NEW JOURNAL PUBLISHING MODELS:
AN INTERNATIONAL SURVEY OF SENIOR RESEARCHERS

Image courtesy NASA/JPL-Caltech

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A CIBER report for the
Publishers Association and the
International Association of STM Publishers

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New journal publishing models: an international survey of senior researchers

Executive summary

This survey reports on the behaviour, attitudes and perceptions of 5,513 senior journal authors on range of issues relating to a scholarly communication system which is in the painful early stages of a digital revolution.

We know a good deal about the views of publishers and librarians in regard to the workings of the scholarly communication system, although a good deal of it is skewed by territorial ambitions. However, as far as we are aware this is the largest, most representative and statistically robust study ever undertaken into the views of authors on the workings of the scholarly publishing system. It was conducted in a totally unbiased fashion; the research team (CIBER) has no allegiances other than to the data. Taken together with the 2004 study, this provides policy makers with an enormous data resource upon which they can build sound policies: policies which have an enormous impact on the whole research community, not to mention a nationally important industry (publishing). To date they have largely had to rely on small, unrepresentative studies bereft of statistical robustness. In this data vacuum, it is impossible to formulate evidence-based policies. Now surely is the time to take stock on the back of the copious evidence that the author community (nearly 10,000 of them) has only too happily shared with us over a period of two years.

The key evidence to note is:

1. In determining where to publish, the author population as a whole does not attach much importance to being able to retain their copyright in the article, nor to gaining permission to place a pre- or post-print on the Web or in some kind of repository.

2. The crucial importance of peer review to the health and welfare of scholarly publishing is re-emphasised here.

3. Most authors felt insecure in the face of the rapid growth of the literature yet, as, by definition, successful authors in highly filtered "top" quality journals, they felt that they were not personally to blame for the information explosion.

4. The "Jekyll and Hyde" nature of academics as authors and academics as readers emerged in many of their responses but no more strongly than when comparing authors' responses to the statements: "High journal prices make it difficult to access the literature" and "As an author, I deliberately publish in journals that are

affordable to readers". There was a strange split of opinion here, with remarkably only one in five of respondents agreeing with both propositions;

5. Significantly, senior authors and researchers believe downloads to be a more credible measure of the usefulness of research than traditional citations, perhaps indicating a commercial opportunity for publishers.

6. Chasing up references in papers remains the most popular method for discovering journal articles of interest. The convenience and speed of electronic tools is highly appreciated but the role and importance of the physical library merits serious reflection – libraries rank in 11th place out of 12, way behind digital methods of information discovery and retrieval. Clearly, libraries need to consider their position and their visibility in a digital world where their users are increasingly removed from them and not even conscious that it is they who are paying the access bills. CIBER log studies show that usage depends highly on visibility and that libraries are facing real problems in maintaining their position in an increasingly digital information world.

7. With regard to open access two significant shifts appear to have occurred since the last survey. Firstly, the research community is now much more aware of the open access issue. There has been a large rise in authors knowing quite a lot about open access (up 10 percentage points from the 2004 figure) and a big fall in authors knowing nothing at all about open access (down 25 points). Secondly, the proportion of authors publishing in an open access journal has grown considerably from 11 per cent (2004) to 29 per cent. This figure is possibly an overestimate since internal research by Elsevier reports that 65 per cent of authors who claimed to have last published in an open access journal had in fact published in a `traditional' journal. The most likely explanation for this is thought to be the fact that most authors' access to journals is already free to them (effectively open at the point of use).

8. Authors strongly believe that, as a result of open access, articles will become more accessible and, somewhat less strongly, that budgetary pressures on libraries would ease as a result. They do not believe, however, that quality will improve.

9. A clear majority of authors believes that mass migration to open access would undermine scholarly publishing. Of those who expressed an opinion, half believed this was likely; however, a good proportion of these people thought this would

probably be a good thing so there is evidence of considerable dissatisfaction with the status quo.

10. There is very little enthusiasm for author-or reader facing charges, and a feeling that libraries should not have to make such a large contribution to the costs of the journals system as they bear at the moment. The favoured option is that a greater burden should be borne (in this order) by research funders, commercial sponsors and central government. There are, however, dangers here because we found that almost a third of authors had published most of their work without external funding (i.e., with 50 per cent or fewer, or none, of their papers having been funded). In medicine, this figure is much higher, casting real doubt on the feasibility of `author pays' business models across the board.

11. Authors are not at all knowledgeable about institutional repositories: less than 10 per cent declared that they know `a lot' or `quite a lot' about this development, and there are signs of a dragging of feet: a significant minority (38 per cent) of those expressing an opinion, declare a clear unwillingness to deposit their articles in an institutional repository.

12. Looking at the author population as whole, two clusters of researchers with especially positive views about open access and the need for reform of the current system are evident. The most radicalised group ('OA Enthusiasts') makes up about 8% of the total population. This group is characterised by its youth, its geographical composition (with very strong representation from Asia, Africa and Eastern Europe) and a tendency towards more applied and clincal ends of the research spectrum. For a very large majority of mid-career and older researchers in the `Anglosphere mainstream', open access issues are not at all high on their list of priorities. Not so far, anyway.

Background to the survey

The context for this survey is a major programme of research (Virtual Scholar) into the changing nature of scholarly communication by CIBER, an independent publishing think tank based at University College London. Virtual Scholar is employing a range of methodologies, from web-based surveys, to interviews, deep log analysis and philosophising to arrive at a better understanding of the impact of new business models and modes of delivery on producers, users and distributors of learned information.

This international survey was commissioned by the Publishers Association (PA) and the International Association of Scientific, Technical and Medical Publishers (STM), with additional support from CIBER associates, early in 2005 following the success of a previous study of author attitudes and opinions which CIBER carried out in 2004[1]. The specific objectives of this study are to chart the growing awareness of open access concepts among the author community and to explore their attitudes to new publishing models, including open access and institutional repositories.

The views expressed in this report are those of the authors alone, based on a detailed analysis of the data. This report does not represent a corporate position, either of the Publishers Association or STM.

Survey methodology

The survey instrument and covering email invitation (see Annexes A and B) were designed by CIBER and extensively piloted over three rounds using correspondents from a variety of disciplinary backgrounds from Australia, India, Mexico, France, Greece, the USA and the UK during May and June 2005. The survey design was based largely on closed questions in order to facilitate its roll out on a very large scale using web technologies. The report does however make extensive use of some of the unprompted free text comments made by authors at the end of the questionnaire to underline the variety of opinions and the complexity of some of the issues raised.

The survey was administered on CIBER's behalf by NOP World (we are particularly grateful to Laura Pennells for her advice on rating scales). Author mailing lists were commissioned from the Institute for Scientific Information (ISI) to CIBER's specification: 100,000 randomly selected authors who had published in an ISI-indexed journal during 2004. The lists were supplied direct to NOP who subsequently removed any duplicate names. NOP have a number of clients in the publishing sector who also engage in web-based survey research. To avoid over-exposure of these methods, NOP removed from our original lists the names of any authors who had recently been invited to take part in such a survey.

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[1] See http://www.ucl.ac.uk/ciber/ciber-pa-report.pdf

Authors were sent an email message inviting them to take part in the survey. The message contained a hyperlink to NOP's database, enabling them to link direct to the online questionnaire. The survey went live on 21 June 2005. Reminders were sent out on 1 July and the field work concluded on 6 July when we had exceeded our target number of completed responses.

An important feature of this study is that it invites the views of corresponding authors only: these are typically principal investigators or research group leaders and so the finding reported here should be interpreted with that fact about their seniority and experience in mind. The findings should not be generalised to all journal authors.

CIBER had complete editorial control over all aspects of the design, interpretation and reporting of the survey. The intention of the survey was to present the material as impartially as possible: two unsolicited free text comments from authors suggest that we may have caught the tone about right:

> "This survey seems biased against the open access publishing model. It is clear that open access will shake up the publishing world, which is a good thing, but it will not, as some have suggested, damage it."

> "It seems to me this survey is biased towards the open access system, which is a very rare system of scientific publishing and that, in my opinion, will make the scientific community even more narrow minded."

RESPONSE RATE

After the removal of duplicate names, and the removal of authors who had recently been contacted by NOP for research purposes, 76,790 email invitations were sent out. The response rate obtained (Table 1) is high for a web-based industrial survey, most of which tend to cluster in the 4%-6% band. The high response rate suggests that senior researchers find this topic interesting and important, despite their self-confessed lack of detailed knowledge of open access and other new publishing business models (see Questions 7 and 13).

Table 1: Survey response rate

E-mail invitations (after de-duplication)	76,790
Fully completed responses	5,513
Effective response rate	**7.2%**

However, the response rate begs the question, common to all surveys, of whether there are any systematic differences between the invited and responding populations? Are respondents different from non-respondents in some material way?

GEOGRAPHIC REPRESENTATIVENESS

In this section, we compare the regional composition of the completed responses with that of the sample of authors from which they were drawn from the ISI database, after de-duplication (Table 2).

Table 2: Regional composition of survey sample (expected) and completed questionnaires (observed)

REGION	OBSERVED	EXPECTED	DIFFERENCE PERCENTAGE POINTS
Africa	2.3%	1.5%	+0.8
Asia	23.2%	32.2%	-9.0
Australasia	5.4%	3.8%	+1.6
Central America	0.3%	0.9%	-0.6
Eastern Europe	6.4%	6.6%	-0.2
North America	38.7%	36.8%	+1.9
South America	3.6%	3.8%	-0.2
Western Europe	20.1%	14.3%	+5.8
Total	**100.0%**	**100.0%**	

Broadly speaking, the completed questionnaires appear to be fairly representative of the broad regional categories that ISI uses. Asian authors are however under-represented, by about 9 percentage points, possibly due to the fact that, for reasons of cost, the survey was administered in the English language. It may well be that the Asian response rate was affected both by language and character set issues. It is worth bearing in mind, however, that the absolute response rate still reflects the views of 1,280 individual Asia authors and CIBER is not aware of any comparable survey of this geographic region, certainly not on this scale.

SUBJECT REPRESENTATIVENESS

In this section, we compare the subject composition of the invited and responding populations (Table 3). It certainly appears that the final sample offers an accurate reflection of authors' subject interests, although there is an important caveat. The data in the second column (`Observed') were provided directly by the authors themselves in response to a question of how they would classify the *subject content of their last paper*. The third column (`Expected') records the subject classification of the *journal* not necessarily the article from which ISI extracted the author's email address - and one should not therefore expect a direct one-to-one correspondence between these two classifications.

Table 3: Subject composition of survey sample (expected) and completed questionnaires (observed)

Broad subject	Observed	Expected	Difference percentage points
Agriculture and biological sciences	10.0%	8.0%	+2.0
Arts and humanities	1.4%	2.0%	-0.6
Chemistry and chem engineering	8.7%	10.1%	-1.4
Earth sciences	2.4%	2.5%	-0.1
Environmental sciences	3.7%	2.5%	+1.2
Life sciences	8.9%	13.1%	-4.2
Materials science and engineering	13.6%	12.6%	+1.0
Maths and computer sciences	4.7%	5%	-0.3
Medicine and allied health	23.6%	20.1%	+3.5
Neuroscience	4.3%	3.5%	+0.8
Pharmacology and toxicology	2.4%	2.5%	-0.1
Physics and astronomy	7.7%	11.1%	-2.4
Social sciences and economics	8.6%	7.0%	+1.6
TOTAL	**100.0%**	**100.0%**	

Most of the variance in Table 3 relates to the very broad categories of life sciences and medicine and allied health and, if these are combined into one super category, the correspondence between observed and expected values is very striking across all disciplines.

POWER OF THE SURVEY

When designing and planning the survey, CIBER hoped to achieve a target of 4,929 completed questionnaires (the final figure was in fact 5,513). Theoretically, reaching this target would mean that we could place our results within a 99% confidence limit and report our individual findings within a confidence interval of plus or minus 1.75%.

In order to establish the power of the survey, we need to know the size of the total population from which the sample is drawn (in this case, corresponding authors who had published in an ISI-indexed journal during 2004). To establish an estimate of total population size, CIBER used the following data and assumptions:

I.   In 2004, around 860,000 ISI-indexed articles were published in the sciences, social sciences and arts and humanities (estimate obtained using Dialog Classic)

II.   Although most papers are multi-authored, we can assume quite reasonably for the purposes of this exercise that there is only one corresponding author per paper

III. Many of these corresponding authors will have published two or more papers during the census period (2004) but we can use Lotka's law[2] to predict the number of *unique* corresponding authors (61%)

IV.   We therefore estimate a total population of about 525,000 (i.e. 860,000 x 0.61) unique principal investigators and senior researchers from which our survey should draw.

We conclude that the final survey sample is highly representative by subject discipline but that there is a small but significant shortfall in Asian authors. For this reason, we are conservatively basing our estimate of the power of the survey on the actual response rate obtained for Asian authors. On that basis, we estimate that the findings reported in this report should be interpreted within the context of a 95% confidence limit and within a confidence interval of plus or minus 2.7%.

> CIBER KEY FINDING 1
>
> **POWER OF THE SURVEY**
>
> **Based on the size of the author population, and the characteristics of those who were invited to take part and those who responded, CIBER concludes that the survey findings reported here are highly robust:**
>
> **Confidence limit = 95%**
>
> **Confidence interval = +/- 2.7%**

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[2]   Lotka's law describes the frequency of publication by authors in a given field. It states that " . . . the number (of authors) making n contributions is about $1/n^2$ of those making one; and the proportion of all contributors, that make a single contribution, is about 61 percent". This means that out of all the authors in a given field, 61 percent will have just one publication, and 15 percent will have two publications ($1/2^2$ times .61). 7 percent of authors will have three publications ($1/3^2$ times .60), and so on. According to Lotka's Law of scientific productivity, only six percent of the authors in a field will produce more than 10 articles.
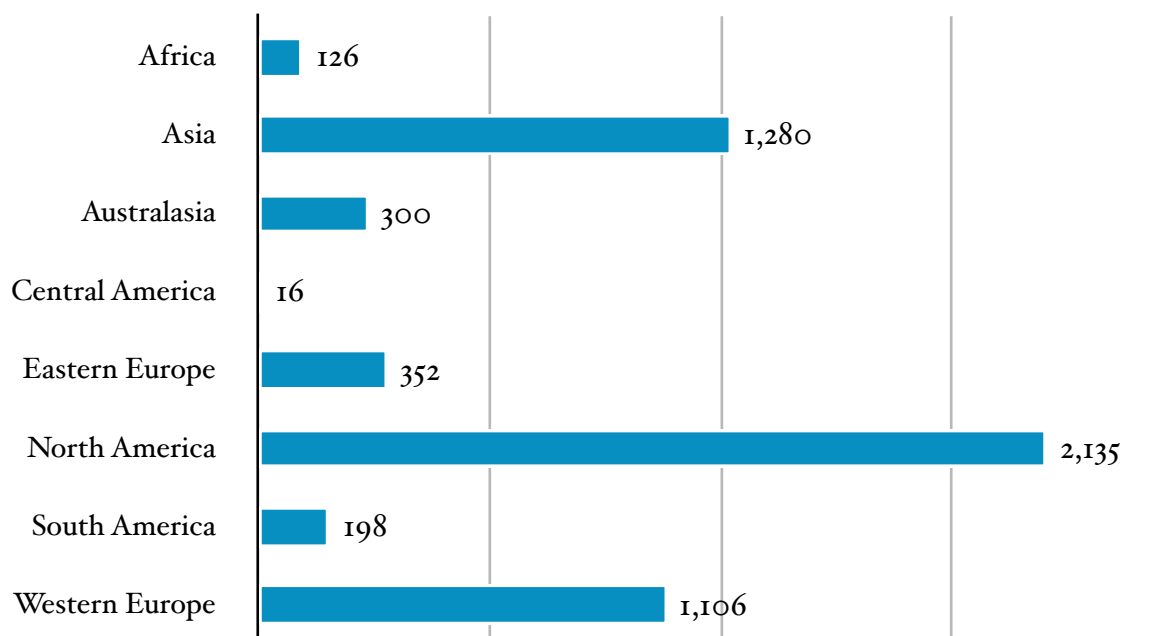
Survey demographics

This section provides an overview of the six key author demographics used in this report: region, employer type, main subject interest, gender, age and the role (or roles) they play in the journal publishing chain.

REGIONAL DISTRIBUTION (Q17)

The regional distribution of the survey emphasises the historic dominance of North American and Western European authors within the `top' journals indexed ISI universe, but it also reveals that Asian contributions are now also very significant.

Figure 1: Regional distribution of respondents (n=5,513)

Numbers of respondents

Region	Number
Africa	126
Asia	1,280
Australasia	300
Central America	16
Eastern Europe	352
North America	2,135
South America	198
Western Europe	1,106

Not surprisingly, the issue of geographic equity raised itself many times, especially with regard to open access, when, at the end of the survey, authors were encouraged to offer their unsolicited opinions:

> "It is very difficult to have a published article in a significant journal if the author is not from Western Europe or North America, if the author does not have close connections to the editorial board. These things remind me of the communist corruption in the East European countries."

> "We [Asian research institute] cannot afford to subscribe to any online journals and this is a major problem affecting our activities."

As will be seen later, region is an important variable which shapes a broad range of author attitudes and experiences.

INSTITUTIONAL DISTRIBUTION (Q18)

As noted in the previous (2004) CIBER author survey, knowledge creation is not the preserve of the traditional university or college setting which generates just under 60% of ISI-indexed articles (Figure 2).

Figure 2: Institutional distribution of respondents (n=5,513)

Numbers of respondents

Institution	Number
University or college	3,269
Hospital or medical school	856
Government	265
Research institute	802
Commercial	167
Self-employed	104
Other	50
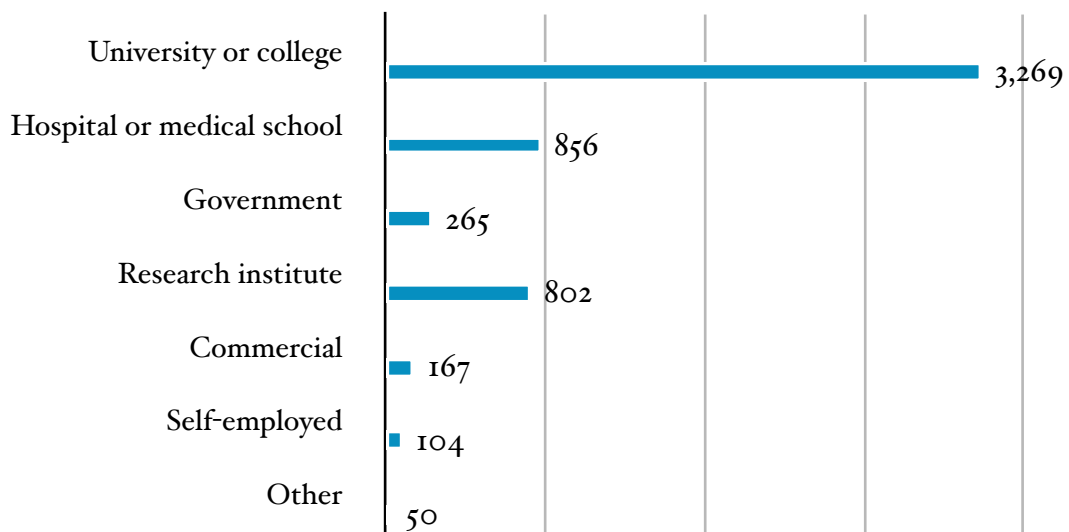
With a few exceptions, institutional affiliation appears not to be a major determinant of author attitudes, this variable tends to be confounded by other, more important factors, notably subject discipline and region.

