



IUMRS SURVEY ON THE EVOLUTION OF SCIENTIFIC PUBLISHING

DATA ANALYSIS AND REPORT

By far, authorship of publications is the most frequent ethical issue encountered by researchers.

My Editor is:
Dysfunctional
Condescending
Supportive
Perfunctory
Conciliatory
Professional
Distant
Ridged
Imperious
Placating
Tutoria
Unfair
Biased
Adversarial
Deferential

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IUMRS Survey on the Evolution of Scientific Publishing

Data Analysis and Report

31 October 2019

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COMMON ABBREVIATIONS

APC	author publication charge	(J)IF	(journal) impact factor
CC	Creative Commons	IP	Internet protocol
CD/DVD	compact disc/digital versatile disc	IUMRS	International Union of Materials Research Societies
CTFP	Cycloid Fathom Technical Publishing	MOE	margin of error
EU	European Union	OA	open access
GDPR	General Data Protection Regulation	PI	principal investigator

ON THE COVER



Observation from Page 12



Logarithmic word cloud of researcher-editor relationship descriptors (see page 14).

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Early discussions with Dr. John E. E. Baglin (IBM) and Professor Yuan Ping Feng (National University of Singapore) provided much needed guidance on Survey design, and their later review of Survey questions was invaluable. Ms. Geok Chooi Lou helped create one of the email channels used to announce the Survey and was responsible for posting relevant information at the IUMRS web site. Dr. Susan Gibbons (Yale University) and Sarah M. Pritchard (Northwestern University) volunteered several insights into Survey questions directed to librarians that were implemented to great effect. Technical support services staffs at SurveyMonkey[®] for Survey implementations and proper functioning and at SalesHandy[™] (Ikigai Infotech LLP) for efficient distribution of email announcements provided urgently needed help in a timely and effective manner. Lastly, support and encouragement from the individual officers of IUMRS has been very much appreciated. (ENK)

DISCLAIMER

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INTRODUCTION

The International Union of Materials Research Societies (IUMRS) is an association of Materials Research Societies from around the world. Each individual member of those societies is a researcher who publishes the results of research and relies on the scientific literature to learn about the results of others. Many protocols and traditions in the publishing process have arisen over a century or more, but the recent advent of electronic resources and demands for open access to research reports and their underlying data has greatly complicated this vital aspect of an individual scientist's or engineer's job as well as the entire fabric of our society's science and technology enterprise. The Survey on the Evolution of Scientific Publishing, initiated by IUMRS in October 2018, was intended to collect opinions and some related demographics which, when aggregated, may provide a fresh perspective on the scientific publishing enterprise from viewpoint of the very people who are most closely affected by it.

Although the Survey comprised 133 questions, except for the first two and final questions that all respondents were asked to answer, the remainder were allocated to respondents based on their self-identified roles in the academic publishing universe. After indicating the region of the world where they work in the first question, the second question is where respondents indicated their role. Respondents with multiple roles were free to re-enter the Survey and specify additional roles. The available roles (and number of related Survey questions) as presented to respondents was as follows:

- A **researcher** who publishes in journals and/or conference proceedings (22). NOTE: At the 21st question, you will have the option to continue in the USER/READER role.
- A **user/reader** of the scientific literature who searches for reports of others of relevance to one's own work (21).
- An **editorial/production employee of a publishing company**, a professional or learned society, or an academy or institute that produces scientific journals (16).
- A **scientific editor** for a medium such as an archival journal that publishes research reports (12).
- An **educator** at a college/university who prepares students for careers in which they may use and/or contribute to the scientific literature (13).
- An **official of a government agency/ministry or not-for-profit foundation** that allocates funds to researchers and their institutions (11).
- A **manager of research** who directs and evaluates the performance of researchers (20).
- A **corporate executive who allocates support** for internal corporate research (20).
- A **librarian or archivist**. I.e., an operator or designer of an access/retrieval/storage facility for the published literature, whether a physical library (18), or an electronic resource (14).
- A **patent attorney or equivalent expert** who identifies Intellectual Property and assesses its publishability (13).

Time devoted to the Survey by respondents ranged from five to 12 minutes, depending on their selected role. No personal identifying information was collected. This anonymous Survey's online host, SurveyMonkey®, is fully GDPR compliant. IP addresses of the devices used by respondents were recorded in order to estimate the number of respondents who took the Survey for more than one role. Assuming that a unique IP address corresponds to a unique respondent, we found that 48 respondents revisited the Survey for that reason.

An Executive Summary follows, notwithstanding the editors' inability to do justice to the full depth and breadth of the responses, especially of the free text responses. We therefore encourage readers to peruse

the litany of results provided in the main body of this report. First, however, a careful review of the sampling caveats called out in the Methodology section is strongly encouraged. Whereas we believe the overall results of this Survey do provide a valid picture, many venues of interest are under-represented or entirely absent due to a variety of practical impediments to the promulgation of a Survey of this kind by an association such as IUMRS.

Location by page number within this report of the data displayed in charts and tables is provided in Appendix A.



Geo-location of Respondents (See page 8)

EXECUTIVE SUMMARY

As requested in the previous section, we very much encourage reading the following Methodology section in order to place our summary and subsequent findings in proper context. By far, the role favored by the majority of respondents was RESEARCHER. Second place was occupied by USER/READER. Therefore, findings of note mentioned below derive primarily from those two roles. Although the role-identification question was posed only in order to segregate the various roles, it turns out that it actually revealed a strong bias among respondents to identify as RESEARCHERS when in fact they were clearly also READERS of the literature, EDITORS, and/or university EDUCATORS.

The Survey Results presented represent our attempt to portray the current attitudes and actions connected with the broad topic of scientific publishing, as perceived by many different communities served by, or dependent upon, the publication process. In the following pages, the detailed analysis of responses from various types of respondent are displayed graphically with explanatory comments where appropriate. Some broad conclusions drawn from the Survey are then presented.

After studying these carefully compartmentalized findings, we observe that there is, in general, a remarkable degree of consensus among the opinions of the various communities, regarding the merits, problems and future of the current landscape of scientific publishing. This is clearly reinforced when reading the collection of free-form comments offered by Survey respondents. Common themes repeatedly arise. They reflect a general concern about several major aspects of the social and professional environment in which we work. These include:

- Widespread unhappiness with the linkage between personal or professional success and both the number of publications produced and the obligation to publish in journals with high impact factor.
- Concern about the proliferation of new narrowly focused journals designed for easy acceptance of low-quality manuscripts.
- An ongoing concern about the fairness and objectivity of the peer-review system.
- A concern about the wide range of fees charged for open access publication as well as about nonuniform subscription costs paid by various subscribers—ranging from university libraries to individual projects and funding agencies.

In order to find more of such issues that concern or please this community, we recommend reading the lists of verbatim informal comments provided in Appendix C.

METHODOLOGY

Structure: As briefly described in the introduction, ten separate roles connected to scientific publishing were defined in the Survey's structure and offered to respondents from which to choose. A complete enumeration of questions posed to each role can be found in Appendix B. All respondents were asked for their home region of the world, their chosen role and, at the Survey's end, their preferred remedial steps to help a publication in financial straits. Beyond those, questions were tailored for the role selected. Three notes about the roles structure are in order. The manager and corporate executive roles, although separate at the outset for the role question, then are directed to an identical set of questions. Also, whereas a single role for librarian is offered at the outset, the next question splits the role into librarian at a physical library and archivist at an online service, each seeing quite distinct sets of questions. Lastly, when those who chose the RESEARCHER/AUTHOR role reach their final role-specific question, they are offered the option to continue to the set of questions for the USER/READER role without having to leave and re-enter the Survey. 341 respondents chose this option (see below).

Announcement: First, member societies of IUMRS were asked to announce the Survey to their membership and to additional colleagues at the institutions in their region. Subsequently, an email announcement campaign was pursued by sending relatively few direct email entreaties to leaders at universities, corporate and government laboratories, societies and associations, publishers, libraries, and government agencies and ministries worldwide. Then, we added use of a web-hosted sales communications service for "mass" emailing to staff email lists available through each target organization's web site. This second approach was found necessary when it was observed that leaders at the addressed entities were not adequately moved to transmit our announcement to staff in sufficient numbers.

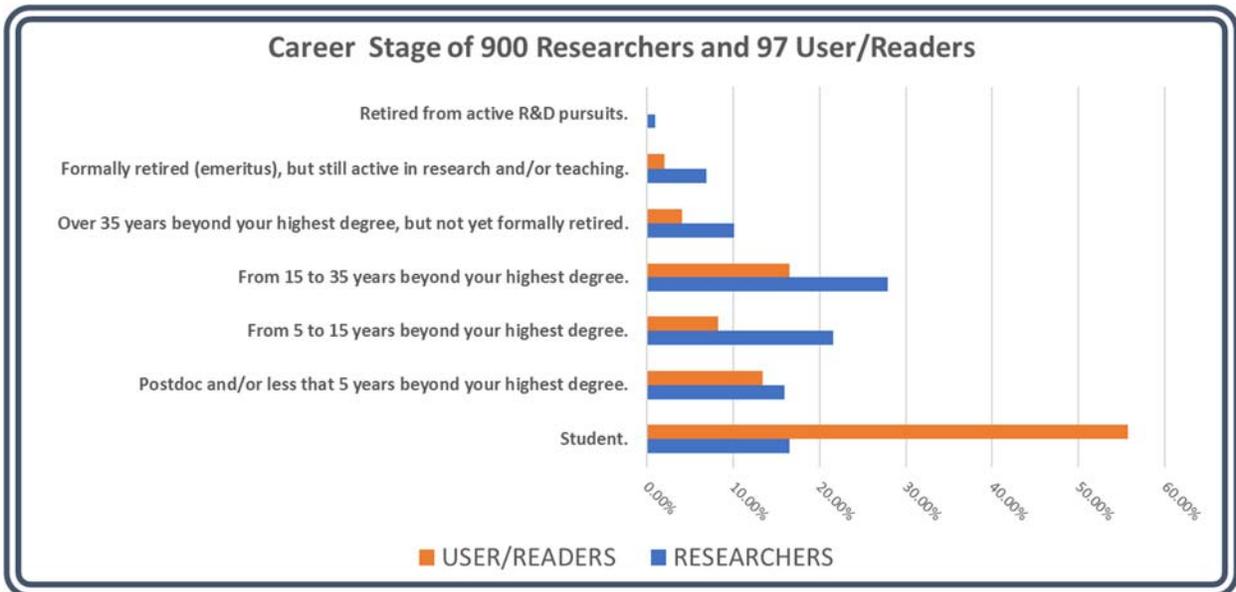
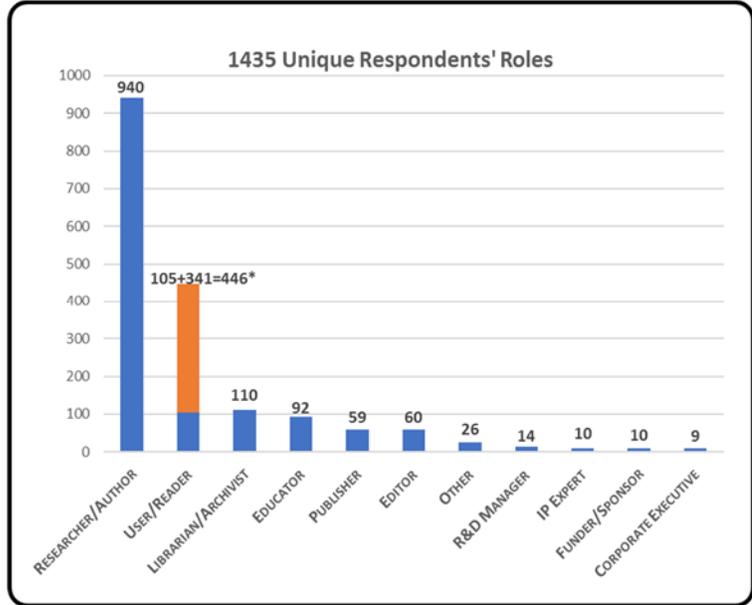
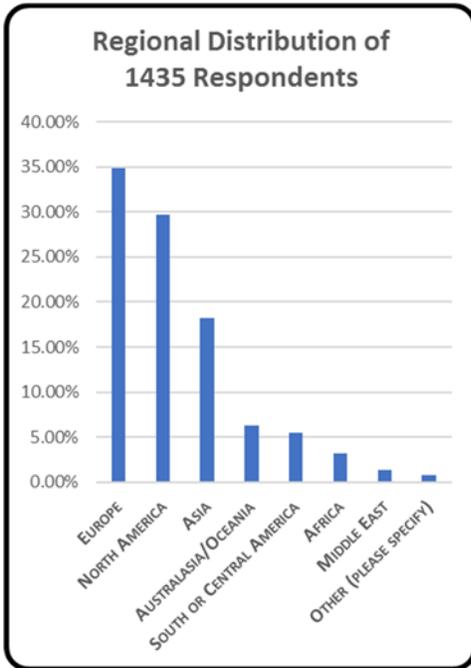
In addition, an announcement flyer was distributed for posting to many email recipients and the Survey was announced at the IUMRS web site's home page, the IUMRS Twitter account, and the web sites of other organizations, such as the European Science Foundation.

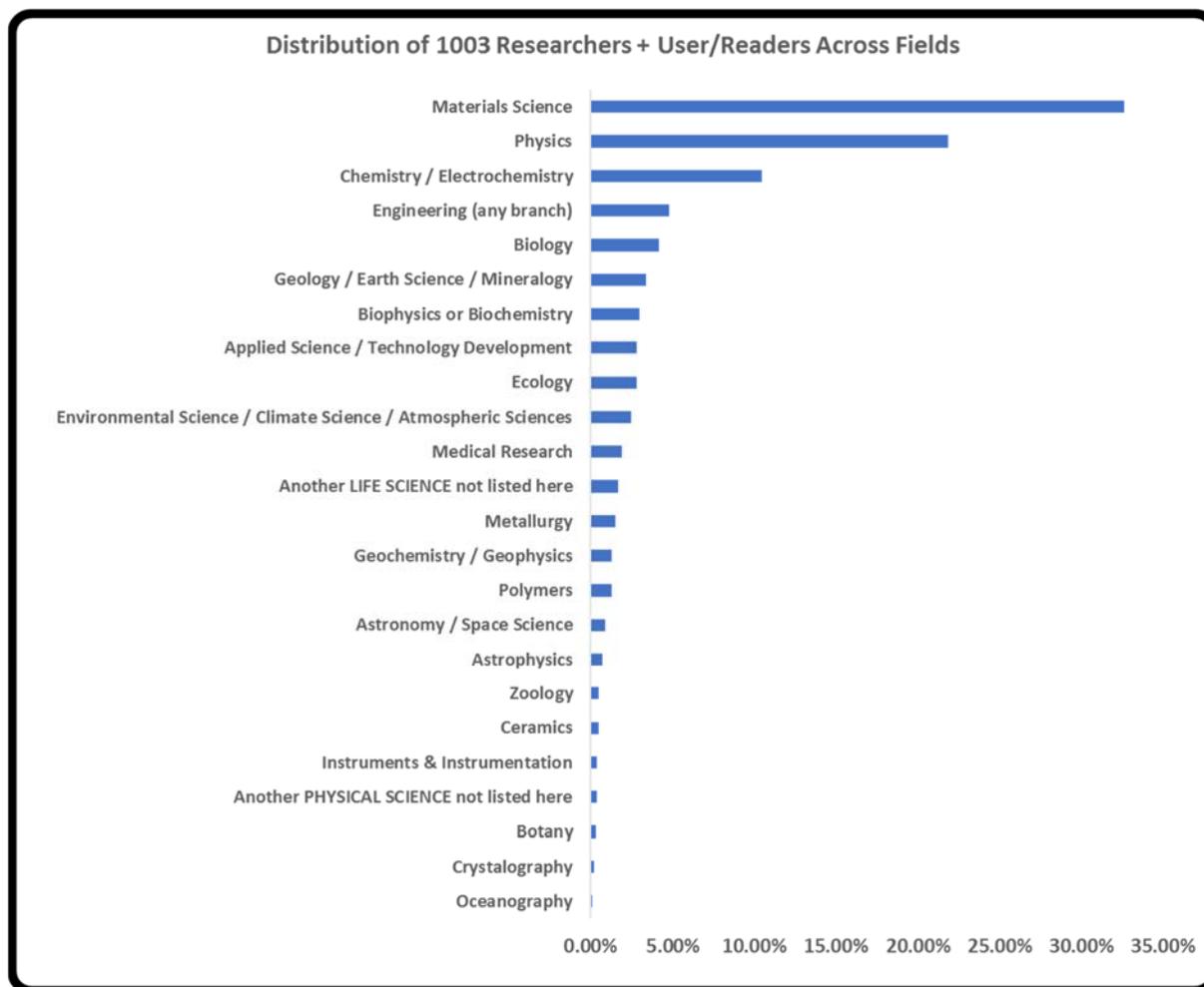
CAVEATS: The variability of leadership response to our requests and the fully justified protections, of uneven effectiveness, instituted by many organizations against mass emailing imposed substantial variability on our sampled population. The clearest bias this circumstance introduced favored responses from university personnel located in North America, Europe, and to a lesser extent Asia. Drastically reduced were responses from corporate and government personnel. Also, notwithstanding it being the accepted language of science, the Survey and its announcements being exclusively in English may have discouraged some respondents whose mother tongue is not English. Of course, adding to this Survey-specific variability, is the generic selection bias that affects all surveys – i.e., only those respond who (a) tend in general to respond to surveys of any kind and (b) find the topic of the Survey sufficiently aligned with their own interests. Speaking to the latter criterion, perhaps the greatest limitation to our Survey's sample is a recognition of personal relevance by recipients or lack thereof when encountering an announcement from the IUMRS and the materials-research-centric appearance that conveys. The preponderance of research fields of respondents revealed by question #3 (RESEARCHERS) and #22 (READERS/USERS) seems to confirm this bias where physics, chemistry and materials science are most favored.

Respondent demographics and behavior: From Survey inception to its close on 31 August 2019, **1435** unique visits to the Survey web site occurred. Those visitors are considered respondents because they began to answer Survey questions after presumably reading introductory text on the landing page. Visitors who browsed to the first page, but left without beginning the Survey, were not counted. If the 341 respondents who entered as RESEARCHER/AUTHORS and continued as READER/USERS are credited separately for each role, then the total number of respondents more accurately equals **1776**. Some respondents skipped those questions for which a response was optional, and several failed to reach the final question and formally exit the site. We estimate the completion percentage at 77%, but those who did not reach the final question still supplied useful opinions and data within their respective roles. On reviewing

the points at which respondents prematurely left the Survey, it became apparent that our allocation of questions to successive web pages unfortunately caused some respondents erroneously to think that the last question on a page was the last question of the Survey.

The following summary data illustrate the demographics of 1435 unique respondents. The regional distribution is also evident from the geolocation map on page 5 above where each unique IP address of Survey visitors is plotted.





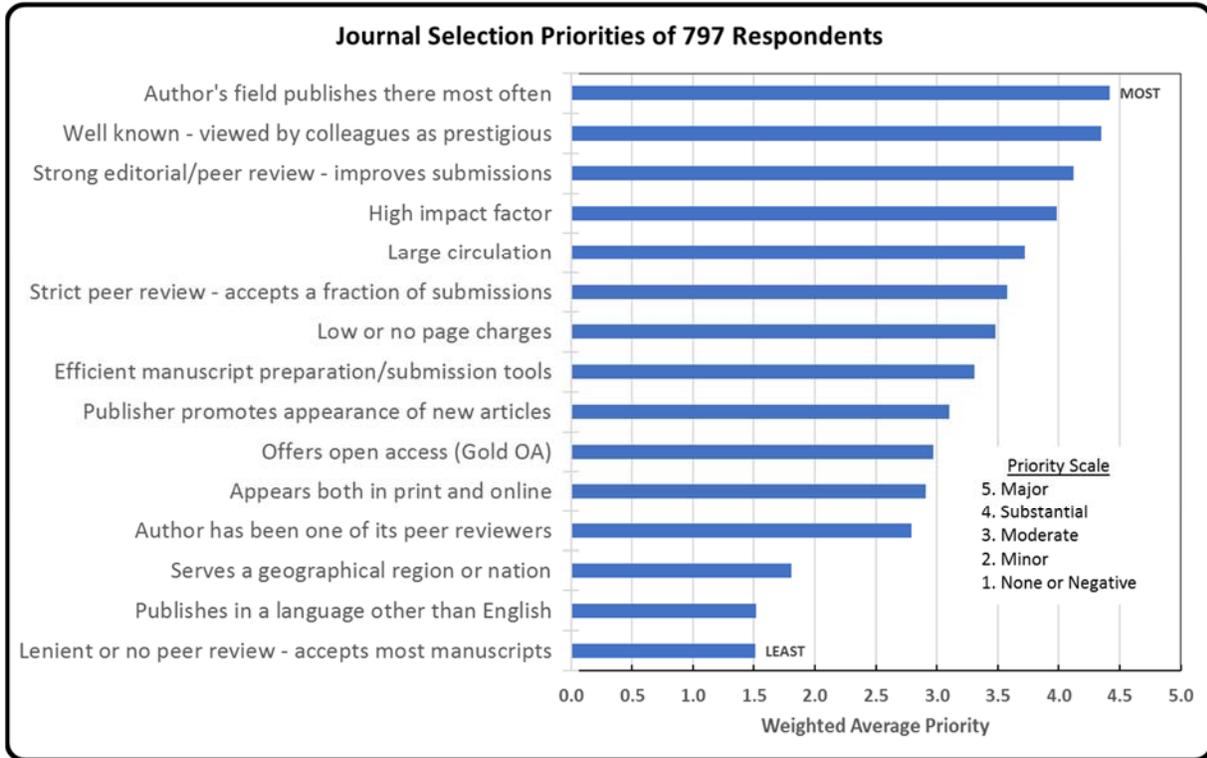
Analysis: It is clear from the demographics above that summary data will be dominated by RESEARCHER/AUTHORS and READER/USERS from Europe, North America and Asia who are in the fields of materials science, physics and chemistry. The number of respondents within that broad swath implies a margin of error⁵ of $\sim\pm 3.4\%$ for summary data relevant to the two most popular roles. The opportunity also exists to parse those responses according to field of study or geographical region while maintaining respectable statistical relevance. However, for several less popular roles, we must accept margins of error of $\sim\pm 10\%$ which borders on the anecdotal. The least populated roles cannot even reach that level and will be discarded, except for retention of narrative comments when judged by the editors to be particularly insightful. The following *Findings* sections present summary data and associated commentary organized according to respondent role. Where significant distinctions are observed based on a more refined categorization, such as by region or field of study, they are included.

