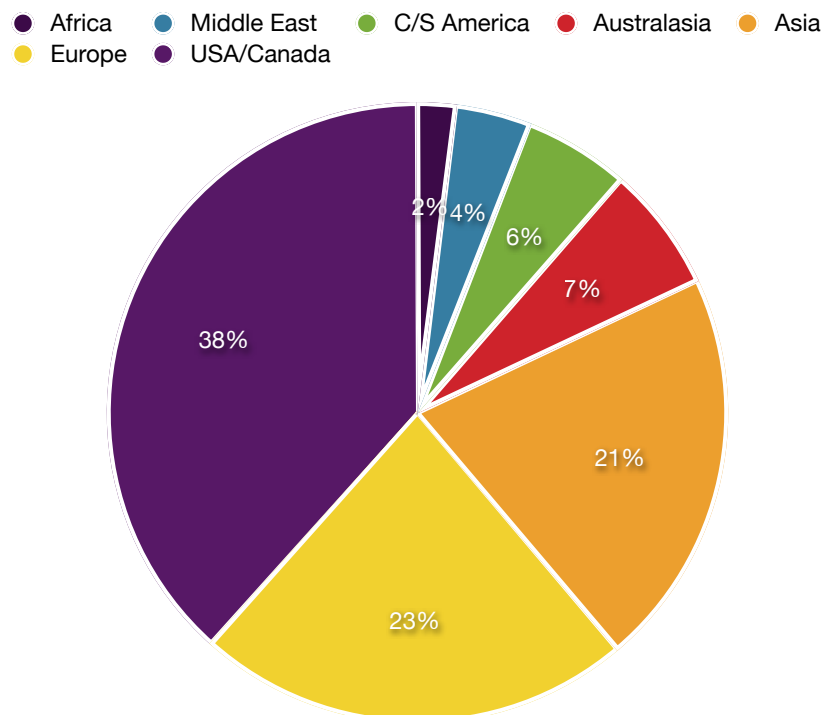


Figure 35: Distribution of respondents by region (n = 3040)

There were substantial attitudinal differences between respondents from different regions. In many, if not most, of the cases where there were regional differences, there was a spectrum of opinion ranging from the English-speaking countries (UK, USA, Canada, Australia and New Zealand – referred to as the Anglophone region in the text) on one side, and the Asian countries on the other, usually with Europe/Middle East lying between these extremes but nearer to the Asian position.

The respondents from the different regions were demographically somewhat different, as shown in the table below.

**Table 34: Regional variations by demographic factors**

Demographic factor	Variations
Organisation type	A similar proportion of respondents were employed in University/Colleges in all regions (60-66%) but employment in Hospitals/medical schools was more common in the Anglophone region (18%) than in Asia (8%) and conversely Research Institutes were more common in Asian respondents (23%) than in Anglophones (8%).
Age	Asian respondents were younger (average 42) compared to the total response (47), while Anglophone (and other) respondents were somewhat older (49).
Gender	Asian respondents were the most male, with only 14% women compared to 23% in Anglophones.
Field of study	See graph below – Asian respondents were much more likely to be in Physical sciences/engineering compared to Anglophones, very much less likely to be in HSS, and less likely to be in Clinical or Life Sciences.
Impact Factor (reviewers)	Reviewers whose last review was for a high impact factor journal were more likely to be from the Anglophone region; those reviewing for medium impact journals from Europe/M. East; and those reviewing low impact journals from Asia and Rest of world.

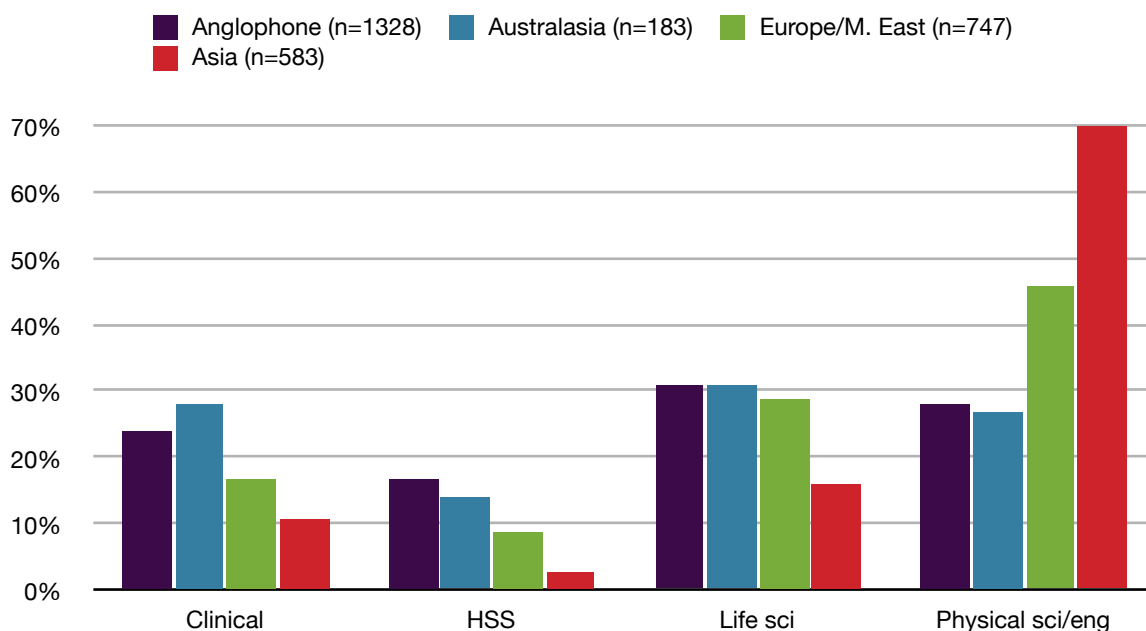


Figure 36: Proportions of subject groups by region

## Subject field

Respondents' fields of research (Q54) were distributed as shown in the figure.