DISTRIBUTION BY BROAD SUBJECT (Q19)

Figure 3: Subject of last published article (n=5,513)

Numbers of respondents

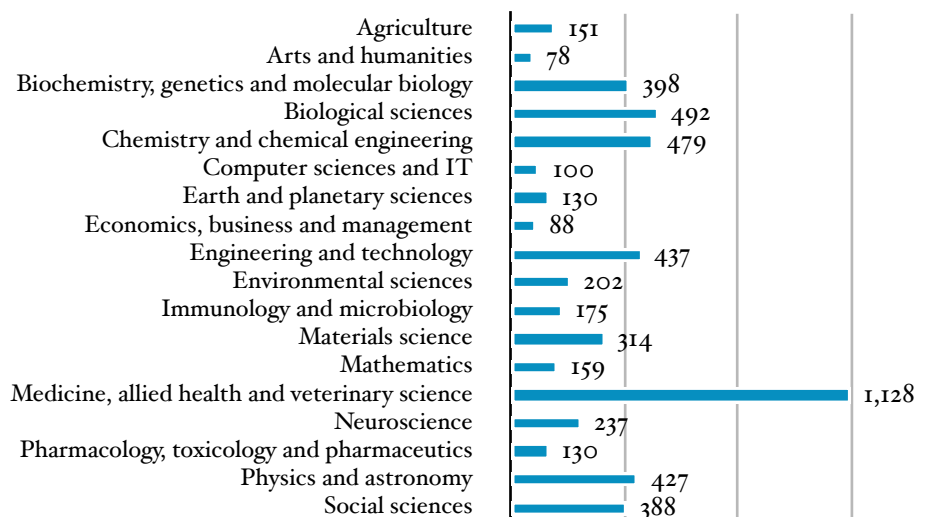| Subject	Number
Agriculture	151
Arts and humanities	78
Biochemistry, genetics and molecular biology	398
Biological sciences	492
Chemistry and chemical engineering	479
Computer sciences and IT	100
Earth and planetary sciences	130
Economics, business and management	88
Engineering and technology	437
Environmental sciences	202
Immunology and microbiology	175
Materials science	314
Mathematics	159
Medicine, allied health and veterinary science	1,128
Neuroscience	237
Pharmacology, toxicology and pharmaceutics	130
Physics and astronomy	427
Social sciences	388

In marked contrast, subject discipline proves to be an extremely influential variable in the course of this report. This strongly suggests that any `one-size-fits-all' solution imposed across the whole sector is at best likely to be counter-productive.

GENDER (Q20)

Gender is a fairly important variable in this survey. Women are very substantially under-represented among senior active researchers (and in other academic roles, see Q22 below), as is sadly evident in Figure 4:

Figure 4: Gender distribution of respondents (n=5,513)

Numbers of respondents

Gender	Number
Men	4,159
Women	1,262
Refused	92
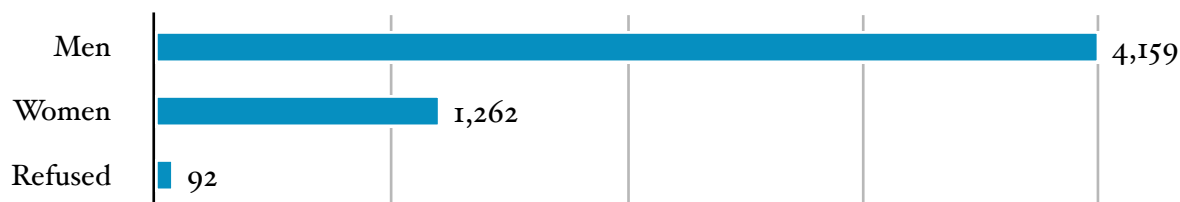
AGE (Q21)

The age distribution of the sample reflects the senior, mid-to-late career, status of the respondents. As noted earlier, the views and attitudes considered in this survey are those of principal investigators and research group leaders and they should not be taken as being necessarily representative of all academic researchers. More than a third (35.9%) of the respondents are baby boomers, aged 45 or older and many of their attitudes will have

been formed during a long period of relative stability for the academic sector, at a time when the current difficulties facing institutional library budgets and the scholarly communication market were not so evident.

Figure 5: Age distribution of respondents (n=5,513)

Numbers of respondents

Age	Number
Under 26	58
26-35	1,431
36-45	1,829
46-55	1,267
56-65	658
Over 65	26
Refused	82
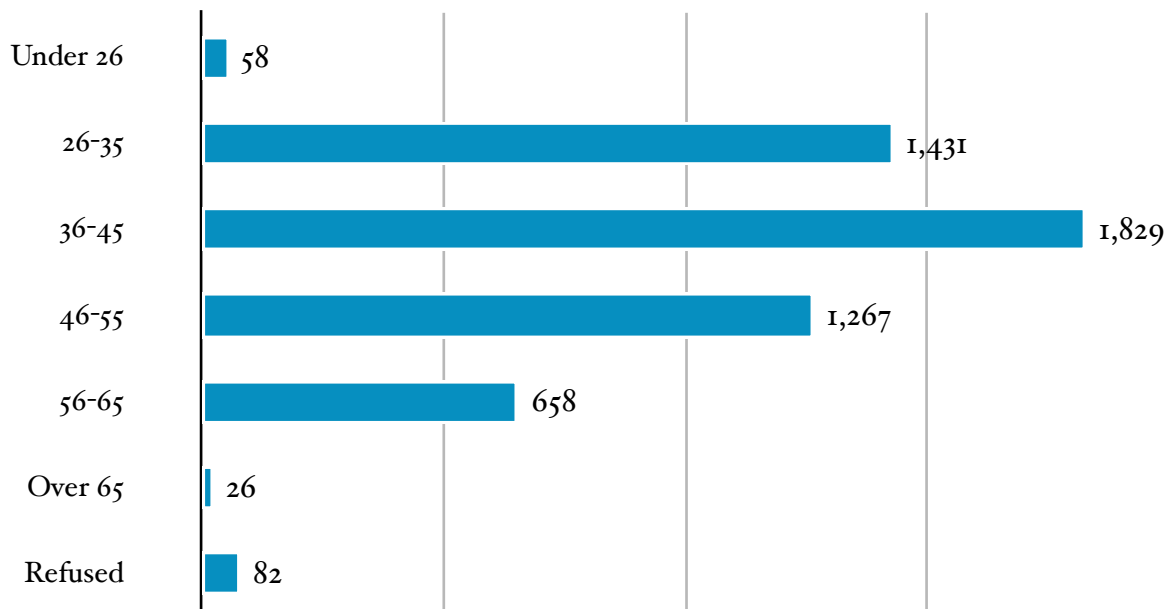
ROLE IN THE PUBLISHING SYSTEM (Q22)

By definition, all of our respondents were recent authors. A high proportion also acted as referees (76.7%), as editorial board members (23.6%) as well as journal editors (8.0%) in the previous 12 months, indicating that this population makes a substantial contribution to and has a very significant interest in the future direction of journal publishing.

Figure 6: Distribution of respondents by publishing role (n=5,513)

Numbers of respondents
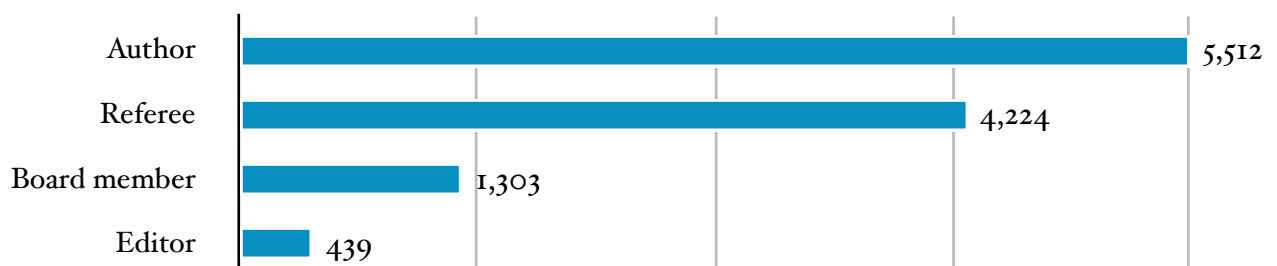
Role	Number
Author	5,512
Referee	4,224
Board member	1,303
Editor	439

amongst referees and editorial board members among `top' (i.e. ISI-indexed) authors:

CIBER KEY FINDING 2

GENDER IMBALANCES IN QUALITY ROLES

Women are significantly under-represented among journal referees.

Chi square = 12.65, d.f. = 2, p < 0.002

Women are significantly under-represented on editorial boards.

Chi square = 9.20, d.f. = 2, p < 0.001

and similarly, for countries on the periphery:

CIBER KEY FINDING 3

REGIONAL IMBALANCES IN QUALITY ROLES

Researchers from countries on the periphery are significantly under-represented among journal referees.

Chi square = 289.49, d.f. = 7, p < 0.001

Researchers from countries on the periphery are significantly under-represented on editorial boards.

Chi square = 97.70, d.f. = 7, p < 0.001

What authors look for

In this section, we look at the factors that determine one key aspect of author behaviour: deciding where to submit their article. The context for Questions 2 and 3 is related to a critical incident - the last article they had published (Question 1 had asked for the title of that journal).
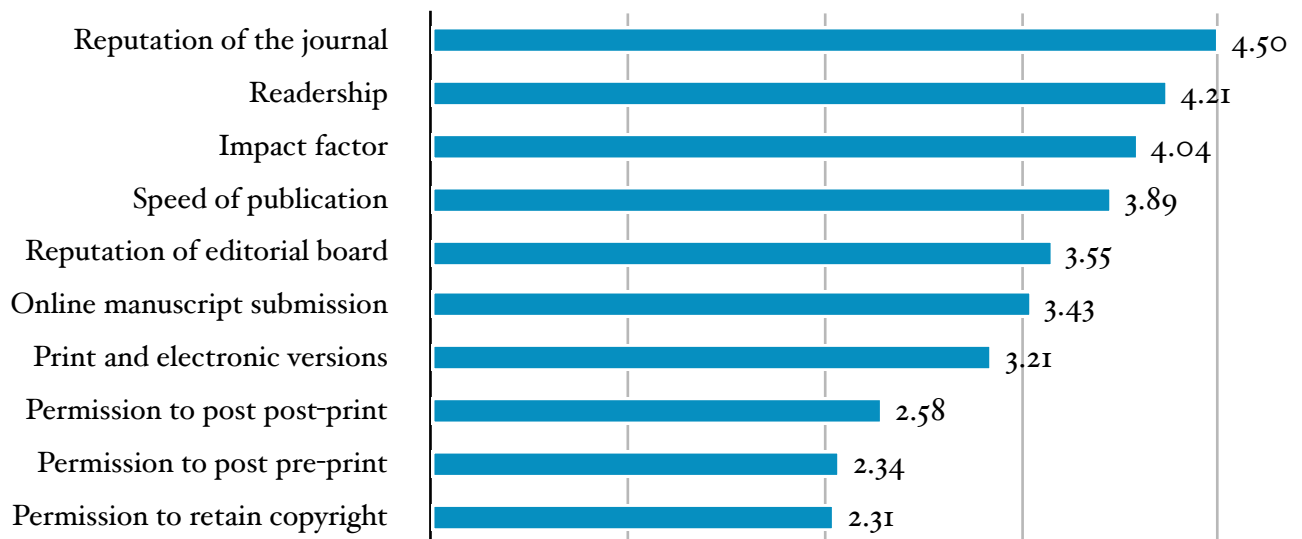
CHOOSING WHERE TO PUBLISH (Q2)

The responses to this question reveal the central importance of the prestige of the outlet, as indicated directly by the journal's reputation or, by proxy, by its impact factor. Practical issues such as the nature of the readership for that journal and speed of publication are also highly rated.

Figure 7: Reasons for choosing last journal (n=5,513)

Averages, where 5 = Very important, 1 = Not at all important

Reason	Average
Reputation of the journal	4.50
Readership	4.21
Impact factor	4.04
Speed of publication	3.89
Reputation of editorial board	3.55
Online manuscript submission	3.43
Print and electronic versions	3.21
Permission to post post-print	2.58
Permission to post pre-print	2.34
Permission to retain copyright	2.31

It seems from these results that the population as a whole does not attach much importance to the issues of being able to retain their copyright in the article, nor to gaining permission to place a pre- or post-print on the web or in some kind of repository.

This is of course an over-simplification and there is certainly a sizeable minority that is more attuned to these kinds of issue:

> "I would like to see scientific articles placed in the public domain or protected by a creative type licence that allows for unlimited distribution and copying of the work."

> "The technological potential of electronic publishing makes it possible to first publish an article and then have it reviewed. This would largely eliminate the problem of delayed publication due to pending referee reports ... a major problem of the current publishing system. It would also make the co-existence of pre-print repositories and peer-reviewed publishing superfluous, as these two could be merged."

EXPERIENCE OF PEER REVIEW (Q3)

On the whole, authors' recent experience of the peer review process is highly positive, with 77.0% of respondents agreeing that the referees' comments on their last published paper were helpful. This sets a useful benchmark for future surveys.

Figure 8: Extent to which the referees' comments were helpful (n=5,153)

Numbers of respondents
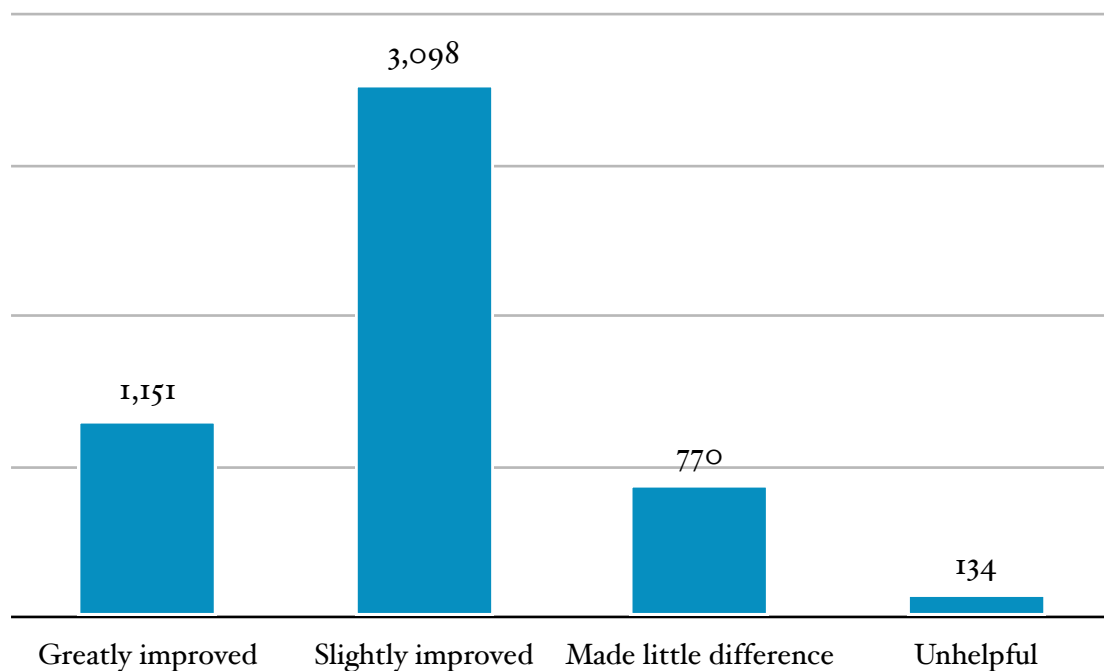
There are major variations within this overall picture: interestingly, authors in physics and astronomy, a community which works within a very open, collaborative, information culture and the first to embrace pre-print servers in a big way, is the least positive about their experience of formal review.

CIBER KEY FINDING 4

PHYSICISTS MORE CRITICAL OF PEER REVIEW

Despite high overall levels of satisfaction with the helpfulness of referees' comments, there are significant differences between disciplines. Authors in physics and astronomy are much more likely to voice dissatisfaction than the population as a whole.

Chi square = 141.33, d.f. = 51, p < 0.001

VALUE ATTACHED TO PEER REVIEW (Q4)

The scholarly community attaches enormous value to the function of peer review in regulating the quality of what is published: 96.2% of our respondents indicated that this aspect is `very' or `quite important'. The unsolicited comments that came at the end of the survey reveal that, love it or loath it, effective peer review mechanisms are fundamental to scholarly communication.

Figure 9: Value attached to the peer review process (n=5,513)

Numbers of respondents
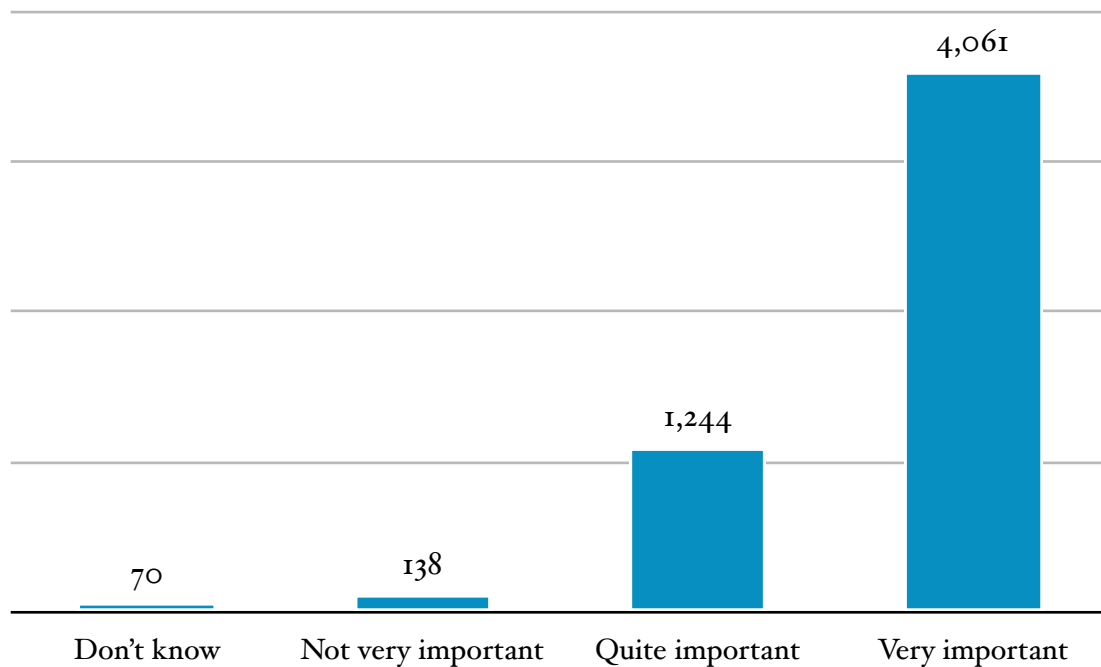
However, a reading of the author comments indicates that all is not well and there is widespread dissatisfaction, especially regarding the time reviewers take over manuscripts, the evident lack of care they sometimes take, even doubting their qualifications for the task in some cases. Several respondents complained of the power that top journal editors and reviewers have to make or break careers and many suggested that more open forms of peer review, perhaps making comments publicly available on the web, would help to address this issue. The vexed question of whether reviewers should have to forego their anonymity, again in the interests of greater transparency was another common theme.