⁵ The MOE is approximated here for a 99% confidence level and a simple $1/\sqrt{N}$ dependence on sample size.

FINDINGS

Researcher/Authors

Choosing a Journal

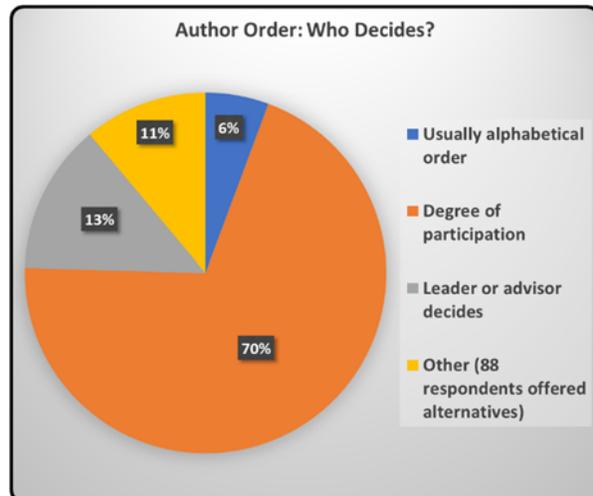
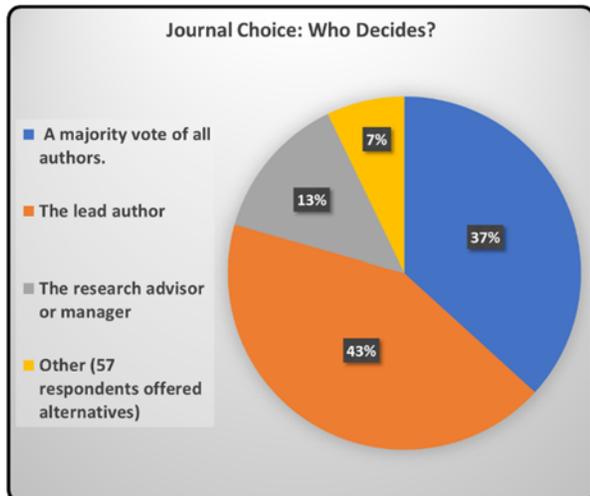


Predictably, author respondents strongly favor well known journals in their own field that apply strict standards. Cost and ease of submission are among other influential factors, but are not necessarily determinative.

Who Makes the Journal Choice?

What About Name-order in the Byline?

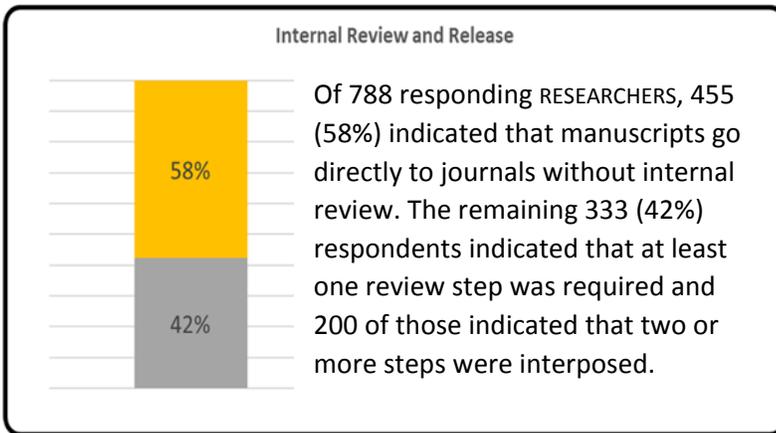
Intra-author relationships may be bound by long-standing traditions, a hierarchical organizational structure, and often affect working protocols and the general atmosphere within which researchers work. We asked our 797 author respondents how their journal selections and bylines are decided.



Interesting to see that whereas the author order is more often than not up to the researcher who has participated the most, that author may nearly as often defer to a more democratic path when it comes to journal choice.

Intervening Steps between Author and Journal

Somewhat relevant to what makes it into the open literature is the possibility of an intermediate vetting step interposed between author and journal. Our initial assumption was that when an article's content included proprietary or classified information, or when the host institution is corporate or governmental as opposed to academic, restrictions would apply. Our data says that among our respondents, less interdiction occurs than might have been expected.



REASONS FOR REVIEW/DELAY:

- Review for proprietary information
- Review for classified information
- Withhold until patent application is filed
- Subject to internal copy editing

It must be pointed out that bias in our sample likely affects, perhaps strongly, this result. Access to and responsiveness of corporate and government organizations being less successful than for academic institutions, those entities where proprietary or classified content is likely are underrepresented.

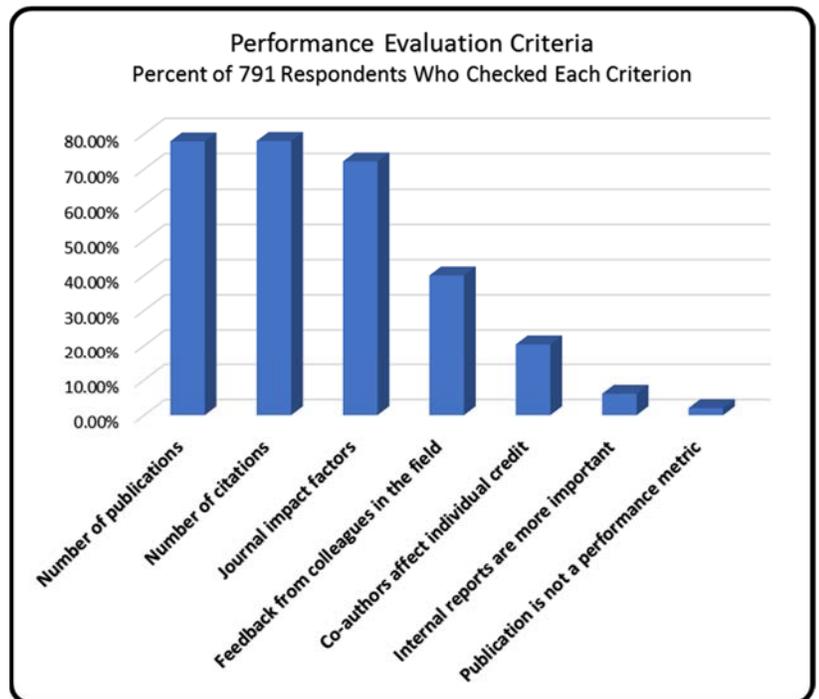
Career Impact

Beyond informing the scientific community of one's research results, there is a collateral motivation to publish.

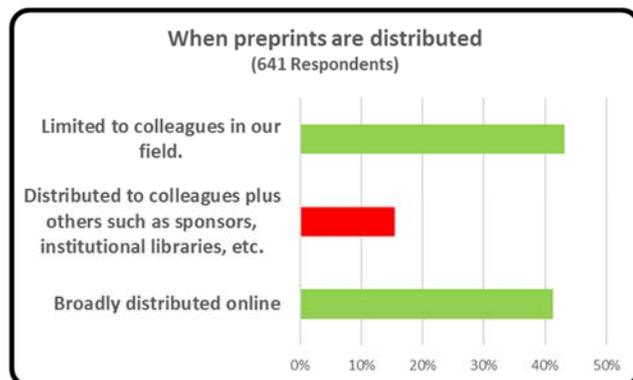
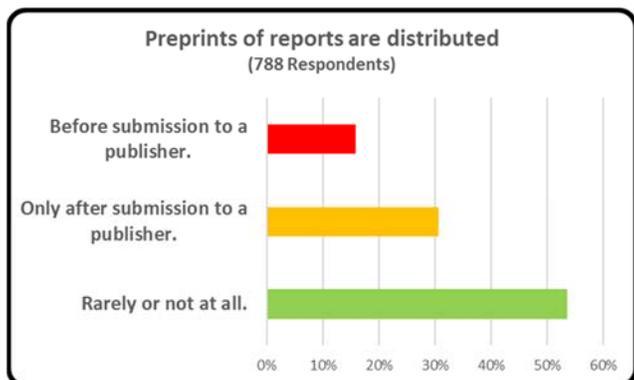
Most of 791 respondents indicated that more than one criterion is applied at their institution when their performance as a productive researcher is evaluated.

These data confirm the continuing relevance of the clichéd "publish or perish" admonition.

Even though this Survey is anonymous, we refrained from asking about such questionable behaviors as unnecessary serial publication, assuming that forthright responses would not be forthcoming.

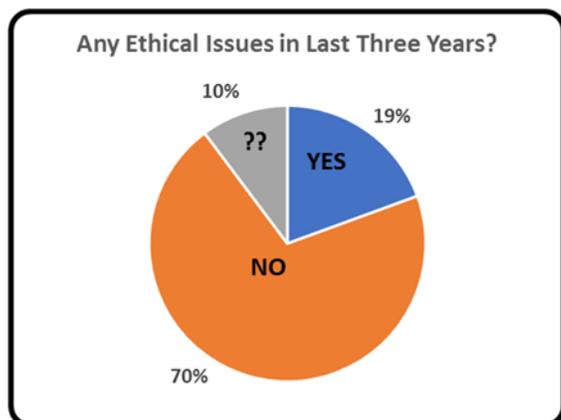


Preprints



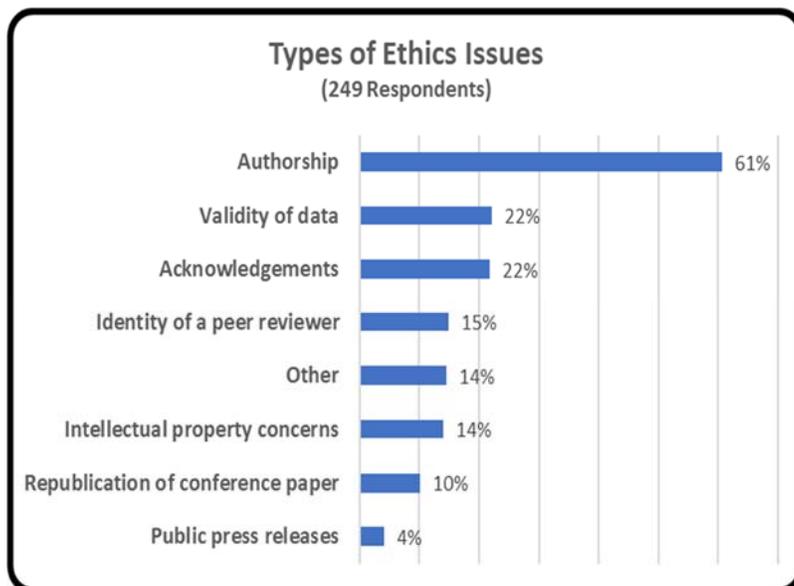
Distribution of preprints had been a common practice for many years, whether as near-final or final versions of a manuscript or as quite preliminary versions – but in all cases, versions that had not yet undergone an external peer review. Today, according to our Survey, distribution is rare for slightly over half of our respondents. The majority of those who do distribute them wait until the manuscript has been submitted to a publisher. Then, for those who do distribute them, there is apparently a rather evenly divided philosophy concern to whom they should be sent. One group limits them to researchers in their own field, whereas the other group prefers wide distribution, taking advantage of today’s online resources such as arXiv, Google Scholar, etc.

Ethics



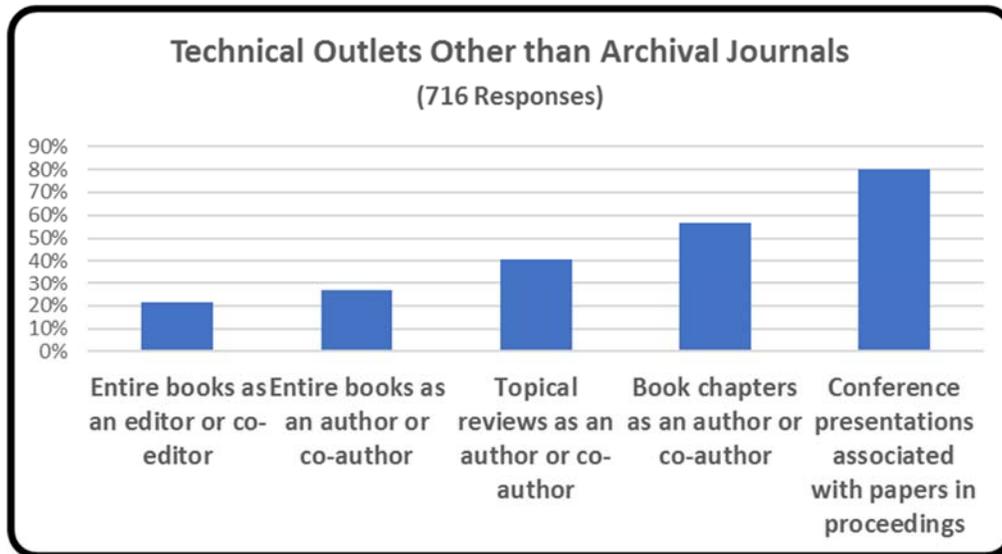
It is reassuring to know that about 70% of 783 respondents have not encountered ethical issues with respect to their publications. Another 10% are unsure – not a large fraction, but it may indicate that education as to what constitutes an ethical issue is not universal. Survey questions did not distinguish between internal matters such as authorship claims and more serious externally relevant ones such as data fabrication.

The number of responses to the right (249) exceeds the 19% who said yes above (152). Some who were unsure have apparently nevertheless added their observations to the list of possible transgressions. Just under two-thirds of replies refer to authorship issues. Beyond the order of author names in a byline as discussed above, whether an individual should or should not be considered an author can become a contentious matter. Plagiarism and violations of nondisclosure agreements were among the “other” 14% of replies.

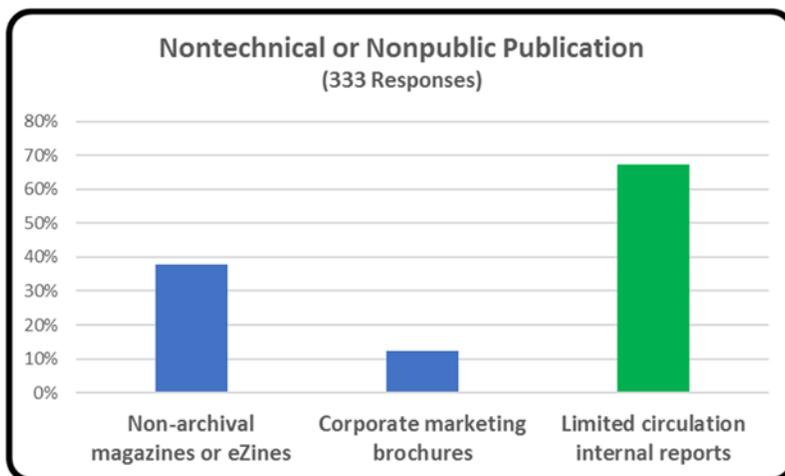


Other Media – Beyond Archival Journals

The typical researcher, especially a more senior one, often contributes through outlets other than the many archival journals available in his or her particular field. Below are data reflecting how frequent is contribution to some alternative channels. These are components of the technical literature, normally not accessible to the broader public.

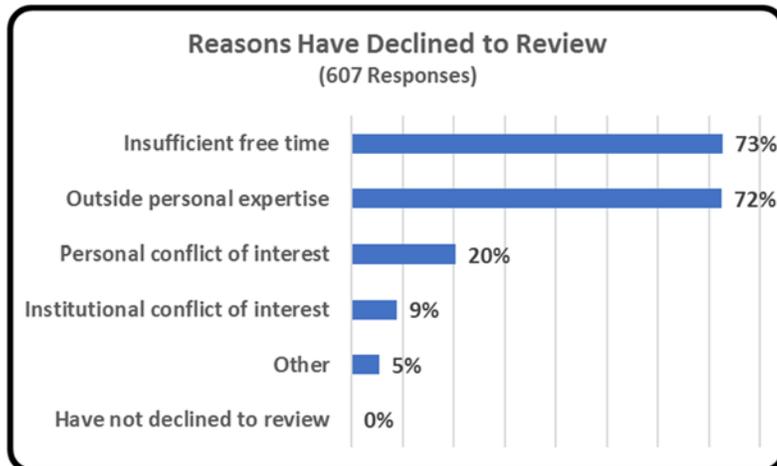
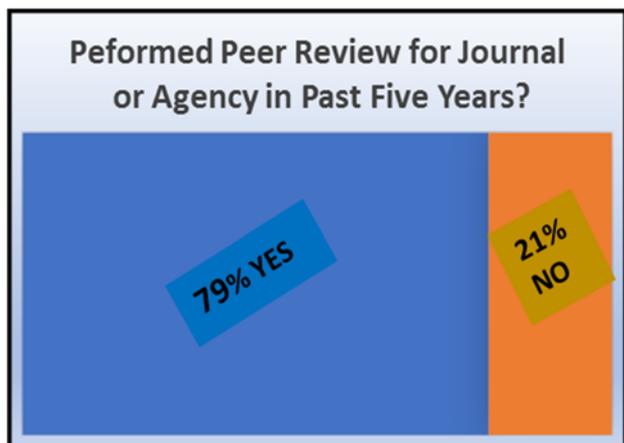


Whereas open access to published reports and underlying data remain relatively inaccessible to the general nontechnical public, semi-technical and nontechnical outlets do reach that population. Scientists are often encouraged to contribute there in order to raise public awareness and one hopes, favorable impressions concerning the R&D their tax dollars support.

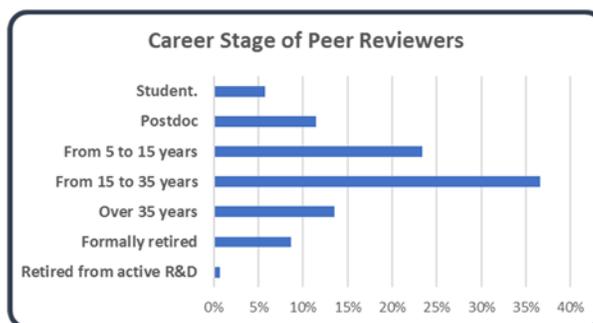
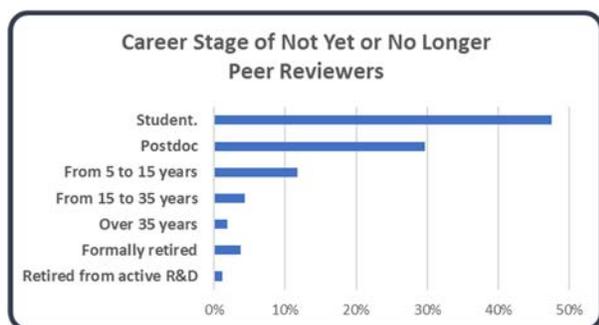


Fewer than half of RESEARCHER respondents indicated any nontechnical publication, and those who did emphasized reports internal to their own organization. Given that in our sample, corporate and government laboratories are underrepresented, the dominance of that channel is likely understated. Concomitantly, at least within a $\sim\pm 6\%$ margin of error, we see less than 40% of our sample contributes to the more publicly accessible domain.

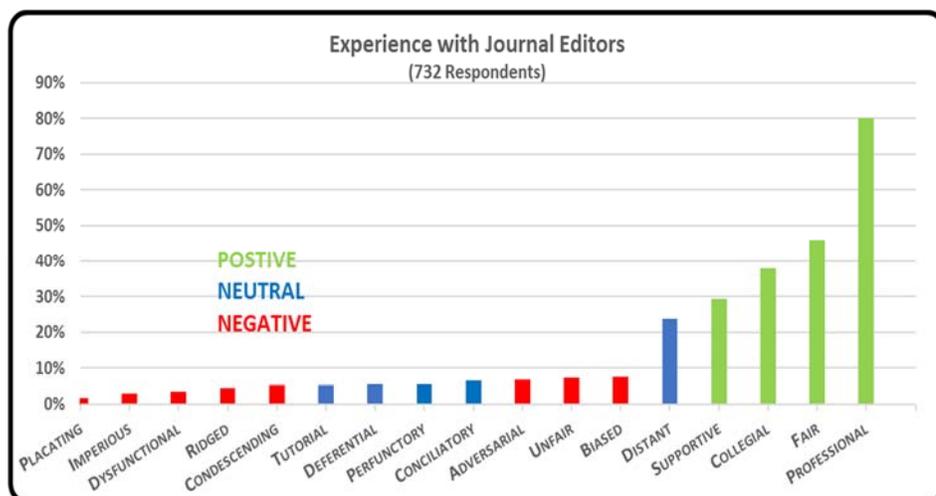
Peer Review Duties



Of 775 replies, nearly 80% indicate that they have performed one or more peer reviews for either a journal or a funding agency within the past five years (above left). This shows a welcome contribution of personal expertise to the publishing enterprise, providing intermediation that maintains the quality of the open literature. Comparing the career stage of those who answered *yes* to those who answered *no* (see below), we see that mid-career reviewers dominate while students and postdocs have for the most part not yet been invited as reviewers. It is also reassuring that review requests are often declined for good reason (above right), another factor that contributes to the integrity of the process.