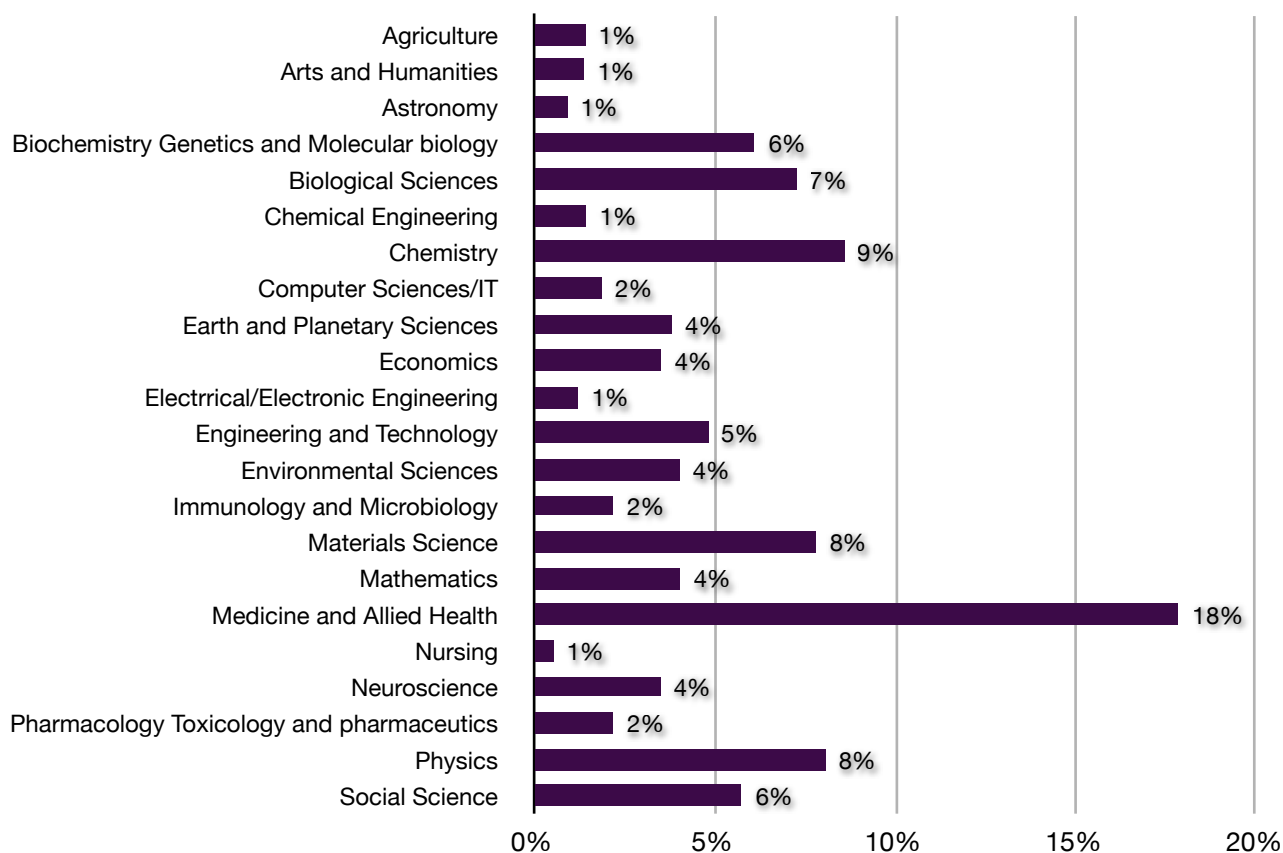


Figure 37: Responses by field of research (n = 3040)

For the purposes of analysis, these have been grouped into four larger categories.

**Table 35: Subject group categories**

Field	Number	Percentage
Clinical medicine & nursing	561	18
Humanities & social sciences (HSS)	327	11
Life sciences	819	27
Physical sciences & engineering	1304	43

## Organisation

Respondents were predominantly from universities or colleges (62%), followed by research institutes (15%) and hospital/medical schools (14%). (Q50.)