> "Why should I pay $50 to call out someone to fix my washing machine for half an hour and then spend three hours improving someone else's chances of competing me for a job by improving their manuscript - FOR FREE? It's madness."

Interestingly, one respondent observed that quality is traditionally regulated by the market as well as through the efforts of editors and referees:

> "[The] quality of the present system of publishing is regulated by both peer review and [the] information market. I guess that open access publishing will lack the market component."

Not surprisingly, there is a strong statistical association between this question and the previous one: authors who have had positive recent experience of the peer review system in practice are more likely to agree that it is important in principle:

CIBER KEY FINDING 5

ATTITUDES TO PEER REVIEW: CHICKEN OR EGG?

There is a strong and significant association between positive recent experience of the helpfulness of reviewers' comments and the value authors attach to peer review.

Chi square = 278.83, d.f. = 9, p < 0.001

More surprising, perhaps, is the finding that positive attitudes toward peer review appear to be age-related and to decline gradually towards the latter part of authors' careers:

CIBER KEY FINDING 6

ATTITUDES TO PEER REVIEW: AGE DIFFERENCES

The importance that authors attach to peer review tends to decline gradually as a function of age: older authors are more likely to rate it as `not very important'.

Chi square = 48.82, d.f. = 18, p < 0.001

Within the sample, there is significant regional variation in the importance authors attach to peer review: North Americans give this factor the highest priority, Asian authors the least.

CIBER KEY FINDING 7

ATTITUDES TO PEER REVIEW: REGIONAL DIFFERENCES

Geography plays a surprising role in the importance authors attach to peer review: North American authors rate this aspect unusually highly, Asian authors give it the least priority.
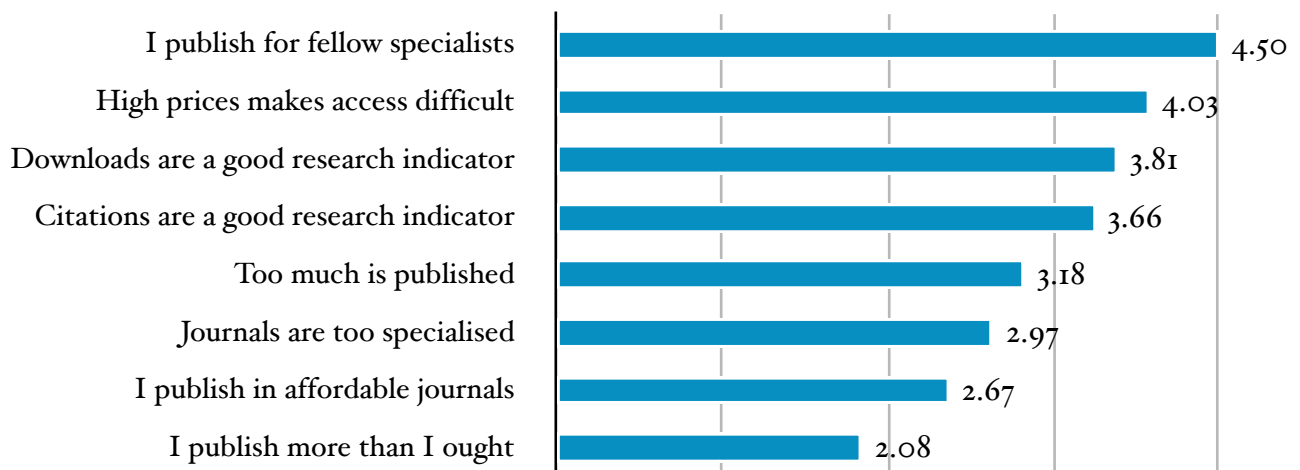
Chi square = 298.66, d.f. = 21, p < 0.001

Views on the current journals system

In this section, attention shifts from a previous critical incident (the last paper published) to a more general exploration of authors' views on the current state of journal publishing.

Respondents were asked to rate each of the following statements on a 5-point scale:

Figure 10: Authors' views on selected aspects of the current system (n=5,513)

Averages, where 5 = Very important, 1 = Not at all important

Statement	Value
I publish for fellow specialists	4.50
High prices makes access difficult	4.03
Downloads are a good research indicator	3.81
Citations are a good research indicator	3.66
Too much is published	3.18
Journals are too specialised	2.97
I publish in affordable journals	2.67
I publish more than I ought	2.08

Although they were presented in a randomised order, these statements did in fact form matched pairs and so they will be discussed in that context.

INFORMATION OVERLOAD (Q5)

Figure 11 juxtaposes responses to the statements `Too much research is being published' (Q5-1) and `I publish more than I ought to' (Q5-6) and finds an interesting disjunction. One might reasonably expect there to be little difference between authors' views on these two statements (the `null hypothesis') but in fact there is a highly significant statistical difference between the two profiles and *only 8.5%* of respondents agree (`strongly' or `a little') with both statements. Perceptions are key here: most people feel insecure in the face of the rapid growth of the literature yet, as successful authors in highly filtered `top' quality journals, they may quite rightly feel that they are not personally to blame for the information explosion. Many authors commented that too much low quality (i.e. non peer-reviewed or scantily reviewed materials) were being published, especially over the internet.

Figure 11: Attitudes towards information overload (n=5,513)

Numbers of respondents

Too much research is being published
I publish more than I ought to
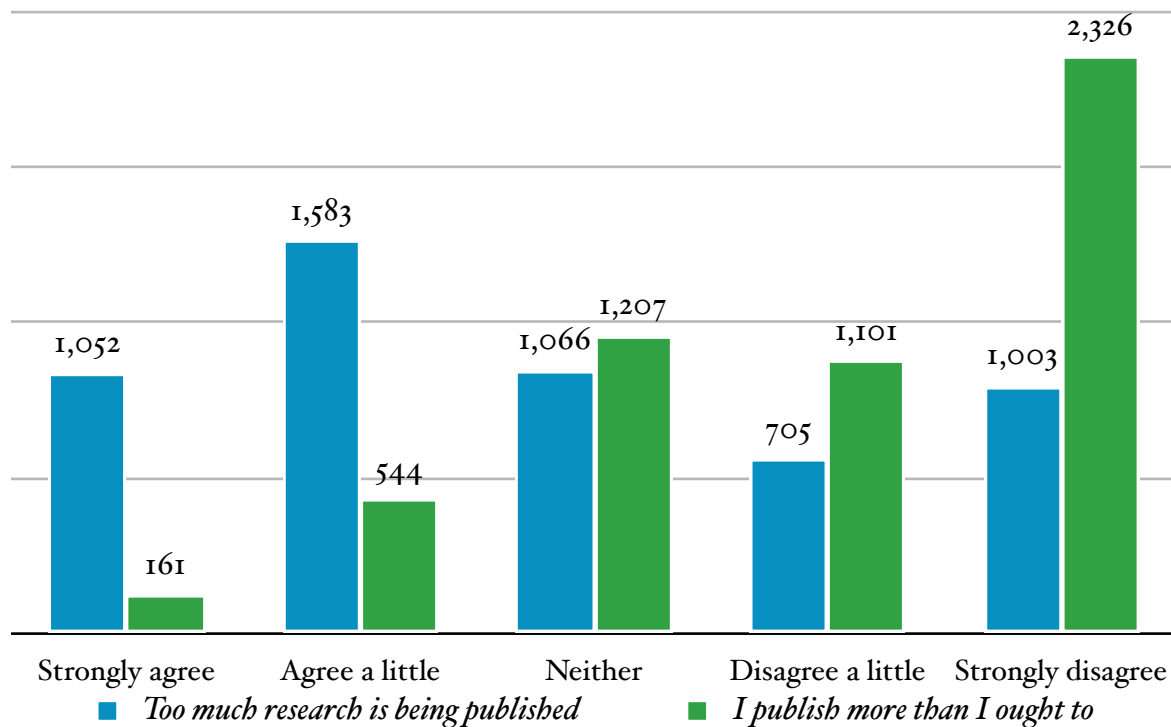
Chi square = 521.11, d.f. = 25, p < 0.001

A persistent theme in author comments is the degrading effect of the `publish or perish' culture on academic discourse:

> "The 'publish or perish' mentality, together with an influx of too many new and obscure journals … is driving quantity at the expense of quality."

> "The reason authors publish too much is … to keep their career on track. Charging authors a page fee only punishes the victim of a system that focuses on numbers rather than quality of publication."

Indeed, one researcher suggested that it was this, i.e. the `publish or perish' mentality, rather than journal pricing or arguments over publishing models, that is the biggest challenge facing the sector during the current journals `crisis'.

JOURNAL PRICING (Q5)

Figure 12 compares authors' responses to the statements `High journal prices make it difficult to access the literature' (Q5-3) and `As an author, I deliberately publish in journals that are affordable to readers' (Q5-7). Again, there is a strange split of opinion here, with only 20.7% of respondents agreeing with both propositions.

Figure 12: Attitudes towards journal pricing (n=5,513)

Numbers of respondents
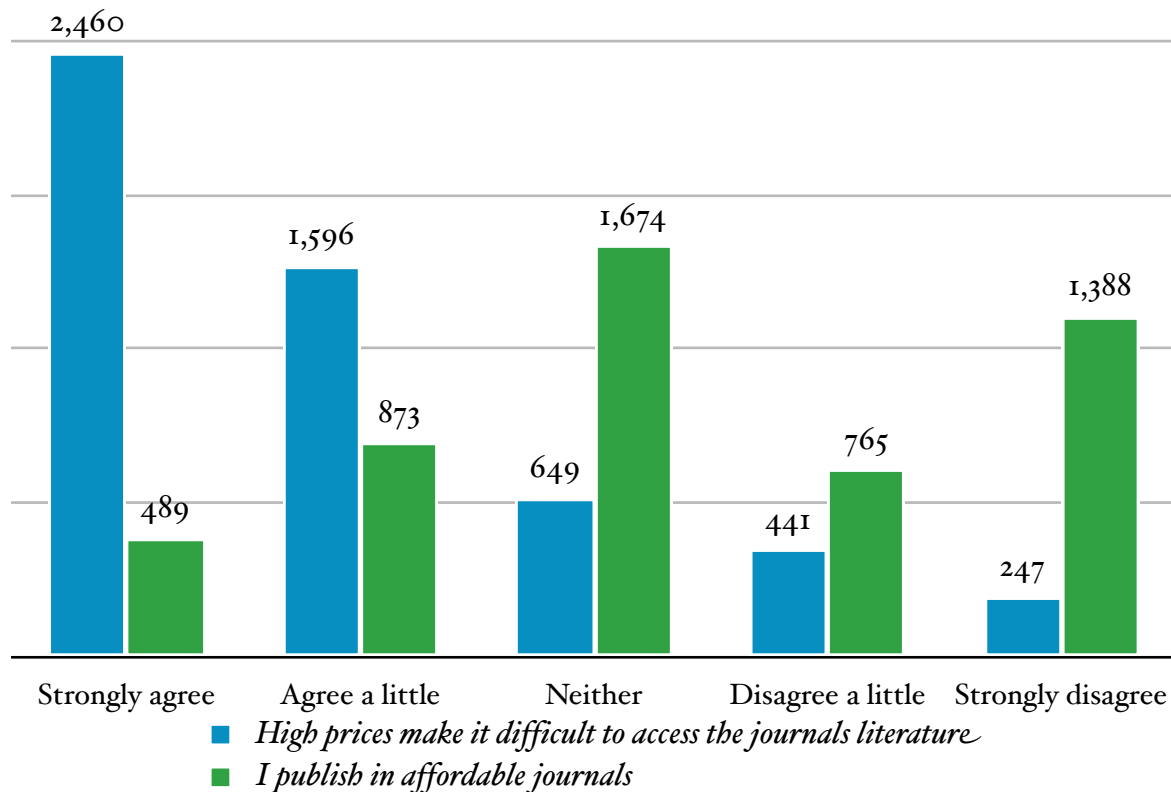
Intriguingly, a small but sizeable minority (12.8%) disagreed strongly that high prices were indeed a barrier to accessing the literature. Biomedical sciences are unusually highly represented in this group.

This finding exemplifies the much discussed `Jekyll and Hyde' nature of academics as authors and academics as readers and suggests that their needs are very different in these two contexts. Many authors spoke of the instrumental influence of external measures, like impact factors, in determining where they feel they have to publish, sometimes to the detriment of their readers. There is also the issue that most academics are shielded from the workings of the marketplace (and journal pricing is hardly as transparent as it might be) and from any reasonable knowledge of journal prices. However, as in the previous question, the lack of integration of author views appears odd to say the least (imagine if the scenario were `Do you agree that unprotected sex may lead to sexually transmitted diseases? and 'Do you use a condom?).

"Research councils such as the Australian Research Council refuse to pay publication expenses, or buy books or journal subscriptions. So academics pay personally to publish their research, pay to access research (books and journals) and don't get paid to review the grants and papers of their competitors. We are being ripped off by the government funding agencies who think that by refusing to pay page charges, journals will stop charging them. This is never going to happen because only good journals can charge and academia is so competitive that everyone wants to publish in good journals regardless of cost."

CIBER KEY FINDING 8

AUTHORS AND JOURNAL PRICES

Researchers acknowledge that high prices are a barrier to accessing the literature: but their behaviour as authors shows little sensitivity to this aspect, and they select publishing outlets for other reasons.

Chi square = 401.64, d.f. = 25, p < 0.001

Unsurprisingly, high journal prices are perceived as a much greater problem, in terms of being able to access the literature, by younger authors and by those based in Africa and Eastern Europe.

J O U R N A L   S P E C I A L I S A T I O N (Q5)

Figure 13 displays the pattern of author reaction to the statements `Journals have become too specialised' (Q5-8) and `As an author, I choose journals that will be read by the specialists in my field' (Q5-5).

Figure 13: Attitudes towards journal specialisation (n=5,513)

Numbers of respondents

- Journals have become too specialised
- I publish in journals that are read by specialists in my field
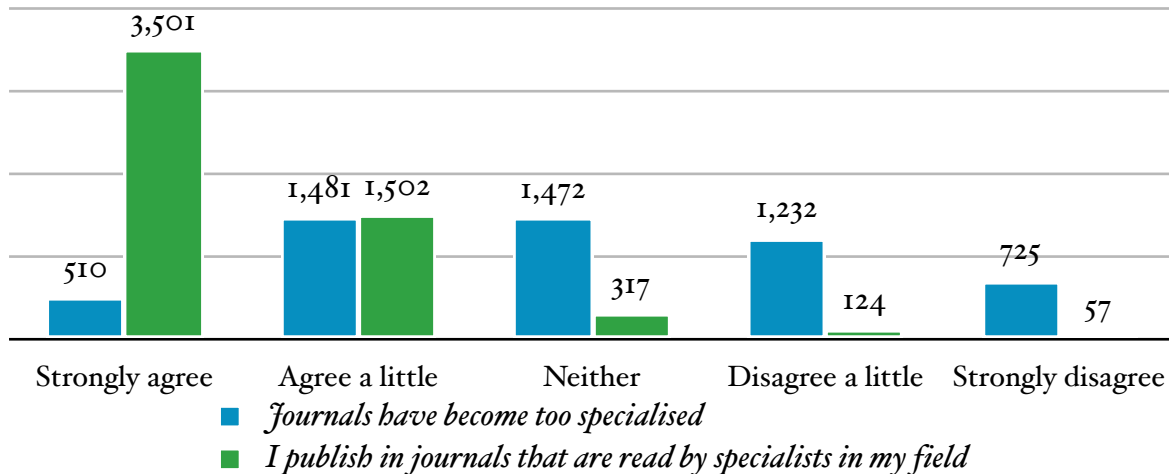
This time, 32.5% of authors agreed with both statements, although there is absolutely no consensus with respect to the first statement and a large majority that agrees strongly with the second. This pair of findings suggests that researchers are strongly wedded to the `narrowcasting' functions of the traditional journal, where considerable value added derives from the niche marketing of these products into specialised communities.

CIBER KEY FINDING 9

JOURNALS - TOO SPECIALISED?

Researchers attach great value to being able to reach deeply into specialist readerships for their articles. There is no evidence of any consensus on the notion that journals are `too specialised'.

Chi square = 110.25, d.f. = 25, p < 0.001

JOURNAL METRICS (Q5)

Finally we consider the issue of how credible senior researchers find two controversial indicators of the usefulness of research: (author) citations (Q5-2) and (reader) downloads (Q5-4).