Editors



Journal editors are the interface between author and publisher. They ensure submissions fall within the intended topical scope of their journal, manage the manuscript review process, mediate any and all debates between principals, and make final acceptance/rejection decisions. Below is a summary of how 732 of our respondents “feel” about their relationship with editors with whom they have interacted.

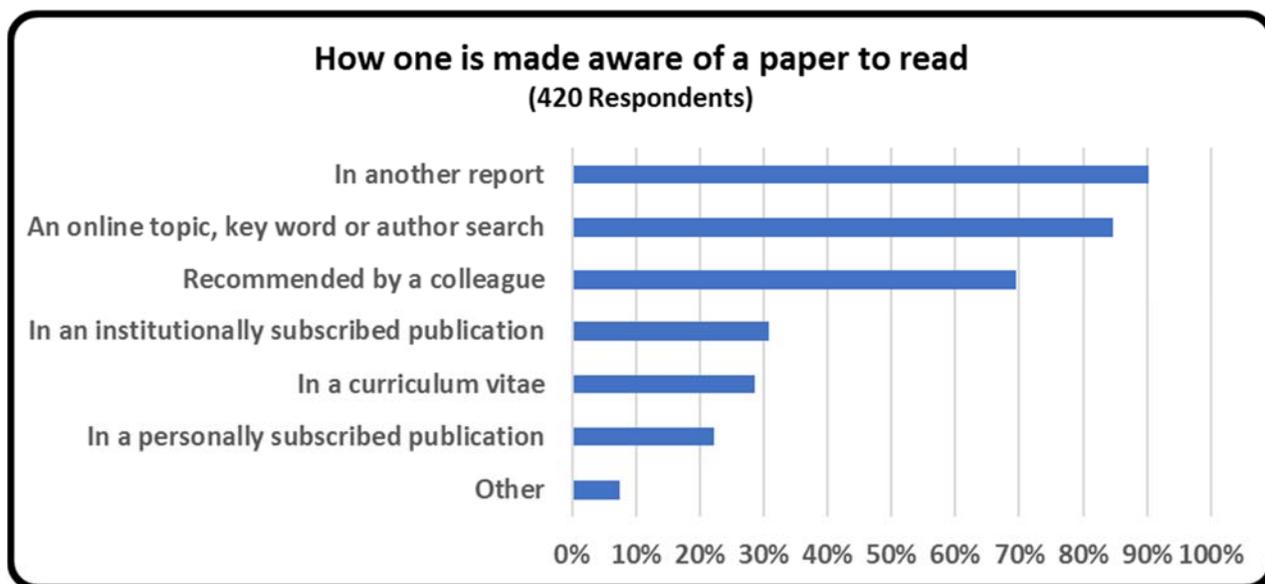
The preponderance of feelings is positive. Examination of how this may vary with career stage (not shown), indicated that the early career researchers have slightly more negative experiences.

Readers of the Literature

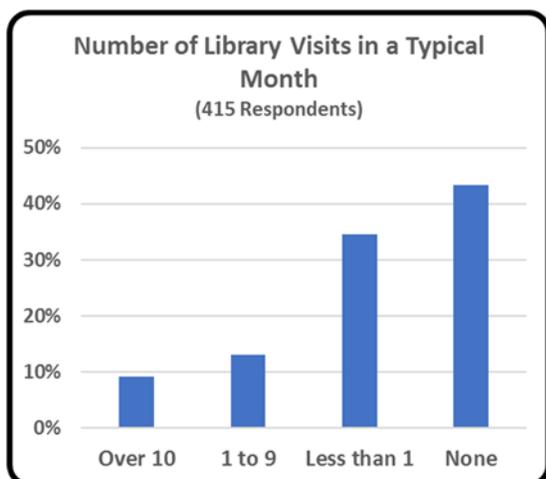
Of course, researchers are readers of the literature too. One set of Survey questions was devoted to accessing the literature. Those who entered the Survey as RESEARCHERS were offered the option to continue answering questions as READERS. 45% or 341 RESEARCHERS took advantage of that opportunity, bringing the total number of READER respondents to about 440. The three-quarters of the self-identified fields of READER respondents were physics, chemistry, or materials science. Over half of those who initially self-identified as READERS were students. Thus at ~20%, students are somewhat overrepresented in the READER sample compared to ~16% among the RESEARCHERS.

Identifying papers to read:

The first question to ask is “How does one find and decide to read a paper?” The data clearly reveal that paid subscriptions play a lesser role than online searches, recommendations of colleagues, and the knock-on effect of citations in reports already being read.



Where do libraries fit into this picture?



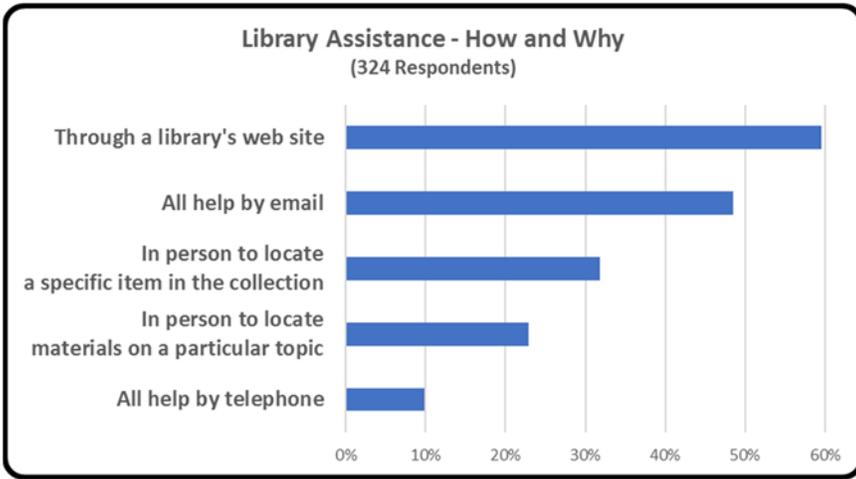
Do you routinely visit a library to browse recent publications with no specific report in mind?

(417 Responses)

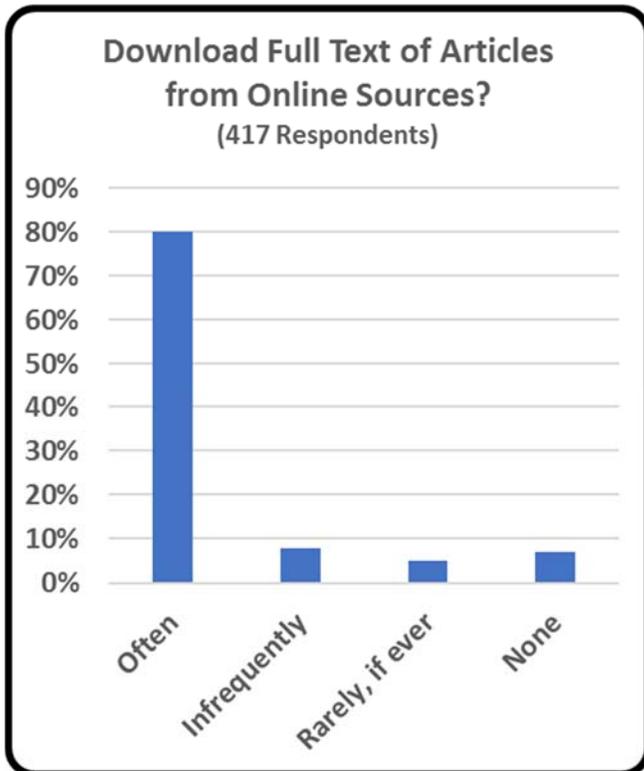
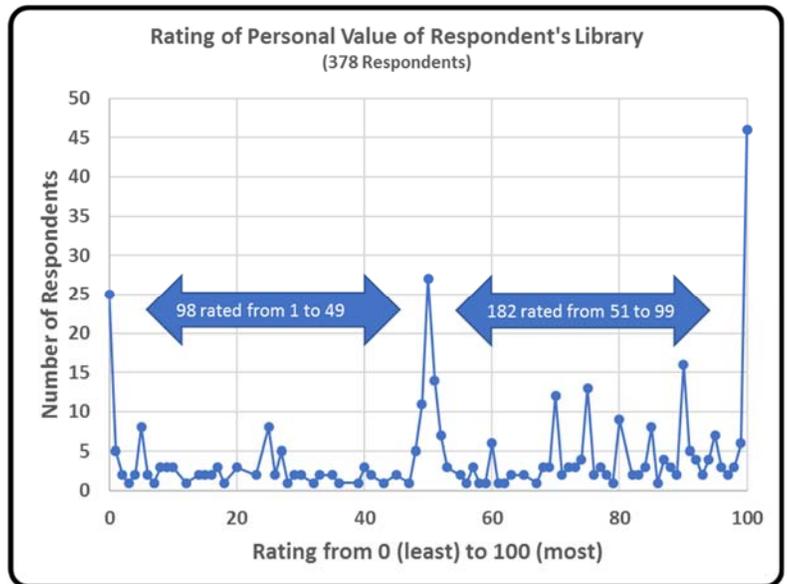


Very few (~110) Survey respondents self-identified as LIBRARIANS. We describe their data in a later section. However, our READER respondents provided some insight into the status and one might say plight of our libraries today. One sees here that physical libraries are significantly underutilized when it comes to in-person visits for both specific needs and for general enlightenment.

However, the expertise and the collections of the libraries do not go unused. On the contrary, more than supplementing in-person visits, they are now largely supplanted by remote communication, in particular by email and web-site tools.



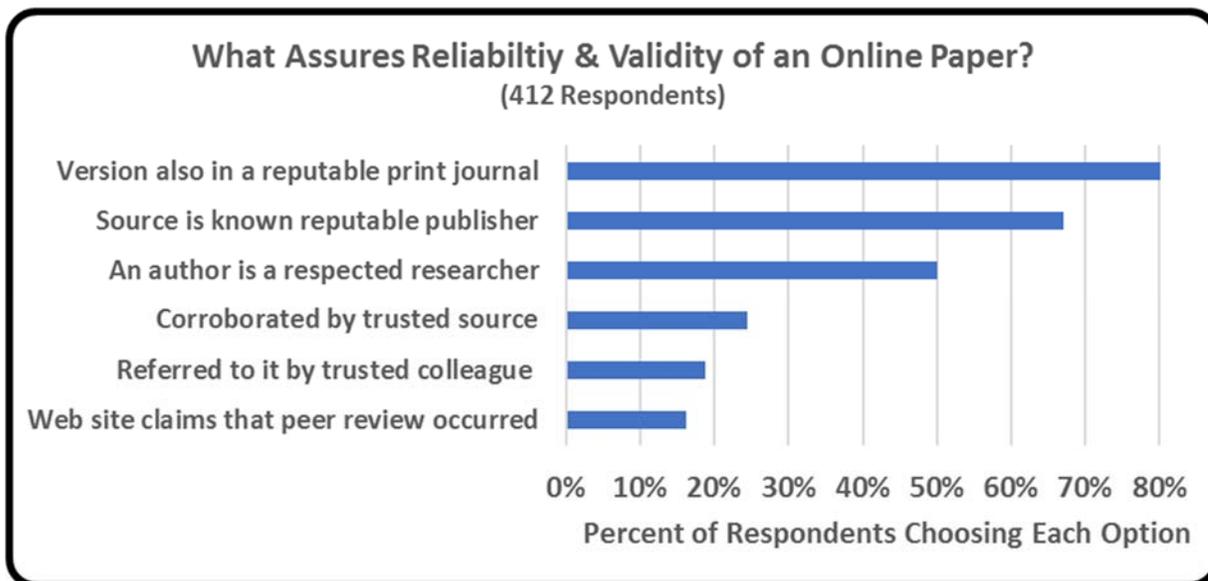
Despite the transition to more remote access algorithms, libraries are still highly regarded by their customers. Not only do twice as many Survey respondents rate their library at 100 as opposed to zero, but that factor of two also applies to other ratings between the midpoint and the maximum as against those between the midpoint and the minimum.



Strongly confirming the trend to digital alternatives are the 80% of respondents who tell us that they often obtain published articles by downloading from the several online services where publications are archived. An advance editorial prejudice moved us to check the career-stage demographics of those who do or do not tend to download papers. Fully expecting to see a trend of greater use of electronic means toward younger respondents, we found no such correlation. The career-stage profile was found to be independent of electronic medium proclivities in this case.

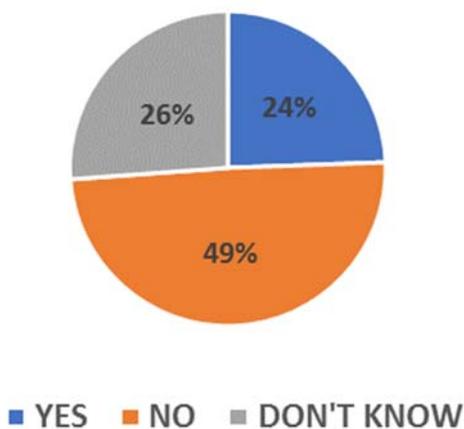
Can the literature be trusted?

Beyond egregious ethical issues such as data fabrication and plagiarism which are thankfully relatively rare, there are less serious but still crucial matters of completeness and accuracy of a publication’s quoted data, the methods of data acquisition, an author’s interpretation of results, suitability of assumptions and approximations, validity of conclusions and speculations, and finally, the completeness of citations to relevant work of others. Past standard practice has relied on peer review by experts in the field of the publication to ensure integrity of the process.



From the above data, we see that journal, publisher and author reputations remain the most cited sources of confidence in a publication’s validity. The notion has been put forward that articles might be published first and only then be subjected to peer review, not by a few select experts but by readers at large. Below we see that only one-quarter of our respondents favor that approach.

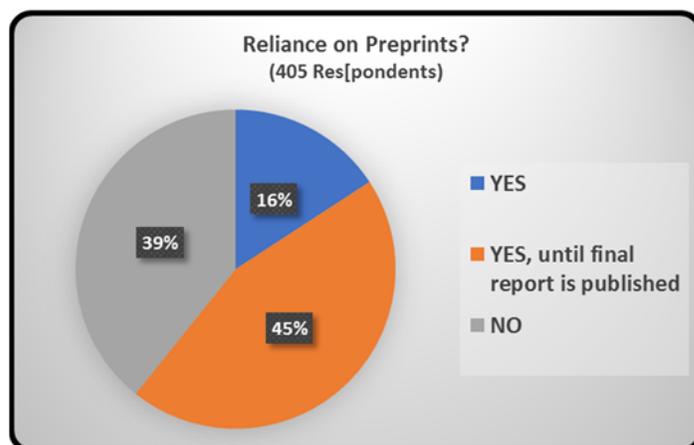
Post-publication Peer Review?
(409 Respondents)



Data Access

With access to the underlying data (whether experimental or simulated) expert readers have an additional avenue toward added confidence in a paper’s methods and conclusions. Also, researchers can more easily pursue independent duplication of results when called for. Of 410 respondents, about 45% tell us that they have accessed raw data archived separately from the corresponding research report.

Above, we asked RESEARCHERS about their preprint distribution polices. Are preprints valuable to READERS as a way of bypassing, at least at first, the formally published literature? An early alert to the results of others, especially at the leading edge of a competitive field, may allow avoidance of unproductive lines of investigation and redirection to *where the action is*. Over 60% of respondents indicated that they do rely on preprints, at least until a final version of a paper is published.



Translation

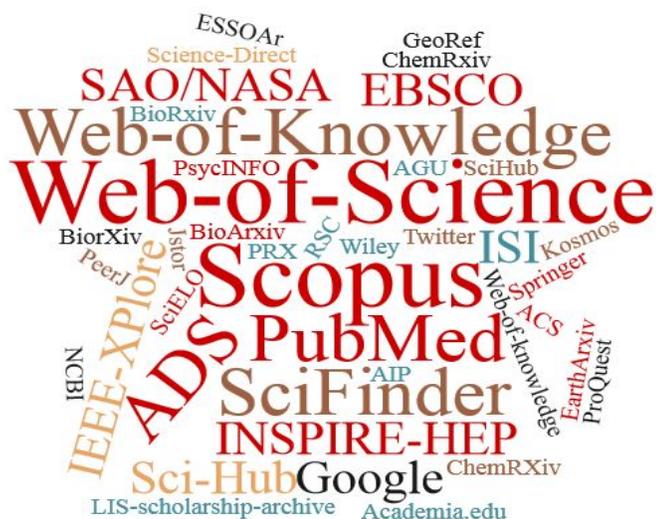
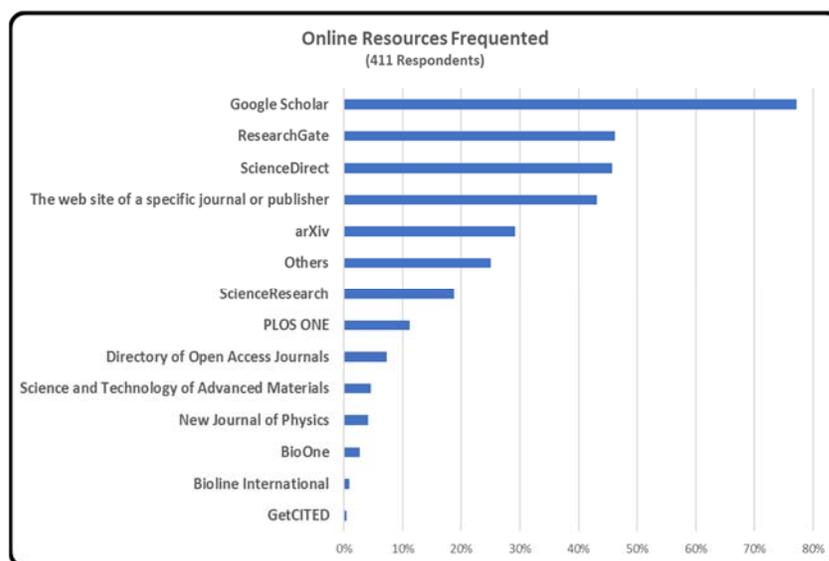
English is the language of science still today. Survey visitors in the READER/USER role were asked:

Within the past five years, have you paid to have an article translated from one language to another?

94% of 412 respondents answered in the negative.

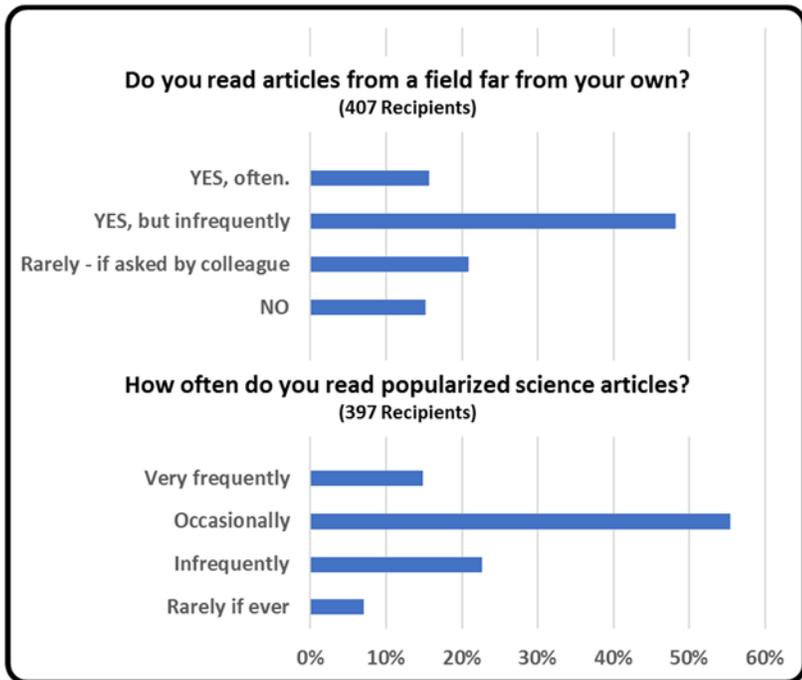
In a related section of the Survey below, educators are asked about instruction in English versus the local language -- clearly relevant to the need for translation or lack thereof.

Below, results of READERS being asked about their online sources are shown. The explicit list offered to them was by no means exhaustive. Also, the bias in our sample against the life sciences clearly affected which sources on the list are favored.



Of 411 respondents, 103 selected the “others” option in addition to any other source they may have checked. At the left are the terms READERS provided under the “others” response.

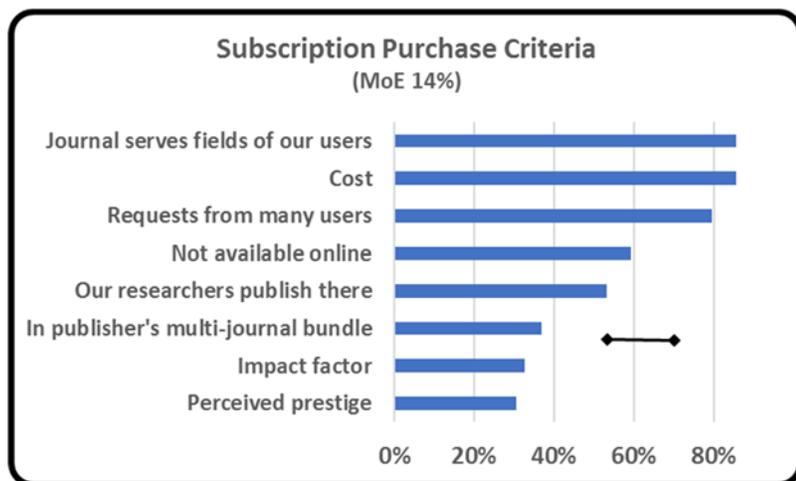
Above we asked READERS if they visited libraries just to browse. We also asked RESEARCHERS if they contributed to nontechnical outlets. Here we return to our interest in the extent to which our respondents go on excursions out of their comfort zones to fields far from their own or away from the purely technical literature itself.