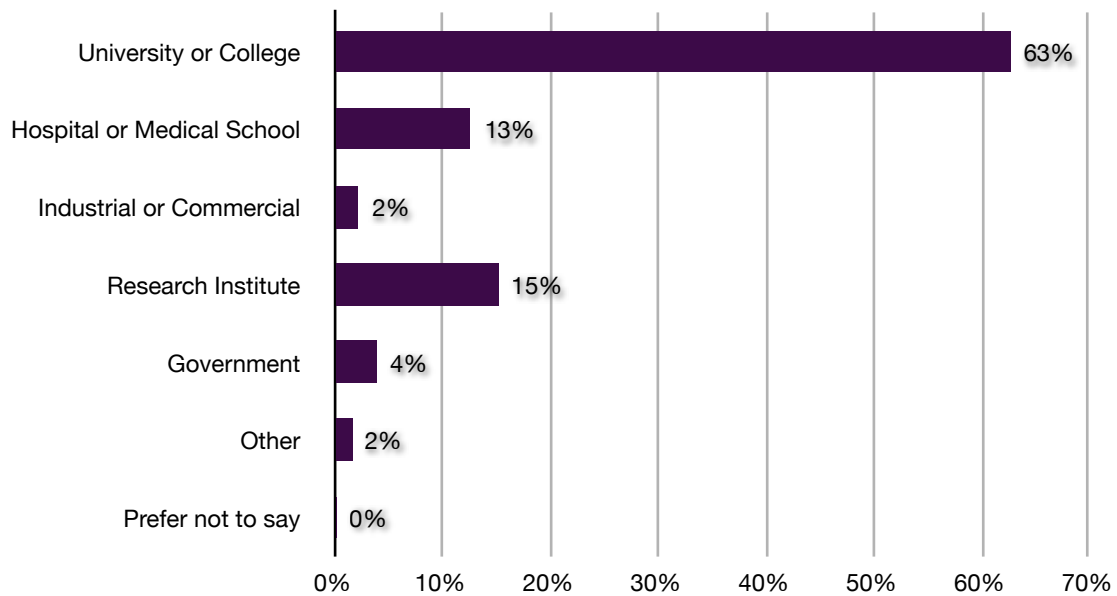


Figure 38: Responses by field of research (n = 3040)

## Age

The distribution of ages (Q51) among respondents is shown in the figure below. For most of the analysis these have been grouped in three broader bands, <36, 36-55, and >55.

The average age of respondents was about 47.

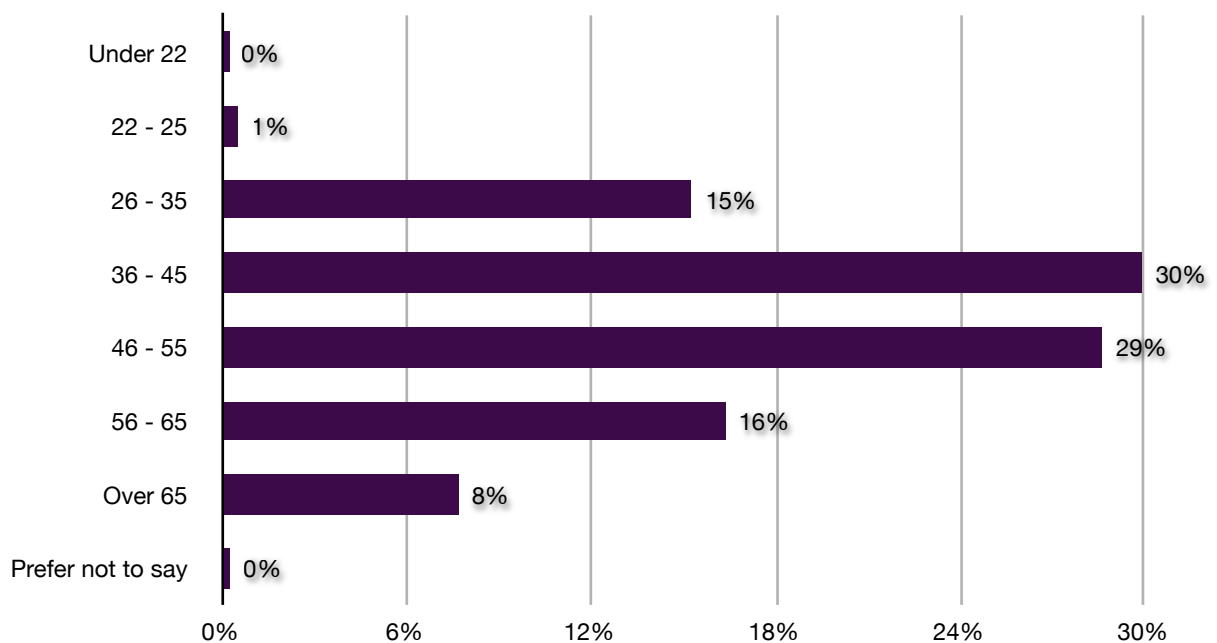


Figure 39: Distribution of respondents by age (n = 3040)

## Gender

20% of respondents were women and 76% men (Q52). (The remainder either explicitly declined to divulge their gender (1%) or skipped the question.) This is comparable to other surveys (e.g. CIBER 2005 had 75% men, 23% women).

There were a number of attitudinal differences between men's and women's responses.

## Position

Respondents were asked to choose the category that most closely matched their position (Q55). This data is used to judge the respondent's seniority (as distinct from age). The distribution is shown below.