Figure 14: Attitudes towards journal metrics (n=5,513)

Numbers of respondents

Article downloads are a good measure of the usefulness of research
Author citations are a good measure of the usefulness of research
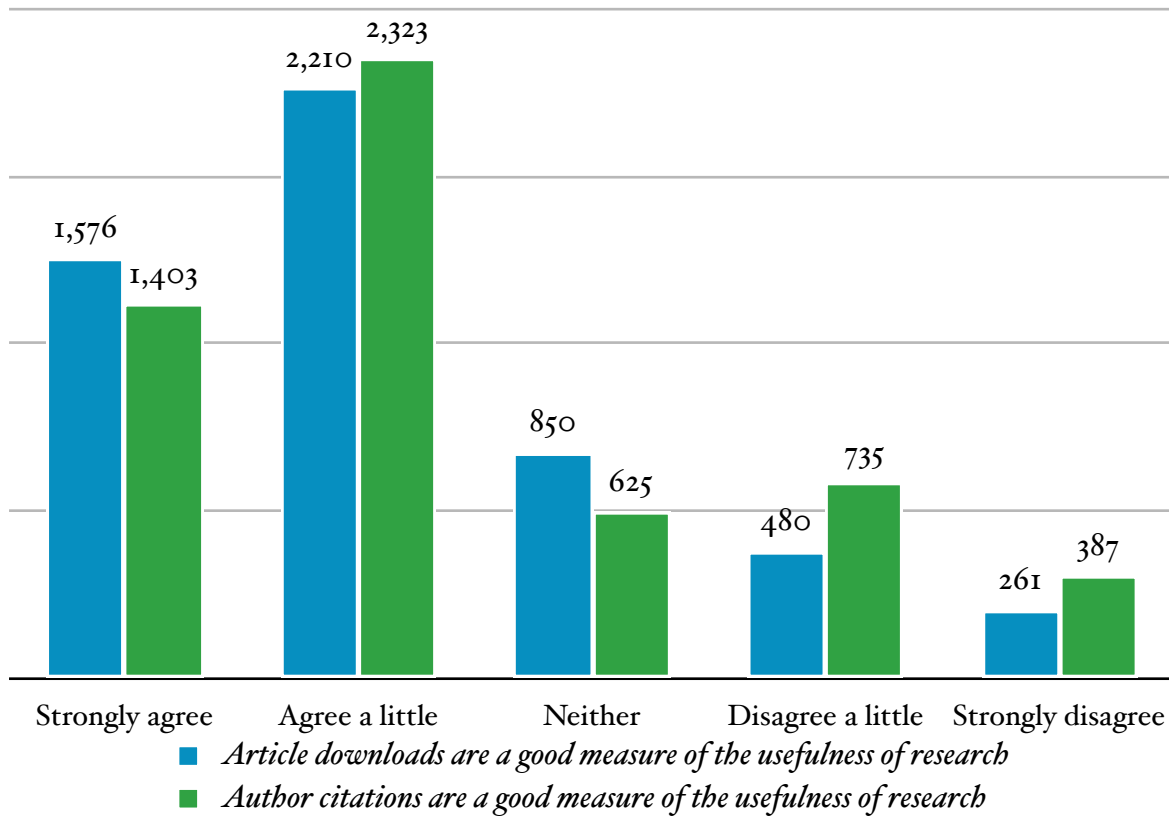
 This time, there is a clear consensus, with 61.5% of researchers agreeing with both statements. Note that the question explored the measurement of utility rather than `quality' but this is nonetheless a surprising finding and it may indicate that download metrics would have considerable credibility amongst the author community. Alternatives to the traditional impact factor, based on article downloads and modeled using the same time windows as are used to construct impact factors might offer a very interesting and worthwhile direction for future research and development: they would certainly be of great appeal to librarians and many publishers.

CIBER KEY FINDING 10

DOWNLOADS RULE!

Researchers believe that article downloads (mean 3.81) **offer a better measure of the `usefulness of research' than author citations** (mean = 3.66).
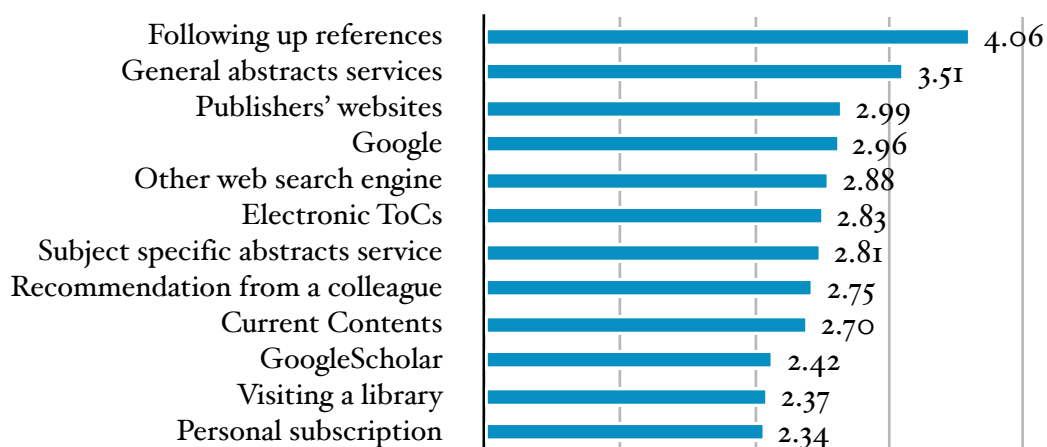
Chi square = 1,528.98, d.f. = 25, p < 0.001

DISCOVERING JOURNAL ARTICLES (Q 6)

Figure 15 demonstrates the very considerable reliance that researchers now place on a wide variety of electronic tools to identify journal articles that are relevant to their needs.

Figure 15: Dependency on various methods for article discovery (n=5,513)

Averages, where 5 = Very dependent, 1 = Not at all dependent

Method	Value
Following up references	4.06
General abstracts services	3.51
Publishers' websites	2.99
Google	2.96
Other web search engine	2.88
Electronic ToCs	2.83
Subject specific abstracts service	2.81
Recommendation from a colleague	2.75
Current Contents	2.70
GoogleScholar	2.42
Visiting a library	2.37
Personal subscription	2.34

The single most important mechanism is still `chaining' from one document to others that may be useful by following up cited references. This is clearly a strong behavioural characteristic and one which the publishing industry is supporting by adding value to digital libraries through extensive cross-linking.

The convenience and speed of electronic tools contrasts with the role of the physical library, now in ranked 11th position out of 12.

A number of respondents commented on how electronic media had contributed to major improvements in their ability to identify and use journal information:

"The existing system works quite well overall. The use of e-alerts and various scholarly-driven search engines has greatly aided researchers [to] stay current ... In general, things are much better than they were even 5 to 10 years ago."

Although there is, of course, more that could still be done:

> "I think the crisis for scientists is not publishing issues but retrieval, organisation and synthesis ... publishers need to do more than `hit and run' (i.e. print and archive) ... They need to pre-treat the articles for easy hyper-searching and hyper-synthesis."
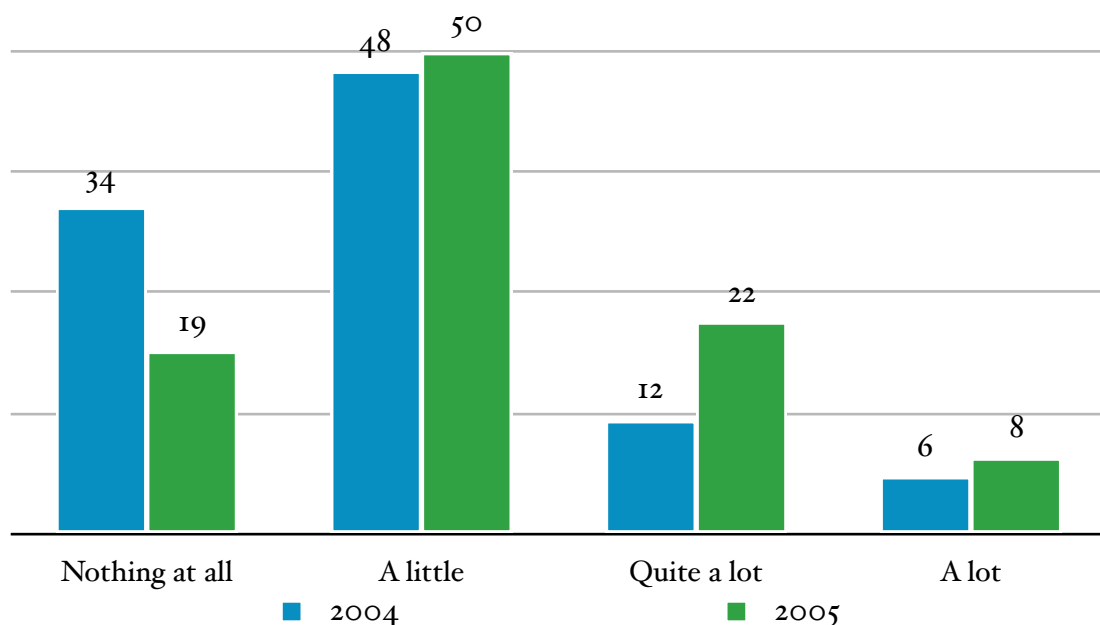
Open access publishing

KNOWLEDGE OF OPEN ACCESS PUBLISHING (Q7)
In this section, we benchmark authors' self-reported knowledge of open access journals (July 2005) with the results of an identical question answered by 3,787 researchers in January 2004 (Figure 15). Even though the data are collected from different populations, the methodology was identical and the confidence intervals for the two surveys small enough to conclude that a significant shift has indeed occurred within the space of eighteen months: the research community is now much more aware of this issue.

Figure 16: Knowledge of open access publishing (2004 n=3,787, 2005 n=5,513)

Percentages

	Nothing at all	A little	Quite a lot	A lot
2004	34	48	12	6
2005	19	50	22	8

At the same time, around a fifth of the author population still claims to `know nothing'.

> "This survey implies that there is a large and important debate going on about open access publication. I hear little about this and wonder where this debate is occurring and how widely known it is."

CIBER KEY FINDING 11

GROWING AWARENESS OF OPEN ACCESS

Researchers' levels of self-reported knowledge of open access journals advanced significantly in the eighteen months from January 2004.

Less than one in five now claims to `know nothing' about this model.

The regional breakdown on this question reveals substantial variation in terms of the level of knowledge of open access, with Eastern Europe, Asia and Africa showing much higher levels than in North America or Western Europe.

Figure 17: Knowledge of open access publishing: 2005 regional analysis
(2004 n=3,787, 2005 n=5,513)

Percentages of respondents claiming to know `a lot' or `quite a lot' about open access journals
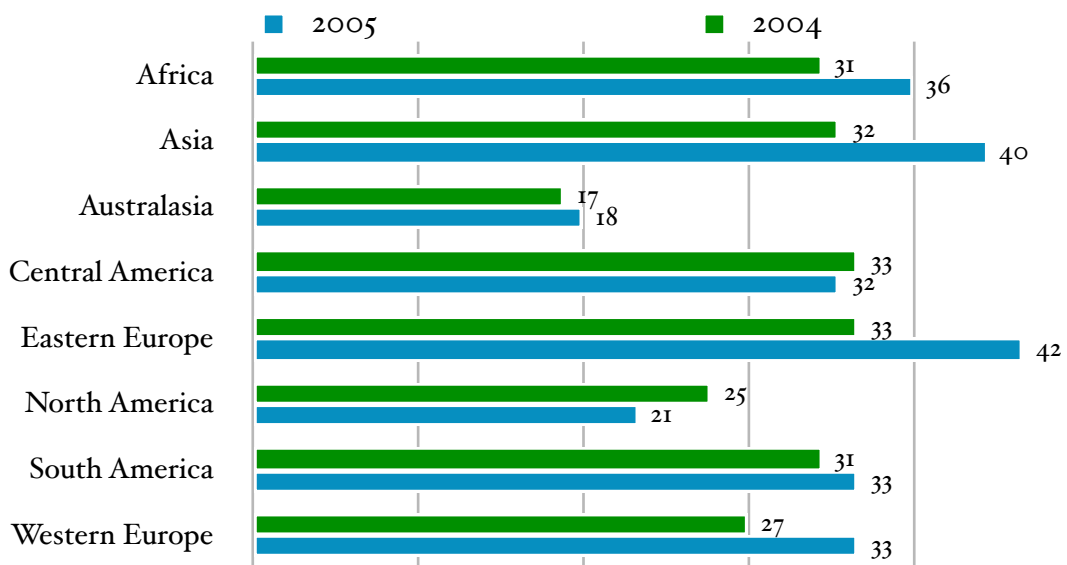
In addition to these regional variations, there are significant differences relating to institutional affiliation and subject discipline:

CIBER KEY FINDING 12

PATCHY KNOWLEDGE OF OPEN ACCESS

Eastern European and Asian authors are the most knowledgeable about open access; North Americans the least.

Chi square = 279.14, d.f. = 21, p < 0.001

Researchers based in hospitals or medical schools are most knowledgeable about open access; these working in the commercial sector the least.

Chi square = 64.33, d.f. = 18, p < 0.001

Medical scientists are the most knowledgeable about open access; social scientists the least.

Chi square = 343.01, d.f. = 51, p < 0.001

E X P E R I E N C E   O F   O P E N   A C C E S S   J O U R N A L S (Q 8)

A surprising finding of this survey is the dramatic growth in authors who say they have actually published in an open access journal since the last survey[3]. This has grown from 11% (January 2004) to 29% (July 2005) and represents a major shift in behaviour, albeit from a low base.

Figure 18: Attitude to publishing in open access journals (n=5,513)

Numbers of respondents

Response	Number
Yes, I publish OA whenever possible	509
Yes, but OA is not a major issue for me	908
No	3
I don't know	622

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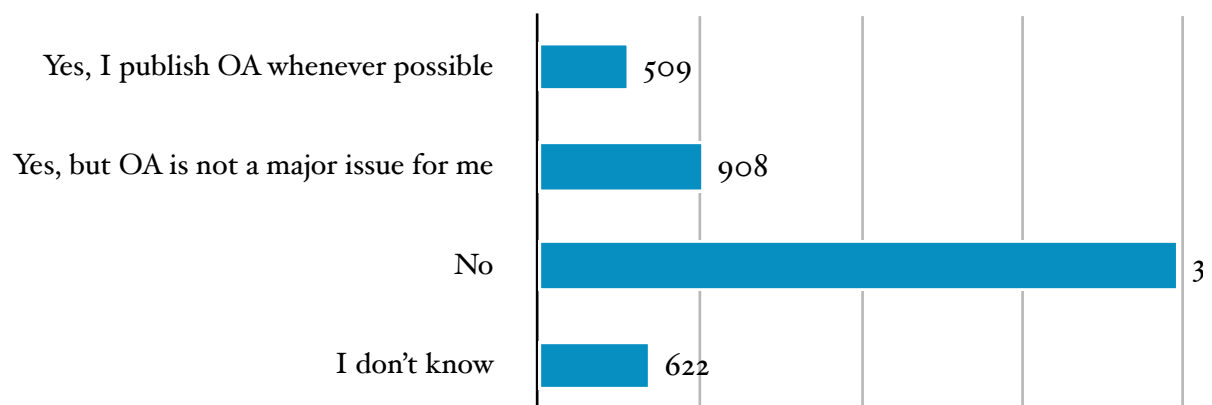
[3] This finding needs to be interpreted with caution: parallel research by Elsevier suggests that up to 65% of authors may confuse the concept of `open access' journals with toll journals that are freely available to them at the point of use.

There is a significant relationship between previous experience of publishing in an open access environment and researchers' attitudes to the value they attach to peer review:

CIBER KEY FINDING 13

OPEN ACCESS AND PEER REVIEW

Authors who have published in an open access journal are more likely to attach lower value to the importance of peer review.

Chi square = 62.77, d.f. = 8, p < 0.001

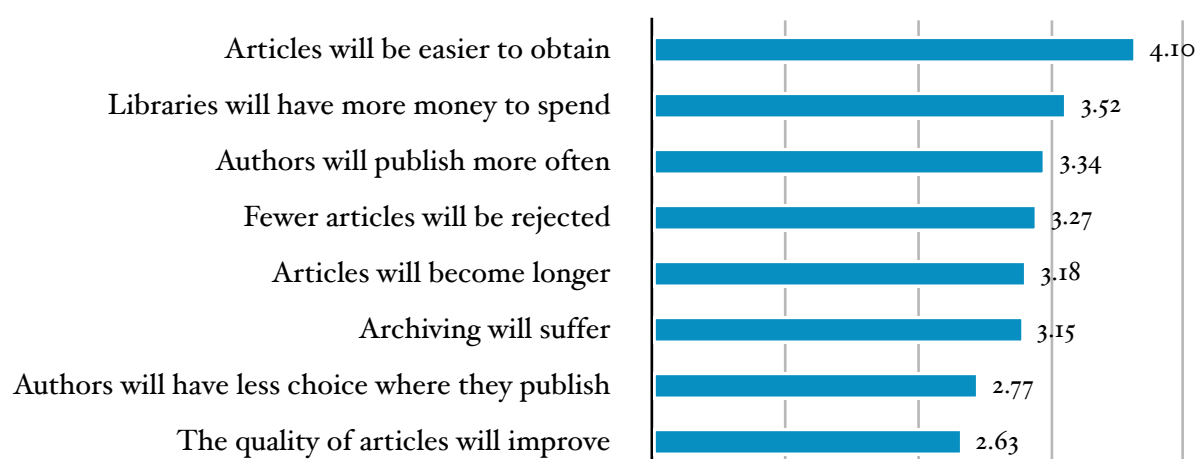## THE IMPACT OF OPEN ACCESS PUBLISHING (Q9)

In Question 9, we provided authors with a working definition of open access journals:

"Open access journals use a funding model in which researchers are able to read, download, copy, distribute and print articles and other materials free of charge from the internet. Open access publishers sometimes meet their costs by charging authors (usually through the author's funding body or employer), for the publishing services they provide. In other cases, open access journals are run by researchers themselves and the publishing costs are absorbed by their employers."

We then provided a list of statements intended to elicit their views on the kinds of outcomes that they might expect in an open access world.

Figure 19: Anticipated outcomes of open access publishing (n=5,513)

Averages, where 5 = Strongly agree, 1 = Strongly disagree

Articles will be easier to obtain	4.10
Libraries will have more money to spend	3.52
Authors will publish more often	3.34
Fewer articles will be rejected	3.27
Articles will become longer	3.18
Archiving will suffer	3.15
Authors will have less choice where they publish	2.77
The quality of articles will improve	2.63

This question was also used in the previous CIBER survey, but using a 4-point rather than a 5-point scale. The rank orderings of the two surveys are *identical,* so it looks as though the findings reported in Figure 19 are exceptionally consistent and robust.

CIBER KEY FINDING 14

WHAT AN OPEN ACCESS WORLD MIGHT LOOK LIKE

In an open access world, authors believe that the literature would be much more accessible to everyone and that budgetary pressures on libraries would be ameliorated. However, the downside is that they believe that the quality of articles would diminish.

HOW DISRUPTIVE IS OPEN ACCESS? (Q10)

We then offered the statement:

"A major shift to open access publishing would undermine the current scholarly journals system"

and solicited researchers' views as to how likely they felt this would come to pass.