We note the interesting similarity of the bar patterns in the two graphs at the left. Apparently, our READERS have the same percentage propensities to stray far from their fields within the scientific literature as they do to visit the lay public’s magazines and other similar media.

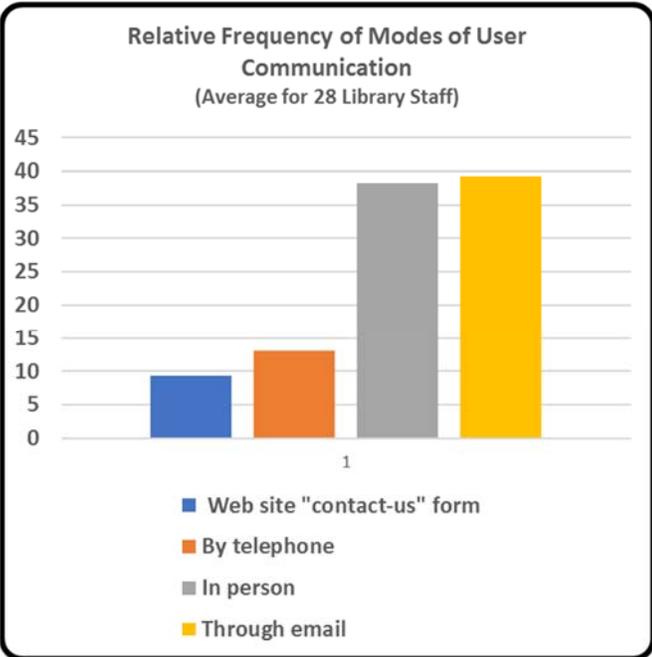
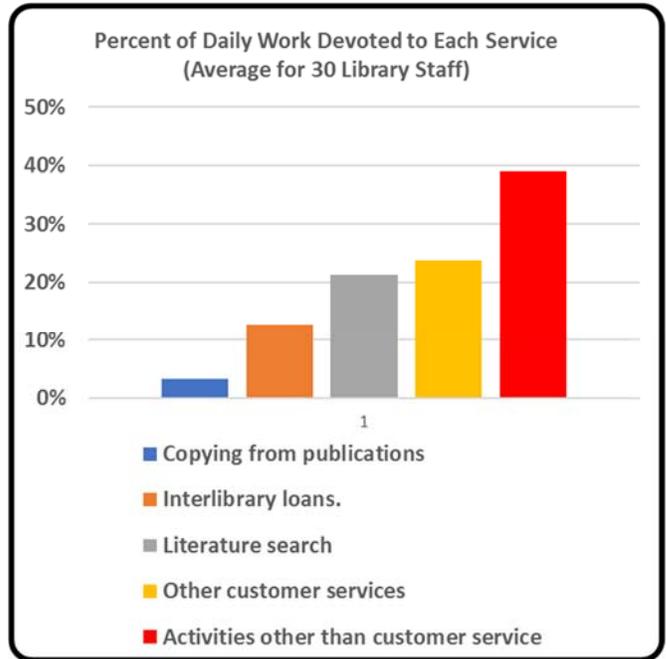
At the Library

Of the 73 unique LIBRARIAN respondents, 66 work at university libraries. All 73 subscribe to online resources through which their users can search for publications. As many as 76% of their libraries offer microfiche records, but half of those limit them to newspapers, magazines, and the like. While 46% offer scientific publications on CD/DVD, only 10% will provide translation services to their users. Additionally, the 49 LIBRARIANS who choose to respond further, indicated that all had catalogues accessible at their web sites, 88% had physical reference sections for encyclopedia and book series, and 65% offered a pre-binding new journal-issue section. Within the university environment, it appears that, within our $\sim\pm 13\%$ margin of error, we can say that libraries continue to offer reasonably robust services.



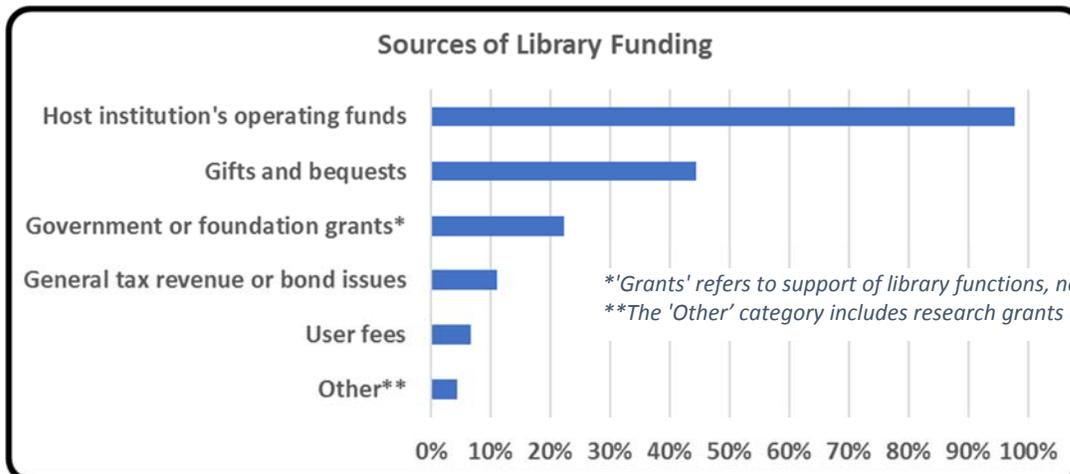
Library budgets are increasingly tight. Difficult decisions on purchase and retention of journal subscriptions (and book purchases) frequently must be made. Our respondents have indicated their priorities for such decisions. Overlap of content with library users’ fields and cost are of greatest sway followed closely by explicit requests from the institution’s users.

In order to obtain a more detailed internal view of typical library operations today, we asked respondents to estimate the time spent performing a few service activities relevant to user experience. The data from our respondents indicate that about 60% of the daily work load is devoted to direct customer service. The inquiry was not sufficiently granular to capture the full spectrum of services provided. Note the ~23.7% that was not adequately characterized.

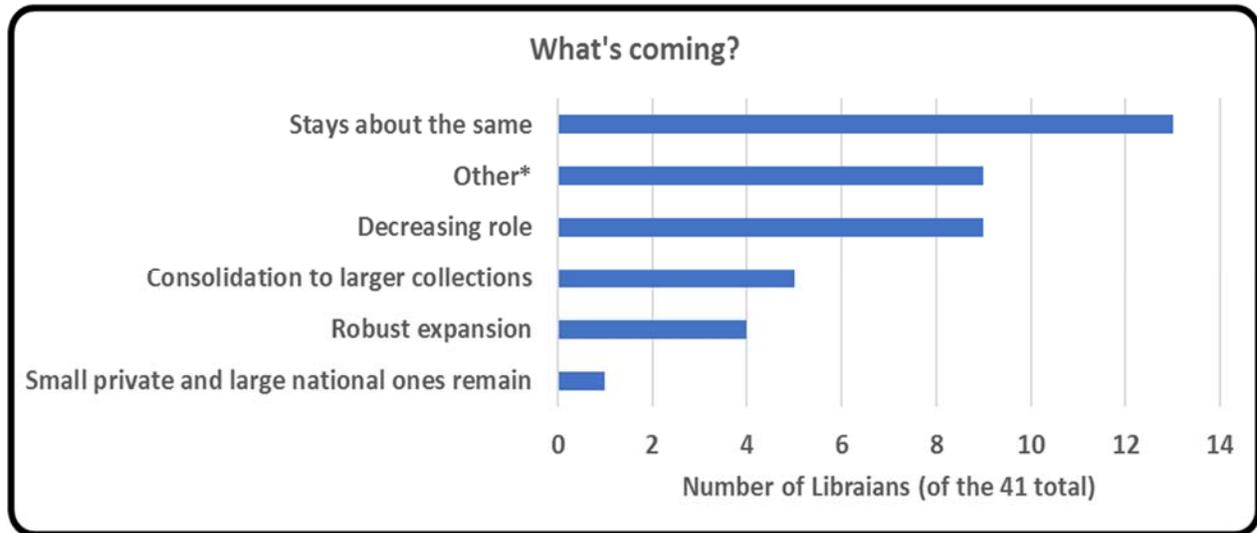


We also inquired about the favored modes of user communication with library staff. The data tell us that email and in-person visits dominate from the perspective of the staff. The question remains open as to why frequent in-person visits are experienced by staff while reader respondents have indicated a quite low rate of in-person visits. One hypothesis may be that in-person visits take more staff time and the interactions are more memorable, whereas most staff do not field inquiries via the web site or telephone.

Given the financial stress that seems to be endemic to libraries in general, the Survey asked 45 LIBRARIAN respondents to identify their revenue sources categorically. Note that the percentages below refer to the number of libraries indicating that they receive such support, not to the amount of funding received or the fraction of budgets that the monies represent.



The Survey asked 41 LIBRARIAN respondents the following vision question: “In the context of the rapid evolution of digital technologies, electronic media, and the Internet, what future for the physical library, as a repository for the scientific literature, do you envision?”



Three comments left for us under the ‘other’ option deserve to be repeated here [with minor edits for clarity]. They summarize a quite positive view of the future, if not for the physical collection, at least for the physical space and the interactions with a community of students and researchers.

Learning environments will offer students and faculty [space] to experiment, develop, practice, with guidance available to become self-directed and independent.

The physical collection might shrink, but the location is more than just the physical collection. The need for the library as a place will remain about the same, but the way the space is utilized will change.

Libraries haven't been 'repositories' for years. We are gateways. Librarians are not gatekeepers; we are guides. It will be a few generations before physical material completely go away, even then, libraries will still be needed to curate and provide access to online content. It is way too expensive for a researcher to purchase everything they need.

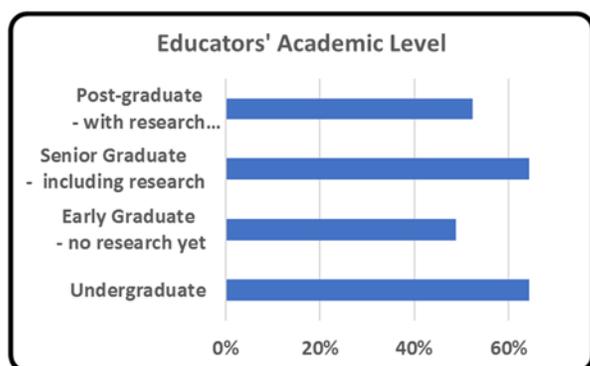
Archives Online

Too few (20) respondents identified themselves as ARCHIVISTS to justify a full exposition augmented with graphics. However, as anecdotes from experts rather than statistically validated reflections from a large group, many observations deserve to be mentioned here. Several visitors were affiliated with academic databases and search engines for published papers from multiple sources -- others with open access repositories that accept original articles for online publication. Still others represented an archive for a single journal, an open access service for both published and unpublished reports, and a service that facilitates access to several databases, none of which are their own. Most provide open access to their own content or to other open access sites and found that open access is not problematic for them. For the most part, these services’ operations are financially supported by larger parent firms in which they are embedded.

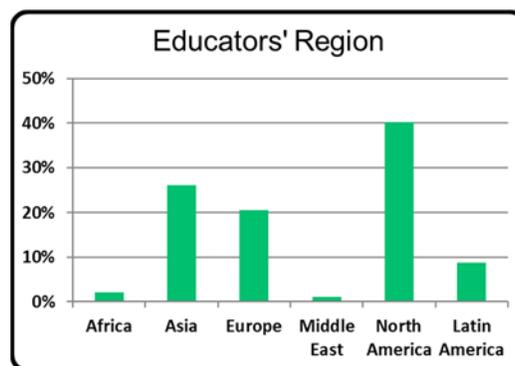
We encountered an interesting spectrum of concern about the validity of content. On the one hand, most respondents said that they only provide access to publications that have been peer reviewed at their source. Several others said that they inform the user whether or not each item has been validated in some way. On the other hand, some said they only make a “best effort,” or that it’s a “buyer beware” situation, or perhaps worst, that users must agree to a disclaimer that holds them harmless.

All archive represented permit free abstract downloads and most permit free full text downloads. Two thirds of the archives, however, do not provide a way for users to extract an excerpt from a longer document. Half of them do provide data curation applied to their content, while the other half rely on the curation done by sources to which they refer their users. Also, roughly half *yes* and half *no* were the responses concerning archiving data that underly the publications they maintain.

Educators



Our 84 EDUCATOR respondents worked at several academic levels, most at more than one, and worked in three principal geographical regions.



When asked if the majority of students arrive with writing and speaking skills consistent with their academic level, 57% said *yes*, and the remainder said *no*. The natural follow-on question as to whether remedial instruction is offered to those whose skills are initially deficient was answered *yes* by 67% of respondents. At a roughly similar level, 65% reveal that their institution does offer one or more courses that include explicit training in communication of technical information, e.g., as part of a professional development curriculum. This level rises to 90% with regard to providing editorial guidance and oversight to students and early-career colleagues who are writing their own reports or preparing presentation materials. Asked in a somewhat narrower sense about their own publications’ junior co-authors, 96% said that they use that opportunity to coach in report preparation.

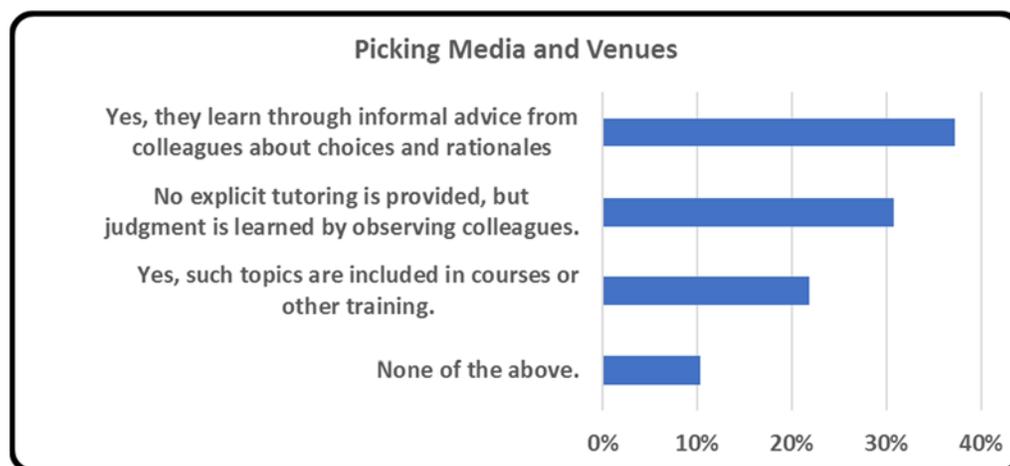
To the more general question about which learning paths are effective for developing communication skills in scientific fields, each of the 78 respondents selected (on average) no less than three of the options presented.

<i>Basic language courses in the lower grades</i>	54%
<i>Advanced courses in language and literature outside of the technical curriculum</i>	46%
<i>Courses devoted to general communication skills and techniques</i>	55%
<i>Formal training focused specifically on writing and presentation skills for scientific publishing and conference presentations</i>	65%
<i>On-the-job trial-and-error experience without formal training</i>	37%
<i>Observing and emulating more experienced senior colleagues</i>	49%

English has been the dominant language of science. For a great many researchers whose native language is not English, this presents an additional hurdle in writing and reading technical papers and understanding and delivering talks at conferences. Several situations are prevalent, as our respondents shown below.

<i>In an English-speaking region.</i>	<i>No special accommodation is provided for students or junior researchers whose native language is other than English.</i>	19%
	<i>To the extent that students or junior researchers whose native language is other than English arrive without adequate fluency in English, language proficiency support is made available.</i>	32%
<i>In a non-English-speaking region.</i>	<i>Students and junior researchers who have been studying science tend to arrive with some proficiency in English. Formal instruction in most science courses is given in English.</i>	21%
	<i>Students and junior researchers tend to arrive without proficiency in English. English language courses are offered and formal instruction in some but not all science courses is given in English.</i>	13%
	<i>All science instruction is in our local language. Students and junior researchers may add English language tutoring or full courses to their curriculum, if they so choose.</i>	14%
	<i>Other[§]</i>	1%

§ One EDUCATOR offered the following comment: *Ours is a multi-lingual society, but the language of instruction is English. Students are often able to communicate verbally with ease, but their knowledge of formal language structures is often minimal, and they struggle to write grammatically acceptable formal English. Hardly any of them reads for pleasure in any language - and social media mean that they read even less, except for papers needed for their studies.*



Beyond language itself, and beyond formal training, it appears from data at the left that an apprentice-style relationship is what often tutors junior authors on how to pick a journal or a conference.

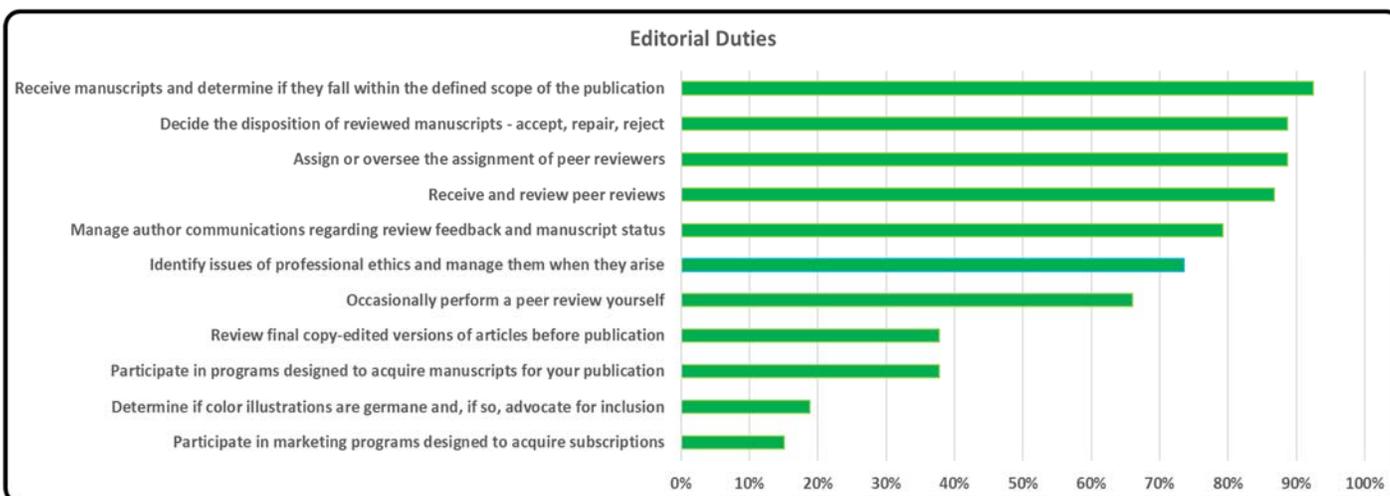
Editors

Our 55 EDITOR respondents are primarily either practicing researchers or educators who have been appointed as editor of a journal by its publisher (60%) or in-house employees of a publisher that produces both print and online journals and/or books (27%).

We have a distribution of publisher types represented by these EDITORS.

A commercial publisher.	33%
A professional or learned society or academy with individual members.	30%
A not-for-profit institute, union, or consortium of professional or learned societies.	24%
A university press.	11%

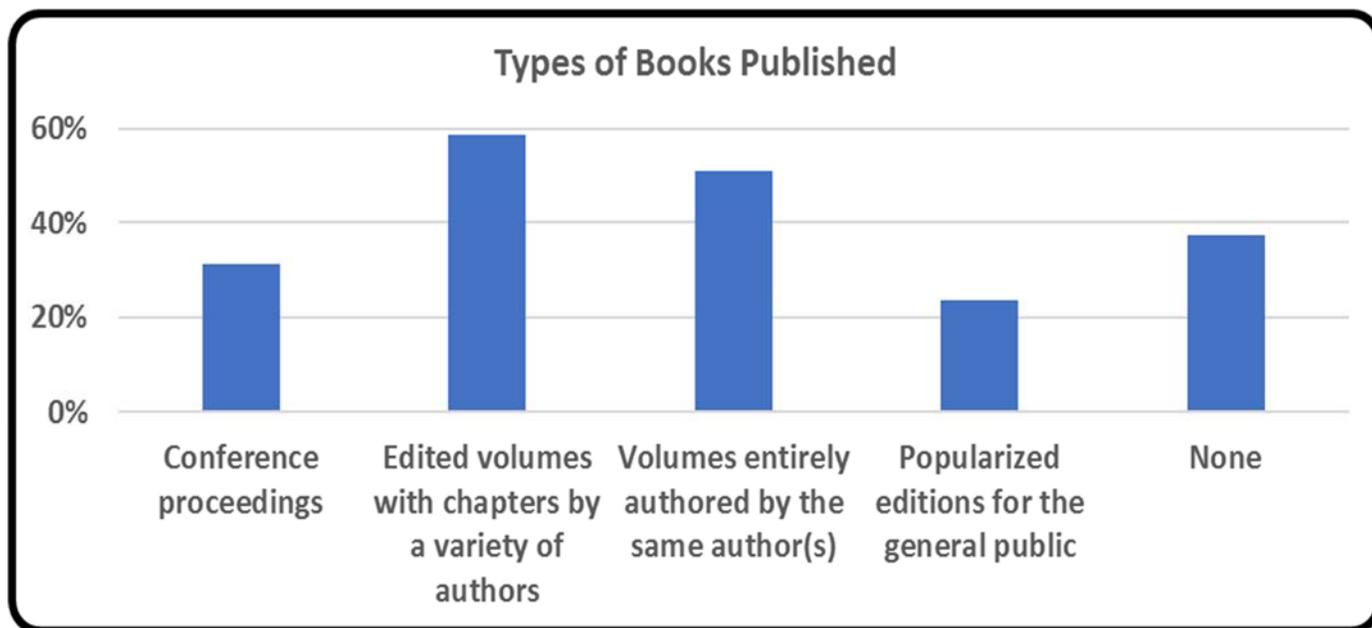
The tasks performed by editors are myriad. The typical editor in our sample checked, on average, between 6 and 7 of the chores listed. No doubt some checked them all.