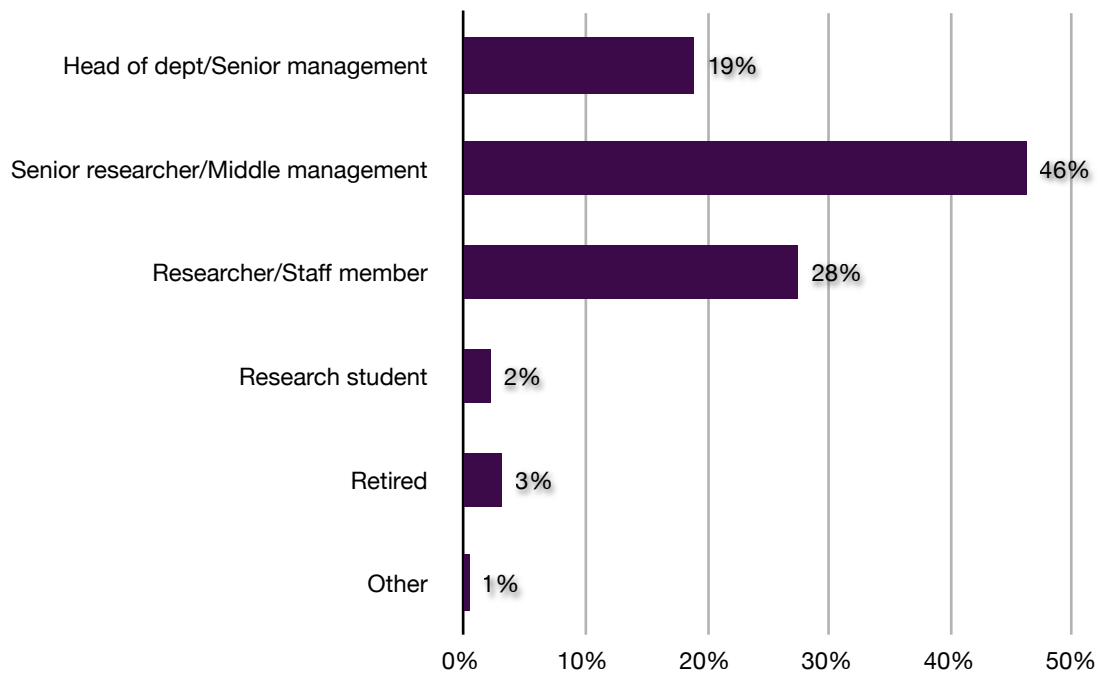


Figure 40: Distribution of respondents by position (n = 3040)

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# Appendix 1: the questionnaire

Note: the question numbering is non-contiguous as a consequence of editing and revisions. We have left it in this form to avoid potential errors that might have arisen from renumbering for the purposes of the report. The respondents were not aware of the question numbers, which were suppressed in the online presentation of the questionnaire.

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*Welcome to the Publishing Research Consortium's survey on peer review, and thank you for participating.*

*The survey should take about 20 minutes - please do complete the whole survey, as this will enable us to derive the most value from your responses.*

Q1 To begin with, please indicate the number of academic peer-reviewed papers you have published:

a) In your career to date

- None
- 1 - 5
- 6 - 10
- 11 - 20
- 21 - 50
- 51 - 100
- 101 - 150
- Over 150

b) In the last 24 months

- 0 [Goto question Q2]
- 1 - 2 [Goto question Q3]
- 3 - 5 [Goto question Q3]
- 6 - 10 [Goto question Q3]
- 11- 20 [Goto question Q3]
- More than 20 [Goto question Q3]

Q2 Are you an editor on a journal? (by editor we mean an individual who receives submissions or makes acceptance decisions on papers)

- Yes [Goto question Q3]
- No [Go to question Q56/terminate]

## **General experience of peer review**

Q3 Overall, how satisfied are you with the peer review system used by scholarly journals?

- Very satisfied
- Satisfied
- Neither satisfied nor dissatisfied
- Dissatisfied
- Very dissatisfied
- Don't Know

Q4 Please indicate the extent to which you agree with the following statements (Scale Strongly disagree / Disagree / Neither agree nor disagree / Agree / Strongly agree):

- The current peer review system is the best we can achieve
- Peer review in journals needs a complete overhaul
- Peer review is completely unnecessary
- Peer review is holding back scientific communication
- Scientific communication is greatly helped by peer review of published journal papers
- Without peer review there is no control in scientific communication

Q5 How effective do you think peer review is at meeting the following objectives? Please indicate the extent to which you agree with the following statements (Scale: Strongly agree – Strongly disagree):

- Peer review selects the best manuscripts for the journal
- It effectively determines the originality of the manuscript
- Peer review improves the quality of the published paper
- It determines the importance of the findings
- It detects plagiarism
- It detects academic fraud

Q6 For research papers published in your field, to what extent do you agree that the following types of peer review are effective statements (Scale: Strongly agree – Strongly disagree)?

- Single-blind peer review (where the author's name is known to the reviewers but the reviewers' names are not known to the author)
- Double-blind peer review (where neither the author's nor the reviewers' names are known to each other)
- Open peer review (where the author's and reviewers' names are known to each other)
- Post-publication review (where online readers comment on and/or rate the paper following publication)

Q7 (a) Which of the above is your single most preferred choice?