Figure 20: How disruptive is open access? (n=5,513)

Numbers of respondents

Category	Value
Very likely	515
Quite likely	1,878
Neither	1,073
Quite unlikely	1,029
Very unlikely	340
I don't know	678
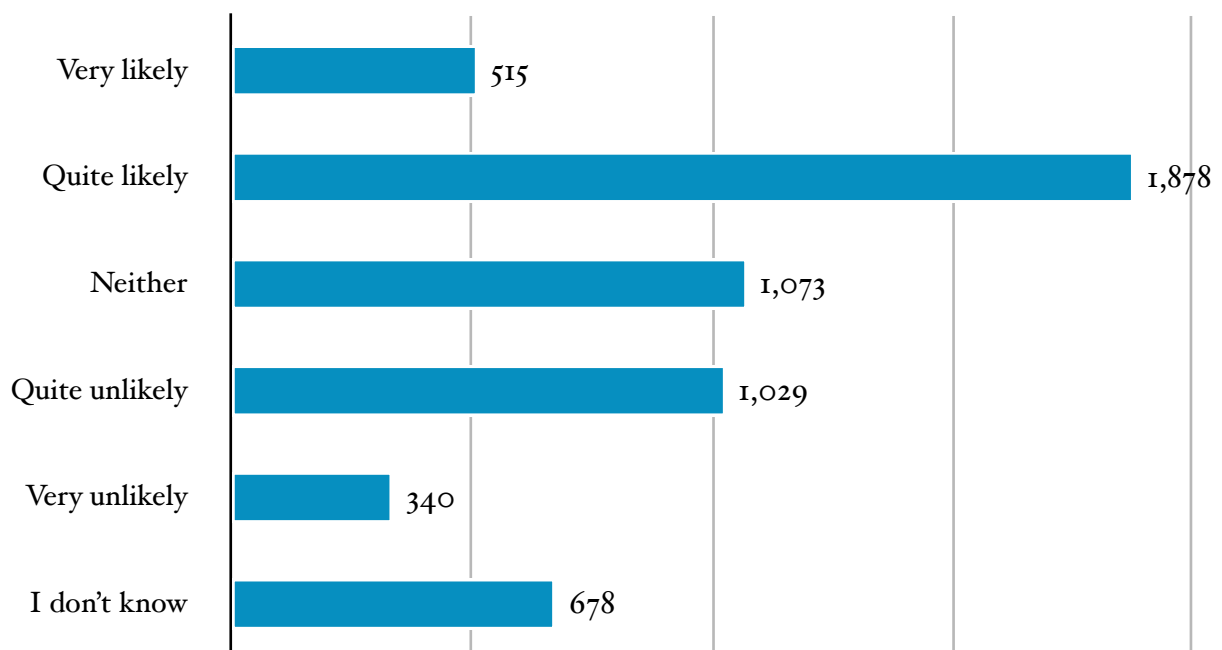
This statement clearly polarised views. Of those who expressed an opinion, 49.5% believed this was likely, 28.3% believed it was unlikely and 22.7% adopted a neutral position.

We then asked a rider:

"To what extent do you think this would be a good thing or a bad thing?".

Figure 21: To what extent would that be a good thing or a bad thing? (n=5,513)

Numbers of respondents

Of those who expressed an opinion, 41.0% said it would be a `good thing', 20.1% a `bad thing'.
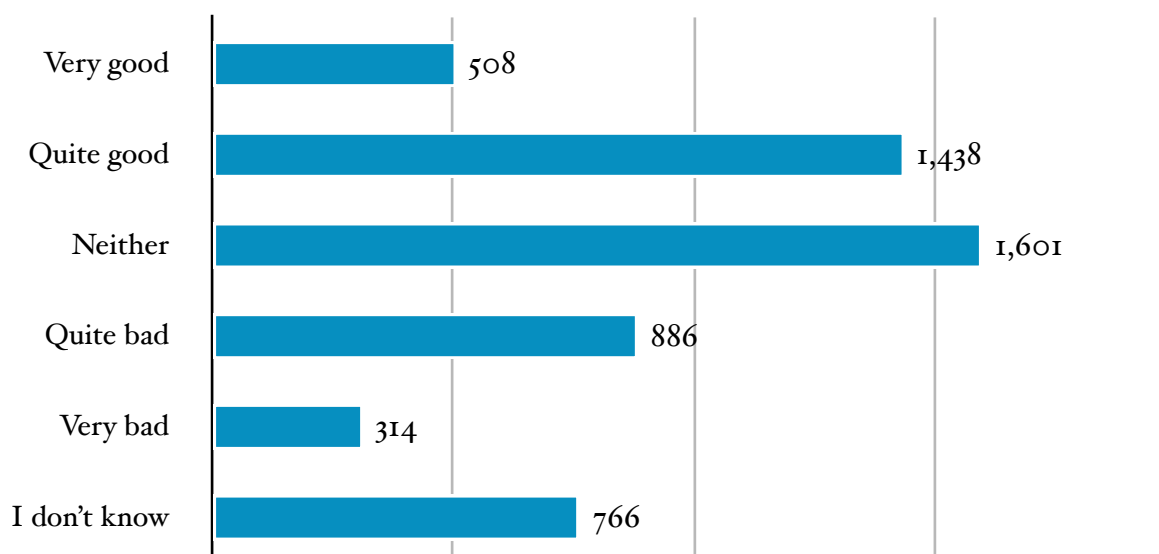
In order to summarise this pair of questions, they have been cross-tabulated as Table 4 and it is clear that there is a substantial minority (28.3%) of researchers which is ready for reform of the system.

Table 4: Summary cross-tabulation of Questions 10a and 10b (n=2,995)

Numbers of respondents and percentages (of those expressing a definite opinion)

	A good thing	A bad thing
Likely	1,733 (51.0%)	805 (23.7%)
Unlikely	628 (18.5%)	231 (6.8%)

As might well have been anticipated, this pair of questions proved to be a useful pivot upon which a whole series of other issues turn.

CIBER KEY FINDING 15

IS OPEN ACCESS A DISRUPTIVE TECHNOLOGY?

POCKETS OF AGREEMENT AND DISAGREEMENT

There are big regional differences in the extent to which researchers feel that open access will undermine the current system; Asian authors believe this to be the case much more strongly than North Americans.

Chi square = 63.86, d.f. = 35, p < 0.002

Similarly, Asian authors are much more likely to see this as a `good thing' than North Americans.

Chi square = 162.58, d.f. = 15, p < 0.001

There is a significant relationship with attitudes to peer review: authors who believe that it would be a `good thing' if the current system were to be destabilised tend to attach the least importance to peer review.

Chi square = 162.58, d.f. = 15, p < 0.001

Authors in the biomedical sciences tend to disagree the most strongly that open access will challenge the current system.

Chi square = 140.59, d.f. = 85, p < 0.001

…but nonetheless tend to agree that it would be a 'very good' thing.

Chi square = 212.61, d.f. = 85, p < 0.001

The complexity of the issues raised in this pair of questions is enormous and is neatly encapsulated by one of our respondents:

"I feel we are caught between the devil and the deep blue sea because first rank journals are exorbitantly expensive yet have a historical record for archival permanence. On the other hand the proliferation of electronic media financially threaten a system (whatever its faults) but also opens the net so wide that we are drowning in rubbish."

The value of this pair of questions does not lie in their predictive power, which is frankly minimal, but in their exposure of the tensions in the current system. The findings caution against blanket assertions about the potential impacts of open access publishing without specific reference to geography and subject discipline.

In the next phase of this study, CIBER will be systematically analysing the large text corpus of unsolicited author comments deposited at the end of the survey. These catalogue a long series of author woes, from principled objections to the involvement of the private sector in scholarly communication, to more parochial grievances against certain referees and journal editors, slow article turn-around times, and the inhumanity of the `publish or perish' culture.

Whether authors are sweeping up all these issues together and finding a cathartic release in Question 10b, rather than providing a rational assessment of the pros and cons of the current system will have to remain an open question for the moment: but there are very clear signs of author dissatisfaction which need to be addressed by the publishing and research policy communities.

R ESEARCH FUNDING (Q11)

This question was designed to provide much-needed data on the extent to which recently published articles are based on work backed by a grant or research contract. This aspect of the `author pays' business model has been largely ignored in the literature and recent surveys, which is very surprising given its significance.

Our research shows that only 40.1% of respondents were in receipt of external funding for all of their papers over the past three years; almost a third (32.3%) had published most of their work without such support (i.e. with 50% or fewer, or none, of their papers having been funded).

Figure 22: Proportion of recent articles with grant support (n=5,513)
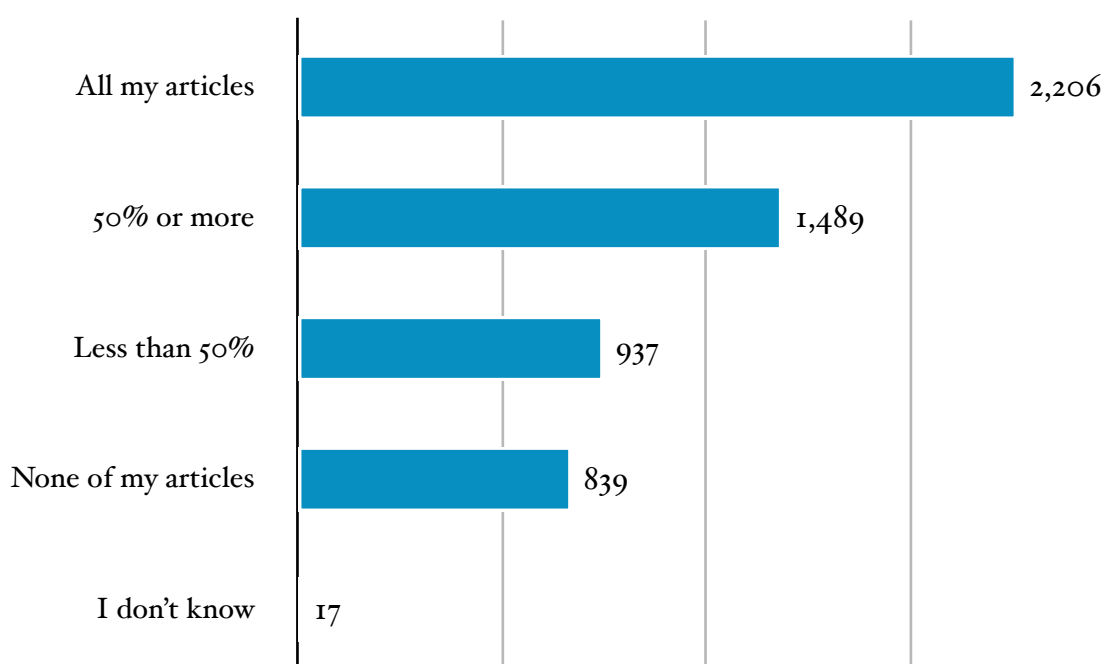
Numbers of respondents

As might be expected, there is considerable regional variation with respect to this question, with African authors being the least likely to have more than half of their recent papers grant-supported (Figure 23).

Figure 23: Regional breakdown of recent funded papers (n=5,513)

Numbers of respondents
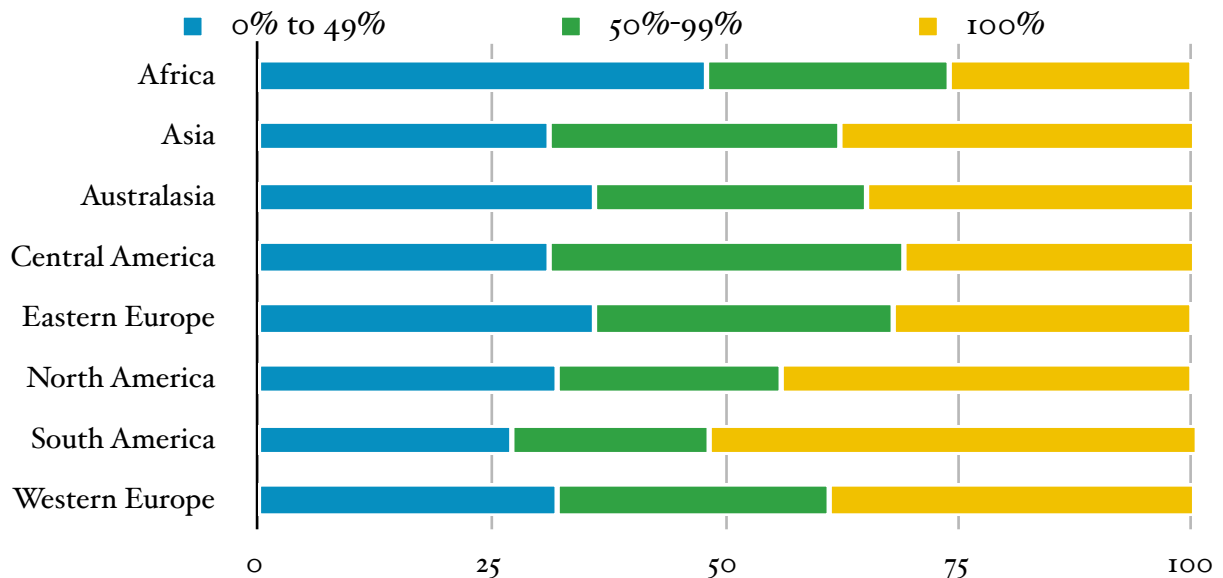
Arts and humanities, mathematics and the social sciences are of course the disciplines which report the lowest proportion of directly funded papers. When we focus on the major science and technology disciplines represented in the survey (Figure 24), it becomes clear that there is still enormous variation, with medicine and allied health comprising the category with the smallest proportion of funded papers.

Figure 24: The `long tail' of low level funding (n=5,513)

Percentages of respondents who said that less than 50% of their recent papers were funded
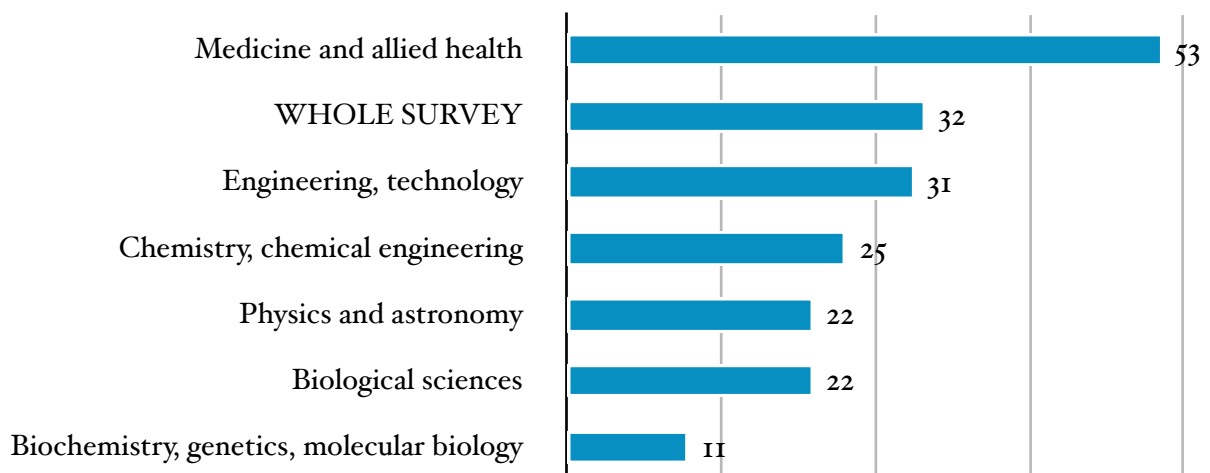
These findings strongly suggest that the `author pays' business model needs to be introduced with some caution: it is evidently not a panacea outside of certain niche markets where it has certainly shown that it can be very successful.

> "Open access is, in theory, a noble idea. But in my field much of the best research is not developed from grant supporting activities."

> "Most publishing of medical articles is done by people with no grant money and no institutional support. If the author were forced to pay this would inhibit much of this output."

CIBER KEY FINDING 16

A LONG TAIL OF UNFUNDED RESEARCH PAPERS

Only for a minority of authors is it the case that all their published articles are associated with explicit funding. There is considerable regional, institutional and, especially, disciplinary variation with respect to this issue.

Medical and allied health articles are the least likely group of scientific outputs to have explicit funding.

Chi square = 837.75, d.f. = 68, p < 0.001

Authors based in hospitals or medical schools are highly unlikely to have 50% or more of their recent articles supported by a grant.

Chi square = 461.68, d.f. = 24 p < 0.001

WHO SHOULD MEET PUBLISHING COSTS? (Q12)

So we naturally turn to the question of who should meet the costs of publishing scholarly articles, the question that is at the heart of the current debate about alternative business models.

> "I think there is a big disconnect between authors, libraries and publishers. Publishing journals costs money. Library budgets are not expanding rapidly and cannot be expected to absorb publication costs. Individual subscriptions are disappearing with the advent of electronic publishing and site licenses. Authors need to understand that open access has to be paid for by someone."

Figure 25: Who should meet publishing costs? (n=5,513)

Numbers of respondents
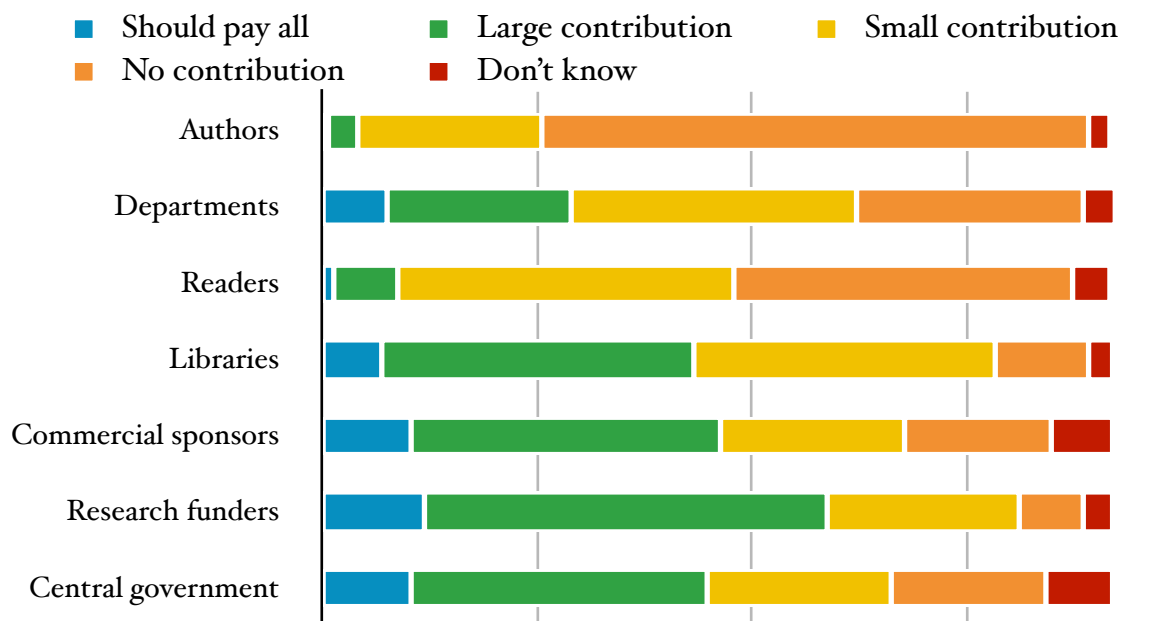
Well, as far as authors are concerned, the answer appears to be `as far away from me as possible'!

> "Freedom of speech is paramount, authors should never (ever) pay."

There is little apparent enthusiasm here for author- or reader facing charges, and a feeling that libraries should not have to make such a large contribution to journal costs as they do at the moment. The favoured option is that a greater burden should be borne (in this order) on research funders, commercial sponsors and central government.

> "Paying upfront for the cost of publishing by the funding agency and making then the research freely available will be the way of the future."