When asked if they believed that broad distribution of preprints prior to peer review and publication is a net positive or negative, half of our EDITOR sample said positive and half said negative. With regard to whether conference proceedings should be subject to the same peer review standards as archival journals are, 62% said *yes* and 38% said *no*. An overwhelming majority (84%) do not permit serial publication of results that could easily be covered in one article. A similar number (85%) ensure that adequate keywords accompany a manuscript in order to guarantee success of future topical searches. Finally, inclusion of advertising in their publications as a way to defray publication costs was only the case for 29% of respondents. A result consistent with a view that scholarly publications ought to avoid commercial content.

Publishers

PUBLISHER respondents (54) primarily come from commercial houses (15%), professional societies (50%), university presses (19%) and other nonprofits (11%). 80% publish archival journals for scientific research reports.



Most of the houses represented in our PUBLISHER sample also publish the usual types of books comprising scientific and academic research reports. Of 53 respondents, 40 publish journals and/or books both electronically and in print, one dozen publish only electronically, and only one publishes only in print.

Manuscript preparation tools such LaTeX plus format and style guidelines	48%
An option for camera ready manuscripts	30%
An option for color illustrations	73%
Electronic manuscript submission	80%
Extramural or in-house scientific editing	63%
In-house copy editing	73%
Page proofs with markup instructions	78%
A repository for experimental data cited in an article	30%
On-site manuscript submission services at conferences for proceedings	5%
Royalties to authors and/or editors of books	40%

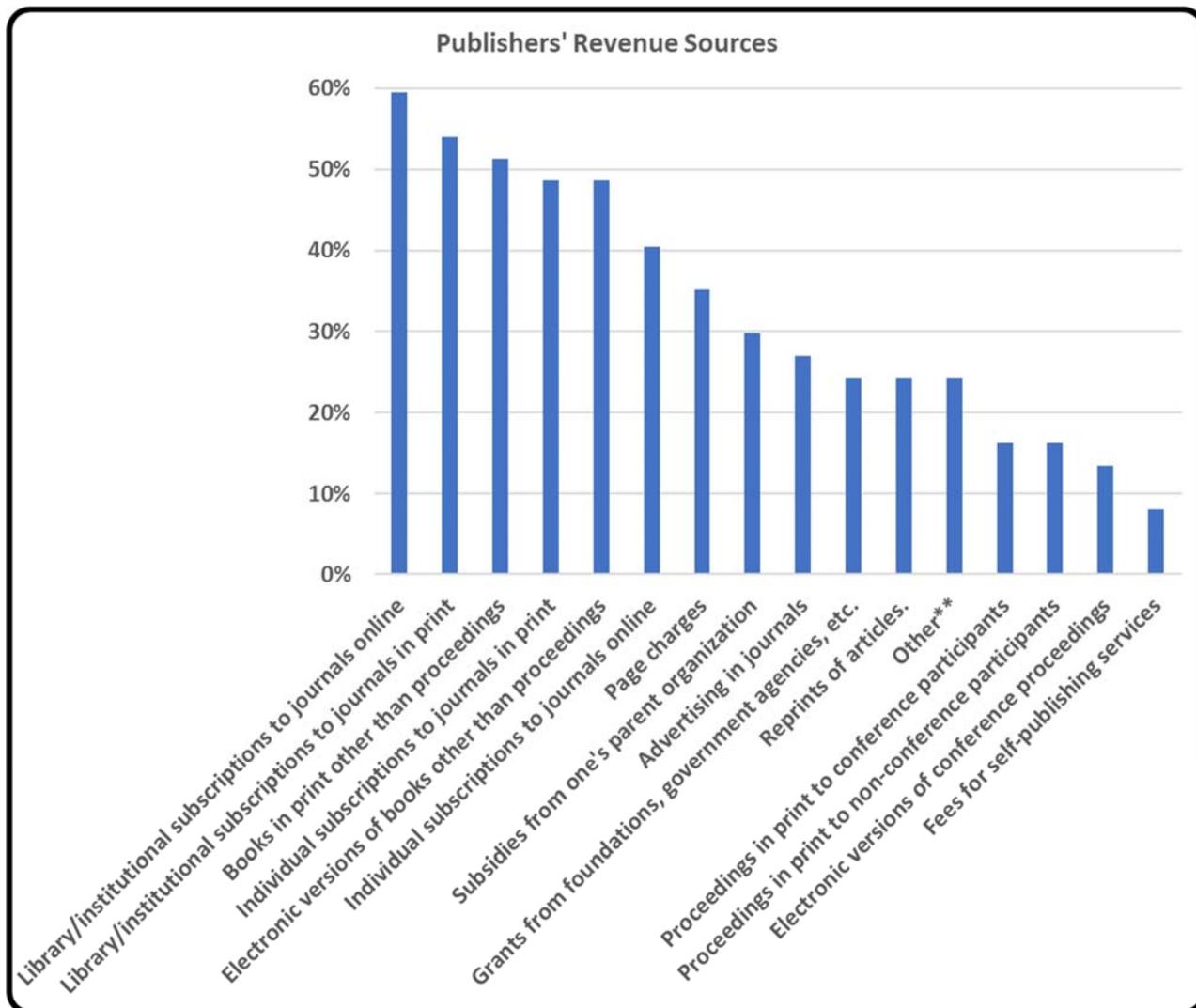
On average, 40 of our PUBLISHER respondents indicated that they each provide at least five of the above services to their content providers and publish in at least eight of the scientific fields listed below. The list of fields is the same as was presented to our RESEARCHER and READER visitors. Whereas those respondents primarily favored just three fields, the PUBLISHERS cover the gamut rather uniformly.

Physics	43%
Chemistry / Electrochemistry	35%
Materials Science	38%
Metallurgy	20%
Ceramics	18%
Polymers	20%
Biophysics or Biochemistry	38%
Geology / Earth Science / Mineralogy	38%
Geochemistry / Geophysics	28%
Astronomy / Space Science	28%
Astrophysics	25%
Crystallography	25%
Another Physical Science not listed here	15%
Biology	43%
Medical Research	40%
Botany	20%
Zoology	30%
Ecology	35%
Another life science not listed here	33%
Environmental Science / Climate Science / Atmospheric Sciences	45%
Oceanography	30%
Applied Science / Technology Development	35%
Instruments & Instrumentation	28%
Engineering (any branch)	43%
Other [§]	35%

[§]Among the “other” topics volunteered by respondents are social sciences, humanities, psychology, health and medicine, defense and security, economics and labor, laboratory analysis methods, entomology, religion, archaeology, art history, pharmacy, computer science, neuroscience, cognitive science, evolution.

We accept the data from our PUBLISHER respondents in the context of this quite wide topical distribution and the broad constituencies that implies. About half of these PUBLISHERS indicate that wide distribution of preprints prior to manuscript submission does not affect acceptance decisions. The remaining group was about equally split between acceptance definitely being affected and it being affected only when a judgment is made about impact on sales of their publication.

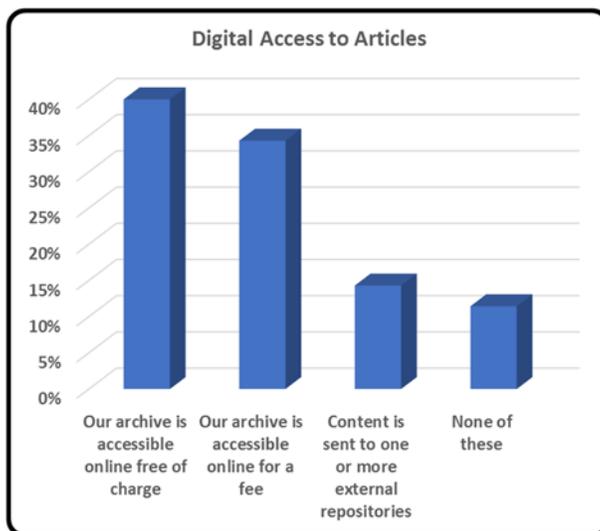
Publisher revenue sources are displayed below.



**Prominent among the “other” sources listed was ‘ Author Publishing Charges (APC) for Open Access.’

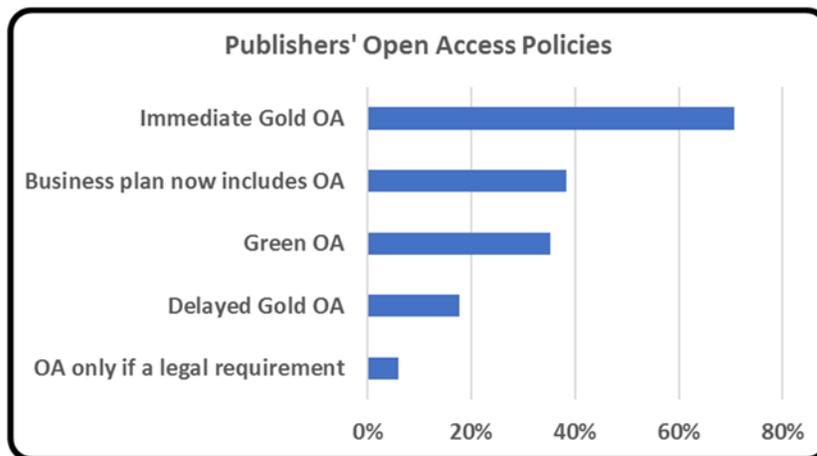
Turning to the question of online access to published scientific reports, most PUBLISHERS either provide an archive of their own (free or for a fee) or deposit content into other repositories where it is accessible.

Open Access (OA) is a relatively new issue in the context of the long history of academic publishing. It is still in a state of flux with varying policies from publisher to publisher and nation to nation. The current lexicon refers to “Gold OA” when a publisher hosts content on its own web site and provides free access, either immediately upon publication or delayed (embargoed) for a time. In some cases, authors are required to pay a processing charge (APC). “Green OA” refers to publishers permitting and perhaps facilitating access to articles at web site repositories not of their own and usually selected by



the authors and their institutions. Thirty-four of our sample of PUBLISHERS provided the following breakdown of their policies. Although we did not offer the explicit option in the Survey, some publishers commented that they operate a hybrid Gold/Green system depending on the specific publication involved.

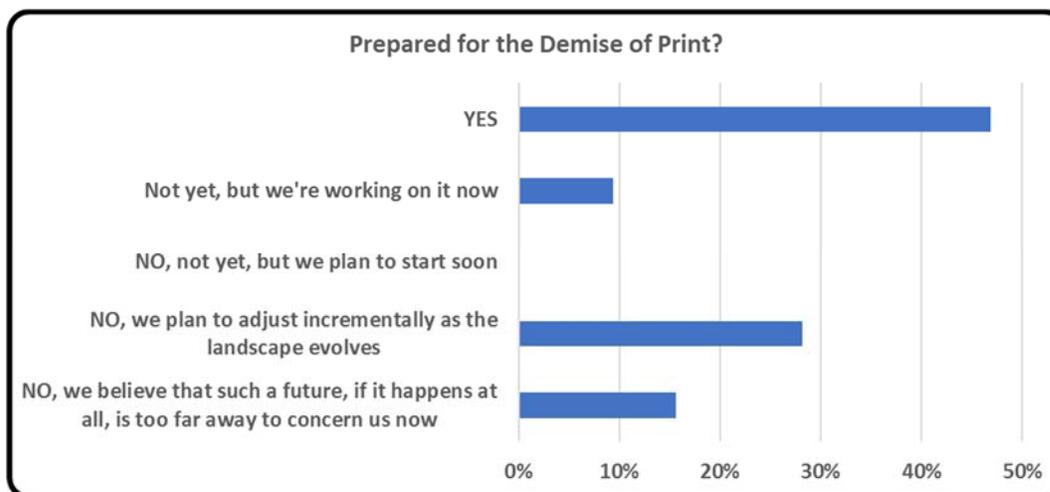
Copyright laws and regulations that protect proprietary interests of makers of original creative works, also cover authorship of scientific research publications. Publisher respondent opinions about copyright were solicited. In summary, it appears that current copyright law is not a serious issue for our PUBLISHER sample. Protections are deemed adequate and nearly half of our respondents require transfer of copyright before publication.



© Copyright Policy and Opinion ©

We require copyright assignment from authors or their employers before publication.	47%
The current domestic and international laws and regulations on copyrighting of scientific publications provide adequate protection.	26%
The domestic and/or international laws and regulations on copyrighting of scientific publications require updating to be effective in this digital age.	6%
Copyright laws and regulations are compatible with the trend toward open access to publications.	44%
We support and facilitate free “fair use” for scholarly purposes of our copyrighted publications and excerpts therefrom.	53%
We grant permission only on a case-by-case basis for substantial non-commercial use of copies of our publications.	18%
Our copyrighted publications are not normally provided through Creative Commons (CC) licenses or the equivalent that would enable their free and broad distribution.	24%

When asked, “Has your institution developed a plan for a transition to a fully electronic/digital print-free publishing environment of the future?” these responses were received. In this case, we have included the answer option that no one selected.



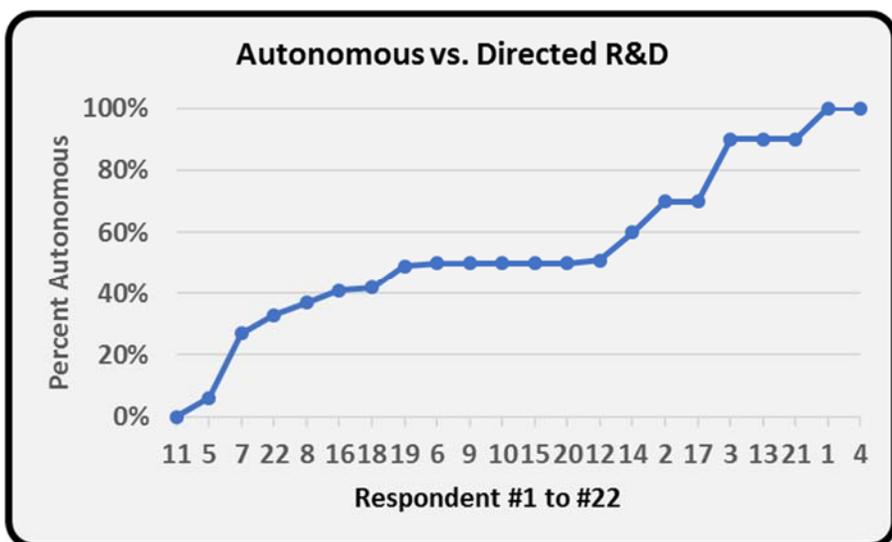
Managers; Executives; Sponsors; Intellectual Property Experts

Too few responses were received from R&D MANAGERS, CORPORATE EXECUTIVES, R&D SPONSORS, and INTELLECTUAL PROPERTY EXPERTS to claim statistical validity for any summary opinions. However, we can exercise some editorial judgment and present a few anecdotal observations that arise from the responses we have received.

Managers and Executives (23 respondents)

Most cite either an academic or government home base. A few cite industry. Two-thirds represent organizations with 200 or more employees engaged in scientific research. For three-quarters of these organizations, over half of their researchers hold doctorate degrees in science or technology.

Also, despite the ubiquity of digital access to publications today, eight of ten of these respondents provide a physical library for their staff. This is consistent with librarian comments we have seen above that a physical library is more than just a repository for books and journals. All respondents do however subscribe to one or more online resources that provide access to the scientific literature.



An interesting distribution relates the degree to which researchers are allowed to select their own projects. The range is quite wide with a plateau at the 50% level, a compromise between individual creativity and an organization's narrower mission needs.

In addition, below we see that two-thirds of respondent organizations support employees' individual subscriptions to journals, often with some restrictions.

All of these MANAGERS and EXECUTIVES encourage their staff to peruse the scientific literature as a way to stay abreast of the science and technology and to build on the work of others. They are also encouraged, in most cases, to publish their non-proprietary research in the open literature. At the same time, they enforce a review and release procedure to prevent release of proprietary information. When proprietary information is found, one-third of our sample provide editors and patent attorneys to help "sanitize" manuscripts, whereas the rest expect the authors themselves to rewrite and resubmit.



Our MANAGERS and EXECUTIVES sample have rather similar views about open access and copyright as do our PUBLISHERS sample as shown in the tables below.

Open Access Attitudes

We prefer Gold OA so that our work gets maximum early exposure	50%
We avoid early release so our researchers can lead in their fields	6%
We avoid early release so our company has a competitive advantage	11%
We have Green OA, so journal policy is not relevant	17%
Our work is publicly funded with OA regardless of journal choice	39%
We don't publish work we hold close without a legal mandate	17%

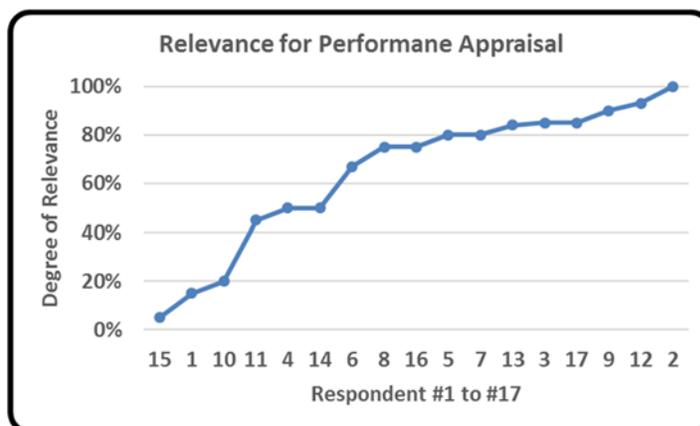
[Highlighted data are the only data that significantly exceed the margin of error for this sample.]

© Regarding Copyright ©

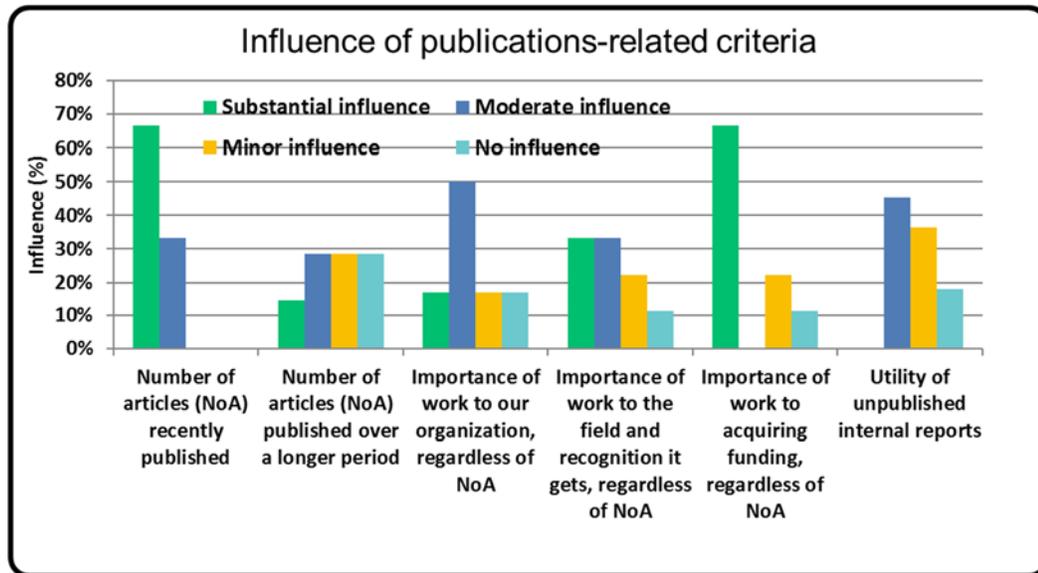
Our researchers perform "work for hire." Our organization owns the copyrights	53%
We often assign copyright to our researchers	12%
We negotiate copyright ownership as part of extramural research contracts	29%
We retain full and permanent ownership of copyrights	35%
We assign copyrights to publishers that require it	24%
"Fair use" of our copyrighted publications does not pose a problem	47%
We grant licenses for commercial use of our copyrighted publications	24%
Copyright laws are compatible with the OA trend	18%
We use Creative Commons (CC) licenses for free distribution of some copyrighted work	24%

[Highlighted data are the only data that significantly exceed the margin of error for this sample.]

Of substantial importance to authors themselves and a source of motivation (or pressure) to publish reports covering their work is the way in which such publications affect appraisal of their performance. Salaries, promotions and less substantive rewards may be directly tied to recent publication numbers and perceived impact. Our MANAGERS and EXECUTIVES sample data vary quite a bit in this regard, but most say an influence of about 80% or greater applies to employee evaluations.



Even though our sample size is small, we feel compelled to dig a little deeper on this subject because of the nuance that underlies how appraisals may be performed. Below we show which criteria our respondents do or do not regard as important.