- Single Blind peer review
- Double blind peer Review
- Open peer review
- Post-publication review

Q7 (b) What are the reasons for your most preferred choice?

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Q8 To what extent do you agree or disagree with the following statements?

- Reviewers should be paid for each review they complete
- Monetary payment would reduce the objectivity of peer review
- Monetary payment would make the cost of publishing too expensive

Q9 If you think that reviewers should be paid for their reviews, where should the additional funds for this come from?

- Subscription fees or licenses
- Publication or submission charges
- Don't know/Not applicable
- Other (please specify) \_\_\_\_\_

### ***Experience of peer review as an author***

Q10 Which of the following types of peer review do you have personal experience of as an author? (select all that apply)

- Single blind peer review (where the author's name is known to the reviewers but the reviewers' names are not known to the author)

- Double blind peer review (where neither the author's nor the reviewers' names are known to the other)
- Open peer review (where the author's and reviewers' names are known to each other)
- Post-publication review (where online readers comment on and/or rate the paper following publication)

In this next section we are going to ask you some questions about the last peer-reviewed paper that you had accepted for publication.

Q11 Do you think that the peer review process improved the quality of the paper?

- Yes [Goto question Q12]
- No [Goto question Q13]

Q12 IF YES: Please indicate how far each of the following aspects of the paper was improved? (please rate using the scale 1 - 5, where 1 = no improvement and 5 = substantial improvement)

- The language or readability
- Identified scientific errors
- Identified statistical errors
- Made suggestions on presentation
- Identified missing or inaccurate references

Q13 Approximately how long did the peer review process take?

- Up to 7 days
- 8 - 14 days
- 15 - 30 days
- 1 - 2 months
- 3 - 6 months
- Longer than 6 months

Q15 To what extent do you agree that the length of time from submission to decision was satisfactory?

- Strongly disagree
- Disagree
- Neither agree nor disagree
- Agree
- Strongly agree
- Don't know/Not applicable

## Alternative approaches to peer review

Q17 Post-publication review: To what extent do you agree with the following statements about the suggested system of post-publication review, where online readers comment on the paper after publication (Scale: Strongly agree – Strongly disagree):

- This would be a useful supplement to formal peer review
- Readers will be unwilling to offer substantial criticism for fear of offending the author
- This would offer an equally powerful alternative to formal peer review
- Adoption of this system would relieve the load on reviewers
- Such a system encourages instant reactions and discourages thoughtful review
- This system is not as good as formal peer review but would be an acceptable alternative
- As an author, the adoption of such a system by a journal would make me less likely to submit to it

Q18 To what extent do you agree with the following statements (Scale: Strongly agree – Strongly disagree)?

- Peer review is unnecessary and could in principle be replaced by utilising usage statistics (for instance the number of times a paper is downloaded) to identify good papers

- Peer review is unnecessary and could in principle be replaced by utilising citation data to identify good papers
- Peer review is unnecessary and could in principle be replaced by utilising post-publication ratings given by readers to identify good papers

## **Other publishing related issues**

Q19 How would you describe your current level of access to the journal literature?

- Very poor (I always have great difficulty getting the journals I need)
- Poor (I frequently have difficulty getting the journals I need)
- Varies (I sometimes have difficulty getting the journals I need)
- Good (I have access to most of the journals I need)
- Excellent (I have access to all the journals I need)

Q21 Please indicate which of the following technologies you use. (select all that apply)

- RSS newsreader
- Blogs - I regularly read blogs
- Blogs - I have my own blog or actively comment on others' blogs
- Wiki - I have contributed to a work-related wiki
- Social bookmarking services such as Del.icio.us, Connotea or CiteULike
- Handheld email devices such as smartphones

Q22 Are you an editor on a journal? (by editor we mean an individual who receives submissions or makes acceptance decisions on papers)

- Yes [Goto question Q36]
- No [Goto question Q23]

Q23 How many papers have you reviewed/refereed in the last 12 months?

- 0 [Goto question Q50]
- 1 - 2 [Goto question Q24]
- 3 - 5 [Goto question Q24]
- 6 - 10 [Goto question Q24]
- 11 - 20 [Goto question Q24]
- 21 - 50 [Goto question Q24]
- Over 50 [Goto question Q24]

Experience as a journal reviewer: In this section we consider your role as a reviewer (sometimes called a referee).

Q10(c) Which of the following types of peer review do you have personal experience of as a reviewer? (select all that apply)

- Single blind peer review (where the author's name is known to the reviewers but the reviewers' names are not known to the author)
- Double blind peer review (where neither the author's nor the reviewers' names are known to the other)
- Open peer review (where the author's and reviewers' names are known to each other)
- Post-publication review (where online readers comment on and/or rate the paper following publication)

Q24 Thinking of the last 2 - 3 years, for how many journals have you reviewed (please give your answer in numeric form)

- a) regularly? (3 or more times a year) \_\_\_\_\_
- b) occasionally? (less than 3 times a year) \_\_\_\_\_

Q25 Thinking about the last invitation to review that you received, was the subject matter of this paper:

- Within your core areas of expertise?
- Outside your core areas but within your peripheral areas of expertise?
- Outside your areas of expertise entirely?