However, as we have already seen, there are problems with a `solution' based on scaling publication costs to research overheads in that many authors prefer, or have no alternative, but to publish on their own or their employer's resources. The issue of commercial sponsorship is an interesting one, and several respondents made the point that greater use of advertising revenues would be welcome (the problem here is that this proposal is unrealistic given the highly specialist nature of many journals) while others made the point that commercial sponsorship could just as easily `pollute' academic discourse.

Institutional repositories

KNOWLEDGE OF REPOSITORIES (Q13)

Figure 26 compares authors' self-rated knowledge of institutional repositories (blue) with the results of the same question for open access journals (green) reported earlier under Question 7. Researchers' awareness of this model is currently very limited: only 9.7% declare that they have `a lot' or `quite a lot' of knowledge, compared with 30.3% for open access journals.

Figure 26: Knowledge of institutional repositories (n=5.513)

Numbers of respondents
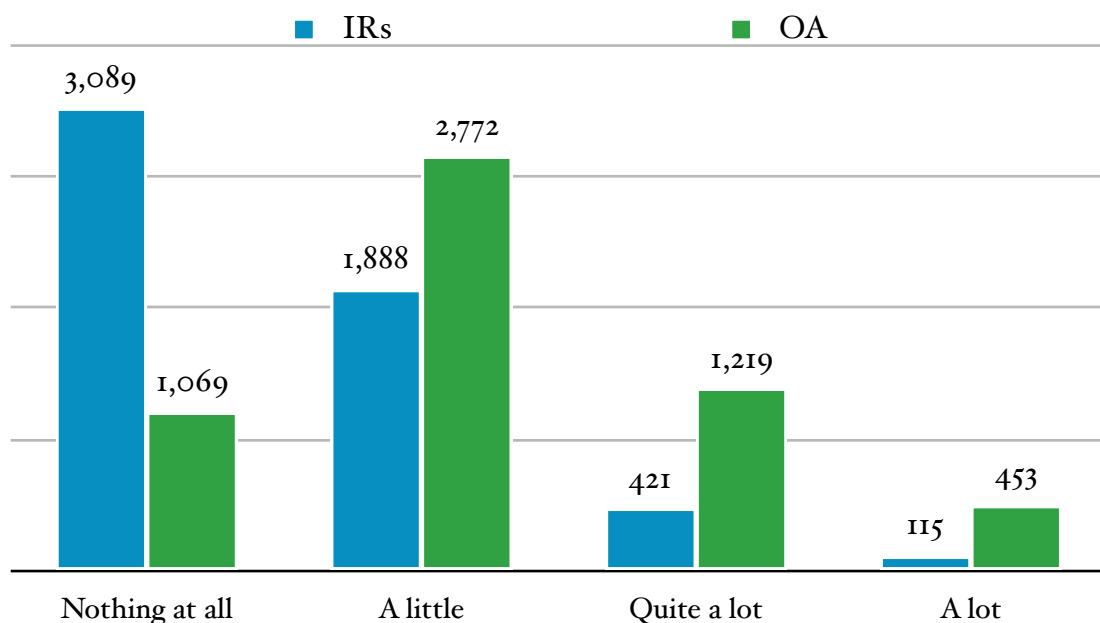
As for open access, there is considerable geographic variation with respect to levels of knowledge of institutional repositories with Asian authors claiming to be the most informed, Western European authors the least (Figure 27).

CIBER KEY FINDING 16

LOW LEVELS OF AWARENESS OF INSTITUTIONAL REPOSITORIES

Researchers currently rate their knowledge of institutional repositories at a much lower level than that of open access journals.

Asian authors are the most informed, Western Europeans the least.

Chi square = 193.62, d.f. = 21, p < 0.001

Figure 27: Knowledge of institutional repositories: regional analysis* (n=5,513)

Percentage of respondents claiming to know a `lot' or `quite a lot' about institutional repositories

Region	Value
Africa	11
Asia	18
Australasia	6
Eastern Europe	10
North America	7
South America	6
Western Europe	7
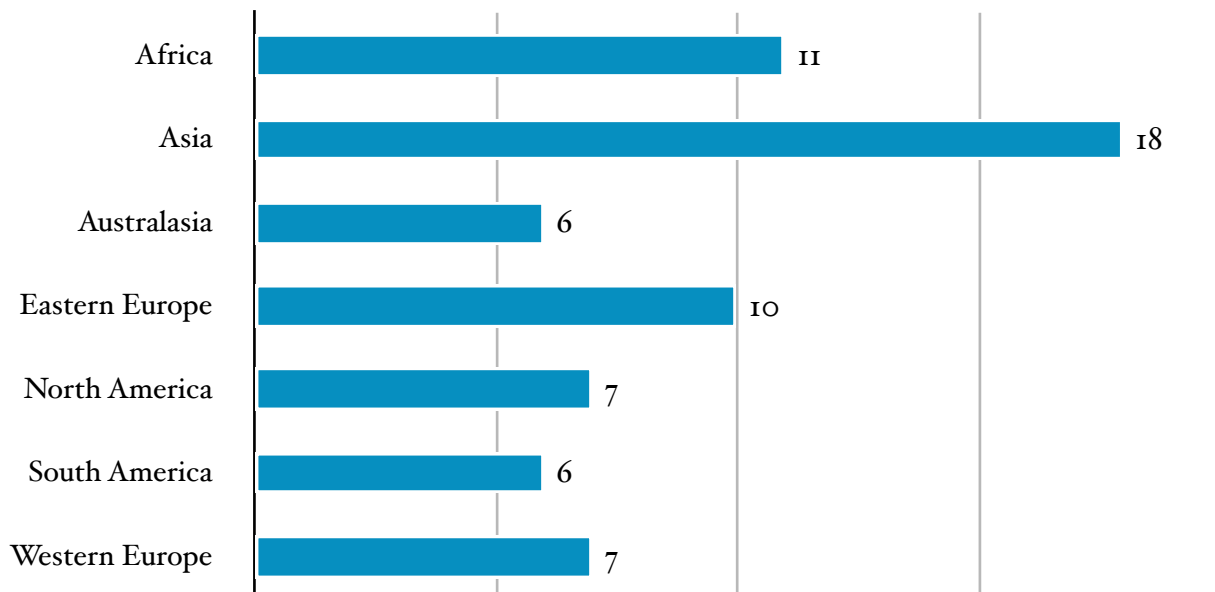
Chi square = 193.62, d.f. = 21, p < 0.001

ATTITUDES TO REPOSITORIES (Q14)

Figure 28: Author attitudes to populating institutional repositories (n=5.513)

Numbers of respondents

Response	Value
Yes, I did so voluntarily	467
Yes, I was required to	391
No, but I am willing	2,071
No, and I don't intend to	1,800
I don't know	784
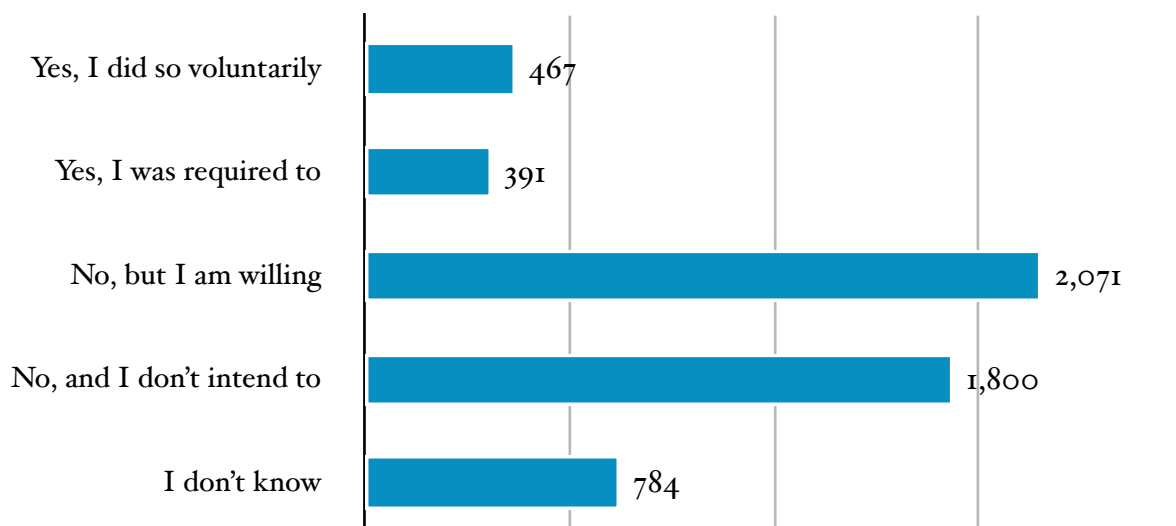
A substantial minority (38.1%) of authors who expressed an opinion, declared an unwillingness to deposit their articles in an institutional repository. Few (15.6%) had actually had experience of placing articles in a repository.

VERSION CONTROL ISSUES (Q15)

We asked researchers to respond to the statement:

"Are you happy that, under an institutional repository model, readers would be able to retrieve several different versions of your articles (for example, the "official" version of your paper on the publisher's website, together with one or more pre-publication versions on public web sites)?"

The results (Figure 29) reveal no consensus at all on this issue.

Figure 29: Author attitudes to version issues (n=5.513)

Numbers of respondents
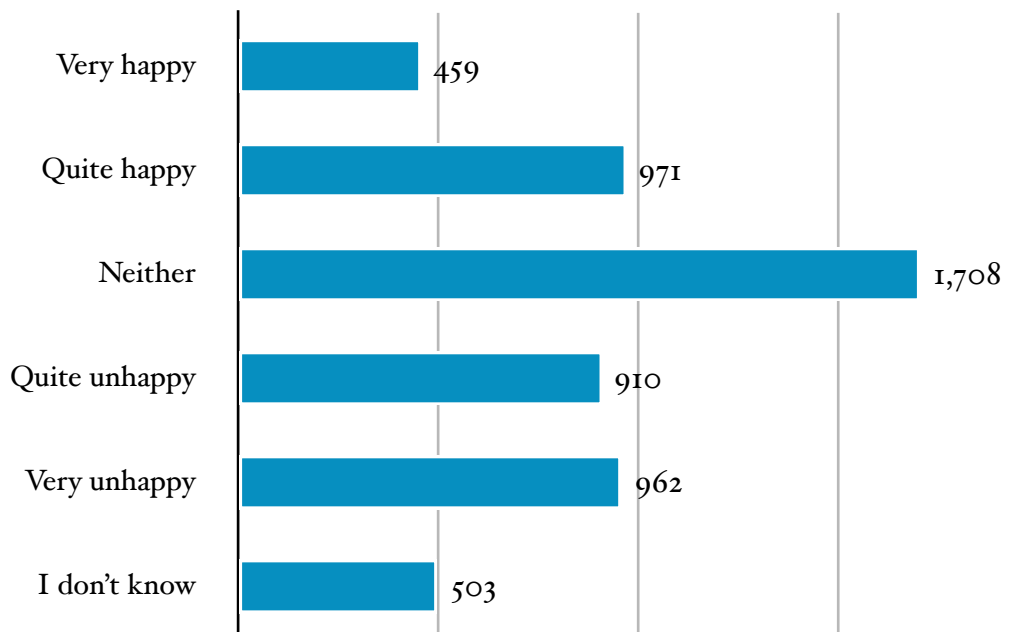
> "I have real problems with the archiving and distribution of pre-published versions because sometimes the results are somewhat different than the final version - the one that has benefitted from peer review and copy editing."

HOW DISRUPTIVE ARE REPOSITORIES? (Q16)

We asked respondents to respond to the statement:

"A major shift to archiving published articles in institutional repositories would undermine the current scholarly journals system"

This comment is reasonably typical of researchers' ignorance and concerns about institutional repositories:

"I am concerned that free access to institutional repositories would be compromised by the vagaries of computer systems and the likelihood that universities would want to charge a fee. It is a recipe for chaos and not in the long term interest of good science."

Although there is no consensus on this issue, it appears that researchers perceive institutional repositories (Figure 29) to be slightly less of a threat to the traditional journals system than open access journals:

Figure 30: How likely is it that institutional repositories will undermine the current system? (n=5,513)

Numbers of respondents
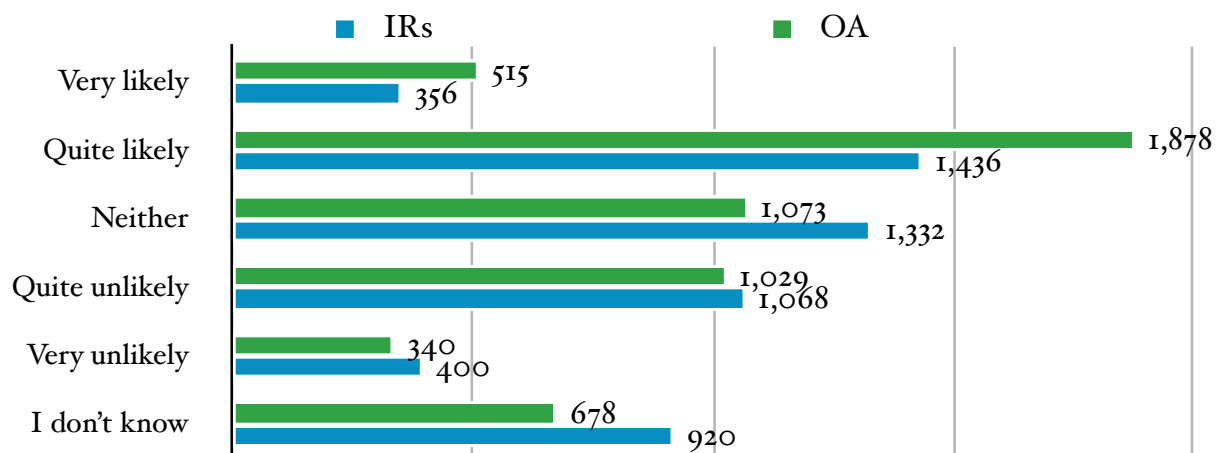
Authors appear to be less positive about institutional repositories than they are about open access journals and see them as less of a `good thing'.

Figure 31: To what extent would that be a good thing or a bad thing? (n=5.513)

Numbers of respondents
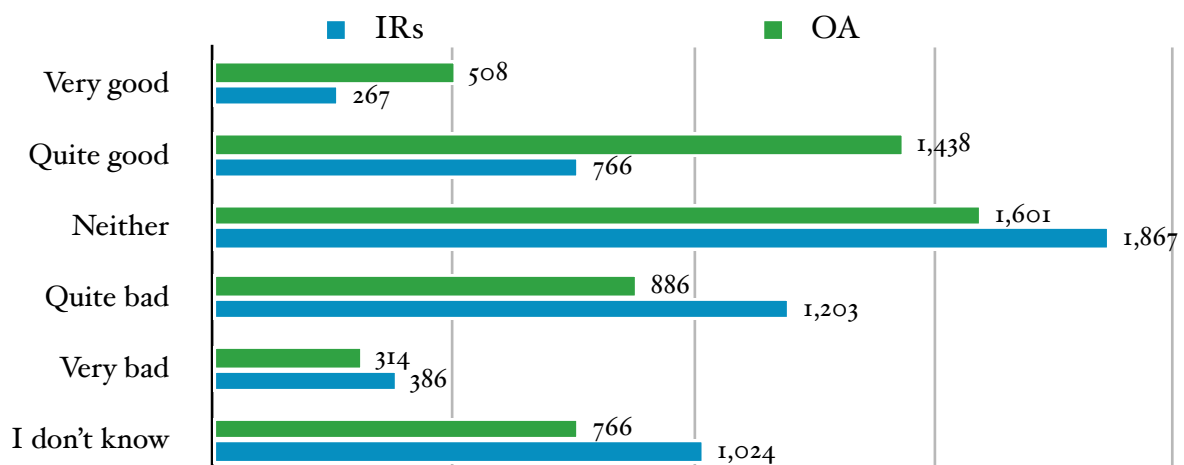
Table 5: Summary cross-tabulation of Questions 16a and 16b (n=903)

Numbers of respondents and percentages (of those expressing a definite opinion)

	A good thing	**A bad thing**
Likely	374 (17.1%)	998 (45.6%)
Unlikely	432 (19.7%)	386 (17.6%)

At the moment, relatively few researchers are familiar with the concept of institutional repositories, as reflected in the large proportion of `don't know' responses in Figure 31. However, such evidence as we have suggests that ‑ at the population level ‑ there is no great interest or drive from the author community for this model.

Segmenting the author population: cluster analysis

METHODOLOGY

So far in this report, we have considered variables either on their own or in combination with just one other variable, possibly a demographic, to answer questions like `is there a difference between men and women in respect of their attitudes to peer review?'. This section is more ambitious in that it uses a number of computer-based techniques to try to uncover any underlying patterns in the survey data when *all variables* are taken into account (multivariate analysis). The intention is to see whether we are dealing with a single homogeneous population, or whether a better interpretation might be to treat the survey results as comprising a number of populations with distinctive views and characteristics.

CLUSTER ANALYSIS AND INTERPRETATION

The first stage of this analysis involves a technique called cluster analysis (in this case using the Quick Cluster algorithm within SPSS, the Statistical Package for the Social Sciences). Cluster analysis is a simple idea in practice, although computationally it is very complex. If we drew two completed questionnaires at random from the survey, it would be possible to compare them line by line, question by question. Since we used closed questions, this is easily possible in a computer environment. In fact, we could calculate a score that summarised how closely that pair of authors agree with one another ‑ in the sense that they tend to answer the same questions in the same way. Scaling this up to the whole survey, we can use cluster analysis to automatically classify the population into groups of authors with broadly similar views and experiences.

Figure 32 shows the results of automatically classifying the CIBER author population using SPSS Quick Cluster.

Figure 32: Cluster group memberships (n=5,512)
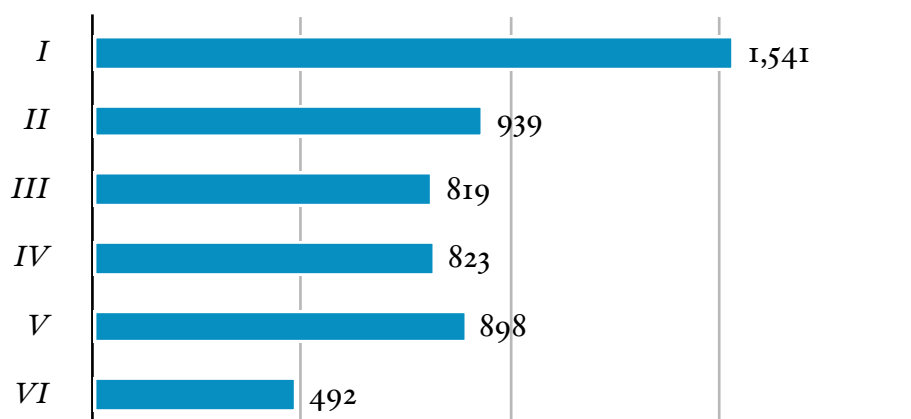
These clusters may or may not be meaningful: the computer algorithm cannot exercise judgement, it simply follows a set of rules until there are no more cases to classify. The computer software does not `know' whether it is dealing with a well-designed questionnaire or random numbers.