A classic question among researchers when it concerns receiving credit for a publication is whether having co-authors, perhaps many co-authors, affects that credit. If there are N co-authors, is the total aggregate credit a factor of N greater so each author gets N, or does each receive 1/N, because one publication has a fixed value to the organization. Our sample reveals that it is more nuanced in practice. 24% tell us that xN applies. 12% say 1/N is the case. But 64% say each coauthor's credit is in proportion to her/his perceived contribution to the underlying research.

An excerpt from one respondent's comments is worth reproducing here.

...it could be perhaps that the general proliferation of readily available information online, the vast majority of which is unsubstantiated and unreferenced, sets a mindset amongst newer researchers of publishing in a similar vein of "volume or number, not quality or depth." [...] ...the skills for the future probably have more to do with filtering and discernment in reviewing literature, than in thoroughness or rigor, as may have been the case in the past.

Sponsors (10 respondents)

National government ministries, foundations, corporations, and R&D services companies are included in the sample. All agreed that publication of sponsored research is rather, very, or extremely important. Whether publication in print or online is more, less, or of the same value did not find consensus. Publication costs are generally covered by research grants, whereas journal subscriptions may not be. Opinion was equally split over covering the cost of a proceedings volume that includes reports of the funded research. Most require an acknowledgement of the source of support in all publications of the sponsored research. Consensus was evident and positive about open access, Gold OA being preferred, where the journal itself maintains the online access.

IP Experts (10 initial respondents)

Unfortunately, the number of respondents dwindled quickly as they encountered publication questions, leaving us with no alternative than to demur. The essential questions about patent protection, copyright effectiveness and striking a balance between open publication and protection of proprietary information must be deferred to a future survey.

RESEARCHERS comment:

- *While I understand the pressure to get papers reviewed and accepted quickly, I feel that some journals are now asking for reviews to be returned far more quickly than I can do it given my other obligations. I'd like to see a more standardized timeframe for peer review.*
- *While I understand the desire for research to be open access, I am concerned that the increasing tendency to require payment from authors makes it difficult for those with little funding to get published...*

HYPOTHETICAL SCENARIO

Respondents of all roles were directed to a final question before exiting the Survey. 850 of 1435 Survey visitors chose to give us their responses. The question posed was as follows:

...your reaction to the following hypothetical scenario is requested. -- You are a senior manager at a profitable publishing house that serves the scientific community. -- A substantial reduction in the funding of scientific research occurs. -- As a consequence, the flow of manuscripts submitted and sales/subscriptions decrease markedly. Which of the remedial business actions listed below would you be likely to implement?

The remedial actions offered were:

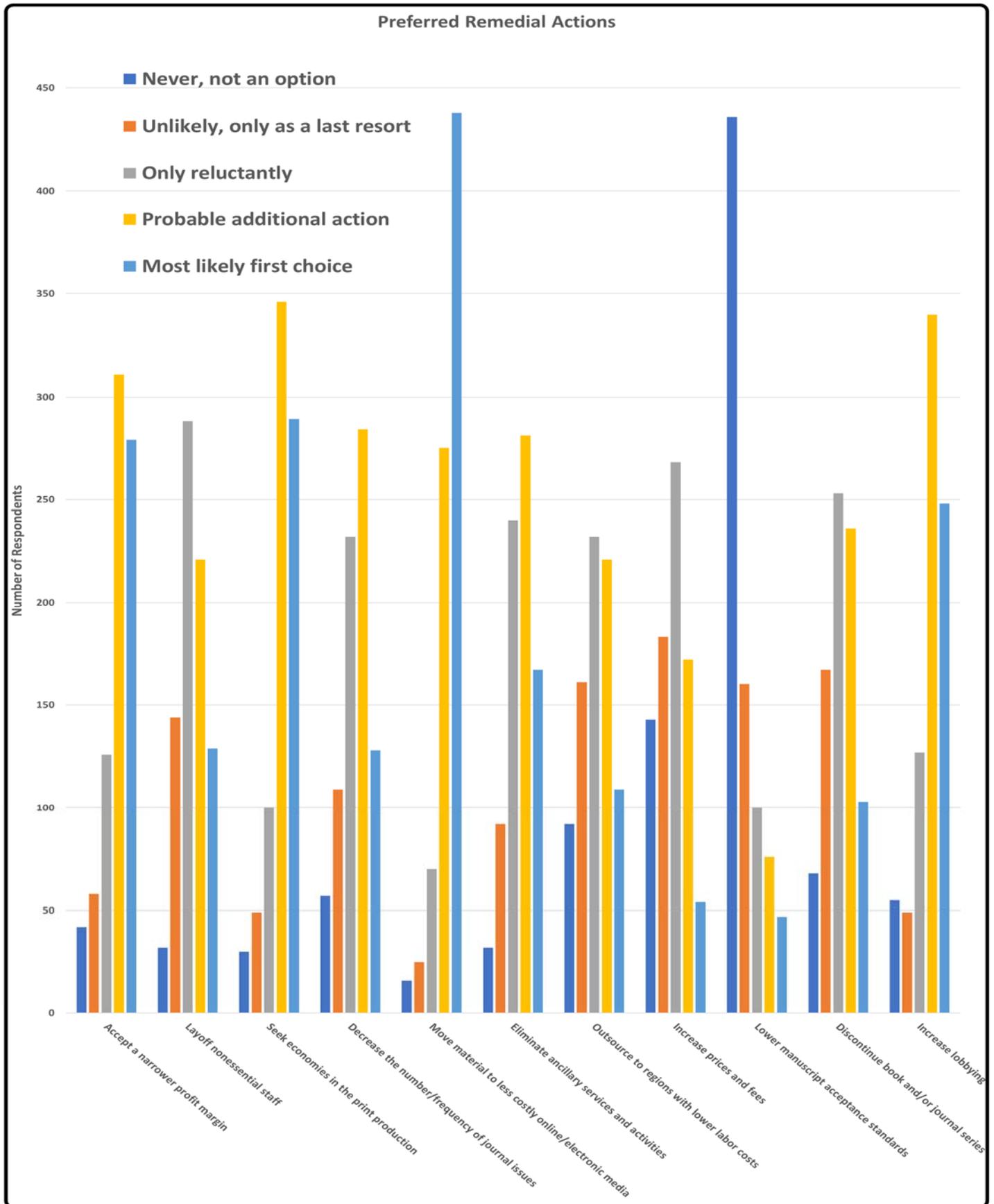
- *Accept a narrower profit margin in order to maintain employees' jobs and all products as they were before the downturn.*
- *Layoff nonessential staff.*
- *Seek economies in the print production processes such as less costly materials, stop four-color presses, etc.*
- *Decrease the number/frequency of journal issues.*
- *Move more published material to less costly online/electronic media.*
- *Eliminate ancillary services and activities such as advertising, pro-bono conference support, community service, etc.*
- *Outsource more customer service and production facilities to regions with lower labor costs.*
- *Increase prices and fees to make up for the shortfall in revenue.*
- *Lower manuscript acceptance standards in order to maintain the same number of published pages.*
- *Discontinue book and/or journal series that have been least profitable.*
- *Increase lobbying directed at sources of research funding in order to reverse the root cause of the problem.*

These are edited to conserve space in the graph on the following page.

Respondents were asked to rate each option according to the following five criteria:

- Most Likely First Choice*
- Probable Additional Action*
- Only Reluctantly*
- Unlikely, Only as a Last Resort*
- Never, Not an Option*

Referring to the data below, we see that there's a trend toward what might be termed "scholarly ethics." Lowering acceptance standards to increase page count is resoundingly rejected. Shifting to online, presumably lower cost, media is very strongly favored. Less extreme but still instructive are a clear resistance to increasing fees and discontinuing series and a clear preference for seeking economies in print and lobbying for increased R&D funding.



SURVEY CONCLUSIONS

It is rather reassuring that most data collected in this Survey reflect quite predictable findings. Easily anticipated by those who are already immersed in the scientific publishing enterprise, many facts and figures, especially some with commentary, may be revealing and unexpected to those more removed from the publication process. The factual data speak for themselves and require no drawing of additional conclusions. Opinions and experiences related through the Survey are more amenable to a bit of review. We can enumerate the general categories: preprints, open access, performance appraisals, copyrights, publication costs, peer review, quality of manuscripts, validity of reports, ethical matters, library roles, etc. Many of the Survey questions allowed open text comments. During the life of the Survey, more than 40,000 words found their way into the comment text fields – too many to reproduce here. As one might expect, the tenor of comments was generally critical of the topic at hand and the current state of affairs, but quite often they also proposed remedies. Our conclusions below have benefited from that visitor commentary as well.

Preprints: Physical preprint mailing is becoming rare. Electronic copies are either sent to close colleagues or, with equal probability, distributed broadly. Authors usually wait for articles to be accepted by a journal before distribution. A majority of users of the literature do rely on prints for early notice of developments whereas the publishers of that literature are about equally split between being agnostic about broad prepublication distribution and more limited to no distribution lest that affects sales and revenues.

Open access: Despite the current unsettled nature of the OA landscape, our Survey respondents have not reflected a heated debate. The general tenor of responses on the topic is positive, although preferences arise over immediate versus delayed release, author processing fees, and best publisher business models. Choices of OA algorithm among Gold versus Green versus hybrids, and the fees they engender, tend to revolve around the economics of commercial and not-for-profit publishers, author institutions with or without substantial resources (both financial and digital), and what requirements may be imposed by sponsors of the reported research. Authors, their institutions and publishers are the classical entities affected, but the digital repositories are the new entries. Their business plans rest on decisions about access fees, processing fees, subscriptions, and whether or not to incur expenses tied to an article's validation. One voice missing from the debate and from our Survey is that of the supposed beneficiaries of OA, i.e., the public who, in principle, will benefit from access to the scientific research. Without substantial worldwide acceptance by all stakeholders of the European Union's cOAlition S (so-called Plan S), which is supposed to take effect on 1 January, 2020, and which calls for immediate access upon publication, open access will continue to see a variety of algorithms and, one hopes, constructive debate.

Performance appraisals: Our sample of performance evaluators was too lean for conclusions to be statistically defensible. But the data are nevertheless consistent with expectations based on years of discussion in the open science press. And, more significantly, they are supported by the quite statistically significant impressions of our sample of evaluated RESEARCHERS. The number and perceived importance of a researcher's publications is taken as a substantive factor in judging that researcher's performance and value to their project, their program or their institution. Multiple co-authors may or may not affect how an individual's contribution is judged. Journal impact factors enter the assessments. Quite uniform and intense open-text comments contend that impact factors are not only an inappropriate measure of the importance and scientific value of the published research but have a negative influence on performance of the research and on the broad dissemination of its results.

Copyrights: Neither PUBLISHERS nor authors' employers in our sample have problems with the current copyright law and the occasional need for assignment. Often Creative Commons access is granted to nonproprietary work for hire and rights are assigned to publishers when required. The current domestic and international laws do not have critics in our sample.

Publication costs: Not surprisingly, authors and their employers and sponsors want fees for publishing to be low or zero. Nevertheless, cost alone does not normally deter submission of an important article to a high impact journal. Similarly, LIBRARIES consider cost as a major factor in choosing among journals for their users, but will yield to high demand from their own constituents. PUBLISHERS of scholarly journals in our sample have for the most part resisted inclusion of paid advertising to defray costs, however our sample did not include some quite well-known magazine-style publications that include news and current events sections in each issue.

Peer review: Besides personal time constraints, the most frequent reason a request to review is declined by an assumed expert is a mismatch of expertise. This implies that most reviews are done by the appropriate experts. The Survey did not delve into details of editor-reviewer-author interactions when acceptability questions arise. Respondents' complaints centered around accusations of supposedly incompetent and lazy reviewers and overly lax and permissive editors, contending that the quality of the literature has declined as a result. That's a minority view in our sample but may deserve more in-depth study. A more outwardly visible problem related to peer review is its admitted absence for some online repositories as well as for purely digital, possibly predatory, journals where a "buyer beware" philosophy seems to apply.

Validity of reports: A concern focused on online content in particular, it is closely tied to the peer review question. Our USER/READER respondents accept a variety of assurances, but primarily rely on identifying a reputable author, reputable journal, or reputable publisher.

Quality of manuscripts: Distinguishing quality from validity, quality speaks to whether authors produce well-written, complete and clear expositions of their work. Our EDUCATOR sample's data reveals considerable opportunity for students and younger colleagues to receive explicit training and experience through apprenticeship that ought to result in well written submissions. A few open text comments have expressed concerns about deterioration in this area because of inadequate language skills of authors and indifferent editors. Mentioned here for the sake of completeness, a narrowly focused study would be needed to identify any such wide-spread phenomena.

Ethical matters: Authorship ranked at the top of ethics issues in our sample. We assume this relates to whether a person has contributed enough to be listed on the byline. Perhaps adding an author who contributed nothing would be an ethical concern, but less egregious situations might be relabeled as issues of project management judgement, especially if personalities are involved. We found a low incidence of serious ethical issues and no evidence from the open text comments that any went unresolved to the extent that published reports were compromised.

Library roles: A general consensus exists that the growth and ease of use of online repositories and associated ubiquitous digital access will affect libraries of the future. Many libraries are however embedded in institutions from which they receive support, and for which they provide a much-valued interactive physical learning environment. A guarded optimism prevails.

Et cetera: in Appendix C, we provide excerpts from the open text comments accumulated from all respondent roles and all questions that offered the comment option. Criteria for choosing excerpts ultimately are a matter of editorial judgement and, indeed, preference. But the goal is to ensure that all salient topics get aired and that attractive ways of expressing relevant thoughts are included even when they repeat points already made.

RECOMMENDATIONS

Given that much of the data obtained through this Survey do not come as a surprise, and certainly have not shone a spotlight on an urgent time-sensitive remedial need, we can at most recommend that the efforts to address such ongoing challenges as library financial health, open access options and costs, and relevance and distortive influence of impact factors, all continue apace.

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APPENDIX B

All Survey Questions[§] Grouped by Respondent Role

The Scientific Publishing process spans many roles. Each contributes to the end product in a different way with different goals. For your responses to this survey to be meaningful, the questions must be relevant to the role you play in the process, based on your choice below. [Please note: If you play more than one role -- for example you are both a researcher and an editor – after completing the survey for one role, you may reenter the survey, choose another role, and answer a correspondingly different set of questions.]

* 1. First, please indicate the home region of the principal institution with which * you are affiliated.

* 2. Please tell us what your relationship is to Scientific Publishing. (Chose your principal activity.)

Researchers (p. 8,9 & p. 10 et seq.)

Across scientific fields and disciplines, the Scientific Publishing process can differ markedly. To better understand your responses, identifying your field and/or discipline is required.

* 3. Please select the one category that most closely matches the field or discipline to which your published work corresponds.

4. You may specify a subfield that fits under the main field selected above.

5. Please indicate your current career stage.

Questions for researchers who publish their results.

6. Please indicate how influential each of the fifteen factors listed below is when you choose a journal to publish your research reports.

7. When your article has multiple authors,

8. When your article has multiple authors,

9. Performance of a researcher is often evaluated, in part, with reference to published research. In your case, (Check all that apply)

* 10. In-house manuscript review prior to submission (check * all that apply)

* 11. Preprints of our reports are distributed

12. When preprints are distributed

* 13. Within the previous three years, have you been concerned about and had to resolve any ethical issues pertaining to publishing your work?

14. If an ethical issue did arise within the past three years, did it involve (check all that apply)

15. In addition to archival journals, do you also contribute to the scientific literature through (check all that apply)

16. Do you provide articles on scientific topics to (check all that apply)

* 17. Have you provided peer review services to a publisher or funding agency/ministry within the past five years?

18. If you have declined to perform a peer review within the past five years, was that because of (check all that apply)

19. Which of these seventeen adjectives describe your overall interaction with journal editors? (Check all that apply)

* 20. Describe one substantial change you believe would be an improvement to a future scientific publishing process for researchers like you.

Thank you for completing the portion of this survey that focuses on your role as a researcher/author of scientific publications. Below you may choose to exit the survey now or continue to questions that focus on your role as a user/reader of the scientific literature. (An additional 16 questions)

* 21. Please choose whether to exit or continue.

[§]Multiple choice options omitted

User of the Scientific Literature (p. 8,9 & p. 15 et seq.)

Across scientific fields and disciplines, the Scientific Publishing process can differ markedly. To better understand your responses, identifying your field and/or discipline is required.

* 22. Please select the one category that most closely matches the field or discipline to which your use of the literature corresponds.

23. You may specify a subfield that fits under the main field selected above.

24. Please indicate your current career stage below.

Researchers, editors, indexers, reviewers and educators read and search the Scientific Literature. The following questions are meant to reveal how you access that literature, what difficulties you encounter, and what improvements you can suggest.

25. How do you identify published reports that you want to read? (Check all that apply)

26. How often do you visit a library to access reports in journals or books in print?

27. Do you routinely visit a library to browse recent publications with no specific report in mind?

28. How and why have you sought help from librarians or other library staff? (Check all that apply)

29. Please rate the overall value to you personally of the library you most frequently use.

30. Either through online subscription or pay as you go, do you retrieve full text versions of reports of interest from electronic media?

31. Upon what do you rely to judge the reliability and validity of reports accessed online? (Check all that apply)

32. Would you favor online post-publication peer review in which all articles are published without advance review but are accompanied by contemporaneous reviews posted by readers/experts such as yourself?

33. Do you ever access raw experimental data archived separately from the corresponding research report?

34. Do you rely on preprints to maintain awareness of the most recent R&D developments?

35. Which online resources do you frequent to search for reports of interest? (Check all that apply)

36. Within the past five years, have you paid to have an article translated from one language to another?

37. Do you read archival scientific reports, or excerpts therefrom, that are from a field of study far from your own?

38. How often do you read popularized accounts of scientific research in newspapers, magazines, or online news sites?

* 39. Describe one substantial change you believe would be an improvement to a future scientific publishing process for users of the literature like you.

Managers at Institutions at which Scientific Research is Pursued (p. 29 et seq.)

As a manager of research and researchers, your views on Scientific Publishing are needed.

* 40. Please specify the type of institution where you manage an R&D program * or portfolio.

41. How many of your employees are engaged in scientific research

42. What percentage of your R&D staff hold a doctorate degree in a field of science or technology?

43. On average, to what extent does your R&D staff select their own research topics?

The role of Scientific Publishing at your institution and its relevance to personnel management and institutional objectives are of interest.

44. Does your organization have library facilities for use by your R&D staff?

45. Does your organization subscribe to one or more online resources that provide access to the scientific literature?

46. Does your organization support your staff's individual paid subscriptions to journals, book series, etc.?

47. Is your research staff encouraged to peruse the scientific literature in order to build on the work of others?

48. Do you encourage your R&D staff to publish their non-proprietary research in the open literature?

49. Do you enforce a review and release procedure to prevent release of proprietary information?
50. Do you help researcher-authors remove proprietary information from manuscripts to enable publication of their work?
51. How do "open access" policies of some journals affect publication decisions? (Check all that apply)
52. Copyright laws and regulations that protect proprietary interests of makers of original creative works, also cover authorship of scientific research publications. Please indicate with which of the statements below you agree. (Check all that apply.)
53. When evaluating the performance of a research scientist in your organization, how important is their recent publication record?
54. Please indicate the influence publications-related criteria have on a researcher's next performance appraisal.
55. Does the credit a researcher receives for a published article depend of whether co-authors are involved?
- * 56. Describe one substantial change you believe would be an improvement to a future scientific publishing process for managers of R&D like you.

Intellectual Property Considerations in Scientific Publishing (p. 31)

The tension between preservation of the proprietary interests of the sponsors of research and the larger scientific community's need to access results of the latest research is an ongoing issue.

57. Are you a patent attorney?
- * 58. Please specify the type of institution for which you provide advice related to intellectual property concerns.
59. Do you review and recommend whether scientific manuscripts may be released for publication?
60. Do you believe "open access" publications are a net positive or negative for protection of trade secret and invention rights?
61. Would your response to the previous question be different if you could specify the embargo period before release to the public?
62. Does the type of open access repository (i.e., your own institution's [so-called Green OA] or a journal hosted [so-called Gold OA] archive) affect your evaluation of the appropriateness of publication?
63. How often do you seek worldwide protection of intellectual property as opposed to domestic only?
64. To establish invention priority, would you use a scientific publication's date of submission as evidence in addition to laboratory notebooks, etc.?
65. Do you agree that reports containing proprietary information must be considered "applied" research whereas those with no proprietary content may be considered "basic"?
- * 66. Copyright laws and regulations that protect proprietary interests of makers of original creative works, also cover authorship of scientific research publications. Please indicate with which of the statements below you agree. (Check all that apply.)

Sponsors of Research (p. 31)

- * 67. With what type of research sponsoring organization * are you affiliated?
68. Please indicate in the table below the importance of publishing reports of sponsored research.
69. Publication of the results of our funded R&D in print journals is:
70. Are the costs of publishing the results of funded R&D considered allowable expenses under your programs?
71. Is the cost of journal subscriptions an allowable expense under your programs?
72. Is the cost of conference proceedings in which your R&D results are reported an allowable expense under your programs?
73. Does your organization require acknowledgement of its support in published reports?

* 74. In what way, if any, does the trend toward "open access" publication affect your programs and policies? If open access is a concern, do you distinguish between author/institution hosted (so-called Green OA) and journal/publisher hosted (so-called Gold OA) repositories?

Editors (p. 24 et seq.)

Editors, as intermediaries between authors and the final published work, have a critical quality control role. However, the term "editor" describes many different jobs in the publication process. The next few questions will help identify your particular role.

* 75. Please select the role that most closely * matches your own.