Q26 During the last 12 months, how many times have you declined an invitation to review?

- 0
- 1 - 2

- 11 - 20
- 21 - 50
- Over 50

Q27 Thinking of the last time you declined an invitation to review, what were the main reasons for you to decline? (select up to a maximum of three reasons)

- Too busy generally
- Too many prior reviewing commitments
- Paper was outside your area of expertise
- Proposed deadline was too short to conduct a high quality review
- Journal was not on your preferred list of journals to review for
- Poor scientific quality of the paper
- Poor quality English of the paper
- I have not declined a reviewing invitation recently enough to recall
- Other (please specify) \_\_\_\_\_

Q28 Now thinking specifically about the last paper you reviewed:

Please give the full title of the journal - Note: Individual journals will not be identified in any reports. (please mention only one journal)

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Q30 How long was the duration between your acceptance of the invitation to review and the delivery of your report?

- Up to 7 days
- 8 - 14 days
- 15 - 30 days
- 1 - 2 months
- 3 - 6 months
- Longer than 6 months

Q29 How much time did you devote to the review? (Please write in the number of hours)

Hours: \_\_\_\_\_

### ***Reviewers' opinions on peer review***

Q32 Reasons why you review: Please indicate the extent to which you agree that the following reasons describe why you review (Scale: Strongly agree – Strongly disagree):

- Playing your part as a member of the academic community
- Enjoy seeing new work ahead of publication
- Reciprocating the benefit gained when others review your papers
- Enjoy being able to help improve the paper
- To enhance your reputation or further your career
- To increase the chance of being offered a role in the journal's editorial team
- Personal recognition from, or opportunity to build a relationship with, the editor

Q33 Please say whether the following would make you more or less likely to review for a journal (Scale: Much less likely / Less likely / No difference / More likely / Much more likely):

- Acknowledgement in the journal (e.g. appear in list of most frequent reviewers)
- Optional accreditation for CME/CPD points
- Free subscription to the journal
- Payment in kind by the journal (e.g. waiver of colour or other publication charges, free offprints, etc.)
- Your name as reviewer disclosed to the author
- Your name being published alongside the paper as one of the reviewers
- Your reviewer's report being published anonymously with the paper

- Your signed report being published with the paper

Q34 What is the maximum number of papers that you would be prepared to review in a year?

- 1 - 2
- 3 - 5
- 6 - 10
- 11 - 15
- 16 - 20
- 21 - 50
- Over 50

Q35 The development of online publishing means that it is increasingly feasible to include the author's data (for instance, data tables, video files, etc) with the paper, either as supplementary materials or potentially as an integrated part of the paper. Please indicate the extent to which you agree with the following statements:

- Peer review of author's data is desirable in principle
- I would be happy to review author's data if requested by the journal
- It is unrealistic to expect peer reviewers to review author's data

### ***The editor's role in peer review***

*The following questions are related to your role as a journal editor.*

Q36 How many reviewers do you normally use per research paper?

- 0
- 1
- 2
- 3
- 4
- 5
- More than 5

Q37 Which of the following types of peer review most closely describes the system in use on your journal? (Select one only)

- Single blind review (where the author's name is known to the reviewers but the reviewers' names are not known to the author)
- Double blind review (where neither the author's nor the reviewers' names are known to each other)
- Open peer review (where the author's and reviewers' names are known to each other)
- Post-publication review (where online readers comment on and/or rate the paper following publication)

Q38 As an editor, roughly how many papers do you make accept/reject decisions on in a year?

- 0
- 1 - 9
- 10 - 24
- 25 - 49
- 50 - 99
- 100 - 149
- 150 - 199
- 200 or more

Q39 What percentage of submitted papers on your journal fall into the following categories? (please fill in with figures – system forces numeric responses that total 100)

- Are rejected prior to peer review due to poor quality \_\_\_\_\_
- Are rejected prior to peer review due to being out of scope \_\_\_\_\_
- Are accepted for publication after peer review without revision \_\_\_\_\_
- Are accepted for publication after peer review but need revision \_\_\_\_\_
- Are rejected after peer review \_\_\_\_\_

Q40 How are the reviewers selected? (select all that apply)

- By the editor
- By a member of the editor's team

- By a member of the publisher's staff
- As nominated by the author
- Using computer matching

Q41 Do you use an online manuscript submission and tracking system?

- Yes
- No

Q42 Do you provide reviewers with a checklist of questions to answer?

- Yes
- No

Q43 Which of the following do you specifically ask reviewers to comment on? (select all that apply)

- Quality
- Relevance
- Importance
- Originality
- Methodology employed
- Experimental data
- Paper length
- Illustrations
- Tables
- References
- Language
- Statistics
- Ethical issues
- Other (please specify) \_\_\_\_\_

Q44 The development of online publishing means that it is increasingly feasible to include the author's data (for instance data tables, video files, etc) with the paper, either as supplementary materials or potentially as an integrated part of the paper. Please indicate the extent to which you agree with the following statements (Scale: Strongly agree – Strongly disagree):

- Peer review of author's data is desirable in principle
- We have no plans to introduce the reviewing of author's data at our journal
- It is unrealistic to expect peer reviewers to review author's data

Q45 Do you give reviewers of research papers a deadline for responding, and if so how long?