We can investigate whether the six clusters are `meaningful' by applying three tests:

Test 1: Which is bigger, the differences between groups or the differences within groups?
A one-way analysis of variance (ANOVA) test reveals that the clusters are sharply defined: the differences *between* them are greater than the differences *within* them for all of the variables (except for Q5-5, Q6-2, Q18 and Q22) at the 1% significance level. This is encouraging but it still tells us nothing about the `meaning' of the clusters.

Test 2: Is it possible to infer what `rules' informed the formation of the clusters?
In the next test, a technique called discriminant analysis is used to try to infer a set of `rules' that might explain why an author has been allocated to cluster IV rather than cluster II, for example.

Table 6: Discriminant analysis

FACTOR	EIGENVALUE	%VARIANCE	CUMULATED%	SUMMARY INTERPRETATION
A	7.014	72.8%	72.8%	`Subject disciplinary factor'
B	2.022	21.0%	93.8%	`Open access enthusiasm factor'
C	0.541	5.6%	99.5%	`Open access scepticism factor'
D	0.033	0.3%	99.8%	`Electronic info enthusiasm factor'
E	0.020	0.2%	100.0%	`Copyright factor'

Table 6 shows that this analysis has uncovered five underlying factors that, taken together, explain 100% of the variance in the survey responses. (A factor in this context

should be understood as a general property of the survey respondents, like `diet' or `lifestyle' in a medical survey, that can be inferred from more detailed information about what patients said they had had for breakfast and what time they went to bed). These might be crudely thought of as the rules that govern cluster membership for a particular author. In the next stage of the discriminant analysis, the computer software classifies the survey respondents once again: this time using the rules it has `learnt' rather than using a clustering algorithm. If the rules are `any good', this should mean that they have high predictive power and the rule-based classification and the `blind' clustering algorithm should give very similar results. In this case, the overlap between the two techniques is 94.0%. In other words, the rules are good enough to predict cluster group membership almost 19 times out of 20. This is very encouraging.

Test 3: Can a meaningful interpretation of the clusters be attempted?
The ultimate test of the cluster analysis is whether a meaningful interpretation can be inferred from the data. The next stage relies heavily on soft human judgements, informed by the outputs from the various statistical analyses that were described above: it is a blend of craft and science.

Table 7: Cluster I profile

MAINSTREAM (35%)
This cluster has a very high predominance of North American and Western European authors, with extremely low African participation. Very strong representation from hospitals and medical schools. Highly represented subjects are medicine and allied health, neuroscience, pharma subjects, physics, astronomy and social sciences. Strong female showing. Mid–late career age profile. An influential group, with very strong showings for both referees and board members. This, the largest single group, is very strongly wedded to the traditional system and regards change as likely but very unwelcome. This group is the most comfortable with the information overload phenomenon: they don't believe that too much is being published or that journals have become too specialised: in fact, they are keen to publish more themselves. Their attitudes to open access are hostile: of all the clusters, members of this group are the least concerned with journal affordability. They dislike `author pays' as they don't have access to so many grants and generally prefer reader charges, levied on individuals or through the library. They are very ignorant of the repository movement although they are quite concerned about the issue of versions control in principle. They don't believe repositories really challenge the current system and regard change generally with suspicion. They are not interested in copyright and associated permissions to re-use their work. This group dislikes information metrics and attaches relatively low importance to impact factors when the choose where to publish. They are relatively unconcerned about journal prices and are unlikely to consider affordability when choosing where to publish. They are pretty relaxed about speed of publication. The biggest library users, they are strongly wedded to traditional working methods, evidenced by a relatively low interest in electronic tools and methods.

Table 8: Cluster II profile

OLD GUARD (29%)
The membership of this cluster is a little less biased towards North American and Western European researchers than I, and it has a strong Australasian component. Its authors tend to work in government, research institutes and in industry. Subject-wise, this cluster has very high proportions of basic life sciences: biochemistry, genetics and molecular biology. Balanced gender profile. Late career age profile. Large numbers of referees and board members.

The second largest group is similarly resistant to change which it regards as threatening. Attitudes to open access journals are hostile. They are grant rich in comparison to Cluster I and are more likely to accept author charges.

They are hostile to IRs and very concerned about version control. They don't believe IRs will really challenge the current system. Not interested in copyright and associated permissions. Very strong attachment to peer review.

This group dislikes information metrics and attaches relatively low importance to impact factors when they choose where to publish. They are relatively unconcerned about journal prices and are unlikely to consider affordability when submitting an article.

Traditional working methods with a relatively low interest in electronic tools and methods.

Table 9: Cluster III profile

PRAGMATISTS (11%)
A more even geographic spread than I or II with a strong Western European component. Broad institutional mix, although hospitals and medical schools are under-represented. Dominated by applied subjects: engineering and technology, immunology and microbiology, environmental sciences and business studies. Balanced gender profile. Early career profile (under 35). Average numbers of referees and board members.

This group is less worried by change than Clusters I and II but still favours the current system. Attitudes to OA are less hostile. They are more likely to be in receipt of grant funding and think that authors and readers should fund the costs of publishing.

They are fairly ignorant of IRs but still quite hostile. They don't believe IRs will really challenge the current system. Not interested in copyright and associated permissions.

Traditional working methods with a relatively low interest in electronic tools and methods.

Table 10: Cluster IV profile

OA SUPPORTERS (10%)
Strong Asian and, to a lesser extent, African participation. Universities and research institutes highly represented. Chemistry, chemical engineering, life sciences and computer sciences all highly represented. Balanced gender profile. Early–mid career age profile. Average numbers of referees and board members. This group welcomes reform of the current system, which it regards as overdue. Attitudes to OA are very positive and they know a lot about this model. Unlike Clusters I–III, this group is strongly in favour of commercial sponsorship in journal publishing. This group is much better informed about IRs and has generally positive attitudes, although they are neutral on the question of version control. They attach a lot of importance to being able to retain copyright and to be able to post articles on the web; they believe that IRs are likely to change their information environment for the better. This group likes information metrics, especially downloads, and impact factors are highly influential over where they publish. These researchers feel that journal prices are a big issue and seek out more affordable journals when they publish. Speed of publication is a big issue for this group. They have a very high interest in electronic information tools (of which they are heavy users) and working methods.

Table 11: Cluster V profile

| OA ENTHUSIASTS (8%) |
|---|
| Very strong representation of Asian, African and Eastern European authors; North Americans and Western Europeans very highly under–represented. High proportion of hospitals and medical schools. Main subjects: materials science, medicine and allied health, mathematics and engineering and technology. Rather male–dominated. Very young age profile. Referees and editorial board members below average.

This is the most radicalised group with extremely positive attitudes to change. Attitudes to OA are extremely positive and they are the best informed of the six groups. This cluster favours a broad mix of funding, and tend to favour central government funding and commercial sponsorship.

This group knows a lot about IRs and has liberal attitudes to the issue of version control. They attach considerable importance to being able to retain copyright and to be able to post articles on the web; they believe that IRs will change their information environment very much for the better. This group attaches much less importance to peer review than the other clusters.

This group likes information metrics, especially downloads, impact factors are highly influential over where they publish. These researchers feel that journal prices are a big issue and seek out more affordable journals when they publish. Speed of publication is a big issue for this group.

They have a very high interest in electronic information tools (of which they are very heavy users) and working methods. |

Table 12: Cluster VI profile

P E S S I M I S T S (7 %)
North American authors are predominant in this cluster. Hospitals and medical schools over–represented. Medicine the key subject. Strong female representation. Oldest age profile. Average numbers of referees and editorial board members.
This, the smallest of the six groups, has a generally negative attitude to open access journals but is more comfortable with archiving articles in institutional repositories. Their views are broadly similar to Cluster I except that they are more inclined to the view that change is inevitable.
Traditional working methods with a relatively low interest in electronic tools and methods.

Figure 34: Survey sub-populations (n=5,512)
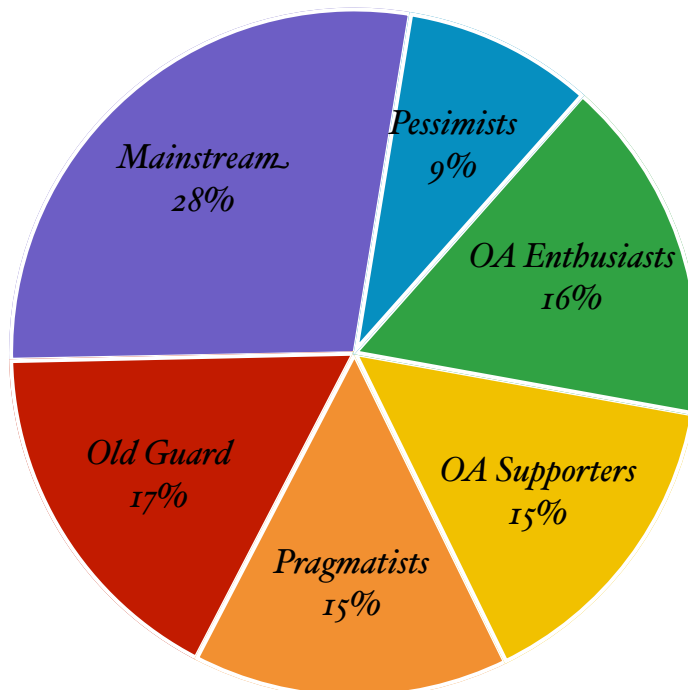
CIBER KEY FINDING 17

CLUSTER ANALYSIS

The survey population is best considered as comprising six fairly distinct sub-populations on the basis of their attitudes and demographics. Authors within these sub-populations share more in common with each other than they do with members of the other groups.

This methodology identifies two minority groups (`OA Supporters' and `OA Enthusiasts') that are keen on reform of the scholarly journals system and whose attitudes diverge sharply from the rest of the research community.

In their own words: interesting author comments

This section draws selectively on some of the more interesting unsolicited comments made by authors at the end of the survey. An attempt has been made to provide a balanced coverage of their views here so as to offer an insight into the range and diversity of opinion. Authors were very keen to share their views: we have a large corpus of opinion here (175 A4 pages) which we plan to mine more systematically in the next stage of the project using text analysis software (N8) and to report our findings separately in the peer-reviewed literature.

ON PEER REVIEW ...

"In my subject, the arXiv repository plays a useful purpose of free immediate access to people's papers. However, it has already had the negative effect that the volume of publications has increased since it is not peer reviewed, with an associated dilution of quality. Peer review is extremely important for keeping the quality of publications up."

"In physics, too many authors publish articles even if they know that what they are writing is completely useless or even false. We have to think about radical changes in the system of publishing and research in general!"

"There should be a place for preliminary publication on the website of a journal so that comments, criticisms and the answers to questions from the general body of readers might be incorporated in the final text. This should improve the quality of papers."

"The system used to work quite well until a few years ago. I haven't thought much about it but seems to me that nowadays the scientific production is so large and researchers have so much work to do (getting funding, bureaucracy, etc.) that refereeing a paper looks more like a nuisance than something somebody will do happily. In short, there is a danger of many papers being reviewed superficially because reviewers have no time nor will to do it properly."

"To have scientific credit any open publishing medium must be based on peer review. Distribution, free or by subscription, is a business matter more than a scientific issue."

"I think the peer review process is one of the most important safeguards we have to the quality of published work. With the expansion of the internet and the explosion of junk information on the web, it is absolutely critical to have a strong system of checks and balances to ensure that there is at least one type of resource that people can count on. I work in highly popular fields: nutrition and exercise science. The degree of misinformation ... is astronomical and pervasive."

ON SPEED OF PUBLICATION ...

"The main criticism I have for the publishing community (and I frequently hear from colleagues as well) is that the turn-around time for peer-reviewed journal articles is much too long. Waiting 2-3 years between the time of first submission and appearance in print is unacceptable, and in a lot of cases, the work is already out of date by the time it appears."

"While I wholeheartedly support the current publishing system and think that peer review is critical to maintaining a quality publishing industry, the delays that the system currently suffers are a barrier to advances in research."

"I prefer to read NEW experimental data ASAP even if they have `bad shape' and 'hard English'. Therefore, availability in the internet is the highest priority."

ON COMMERCIAL PUBLISHERS ...

"Journal pricing and the associated inflation charged to libraries is OUT OF CONTROL!!! Publishers have no shame and have turned the dissemination of ideas into big business for people who have no commitment to the fundamentals of the peer review process."

"What moron decided that $25-$35 for a one-off download of a PDF file from a journal's website was a good business model? Try being competitive with the cost of making a photocopy at the library or ordering an article through inter-library loan. At $1-$2 each, you may get a far larger number of hits."

"Free and open access is the only way to go. The publish-for-profit industry is contributing to the destruction of the scientific community."

"Commercial publishers should publish scholarly journals at as nearly a cost-only basis as possible (certainly not more than cost plus 10 per cent)."

"My main objection is to the professional-editor run journals ... because publication in them has a decisive impact on people's careers and career advancement, yet they use partially non-scientific criteria (e.g. perceived newsworthiness and balance of topics) in deciding on acceptance."

"So-called `global' corporations have become rulers of the planet and owners of most politicians."

"The profit motive provides a strong continuing incentive for improving journal / article quality."

"I am quite concerned at the predatory pricing that some commercial publishers are engaging in."

"Some journals become near monopolies, charging as much as they want with no limit since authors need to publish ... it would be great if more journals became open access."

ON ACCESS ON THE PERIPHERY ...

"High impact specialty journals (especially electronic versions) are very expensive, thus creating a sort of `elite' who can access them."

"Third world authors are at a clear disadvantage as the author charges are extremely high relative to their funding."

"I think an open source system would greatly benefit scientists from the developing world ... the current system disadvantages those with limited financial resources."

On open access ...

"Open access journals will not affect quality as authors will ensure that they publish in the best journal for maximum readership."

"I am a surgeon who writes so that the public can understand my results. My articles all end up on my own web site."

"Open access publishing may lead to a flood of relatively poorly organized, non-peer reviewed material that will make it difficult to tell the wheat from the chaff. The organization, review and editing of scholarly works is an age old filtering process that is essential to scientific discourse."

"In [author pays] open access journals, it would be very difficult for young and junior people to publish as they either need to pay the fees themselves or get it from their supervisors: the result being that supervisors and professors will control the whole show as they control the funding money."

"Accessibility to in press and published articles is increasingly biasing our current use of the literature. Open access would greatly reduce this problem and would ameliorate band wagon science that too frequently dictates research directions and funding."

"I believe articles should be accepted for publication based on merit not on the size of the author's cheque book."

"I am concerned that the open access model is financially untenable, regardless of its merits or demerits or otherwise. This is apparently not addressed in your questionnaire, yet it is important. What if the open access model fatally undermines traditional ones before failing itself?"

"If open access publishing simply adds more capacity to the system, it will have some negative effect unless competition drives some of the weaker journals out of existence."

"By allowing the individual reader to access papers and journals free of charge, this might hopefully engage wider and better public debate of many issues that currently people only have access to through the populist media with all its inherent and often deplorable level of bias in reporting."

"Any variant of `author pays' would be the worst thing I could possibly imagine for publishing of mathematics research journals."

"I worry open access may ultimately mean accountants control what we can publish: access may be open, but publication closed to all but rich institutions and individuals."

"Open access publishing is completely in line with the open conduct of science and the free sharing of information."

"I would enjoy open access to all literature, but also see the need for curatorship, sustainability and peer review ..."

O N   R E P O S I T O R I E S ...

"Institutional repositories and traditional publishing serve rather different purposes - fast and wide distribution vs peer review and imprimatur - and they can happily co-exist in principle. But journals may not be able to command their current exorbitant prices when they play only one part of their current role."

"We need more interaction between library scientists and the scientists publishing in scholarly journals. The issues of archiving and the use of peer-reviewed materials (not just googled white papers) are VERY important."

"I think the issue of multiple versions of a MS is a serious problem."

"There should be one and only one version of each paper published. That version should have undergone full scholarly peer review, with editorial oversight of the process."

"In strongly interdisciplinary fields, where the backgrounds of the scientists vary significantly, it is often difficult to obtain a fair and informed review of submitted articles: the problem is often made worse if the field is small because then the possibilities for independent appeal and re-review are small. A publishing model based more on the physics arXiv might serve such fields better, where the review process is replaced by a full open access repository system."

"The journal of the future is just a set of pointers to peer-recommended articles in public repositories."

"I think institutional repositories would be a good idea, but would devastate publishers."

"I strongly feel that there are much better ways to handle the right of US taxpayers to have access to the scientific literature ... than requiring that all publications be deposited in a separate repository. This is redundant and inefficient."

ON THE FUTURE ...

"... we may end up with a two- or three-tiered system, with scholarly published hard copy and electronic copyrighted journals at the top, then electronic only refereed journals, then institutional archived sources, then open website ... This may not be a bad thing. I doubt that it will be the demise of high quality, reputable, scholarly publishing."

"The scholarly publishing community has to find a compromise with the new open publishing initiatives in order to survive. It is time to think about smaller, but fair and realistic profits."

"In many areas, traditional journals are obsolete and should be allowed to die. Each research community should make its own decision about which publishing model to follow."

"What is happening now is a new way of getting information and the research community is going to adjust. This will take a bit of time but online and open access is happening. It is similar to what occurred when the printing press was invented. There is no way to stop it and no way to predict exactly what will happen. Scientists should not fight it but work to make the adjustments helpful and appropriate."

"Science information should be free and so articles should be free of cost to its readers. Commercial sponsorship must pay for the system to sustain. Linux operating system should be an inspiration."

"The government should stay out of scientific publishing."

"The integrity of science publishing is its most important feature. Without this, science would be another tainted endeavor, prey to vested interests, and of little independent use to the public. Science publishing would do well to avoid falling publication standards, or corporate sponsorship corrupting the process. However, as the former requires money, and the latter can supply it, science publishing is walking a tightrope."

"The pressure to publish needs to be lifted. With the current enormous pressure on researchers, quality of research, quality of articles, and quality of the peer review process suffer. I do not see that a shift of publishing method will affect this problem. I think this issue needs to be settled first before any major paradigm shifts occur."

"There seem to be similarities and overlaps with the issue of open source software vs proprietary code, copyright vs free distribution. I suspect the technology will drive the answers more than is imagined."

Annexes

A N N E X   A :   E - m a i l   i n v i t a t i o n   t o   a u t h o r s

We are writing to you as someone who has recently published a peer-reviewed article to invite you to participate in a survey designed to find out what authors think about recent developments in journal publishing.

This survey is being conducted by CIBER, an independent scholarly communications think tank based at University College London. It is being conducted against the backdrop of considerable uncertainty in the world of journal publishing. New business models are being proposed, experimented with, and debated. Change is in the air. The findings of this survey will give a powerful voice to authors to express their preferences and concerns. Your views will help to shape the debate about new publishing models by providing key decision makers in government and industry with the facts.