76. The publisher with which you are affiliated is:

77. Please indicate the kinds of tasks your editorial responsibilities entail. (Check all that apply)

78. Do you believe broad distribution of preprints prior to peer review and publication is a net positive or negative?

79. Do you believe that papers in conference proceedings should be subjected to the same peer review standards as those in archival journals?

80. Do you allow "serial" publication of a sequence of results that could easily be collected and published in a single article?

81. Do you ensure that appropriate key words accompany an article so future topical searches succeed?

82. Does your publication accept paid advertising as a way to defray publication costs?

* 83. Describe one substantial change that you believe would be an improvement to a future scientific publishing process.

Publisher (p. 24 et seq.)

The publisher of scientific research reports is the vital intermediary between the researchers, their institutions, their sponsors and the consumer of scientific information. NOTE: Many publishing houses comprise multiple divisions, serve a wide variety of communities, and publish in a wide variety of genres. For purposes of this survey, please confine your responses to those applicable to publishing scientific research reports and reviews.

* 84. Please indicate the type of publishing organization you represent.

85. Do you publish one or more archival journals for scientific/academic research reports?

86. Do you publish books comprising scientific/academic research reports? (Check all that apply)

87. Are your journals and/or books published only in print, only in electronic media, or both?

88. What are the services that you provide to your authors/content providers? (Check all that apply)

* 89. In which fields do you publish journals or books? (Check * all that apply)

90. Does wide distribution of preprints prior to manuscript submission affect your decision to accept a manuscript?

91. Referring specifically to publication of scientific research reports, reviews, and books, on which sources of revenue does that part of your publishing business depend? (Check all that apply)

92. Retrieval of information without visits to a library is an increasingly common practice of researchers in this digital age. Does your institution maintain or support a searchable archive of your own publications for that purpose?

93. How is your institution responding to the trend toward, and in some cases to regulations requiring, open access publication? (Check all that apply)

94. Copyright laws and regulations that protect proprietary interests of makers of original creative works, also cover authorship of scientific research publications. Please indicate with which of the statements below you agree. (Check all that apply.)

95. Has your institution developed a plan for a transition to a fully electronic/digital print-free publishing environment of the future?

* 96. Describe one substantial change you believe would be an improvement to a future scientific publishing process.

Library/Archive Operator (p. 19 et seq. & p. 21 et seq.)

The utility of the scientific literature depends on immediate and long-term convenient access to that literature by researchers and their institutions. Repositories, be they library shelves with print journals or fully electronic searchable archives, provide a crucial service to those who contribute content and those who ultimately use it.

* 97. Please choose the information storage and retrieval service where you work. [If you work at a combined facility, please choose one now, finish the Survey, then return to the Survey's entry link and choose the other on your return.]

* 98. Please choose the type of library * where you work.

99. Does your library subscribe to online resources through which your users can search for publications?

100. Does your library offer a microfiche archive to users?

101. Does your library offer scientific publications on CD or DVD to local users?

102. Does your library provide or obtain translation services for local users?

103. Does your library provide a reference section where, for example, scientific book series and encyclopedia are offered?

104. Is electronic access to your library's catalogue offered?

105. Does your library provide a new-issue display for the latest journal issues prior to binding?

106. What factors affect the decision to subscribe to a journal in print or a book series? (Check all that apply)

107. Please enter the percent of library staff daily work devoted to customer service interactions directly with users for the following reasons. (Whole numbers only that sum to 100%)

109. What source of funds supports your library's operations and maintenance of your collections? Please exclude the capital costs of library construction and major equipment purchases. (Check all that apply)

110. In the context of the rapid evolution of digital technologies, electronic media, and the Internet, what future for the physical library, as a repository for the scientific literature, do you envision?

* 111. Describe one substantial change you believe would be an improvement to a future scientific publishing process.

Online Archive/Search Engine (p. 21 et seq.)

* 112. Please choose the type of online storage and retrieval resource where you work. [If more than one apply, please choose the one service most used by your customers.]

113. How is your service affected by "open access" policies?

114. What sources of revenue support your operation? (Check all that apply)

115. How does your service deal with questions of the validity of content (i.e., intermediation)? (Check all that apply)

116. Do you perform or sponsor data curation activities including development of subject-specific ontologies?

117. Are visitors to your service permitted to download/copy abstracts of articles free of charge?

118. Are visitors to your service permitted to download/copy full text and figures of an article?

119. Often, a user is interested only in a relatively small portion of a scientific article. Do you provide a means to copy/download short excerpts?

120. Does your service offer a repository for scientific data linked to a published report?

* 121. Describe one substantial change you believe would be an improvement to a future scientific publishing process.

"Other" roles are not included in our Survey's current scope.

If you would like to try again, select "Return to the beginning..." to choose a role closest to your own. Otherwise, select "Exit survey."

* 122. Choose to try again or to exit the survey.

Educators (p. 22 et seq.)

An educational institution provides knowledge and skills for pursuit of research careers. Communication of the results of research is one such vital skill that must be acquired.

* 123. Please indicate the academic level at which you contribute to the training of students in science and technology. (Check all that apply)

124. Do the majority of your students arrive with writing and speaking skills consistent with their academic level?

125. Does your institution offer remedial courses for those students who initially lack adequate language skills?

126. Does your institution offer one or more courses that include explicit training in communication of technical information, e.g., as part of a professional development curriculum?

127. Do you provide editorial guidance and oversight to students and early-career colleagues who are writing their own reports or preparing presentation materials?

128. When you and a student or junior colleague are co-authors of a report, do you use that opportunity to coach your co-author in report preparation?

129. Which learning paths do you believe are effective for developing communication skills in scientific fields? (Check all that apply)

130. English has been the dominant language of science. For a great many researchers whose native language is not English, this presents an additional hurdle in writing and reading technical papers and understanding and delivering talks at conferences. Please choose the description that best matches your situation from the list below.

131. Beyond requiring writing, composition and presentation skills, are students and junior researchers also provided criteria for selecting publication media and presentation venues.

132. Describe one substantial change you believe would be an improvement to how next-generation researchers are prepared for publishing their work.

A Hypothetical Scenario for All Respondents (p. 32 et seq.)

The set of questions you have addressed so far were tailored to respond to your self-identified relationship to the scientific publishing enterprise. As a final question for all respondents, your reaction to the following hypothetical scenario is requested. [Please note: If you have taken this survey more than once, because you play multiple roles in the scientific publishing process, you will have seen this final question before. You may enter new responses based on your additional role in the publishing process or just proceed to the exit.]

-- You are a senior manager at a profitable publishing house that serves the scientific community.

-- A substantial reduction in the funding of scientific research occurs.

-- As a consequence, the flow of manuscripts submitted and sales/subscriptions decrease markedly.

Which of the remedial business actions listed below would you be likely to implement?

133. Please indicate the likelihood that you would implement each of the eleven possible remedial actions listed below.

*Questions preceded by an asterisk were not optional.

APPENDIX C

Fair warning! The vast majority of comment excerpts below reflect complaints and quite negative observations about the many components of the publishing enterprise as it exists today. It would be tempting to ascribe this to the well-known tendency, when any survey offers an open text opportunity, for those respondents who are unhappy about something to invest the extra effort to pen a response. But in this Survey, to be fair, our respondents are simply satisfying our request. They are responding to a question generally posed as: *Describe what you find to be unsatisfactory about the scientific publishing process today and one substantial change you believe would be an improvement.* After naming the object of their complaint, most respondents offer some remedial ideas, albeit some confess to having no practical solutions in mind. The excerpts (slightly edited for clarity) chosen below each representant very many similar comments found within the 40,000 words collected.

We can exercise editorial prerogative here, instead of waiting until the end of this appendix, by enumerating up front the ubiquitous issues that become apparent below.

- Costs borne by researchers, their institutions and libraries in the context of high fees and commercial publishers.
- Poor performance of editors and peer reviewers; unfair burden on peer reviewers without incentives.
- Flood of papers and journals – many of poor quality; predatory journals
- Misuse of journal impact factors and quantity vs. quality in performance appraisals: “publish or perish” paradigm.
- Open Access needed but fraught with problems.
- Nonuniform manuscript formatting requirements.
- Favoritism based on fame, gender, nationality, and/or intuitional affiliation. Use double blind reviews.
- Access to the literature for smaller institutions and developing countries.
- Publishing negative results; Publishing confirmatory results.
- Underdeveloped language and writing skills.

It would be fair to ask, why not simply summarize the central themes of our respondents’ comments, rather than devote the extra time to compile and the space to print so many examples. We are more than editors of his report; we are also members of the scientific and publishing communities. It seemed therefore obligatory to try to match the obviously intense and heart-felt comments with an allocation of effort and space proportionate to and respectful of the sincere and impassioned contributions of our responding colleagues. [eds.]

JOURNAL CHOICE

- *The choice of journal is discussed by all authors with a goal to reach consensus, but generally the lead and/or senior author has the final say.*
- *Group decision, heavily influenced by the view of the senior author.*
- *The choice of journal is decided by both the lead author and the research advisor or manager.*

AUTHOR ORDER

- *The PI is listed last; the lead (corresponding) author goes last; the advisor of the project is last; the academic advisor is last.*
- *From junior to senior; supervisor is last author; senior author (i.e., last); most work first, most responsibility last.*
- *Author list order is based on compromise between high-to-low degree of participation and low-to-high seniority.*
- *Last is the main PI; the group leader as last author (even if he did a lot); team leader(s) always goes last; the end position is reserved for head of the group; supervisors/director of studies as last author; director(s) of the research go last; last author is the leader.*
- *Usually the PI decides the sequence when it is clear but consults individual authors if there is ambiguity; The lead author decides; author list order is discussed among senior authors; consensus on various agreed factors; the order is decided by all authors.*
- *Issues with people being acknowledged when they should be coauthors and issues of people being authors when they should be acknowledged.*

Analysis and Report of Responses

ETHICS

- *Failure to appropriately cite the literature.*
- *Papers published using my name that I did not write or approve.*
- *Ownership of samples.*
- *Public discussion of confidential work by a peer reviewer.*
- *Tried to stop publication as they were afraid the data would affect their commercial activities.*
- *Unknowingly broke a secrecy agreement.*
- *Partial republication of text found on-line.*
- *Potentially misleading presentation of results*
- *Plagiarism of data and text already published in papers written by others; Plagiarism by coauthors;*
- *Colleague with no links to the project submitted a paper on the same material and same topic after seeing our internal presentation.*
- *Everyone agrees that publishing the same result twice is not good.*
- *End the destructive practice of automatic co-authorship of bosses of research institutions or heads of research teams.*
- *Several high-profile data fabrication scandals have served to undermine the public's faith in the motives of academic researchers.*
- *Problem of authors submitting to multiple publications at the same time.*
- *Sometimes it is difficult to determine plagiarism if you don't pay for a service to check for plagiarism.*

WHY NOT DO A PEER REVIEW

- *The journal asked me to review far too often.*
- *So many manuscripts need more editorial/copy editing than I can reasonably provide.*
- *Absolutely no reward for doing it.*
- *The review process is rather pointless these days.*
- *Will only peer review for journals that I publish in.*
- *Not for a non-reputable publisher.*
- *I do not offer my refereeing services to publishers who overprice their journals.*
- *Too many requests at the same time and prior reviewing commitments.*
- *Not when predatory journals make the request*
- *Poor written quality of the manuscript; my job is not to edit the papers of others.*
- *Bad reputation of the journal.*
- *They publish papers apparently regardless of what I say as a reviewer.*

BIAS

- *...many papers even not reaching the referees for quite obscure reasons if papers are submitted from small or not fully known research groups.*
- *A double-blind process, during the revision stage, may help. It is evident that large groups have some preferential publication pathways.*
- *Double blind peer review may be a solution to reduce reviewers possible bias based on gender, nationality, location or reputation of authors.*
- *Editors must not be biased towards institutions/countries/regions.*
- *Having big names on the manuscript determined whether the paper is sent out for reviews or not.*
- *I believe nowadays, scientific journal accept article by the name of authors not quality of results*
- *I think a great deal of reviewer bias comes based on the authors and/or their institution.*
- *The researchers from all the corners of the world should get equal opportunity.*
- *The scientific publishing process today is biased in favor of developed countries.*

- *There is measurable bias against female authors in scientific publishing. I have friends who have been told by reviewers to add a male co-author.*
- *Those of us at less prestigious institutions have to endure greater scrutiny, condescension, and outright disbelief on the part of peer reviewers. Everyone should have to face the same level of criticism from the peer reviewers.*

COST

- *A color pixel doesn't cost any more than a black or white pixel, but many journals still charge more for color pages.*
- *A single fee paid annually that could open all journals to full text reading.*
- *Break the cycle where authors, reviewers and editors all work for free, and then actually pay to receive the fruits of their labors.*
- *Commercial journals rely upon my free expertise to improve poorly prepared articles but then charge my institution exorbitant rates to purchase their journals.*
- *Complaining about commercial publishing houses won't change the system. The change has to come from researchers themselves, not from publishers.*
- *Financial considerations have become too important for many of the major journals.*
- *For governments, funding of research publication should be similar to funding research infrastructure.*
- *From my point of view the journal should pay the researchers if they want to publish our research*
- *Government funding of open access included explicitly in research grants so that publishers can still afford to manage review and editorial processes, while making it possible to have the research literature much more broadly available to the community.*
- *I am deeply concerned about the costs of the journals, especially in the developing world.*
- *I am using less and less paper-based materials, so that might be a place for publishers to cut costs.*
- *I believe costs are a true hindrance to scientific publishing today.*
- *I worry about the future funding model for journals and how they can keep afloat in an increasingly competitive world in which for-profit companies want to squeeze out journals published by scientific societies.*
- *In principle the public and its representatives should decide how knowledge produced at public institutions becomes available to the public.*
- *It's strange, even though electronic content is cheaper to produce, publishers charge just as much or more for it.*
- *Move all publishing out of the private sector, and back to the learned societies.*
- *My group has moved more and more to publishing only in journals that allow for online open access for zero fee or low fee to authors.*
- *Paying to publish and then paying to access is unacceptable - Knowledge should be accessible to everyone.*
- *Persistent increases in subscription costs are unsustainable and neglect the vast voluntary contributions made by academics.*
- *Professional journals are serving mainly their profit interests. which do not align with the quality of science or fair and democratic scientific communication*
- *Publisher services include: peer review, editorial development, global sales distribution, marketing, publicity, warehousing and fulfillment, promotion via advertising, direct marketing, and conference exhibits, metadata and discovery, and many others.*
- *Publishers need to identify their main customer and establish brand-loyalty. Otherwise, they should all be nonprofits.*
- *Push towards author pays model is misguided. This will stifle innovation.*
- *Scientific publishing houses profit from the work of others. Access to science is limited by paywall. This is not sustainable / acceptable in the 21st century*
- *Scientific publishing today is becoming a business; Research cannot follow the market rules, it is a value for humanity.*
- *Some scientific societies seem to view their publications branch as a cash cow.*
- *Stop charging institutions who pay for subscriptions additional fees for open-access credits on behalf of their researchers.*
- *The authors who secure the funds for the research and do essentially all the work of writing the papers still have to pay for the privilege.*
- *The business plan in the publishing of science is not sustainable and should be rethought from bottom to top.*
- *The copyright should stay with the author, not go to the publisher*
- *The cost for our university libraries is very high, to the point of being unsustainable.*

Analysis and Report of Responses

- *The cost of publishing must be built into the cost of doing the research.*
- *The current model in which academic institutions have to pay for access to content that their own researchers produced and peer-reviewed, to the enormous profits of publishers, is unsustainable.*
- *The high cost of open-access journals is an obstacle to what would otherwise be a desirable (and increasingly mandated) model.*
- *The pay-wall is set high enough to discourage scientists from developing countries to access and gain from the archival content that actually is a legacy of the scientific community across the world*
- *Those who insist on increasing profit margins will probably see substantial cancellations over the next decade.*
- *We shouldn't have to pay nearly so much for access to the literature that we ourselves have generated.*

EDUCATION

- *All courses should include communication assignments that are designed to provide experience targeting different audiences (general public, scientists outside of the discipline, policy makers, scientists inside the discipline). All curricula should include multiple opportunities of increasing complexity in all modes of communication (poster, paper, whitepaper, opinion piece, policy proposal, graphic design, etc.).*
- *Formal courses seem to do no more than cause resentment in the students, particularly if there is no explicit relationship between the language courses and their scientific studies.*
- *I believe communication skills are changing drastically. Young researchers tend not to read full length papers. They find the information they need by Googling around.*
- *I believe preparatory courses on scientific writing should be mandatory in undergraduate courses.*
- *I feel graduate students are unprepared for the 'academic' world in terms of expectation to publish, how difficult it often is to get a publication across the line, how often rejection occurs. This would be very useful to highlight more widely. The importance of writing in general is not fully appreciated at an early stage.*
- *I find that there are few courses targeting how to write scientific papers vs. how to keep a lab journal and simply report the findings in a short protocol.*
- *Involving students with projects that can lead to publications where the student has to use its writing skills.*
- *Isolation of the disciplines is exacerbated by the proliferation of special-topic journals, whose content is not usable by students or researchers in other disciplines.*
- *K-12 education does not appear to give good training in how to write clearly and concisely, which is critical for scientific publishing.*
- *More opportunities for all students to have authentic research experiences so that they can then work on communicating what they did and why.*
- *Myself, my students, and colleagues could benefit from formal instruction on manuscript preparation.*
- *Separate classes should be provided for native and non-native English speakers.*
- *Students' poor grasp of formal language for 'scientific' writing.*
- *Teaching scientific writing skills is I think very important for students, researchers and teachers.*
- *There are currently serious gaps in the preparation of students to use language with precision.*
- *There is insufficient explicit guidance in how to communicate scientific information. Most authors are expected to learn how to prepare a publication or presentation by emulating their seniors. Unfortunately, few of their seniors have had such guidance and themselves produce poor products to emulate. This applies not only to poor language skills, but also to poor organization of ideas and poor graphical representation of information.*
- *he proliferation of journals means that virtually any manuscript can get published, which is why number of publications represents an increasingly poor representation of the quality of a researcher.*
- *It is difficult for people at small institutions to afford broad access to archival publications.*

LIBRARY

- *Decreasing role as a repository for physical materials, but maintaining or increasing in terms of place to access resources and services related to electronic scientific literature*
- *Due to increased cost and increased number of journals, libraries cannot afford subscribing to all of them. Uploading preprints in depositories would be a good way to overcome the challenge*

- *High cost of subscriptions to Libraries limits material that can be provided to users.*
- *I do use the library for books, and sometimes buy a book. Is there any reason to continue printed versions of journals?*
- *I just don't have the time, so I find myself only reading articles written by people whose names I recognize. This puts me in a bubble where I only read papers from a small subset of the research community.*
- *It would be ideal if the library budget shifted from subscription fees to paying author fees, but it's important for all people involved in publishing to understand there will always be, for the foreseeable future, a cost to scholarly publishing.*
- *Learning environments to offer learners [students and faculty] to experiment development/practice, with guidance available to become self-directed independent learners*
- *Libraries do not have the budget to keep up with costs (they increase subscription prices every year; Library budgets tend to stay the same or decrease every year)*
- *Libraries have less and less flexibility in their budgets when a small number of vendors and publishers take large chunks of their funding.*
- *Libraries haven't been 'repositories' for years. We are gateways. Librarians are not gatekeepers; we are guides. It will be a few generations before physical material completely go away, even then, libraries will still be needed to curate and provide access to online content. It is way too expensive for a researcher to purchase everything they need.*
- *Old literature remains difficult to access.*
- *Physical libraries will almost disappear, but they should take up the task of administering the electronic subscriptions.*
- *Retrievable search results, i.e., key words, rather than subject headings, as it can be hard to drill down.*
- *The need for the library as a place will remain about the same but the way the space is utilized will change.*
- *Would like old archive material to be scanned and available online.*

OPEN ACCESS

- *All articles describing research financed by public funds must be open access*
- *All research should be published in open access, not for profit journals. For profit journals disrupt research and make us, the researchers, do all the work while still having to pay for access.*
- *As a librarian, I support open access journals. However, I think there is still much work to be done to lower costs.*
- *Drives by funding bodies to make all outputs open access are premature.*
- *For academic researchers, finding the money to publish in open access formats can be a problem.*
- *I am a strong supporter of open access, but open access fees are often prohibitive.*
- *I would rather that open access journals be abolished entirely. The scientific community was better off before they existed.*
- *In my opinion, the future of publishing involves preprints being made available before publication, double-blind peer review, publication of the manuscript with a comments and questions section at the bottom and freely available open access data in a repository. Plan S.*
- *Online, fee-based OA journals operated by so-called Predatory Publishers are doing serious damage to scientific publishing.*
- *Open access creates unnecessary difficulties for authors and has led to a large number of non-peer reviewed online journals levying page charges to cover open access and advertising unlikely impact factors*
- *Open access may become more and more essential, but costs must remain affordable.*
- *Open access needs to be a default and publishers need to be part of a symbiotic relationship with academia.*
- *Providing better supplementary material is generally consistent with the move to open-access publishing.*
- *The advent of open access is pushing the community so that only well-funded groups can publish in top journals.*
- *The direction should move towards open access rather than gate-keeping for fees.*
- *The drive for open access has been conflated with a desire for free information. A digital, peer reviewed, interlinked, curated, quality assessed, branded body of content requires funds to create*
- *The Open access has opened a tsunami of scam journals, scam conferences.*
- *The publishing system is not healthy, it needs more open access papers and less big corporation monopolies.*
- *The transition to open access is necessary, but as in any change the transition phase is difficult.*
- *There are too many new open access journals, many of which have no academic standing and which constantly harass fill our in-boxes with invitations to publish with them.*