- Up to 7 days
- 8 - 14 days
- 15 - 30 days
- 1 - 2 months
- 3 - 6 months
- Longer than 6 months
- No deadline

Q46 Approximately how long does the peer review process take on your journal (1 week or less / 2 - 3 weeks / 1 - 2 months / 3 - 6 months / More than 6 months)?

- From submission to first decision
- For any revision stages that were undertaken
- From submission to final acceptance by the journal

Q47 To what extent do you agree with the following statements about your journal (Scale: Strongly agree – Strongly disagree)?

- I am happy with the length of time from submission to first decision
- I am happy with the length of time from submission to final acceptance by the journal

Q48 What feedback do you give reviewers? (select all that apply)

- Publication outcome
- Quality of their report
- None
- Other (please specify) \_\_\_\_\_

Q49 How do you reward reviewers? (select all that apply)

- Payment
- Free subscription
- Waiver of publication/page/colour/offprint charges
- Acknowledgement in journal
- CPD/CME points
- Token gift
- Reviewer receptions at conferences
- Offer no reward
- Other (please specify) \_\_\_\_\_

## **About you**

Q50 Which of the following best describes your organisation?

- University or College
- Hospital or Medical School
- Industrial or Commercial
- Research Institute
- Government
- Other
- Prefer not to say

Q51 Which of the following age groups do you fall into?

- Under 22
- 22 - 25
- 26 - 35
- 36 - 45
- 46 - 55
- 56 - 65
- Over 65
- Prefer not to say

Q52 Could you please indicate your gender

- Female
- Male
- Prefer not to say

Q53 In which country are you located?

[Select from drop-down list]

Q54 Which of the following best describes your field of research?

- Agriculture
- Arts and Humanities
- Astronomy
- Biochemistry, Genetics and Molecular Biology
- Biological Sciences
- Chemical Engineering
- Chemistry
- Computer Sciences/IT
- Earth and Planetary Sciences
- Economics
- Electrical/Electronic Engineering
- Engineering and Technology
- Environmental Sciences
- Immunology and Microbiology
- Materials Science

- Mathematics
- Medicine and Allied Health
- Nursing
- Neuroscience
- Pharmacology, Toxicology and Pharmeceutics
- Physics
- Social Science

Q55 What is your position within your organisation?

- Head of Department/Senior Management
- Senior Researcher/Middle Management
- Researcher/Staff Member
- Research Student
- Retired
- Other (please specify) \_\_\_\_\_

[Q56 For non-qualifiers]

*Thank you for your assistance. Unfortunately you have indicated that you have published no peer-reviewed papers in the last 2 years and are not a journal editor, and as this survey is designed for these two groups we shall not be able to make use of your responses.*

Optionally, if you would like to be notified when the results are available, please fill in your email address below:

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Thank you for your assistance. Your answers will be of great help to us in understanding the way in which peer review is conducted, how it might develop, and how the current processes are perceived. A report on our findings from this survey will be made available on the PRC website as soon as practicable.

Optionally, if you would like to be notified when the results are available, please fill in your email address below:

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# Appendix 2: cluster analysis

## Cluster analysis

In order to understand better some apparent anomalies in some of the answers in the survey concerning general levels of satisfaction, a cluster analysis was undertaken. After some preliminary study, the factors chosen as most likely to shed light were:

- Overall satisfaction with peer review
- Level of agreement with “current system is the best we can achieve”
- Level of agreement with “peer review needs a complete overhaul”

All the scores on these three parameters were mapped in three-dimensional space, and three clusters (or groupings based on proximity to each other) were identified. The three clusters can be characterised as follows:

Cluster 1 (1123, 37%):

- Those who were dissatisfied with the peer review system, and
- Disagreed that it is the best we can achieve, and
- Agreed that a complete overhaul is needed.

Cluster 2 (1423, 47%):

- Those who were satisfied with the peer review system, and
- Agreed that it is the best we can achieve, and
- Disagreed that a complete overhaul is needed.

Cluster 3 (366, 12%):

- Those who were satisfied with the peer review system, and
- Agreed that it is the best we can achieve, but
- Also agreed that a complete overhaul is needed.

Clearly, the first two clusters are each internally consistent whilst also being opposites. The third cluster is different, in that it is satisfied, considers the current system the best we can achieve, yet still believes that a complete overhaul is needed, which appears contradictory. (It should be noted that the descriptions above are relative to the total sample, and not absolutes.)

The table below sets out some of the key demographic and descriptive characteristics of these three clusters. It is interesting that there are very few demographic differences between the first two clusters: these attitudes towards peer review are therefore not particularly associated with demographic factors. (The description of the Dissatisfied group below shows a

similar picture). In some ways this is a surprising finding, as one might have expected more radical views on the need for change to be held by (say) younger researchers, or for there to be more differences between fields.

Cluster 3 is clearly quite different in its demographic make-up: its members are more likely (compared to the average) to be a younger male new-technology-using Asian university-based researcher in HSS or Physical sciences/engineering.