Your response is confidential and will only be used in combination with those of other participants. You can read more about our survey site by clicking here {LINK TO CONFIDENTIALITY STATEMENT}. If you have any concerns about this survey not being genuine, or would like further information about CIBER, please contact Professor Dave Nicholas {LINK TO david.nicholas@ucl.ac.uk*}. If you wish, you will be able to view the main findings from the survey early next month on the CIBER website.

The questionnaire should take you around 15 minutes to complete; please bear with us, your views are very important and, without them, the publishing community will not be able to take note of what their most valuable stakeholders, their authors, really want out of the system.

Please click here to proceed {LINK TO NOP DATABASE}.

If you have any problems or technical issues with the questionnaire please email: publishers_association@nopworld.com.

A n n e x B : Q u e s t i o n n a i r e

SECTION A
What do you look for as an author?

In this section we hope to find out what authors want from the journals system. To avoid generalization, we ask you to think about your last published article when you answer the next four questions.

Question 1
What was the title of the last journal in which you published?

[ENTER FULL JOURNAL NAME]

Question 2
When you submitted your article, how important were the following factors to you?

[TICK ONE BOX IN EACH ROW]

Very important / Quite important / Not very important / Not at all important / I don't know

The reputation of the journal
The reputation of its editorial board
Its impact factor
Online manuscript submission
It offered both print and electronic versions
Speed of publication
Its readership
It allowed me to retain copyright in my article
It permitted me to put the pre-published version on a public web site
It permitted me to put the published version on a public web site

Question 3
Which of these statements best represents your experience of the reviewers' comments on your last article?

[TICK ONE BOX ONLY]

They greatly improved the quality of my article
They slightly improved the quality of my article
They made little difference
They were unhelpful

Question 4
In your view, how important is it that articles should be peer reviewed?

[TICK ONE BOX ONLY]

Peer review is very important
Peer review is quite important
Peer review is not very important
I don't know

SECTION B
What do you think about the current journals system?

In this section, we ask you to think more generally. Big changes are taking place in the journal publishing business and there is considerable disagreement amongst authors, publishers, librarians and funding bodies about the best way forward.

Question 5
What are your views on each of the following statements?

[TICK ONE BOX IN EACH ROW]

Strongly disagree / Disagree a little / Neither agree nor disagree / Agree a little / Strongly agree/ I don't know

Too much research is being published.
Citations are a good indicator of the usefulness of research.
High journal prices make it difficult to access the literature.
Article downloads are a good indicator of the usefulness of research.
As an author, I choose journals that will be read by the specialists in my field.
I publish more than I ought to.
As an author, I deliberately publish in journals that are affordable to readers.
Journals have become too specialised.

YOU WILL BE ABLE TO SEE HOW EVERYONE ELSE ANSWERED THIS QUESTION AT THE END OF THE SURVEY

Question 6
How dependent are you on each of these methods for discovering articles that might be of interest to you?

[TICK ONE BOX IN EACH ROW]

Very dependent / Quite dependent / Not very dependent / Not at all dependent

Visiting a library
Recommendations from a colleague
Following up references at the end of papers
Personal journal subscriptions
Using a general abstracts service, like the Web of Knowledge
Using a subject-specific abstracts service, like Psychological Abstracts
Visiting journal publishers' websites
Current Contents
E-mail alerts to tables of contents
Searching Google
Searching GoogleScholar
Searching another web search engine

SECTION C
What do you think about `open access' journals?

Question 7
How much do you know about open access journals?

[TICK ONE BOX ONLY]

A lot
Quite a lot
A little
Nothing at all

Question 8
Open access journals use a funding model in which researchers are able to read, download, copy, distribute, and print articles and other materials free of charge from the internet. Open access publishers sometimes meet their costs by charging authors (usually through the author's funding body or employer), for the publishing services they provide. In other cases, open access journals are run by researchers themselves and the publishing costs are absorbed by their employers.

Have you ever published an article in an open access journal?

[TICK ONE BOX ONLY]

Yes, I publish in open access journals whenever possible
Yes, I have, but open access is not a major issue for me
No
I don't know

Question 9
To what extent do you agree or disagree with the following statements about open access publishing?

[TICK ONE BOX IN EACH ROW]

Strongly disagree / Disagree a little / Neither agree nor disagree / Agree a little / Strongly agree / I don't know

Authors will publish more often
Authors will have less choice over where they publish
The quality of articles will improve
Fewer articles will be rejected
Articles will become less concise
Libraries will have more money to spend
It will be easier to obtain the articles I need
Archiving will suffer

Question 10
Consider this statement:
"A major shift to open access publishing would undermine the current scholarly journals system"

Question 10a
To what extent do you think this is likely to happen?

TICK ONE BOX ONLY

Very unlikely / Quite unlikely / Neither likely nor unlikely / Quite likely / Very unlikely / I don't know

Question 10b
To what extent do you think this would be a good thing or a bad thing?

TICK ONE BOX ONLY

Very bad / Quite bad / Neither good nor bad / Quite good / Very good / I don't know

Question 11
Looking back over the past three years, how many of your published articles were based on work funded by a grant or research contract?

[TICK ONE BOX ONLY]

All my articles
50% or more
Less than 50%
None of my articles
I don't know

Question 12
Who do you feel should meet the costs of publishing scholarly journals?

[TICK ONE BOX IN EACH ROW]

Should pay all / Should make a large contribution / Should make a small contribution / Should not make any contribution / I don't know

Authors themselves
Departments or faculties on behalf of their authors
Individual readers

Libraries on behalf of their readers
Commercial sponsors
Research funding bodies
Central government

SECTION D
What do you think about `institutional repositories'?

Question 13
How much do you know about institutional repositories?

[TICK ONE BOX ONLY]

A lot
Quite a lot
A little
Nothing at all

Question 14
An `institutional repository' is a digital collection of scholarly materials that is managed by a research community, typically a university or a funding agency. Researchers can deposit materials in these repositories, subject to copyright, with the host institution providing the infrastructure for these materials to be organized, archived and disseminated. These repositories sit alongside the traditional publishing system and generally do not offer peer review in their own right.

Have you ever deposited one of your articles in an institutional or subject repository?

[TICK ONE BOX ONLY]

Yes, I did so voluntarily

Yes, I was required to do so
No, but I would do so willingly if there was an opportunity
No, and I don't intend to
I don't know

Question 15
Are you happy that, under an institutional repository model, readers would be able to retrieve several different versions of your articles? (for example, the "official" version of your paper on the publisher's website, together with one or more pre-publication versions on public web sites)?

[TICK ONE BOX ONLY]

Very happy / Quite happy / Not very happy / Not at all happy / I don't know

Question 16
Consider the statement:
"A major shift to archiving published articles in institutional repositories would undermine the current scholarly journals system"

Question 16a
To what extent do you think this is likely to happen?

TICK ONE BOX ONLY

Very unlikely / Quite unlikely / Neither likely nor unlikely / Quite likely / Very unlikely / I don't know

Question 16b
To what extent do you think this would be a good thing or a bad thing?

TICK ONE BOX ONLY

Very bad / Quite bad / Neither good nor bad / Quite good / Very good / I don't know

SECTION E
Some questions about you

In this section we just need to ask a few more questions about you so that we can relate the survey findings to some simple demographics. Nearly finished.

Question 17
Where are you based?

[TICK ONE BOX ONLY]

Africa
Asia
Australasia
Central America
Eastern Europe
North America
South America
Western Europe

Question 18
Where do you work?

[TICK ONE BOX ONLY]

University or college
Hospital or Medical School
Government
Research Institute
Commercial organisation
Self-employed (e.g. consultant)
Other

Question 19
Which of these very broad subject headings best describes your last published article?

[TICK ONE BOX ONLY]

Agriculture
Arts and humanities
Biochemistry, genetics and molecular biology
Biological sciences
Chemistry / chemical engineering
Computer sciences / IT
Earth and planetary sciences
Economics / business and management
Engineering and technology
Environmental sciences
Immunology and microbiology
Materials science
Mathematics
Medicine / allied health / veterinary science
Neuroscience
Pharmacology, toxicology and pharmaceutics
Physics and astronomy
Social sciences

Question 20
Are you

[TICK ONE BOX ONLY]

Female
Male
Refused

Question 21
How old are you?

[TICK ONE BOX ONLY]

Under 26
26-35
36-45
46-55
56-65
Over 65
Refused

Question 22
Which of these journal publishing roles have you undertaken in the past year?

[TICK AS MANY BOXES AS APPLY]

Author of journal articles
Referee for journal articles
Editorial board member
Journal editor
None of these

Question 23
Do you have any comments that you would like us to bring to the wider attention of the scholarly publishing community?

[ENTER FREE TEXT COMMENTS]

ANNEX C: SUMMARY CLUSTER VARIABLES

In order to facilitate analysis, the data which follow show the adjusted standardised residuals for each variable and each cluster. Larger positive numbers (green) indicate that a given variable occurs more frequently than might be expected; large negative numbers (red) indicate the opposite.

When you submitted your last published article, how important were the following factors to you? (Q2)

`VERY IMPORTANT' OR `QUITE IMPORTANT' RECODED AS `IMPORTANT'

The reputation of the journal (Q2-1)
No significant differences between clusters at the 1% level

The reputation of its editorial board (Q2-2)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Important	-3.4	-6.0	-2.5	7.2	7.5	-2.3

Its impact factor (Q2-3)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Important	-3.6	-2.8	-0.8	3.9	3.5	-1.1

Adjusted standardized residuals

Online manuscript submission (Q2-4)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Important	-8.6	-6.7	-6.0	11.3	16.2	-5.3

It offered both print and electronic versions (Q2-5)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Important	-8.2	-5.6	-2.5	9.3	12.5	-4.4

Speed of publication (Q2-6)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Important	-4.2	-5.1	-0.6	10.3	12.3	-5.3

Its readership (Q2-7)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Important	2.9	-0.4	-3.5	1.6	-1.3	0.1

It allowed me to retain copyright in my article (Q2-8)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Important	-9.8	-7.8	-4.2	10.9	16.9	-4.6

It permitted me to put the pre-published version on a public web site (Q2-9)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Important	-6.0	-9.2	-3.9	11.0	14.6	-6.0

It permitted me to put the published version on a public web site (Q2-10)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Important	-9.5	-7.2	-2.1	12.1	13.2	-5.2

Did the reviewers' comments improve the quality of your article? (Q3)

`GREATLY IMPROVED' OR `SLIGHTLY IMPROVED' RECODED AS `IMPROVED'

Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Improved	-3.1	-0.3	-2.2	4.5	3.5	-2.1

In your view, how important is it that articles should be peer-reviewed? (Q4)

`VERY IMPORTANT' OR `QUITE IMPORTANT' RECODED AS `IMPORTANT'

Significant at the 10% level

CLUSTER	I	II	III	IV	V	VI
Important	-3.1	-0.3	-2.2	**4.5**	3.5	-2.1

What are your views on each of the following statements? (Q5)

`STRONGLY AGREE' OR `SLIGHTLY AGREE' RECODED AS `AGREE'

Too much research is being published (Q5-1)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Agree	**-4.1**	-2.6	1.3	2.3	**6.9**	-3.6

Citations are a good indication of the usefulness of research (Q5-2)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Agree	**-5.2**	**-4.0**	-1.8	**5.5**	**8.0**	-1.4

High journal prices make it difficult to access the literature (Q5-3)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Agree	-3.4	-3.4	1.6	**6.6**	**4.0**	**-5.6**

Article downloads are a good indicator of the usefulness of research (Q5-4)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Agree	**-4.8**	**-7.6**	-1.6	**8.3**	**11.8**	**-6.1**

As an author, I choose journals that will be read by the specialists in my field (Q5-5)
No significant differences between clusters at the 1% level

I publish more than I ought to (Q5-6)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Agree	-6.3	-6.0	1.2	4.5	11.9	-4.7

As an author, I deliberately publish in journals that are affordable to readers (Q5-7)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Agree	-9.3	-7.4	-4.5	13.1	16.6	-7.8

Journals have become too specialised (Q5-8)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Agree	-5.6	-6.4	-5.2	8.8	14.5	-6.1

How dependent are you on each of these methods for discovering articles that might be of interest to you? (Q6)

Visiting a library (Q6-1)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Dependent	8.3	3.9	1.1	-6.1	-9.9	0.8

Recommendations from a colleague (Q6-2)
No significant differences between clusters at the 1% level

Following up references at the end of papers (Q6-3)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Dependent	-2.9	1.0	3.4	-0.2	-1.9	1.6

Personal journal subscriptions (Q6-4)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Dependent	2.4	-2.5	-0.6	-2.3	2.2	0.3

Using a general abstracts service, like the Web of Knowledge (Q6-5)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Dependent	**-7.7**	-2.6	1.9	**7.1**	**6.9**	**-4.6**

Using a subject-specific abstracts service, like Psychological Abstracts(Q6-6)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Dependent	-1.3	**-6.4**	-3.1	2.2	**7.8**	1.4

Visiting journal publishers' websites (Q6-7)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Dependent	**-10.6**	**-6.7**	0.4	**11.0**	**13.4**	**-6.1**

Current Contents (Q6-8)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Dependent	**-10.9**	**-9.4**	0.6	**9.8**	**16.5**	**-4.8**

Email alerts to tables of contents (Q6-9)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Dependent	-3.4	-2.0	-1.3	**6.4**	3.8	-3.4

Searching Google (Q6-10)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Dependent	**-9.7**	**-7.9**	1.1	**10.6**	**12.7**	**-5.5**

Searching GoogleScholar (Q6-11)

Significant at the 1% level

C L U S T E R	I	I I	I I I	I V	V	V I
Dependent	-10.1	-8.1	0.2	11.9	12.8	-5.3

Searching another web search engine (Q6-12)

Significant at the 1% level

C L U S T E R	I	I I	I I I	I V	V	V I
Dependent	-2.2	-4.6	-4.8	4.7	9.7	-2.8

How much do you know about open access journals? (Q7)

`A LOT' OR `QUITE A LOT' RECODED AS `INFORMED"

Significant at the 1% level

C L U S T E R	I	I I	I I I	I V	V	V I
Informed	-3.4	-4.4	-3.9	7.5	13.3	-10.5

Have you ever published in an open access journal? (Q8)

`YES, I PUBLISH IN OPEN ACCESS JOURNALS WHEREVER POSSIBLE' OR `YES, I HAVE, BUT OPEN ACCESS IS NOT A MAJOR ISSUE ' RECODED AS `EXPERIENCED'

Significant at the 1% level

C L U S T E R	I	I I	I I I	I V	V	V I
Experienced						

To what extent do you agree or disagree with the following statements about open access publishing? (Q9)

`STRONGLY AGREE' OR `SLIGHTLY AGREE' RECODED AS `AGREE'

Authors will publish more often (Q9-1)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Agree	1.1	-11.4	0.2	7.4	14.1	-14.4

Authors will have less choice over where they publish (Q9-2)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Agree	-3.1	-6.2	-1.1	7.4	10.5	-8.4

The quality of articles will improve (Q9-3)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Agree	-11.2	-11.2	-4.8	12.7	24.5	-9.1

Fewer articles will be rejected (Q9-4)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Agree	10.8	-3.7	4.7	-0.7	-3.0	-13.3

Articles will become less concise (Q9-5)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Agree	7.1	-3.3	3.8	1.4	0.6	-14.0

Libraries will have more money to spend (Q9-6)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Agree	3.4	-4.6	0.2	5.6	4.9	-13.0

It will be easier to obtain the articles I need (Q9-7)

Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Agree	-0.9	**-8.7**	1.1	**10.0**	**11.8**	**-16.4**

Archiving will suffer (Q9-8)

Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Agree	-1.9	-3.5	3.6	**6.0**	**5.8**	**-12.0**

Consider this statement:

"A major shift to open access publishing would undermine the current scholarly journals system"

To what extent do you think this is likely to happen? (Q10a)

`VERY LIKELY' OR `QUITE LIKELY' RECODED AS `LIKELY'

Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Likely	2.2	-1.3	2.1	1.2	-3.0	-2.0

To what extent do you think this would be a good thing or a bad thing? (Q10b)

`VERY GOOD' OR `QUITE GOOD' RECODED AS `GOOD'

Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Good	**-4.7**	**-8.2**	-2.2	**10.0**	**14.2**	**-10.0**

Looking back over the past three years, how many of your published articles were based on work funded by a grant or research contract? (Q11)

`ALL MY ARTICLES' OR `50% OR MORE' RECODED AS `GRANT-RICH'

Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Grant-rich	-7.7	6.2	4.3	6.2	-4.3	-3.7

Who do you feel should meet the costs of publishing scholarly journals? (Q12)

`SHOULD PAY ALL' OR `SHOULD MAKE A LARGE CONTRIBUTION' RECODED AS `SHOULD PAY'

Authors themselves (Q12-1)

Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Should pay	-4.6	2.7	1.5	2.2	1.4	-2.8

Departments or faculties on behalf of their authors (Q12-2)

Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Should pay	-3.4	-3.3	1.0	2.5	7.4	-4.3

Individual readers (Q12-3)

Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Should pay	2.1	-3.2	0.6	-2.2	1.8	0.5

Libraries on behalf of their readers (Q12-4)

Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Should pay	2.0	-3.1	-0.9	-1.6	3.8	-1.0

Commercial sponsors (Q12-5)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Should pay	-5.5	-6.6	-3.0	8.0	11.6	-4.0

Research funding bodies (Q12-6)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Should pay	-3.5	-3.5	-0.9	5.0	7.4	-4.7

Central government (Q12-7)
Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Should pay	-4.0	-8.2	-2.6	7.8	12.0	-5.0

How much do you know about institutional repositories? (Q13)

`A LOT' OR `QUITE A LOT' RECODED AS `INFORMED'

Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Informed	-5.5	-3.3	-2.4	8.2	9.2	-6.2

Have you ever deposited one of your articles in an institutional or subject repository? (Q14)

`YES, I DID SO VOLUNTARILY' OR `YES, I WAS REQUIRED TO DO SO' RECODED AS `EXPERIENCED'

Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Experienced	1.4	-3.5	-0.5	2.0	3.0	-3.5

Are you happy that, under an institutional repository model, readers would be able to retrieve several different versions of your articles? (Q15)

`HAPPY' OR `QUITE HAPPY' RECODED AS `HAPPY'

Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Happy	-6.3	-9.0	-2.4	5.6	18.2	-5.8

Consider this statement:

"A major shift to archiving published articles in institutional repositories would undermine the current scholarly journals system"

To what extent do you think this is likely to happen? (Q16a)

`VERY LIKELY' OR `QUITE LIKELY' RECODED AS `LIKELY'

Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Likely	0.6	0.1	-1.5	2.4	3.9	-7.3

To what extent do you think this would be a good thing or a bad thing? (Q16b)

`VERY GOOD' OR `QUITE GOOD' RECODED AS `GOOD'

Significant at the 1% level

CLUSTER	I	II	III	IV	V	VI
Good	-4.0	-6.4	-1.7	7.1	10.7	-5.8