Analysis and Report of Responses

- *We need a consistent approach to open access across all publishers.*
- *We subscribe to the recently somewhat relaxed implementation plan of cOAlition S of the EU, which means a substantial change in the business of scientific publishing.*
- *We work a lot with developing countries that have limited capacity to pay subscriptions and access pay-walled journals so we push for OA in any form, preferably gold.*

PERFORMANCE APPRAISAL

- *Abandoning H-index, journal impact factors and citations would help - but will not happen unless something replaces it, which will then be gamed.*
- *Academia is very broken and it has been led by the driver for metrics in publication.*
- *Appreciate other aspects of the scientific endeavor beyond peer reviewed papers including science communication, teaching experience, etc.*
- *Because quality is harder to measure than quantity, and because most funding agencies do not divide numbers of publications by the number of authors or by the amount of money spent to produce these publications, this greatly inflates the value of quantitative research outputs.*
- *I, myself try to publish in high impact factor journals - the only reason for that is "perceived prestige" that is important for the reviewers of the funding bodies, evaluation committees, etc.*
- *Impact factors are totally crazy. I cannot understand why my research should be assessed as a result of decisions made by editors on papers produced by other authors.*
- *Less importance should be given to the bibliometric indexes and more attention paid to the real scientific relevance and content of the articles.*
- *Manuscripts cascade down the 'food chain' from the more glamorous journals, to which they should never have been submitted in the first place, to more specialist journals.*
- *Measures of excellence could also help relieve the pressure of producing unnecessarily high volumes of work, and move toward a culture of securing funding based on quality of research.*
- *Misidentifying journal impact factor as a mark of quality of the research published within.*
- *Number of publications and citations should not be the major indicator of research performance*
- *People are currently encouraged to publish no matter what. They divide papers up as much as possible.*
- *Publication in prestige journals is taken as a proxy of quality in assessments*
- *Removing impact factor from career impact would also be helpful for authors to match their work to appropriate journals.*
- *Research results should be published in longer "units" again, i.e. instead of cutting research projects in smallest publishable research results.*
- *Scientific publishing is the quest for truth. I would eliminate all aspects of present insane competition in science, terms such as prestigious journals, Impact Factor, quartiles 1 to 4 and similar nonsense.*
- *Self-referential groups game the impact scores.*
- *Stop counting the publication numbers but focus on the article's merits, especially their originality.*
- *Tenure and promotion should be based on quality of contributions over quantity. Incremental and duplicate publishing should be stigmatized.*
- *Tenure and promotion. Quantity of publications is valued over quality. This is why there is too much literature for researchers to keep track of, and why so many poorly designed/analyzed studies exist.*
- *The emphasis on quantity instead of quality is problematic.*
- *The fact that publication (numbers of papers and citations) is such an important factor in academic promotion and tenure decisions has led to a race for the least publishable unit.*
- *The proliferation of journals means that virtually any manuscript can get published, which is why number of publications represents an increasingly poor representation of the quality of a researcher.*
- *The quality of a paper/journal should not be measured by the impact factor, rather by the reproducibility of its results.*
- *The value of a scientist / scientific research must not be mainly judged by the impact factor of the journals chosen to submit the reports.*

- *The value of quantity of publications and impact factor of journals is rated far too high in the evaluation of scientific output, leading to low quality and split publications.*
- *There has to be a rejection of "Impact Factor" as a criterion for evaluation of publications. The Impact Factor has ZERO to do with any given paper. It does not provide any data about a paper's worth, citations, impact, etc. It is merely an advertising tool for some glossy journals that has, unfortunately, captured the imagination of funding agencies.*
- *There is too much pressure to publish many papers in high-impact journal*
- *There should be a better system than impact factor for evaluating a professional journal.*
- *This unfortunate practice distorts the scientific environment, degrades evaluation of scientific performance by the number of their publications and the h-index, and generates the so-called publishing celebrities.*
- *Today's scientific publishing is almost like a pyramid scheme. Focus should be on quality not quantity*
- *Too much emphasis on metrics which distorts publishing behavior*
- *Unweighted citation distribution: e.g. 10 authors receive 100 citations each for a paper cited 100 times. In the world of economics this would have been a joke.*
- *Using scientific publishing to assess performance and progress in your career is not working. We publish for the credits and not for the knowledge.*
- *We need to de-emphasize the importance of impact factor, number of papers, and number of citations. Focus on quality of work only as assessed by peers in the field.*
- *What I find unsatisfactory is the way institutions often judge scientific output with metrics rather than contents.*

PEER REVIEW

- *A system to really reward good peer review and to show what that looks like would be great.*
- *All of the process should be double blind, even the editor should not know which institutions the authors are from.*
- *all reviews should be double-blinded, even at the submission to the editor level,*
- *Anonymity of peer reviewing encourages bad/vindictive peer reviewing.*
- *As a scientific editor of accepted papers, I am finding that a lot of the papers that are coming through are rubbish.*
- *Authors are sharing their research in alternative ways (or being forced to). The next thing will be authors implementing peer review in preprint services or personal websites, and the whole publishing business is over.*
- *Blind submission and peer review would help but is hard to really arrange, as it is usually quite easy to spot the author if you know the field and can be gotten around by pre-circulating preprints.*
- *Decisions often seem to be based on the perceived "sexiness" of the paper, with no real connection to its scientific content.*
- *Double blind peer review should be mandatory for all articles with a time bound review time of 10-15 days.*
- *Double-blind reviews should be standard practice.*
- *Ease of submitting a manuscript has the effect of overwhelming the peer review process.*
- *Editors and journals are pressured to reward stuff that will ring the biggest number of bells.*
- *Editors are indifferent to the effort that goes into preparing a manuscript. They often don't read a manuscript with the result that they are unable to make a meaningful decision about the manuscript. The reviewers are often careless or capricious. The editors do nothing to act like a moderating influence over the reviewers.*
- *Editors should get out of the business of denying to send a manuscript for peer review after a quick look at a paper.*
- *Editors spend a lot of time and effort that could have been spent generating their own research outputs. There is a need for greater institutional appreciation and support of this role.*
- *Editors too often take a passive role in the review process.*
- *Encourage open constructive post-publication review/discussion.*
- *Find ways to reward peer reviewers and journal editors for their voluntary work.*
- *Have most manuscripts reviewed before and after publication (full peer review prior; community discussion after).*
- *I also like what some publishers have done about letting referees see each other's reports.*
- *I am a fan of double-blind submission and reviewing; It seems the most appropriate way to remove any bias.*
- *I am invariably asked to evaluate the revised version, which is often not much better than the previously submitted version.*
- *I believe "Double-blinded peer review" is most fair and appropriate method.*

Analysis and Report of Responses

- *I dislike reviewing because I am asked to review so many poorly prepared manuscripts*
- *I have stopped participating in editorial boards for the journals of for-profit publishing houses and have stopped accepting their review invitations.*
- *I rarely hear debate about the role of academic editors in a role where a small honorarium is received but the work load can be substantial.*
- *I support open review system where the review process is open and subject to challenge on technical grounds. Alternatively, the process can be double-blind. Currently, the openness is one-sided.*
- *I'd like to see a more standardized timeframe for peer review.*
- *If a journal is charging for publications, they should at least pay their reviewers.*
- *If the reviewers are anonymous, let us keep the authors anonymous too, till the decision has been made. I believe this will substantially improve the fairness of the review and allow publications by not so well-known and young investigators to publish in high impact journals.*
- *If the reviewing process rules would be stricter and reviewers would be salaried for this, the quality of the reviews would be higher.*
- *Improve on the quality of the writing, prior to sending it out for review.*
- *In my opinion the costs of peer review should be part of the research budget.*
- *In our world of overwhelming amount of low-quality papers in any field, it should be both advance review and post reviews.*
- *It is evident that some peer reviewers do not take their task seriously or are reviewing outside of their expertise.*
- *It is getting harder for editors to find reviewers for papers - I've seen some terrible and careless reviews, clearly written by someone who was not prepared to take the time and effort needed*
- *Its relevance to the popular market-place should not be the driving criterion for effective research publication.*
- *Many editor colleagues are in it for the honor and because of their name and reputation. Some kind of formal training / evaluation of editorial issues should, however, be mandatory.*
- *Many of us perform this service for free and often on our own time (nights, weekends, days off); please don't waste our time with poor quality papers.*
- *Many top journals are governed by fashion [...] attending to only what seems to be "hot."*
- *More emphasis should be put on the scientific rigor of manuscript rather than just the results.*
- *Most journals provide the facility of suggesting possible reviewers. This leads to authors suggesting reviewers that have a higher chance of accepting their work. And this leads to a situation of 'you scratch my back, I'll scratch yours'.*
- *Need a shorter time from discovery to dissemination.*
- *Occasionally when reviews are poor, editors [should] step in to make a well-informed decision, discounting the poor review.*
- *Offer incentives to reviewers to perform much faster.*
- *Often older, seminal work containing the concepts and ideas for research fields does not get cited.*
- *Often the reviewers ask the authors to cite the reviewers' publications as a condition for acceptance of the manuscript.*
- *Open peer review, where you have to commit to having your views openly available and attributed, would remove perceived bias.*
- *Papers should be evaluated by their merit and no importance should be given to the reputation of the authors and of their institutions.*
- *Peer review has become more a matter of chance than a filter against mediocre work.*
- *Peer review should be blind.*
- *Peer reviewers should get a small stipend.*
- *Perhaps, blind refereeing - when a referee knows neither authors' names nor their institutions - could give unbiased results.*
- *PI's are frequently having their graduate students perform reviews. Strict control over review ownership should be implemented and limitations set on delegation of reviews.*
- *PI's are overburdened with review requests, and increasingly rely on graduate students and postdocs to carry out the review*
- *Post publication review of papers is essential, even if they have been peer reviewed.*

- *Post-publication peer review by a much wider field of researchers would be better.*
- *Preprints of manuscript while under review and at each stage of review should be publicly available.*
- *Pre-publication peer review is hit and miss in quality and driven by many factors beyond simple quality of the work and a desire to constructively criticize it.*
- *Pre-review editorial filter is becoming too strong*
- *Publication may be delayed because of a lack of available reviewers.*
- *Publication of peer reviews after the paper has appeared seems like an excellent idea to me.*
- *Publish reviewer comments on line along with the paper.*
- *Published scientific literature may receive comments on line and the authors may be able to answer.*
- *Push for transparency in the peer review process, perhaps by the publishing of the review reports post acceptance.*
- *Reviewers are asked to judge the impact of the paper, a very arbitrary and fortune telling-like exercise - less focus on impact and more on the scientific quality.*
- *Reviewers must know and admit their own biases and weaknesses.*
- *Reviewers should be paid and policed by editors.*
- *Reviewers should receive a financial compensation for delivering a review.*
- *Reviewing is not rewarded to the degree that publishing research is.*
- *Reviews should always be double-blind*
- *Reviews should be double-blind and manuscripts should undergo more rigorous preliminary screening by the journal before it is sent out for peer review.*
- *Reviews which are only a few lines long and provide little justification should be disregarded by editors.*
- *Sample preparation is often taken as "second class science". This is one of the most difficult parts of the scientific knowledge, and crucial to understand the physical phenomena.*
- *Scarcity of expert reviewers.*
- *Scientific issues can get overlooked because the reviewers are distracted by the other shortcomings.*
- *Should not allow statements such as "not of broad enough interest" to be involved in the decision regarding publications.*
- *The editors should not take the reviewer's opinion on faith without reading the article. We need reviewers who take the review process seriously.*
- *The English language in many of these journals is extremely poor and incomprehensible which signifies that they are not peer reviewed properly.*
- *The entire system needs to be torn down and replaced with something better, faster, and less based upon the system of control called peer review. Everything should be post-published peer-reviewed.*
- *The majority of reviewers do not consider the importance of the unsuccessful results to direct future researches*
- *The peer review process needs to be something more than just a quick rubber stamp.*
- *The problem is how to identify or educate peer reviewers to do a top-notch job?*
- *The review process would be greatly improved if it were open and not secretive, with back and forth allowed between reviewers and authors*
- *The review process, while in theory produces the best publications, is not incentivized. it is harder to find reviewers which slows down the review process.*
- *There can be substantial unconscious bias when it comes to the peer review process*
- *There is too much emphasis on perceived potential impact of the research rather than judging the quality of the science.*
- *There should be a minimum level of feedback from journals which indicates specifically why a manuscript is being rejected, e.g., technical limitations, writing, lack of data, poor hypothesis, poor interpretation etc.*
- *There should be more incentive to increase the commitment of reviewers to reviewing, to ensure they are more serious and careful in their review.*
- *To encourage scientists to take the time to review articles, we need to find a reward system.*
- *Too many journals provide inadequate time for review.*

Analysis and Report of Responses

- *We have to reduce the burdens associated with peer review*
- *With internet capacity, it may be time to make referees' comments available to readers while still keeping their identities confidential.*
- *Would like to see a system for rating the quality of reviews by editors.*

PUBLISHER

- *A single format for supplying the text, figures, supplemental data etc. Now you often need to substantially reorganize a manuscript to submit to a different journal.*
- *Accept the important role of copyeditors in manuscript preparation.*
- *Authors should be able to freely have their published works on their own websites without reprisal from publishers.*
- *Better help and/or preparation of authors for conforming to a particular journal's format and style.*
- *Commercial publishers make profits that are not compatible with aims of the sharing of scientific knowledge and discovery and charge fees at too many points in the process. A greater, wider commitment to Open access publishing would be a considerable step forward.*
- *Creative Commons is thought to be a panacea but is not and the label translates to "oh its free" for most users.*
- *Hard copy production should be in decline to the point of elimination given the almost 100% choice nowadays of online journal access.*
- *I am not sure how sustainable open access is for a learned scientific society which does not generate public funds.*
- *I would like to see publishers look for ways to standardize terms and conditions contained in copyright transfer agreements.*
- *It would be helpful if authors could submit their articles in a standard format for every article.*
- *Journals are dinosaurs. They are a remnant of an era when information could be controlled and sold. In a world with instant information distribution via the internet they are no longer needed.*
- *Journals should share one uniform and universal format for submitted manuscripts.*
- *Overcome the "Impact Factor dictatorship" and return to evaluation of the real value and importance of scientific results and publications.*
- *Print journals are wasting resources trying to preserve an obviously obsolete medium (paper).*
- *Publishing has real costs; highly selective journals and those that employ science writers and editors to create content to put research into context and to communicate it broadly have even higher costs. Diversified revenue streams have proven to be sustainable rather than relying only on those authors who have enough funding to pay APC fees to publish. Continuing the hybrid open access model would allow the scientific community to decide how many authors can afford to pay for access, up to the tipping point where it becomes clear that it is time to flip to a fully open access model.*
- *Scientific publishing needs a complete overhaul.*
- *Systems like ArXiv.org should be in place for all scientific work.*
- *The journal business is a huge embarrassment to the world of science and should be entirely restructured as soon as possible. Priority should be given to open access and to quality of content.*
- *The scope of many journals is too vague. Perhaps a portal where manuscripts are scanned for content and a list of relevant publication is presented to the authors would help better target the right journals for submission.*
- *University presses deliver a host of valuable services to authors but our business model is under severe pressure.*
- *Using forever copyrights by publishers is damaging not only for researchers but also the publishers themselves.*
- *We need publishing from the scientific community for the scientific community via the Learned Societies.*

QUALITY

- *A system in which rejected papers would go to a central information depository and re-submission to other journals would require them being informed of the history of the paper including the reviews which led to rejection*
- *Allow readers to comment and ask questions. In the electronic age, a scientific paper should be a "living" resource, not something that is cast in stone for eternity*
- *As a scientist, I know how to recognize predatory journals and publishers, but the public won't be able to do that.*
- *Better understanding not just of what has worked, but also what does not.*
- *Citation of previous work is often inadequate*

- *Clearly, predatory publishing has become a major brand for publishers.*
- *Currently authors seek high impact factor journals whether or not their work meets the standards.*
- *Expectations from some journals for "sexy factor" as opposed to strictly scientific merit.*
- *Findings typically only become trustworthy as other researchers test, correct, and build upon them.*
- *High quality learned journals edited by active scientists is the key to fairness and rigor.*
- *High quality specialist journals in small disciplines have inherently low impact factors, but are critical to scientific progress in their fields.*
- *How to make it easier to identify a predatory publisher.*
- *I am disappointed at the metastasis of journals, which makes it very difficult to keep up, and with the apparent inability of the scientific community to restrain the proliferation of extremely low-quality start-up publications.*
- *I think the scientific community should shift its culture towards publication of both positive and negative results - be it in technology building or more fundamental scientific research.*
- *If this is a letter you have to try to explain everything in a concise but still understandable form. Otherwise write a long article.*
- *I'm not sure what would work best but the current system is beyond broken.*
- *Impact factor of journal should be considered less important, otherwise editors are forced to publish what will be cited most and prefer it to what has higher scientific value.*
- *In general, the level of disclosure of detail in literature reports is much poorer, nowadays.*
- *In some cases, some negative results can be very useful to avoid repetition of experiments, or even to better understand a theory, process, etc. I think it would be very helpful for researchers to read sometimes works that did not work, but that can lead to new questions that might advance knowledge in a specific field of research.*
- *It could be that the general proliferation of readily available information online, the vast majority of which is unsubstantiated and unreferenced, sets a mindset amongst newer researchers for publishing in a similar vein, i.e., volume or number, not quality or depth.*
- *It has become common practice to dump enormous amounts of materials into Supporting Information.*
- *It is very difficult to publish negative results.*
- *It's the content that matters.*
- *Junk science is being published*
- *Low or no credit for reproduction of experiments.*
- *Low-quality research gets published in newer journals.*
- *Many high-impact journals support fancy articles instead of solid interesting work.*
- *More interest is needed in publishing studies with negative results or those confirming a previous study.*
- *More reports on negative or 'insignificant' findings should be published.*
- *Negative findings should be just as encouraged to be published.*
- *Now, only the "good news" is accepted for publication. It would be more scientific to also allow the less popular "bad news" or repeated experiments to be published to get a less biased and more corroborated view on reality*
- *One terrible result is the growth in number of predatory publishers and journals.*
- *Our industrial research agenda is partly dictated by the predicted prestige of publishing results in a high impact factor journal, whether or not the topic is critically linked to our technology business.*
- *Papers that report research that did not work should be promoted.*
- *public is increasingly aware of the fact that many scientific results are often overstated*
- *Publishers publish a huge amount of material but much goes unused and unread.*
- *Repetitive measurements and validations (of the same thing by different people in different settings) are important and necessary, but this contradicts that journals want unique data.*
- *Scientific research is increasingly influenced by the trend of quick and dirty publications, easy fame, future positions, grants, and awards.*
- *Single-author papers used to be the norm a century ago and are now a rarity.*

Analysis and Report of Responses

- *Some journals add substantial value and curate an excellent range of reports*
- *The current problem of too much importance to impact factors and too many predatory journals is of our own making.*
- *The entire system is unnecessary and a throwback to pre-internet times*
- *The interplay of digital publishing and paper publishing is rapidly changing, and I see many new and good things coming out of this; if only we could raise the quality bar.*
- *The JIF [journal impact factor] arms race results in inappropriate behaviors by publishers and editors.*
- *The number of publications per researcher, per day, per journal is too large.*
- *The old "volume / issue" system is totally outdated and should be dropped.*
- *The onus is now firmly on the reader and user of the research to make critical assessment of work for themselves (buyer beware!)*
- *The practice of having "grave-yard" journals is very wrong and we, as a community, should get rid of these.*
- *The prevalence of predatory journals is a growing problem*
- *The problems are complicated by the ability of the authors to reference other articles in the literature that should not have been published, but support their viewpoint.*
- *The proliferation of journals leads to more being published but less being read.*
- *The quality of scientific publications has gone rapidly downhill over the last two decades or so.*
- *The race for novelty makes no sense.*
- *The race to publication discourages the presentation of more comprehensive syntheses of topics*
- *The seminal works are often neglected and recent routine papers or minor reviews are cited in detriment of original, ground breaking publications.*
- *There are many dubious journals that publish work of negligible academic merit*
- *There are too many journals and too many articles. It would be better to have fewer, carefully thought-through, well-written articles that move the field forward.*
- *There has recently been a proliferation of for-profit journals that seem to have essentially no standards whatsoever. I worry others, including junior scientists, reporters, and the public, may be tricked into thinking these operations are legitimate. I fear this dilution of real scientific journals with junk represents a serious threat to scientific publishing.*
- *There is a huge need for review articles and those with perspective; however, there is no incentive to write such an article.*
- *There is a vast growing quantity of on-line, minimal review, pay to publish journals that are growing because they can be profitable to publishers.*
- *There is not enough value and possibility to publish given to negative results and reproduction of published data.*
- *There is too much low-quality work being published, and reading the literature is frustrating and a waste of time.*
- *There needs to be a more efficient process through which the community can express its opinion on the worth of a piece of work. Enabling comments on ArXiv could be a starting point. Journals also need to allow comments on their portals. Why are we afraid of using these technologies?*
- *There needs to be an acceptance for publishing studies focused on reproducing results (with some limited additional work), as well as publications of null or negative results.*
- *There should be some way to punish or eliminate the massive numbers of predatory open access journals that have sprung up.*
- *These journals are bad for science and for scientists.*
- *Too many papers are being submitted for publication that have too many authors (>5) and only report incremental progress in the science.*
- *Too many papers are published with insufficient information to permit attempted replication, and insufficient data to buttress validity.*
- *With the proliferation of online journals, it is too easy to publish manuscripts that are deficient in some way.*

IUMRS SURVEY ON THE
EVOLUTION OF SCIENTIFIC PUBLISHING