**Table 36: Demographic characteristics of the three clusters**

Categories	Cluster 1	Cluster 2	Cluster 3
Anglophone	High	High	Low
Asian	Low	Low	High
Age			Younger
Univ/College			High
HSS	Low	Low	High
Physical Sci/Eng	Low		High
Early adopters			High
Access to journals			Poor/Varies
Male			High
Experience of Single Blind as reviewer			Low
Papers reviewed in last 12 months	No significant difference		

*Note: Gaps in the above table indicate a level close to that total sample.*

The attitudes of the clusters are compared in the next table. Cluster 1 (dissatisfied with peer review and seeing it in need of an overhaul) is less likely to see single-blind review as effective, more likely to see open review as effective, and more likely to give open or post-publication review as their most preferred choice of system. They are more sceptical about the effectiveness of peer review in determining the importance of findings and at detecting plagiarism and fraud.

Cluster 2 (satisfied with peer review and disagreeing there is a need for overhaul), which was the largest single group, is more likely to see single-blind review as effective and more likely to give it as the most preferred choice of system. Consistent with the satisfaction with the current systems, they are less likely to agree that post-publication review can offer an equally powerful alternative to formal peer review, and less likely to say that peer review is unnecessary.

Cluster 3 (satisfied with peer review but also strongly believing it is in need of an overhaul) were the most likely to see post-publication review as effective and more likely to agree that post-publication review offers an equally powerful alternative, and more likely to give double-blind review as the most preferred choice of system. (This is not necessarily inconsistent if post-publication review is seen as a supplement to formal peer review rather than a replacement.) They were more likely to say peer review is holding back scientific communication (39% agreed) and more likely to say that peer review greatly helps scientific communication (92% agreed) – this does seem inconsistent at first sight, but it is possible to hold both positions (e.g. peer review could help by improving the language and/or presentation but also hold back science by discriminating against novel or non-consensus findings). This group has a strong belief in the effectiveness of peer review on many different measures. The cluster is more likely to agree to self-interested reasons for reviewing.

**Table 37: Attitudinal differences among the three clusters**

Statements	Cluster 1	Cluster 2	Cluster 3
Peer review type: most preferred choice	Open/Post	Single blind	Double blind
Single-blind review is effective	Low	High	
Double-blind review is effective	No significant differences		
Open review is effective	High		
Post-publication review is effective			High
Post-publication review offers an equally powerful alternative		Low	High
Peer review is unnecessary		Low	
Peer review is holding back scientific communication			High
Peer review helps scientific communication			High
Peer review of my paper improved the language; improved the presentation; identified scientific errors; identified statistical errors; identified missing or inaccurate references			All High
Peer review is effective at detecting importance of findings, plagiarism and fraud	Low		High
Reviewers should be paid			High
Payment would reduce objectivity			High
Payment in kind would make me more likely to review	High		Low
Undertake review to increase chance of being offered a place on the editorial team; to build relationship with the editor; to enhance reputation or further career			All High
Undertake review to build relationship with the editor			
Publication of my reviewer's report (signed or anonymous) would reduce willingness to review		High	
Prepared to review authors' data			High

## The Dissatisfied group

While the large majority of respondents expressed themselves satisfied with peer review system used by scholarly journals, a minority (12%) said they were dissatisfied or very dissatisfied, referred to as the Dissatisfied group in this report. It is interesting to ask what we can say about this group.

In terms of demographics, there are relatively few differences from the average. There were no significant differences by age, gender, type of organisation or position (seniority). By region, they were more somewhat likely to be in the Anglophone region or USA/Canada, and less likely to be in Asia or the Rest of world. Looking at field of research, they were most likely to be in HSS, and least likely in Physical sciences/engineering.

In terms of their own experience of peer review, this group reported that the peer review of their last published paper took significantly longer than average (about 110 days compared to 80), and they were more likely to be dissatisfied with the length of time involved (65% disagreed it was satisfactory compared to 38% agreeing overall). The Dissatisfied group tended to be somewhat less likely to report that peer review had improved their last published paper, and likely to give lower scores to the improvements they did report. We cannot say if there is a causal relationship; that is, is this group dissatisfied

with peer review because they have experienced longer times and less personal benefit on their own papers, or does their dissatisfaction arise from other causes and then lead them to give less positive scores?

Looking at their attitudes towards peer review, they held consistently less positive views insofar as they were more likely to agree that peer review needs a complete overhaul, or that it is completely unnecessary and that it is holding back scientific communication. Similarly they were less likely to agree the current system was the best we can achieve, or that scientific communication is greatly helped by peer review, or that without PR there is no control in scientific communication. They were less likely than average to agree that peer review was effective on all the objectives proposed.

In terms of alternative approaches to peer review, the Dissatisfied group were more likely to agree that open and post-publication review were effective. They were also more likely to agree that post-publication review would be a useful supplement to formal review, that it would relieve the load on reviewers, and that it could offer an equally powerful alternative; and they were less likely to agree it would encourage instant reactions, that readers would be unwilling to offer criticism for fear of offending, and that they would be less likely to submit themselves to a journal using it.