Exposing the predators
Methods to stop predatory journals

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Abstract

The internet is greatly improving the impact of scholarly journals, but also poses new threats to their quality. Publishers have arisen that abuse the Gold Open Access model, in which the author pays a fee to get his article published, to make money with so-called predatory journals. These publishers falsely claim to conduct peer review, which makes them more prone to publish fraudulent and plagiarised research.

This thesis looks at three possible methods to stop predatory journals: black- and white-lists, open peer review systems and new metrics. Black- and white-lists have set up rules and regulations that credible publishers and journals should follow. Open peer review systems should make it harder for predatory publishers to make false claims about their peer review process. Metrics should measure more aspects of research impact and become less liable to gaming. The question is, which of these three methods is the best candidate to stop predatory journals.

As all three methods have their drawbacks, especially for new but high quality journals, none of them stop predatory journals on its own can. Rather, we need a system in which researchers, publishers and reviewers communicate more openly about the research they create, disseminate and read. But above all, we need to find a way to take away incentives for researchers and publishers to engage in fraudulent practices.

Preface

My Master thesis did not come about easily. Two years ago, when I first tried to graduate, a protest movement had just arisen against the journal publication practices of, most notably, Elsevier. Some dubious practices were openly discussed, like the fact that Elsevier had published some fake journals some few years before. About a year and a half later, when I started my research for this thesis, another sort of dubious journal publishing caught my attention: predatory journals. As open access publishing in itself seems to have many advantages, I decided to see if there is a way to diminish or even take away the disadvantages of the system.

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August 15, 2014

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Chapter 1

Introduction

In the academic world, the open exchange of knowledge is of vital importance. It helps to rapidly refute unreliable findings and to spread and build on ideas that have proven to be correct.[1] Over the past three decades, open access publishing has become a great help in openly spreading academic knowledge. Many journals, repositories and archives have been set up to publish articles, papers, data and other research artefacts and bring them to the attention of other academics and society.

In the case of journals, though, the open access movement has also led to fraudulent publication outlets. Since open access means that publishers can't charge their readers anymore, part of them have moved to asking authors of academic research to pay for the peer review, publication, and dissemination of their papers. While this in itself is a valid practice, publishers have arisen that abuse this model to earn lots of money without conducting proper peer review. This increases the chance that unreliable findings and ideas find their way into society, thereby affecting reliable academic research as well.

This thesis explores three possible mechanisms to stop predatory journals: black- and white-lists and their criteria; open forms of peer review; and new metrics for determining journal reputation. Through a literature study an attempt is made to determine which of these mechanisms is the best candidate to stop preda-

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[1]C.L. Borgman. *Scholarship in the Digital Age*. MIT Press, 2007. ISBN: 9780262250665. URL: `http://books.google.nl/books?id=ZDDu3CuzDdMC` (visited on 08/02/2014), p. 35.

tory publishers.

It is concluded that none of these mechanisms on its own is enough to achieve this goal, but that a combination of the three is needed. It is argued that we may well turn to a new sort of publication system, in which journals and publishers are left out and researchers publish their findings by themselves on the web to have them reviewed and rated by their peers. Some platforms already exist that perform one or more publication functions. These are discussed and it is discussed if their main features could be combined into one publication platform.

1.1   The rise of open access

Over the last thirty years, open access publishing has gained great popularity in the academic world. It enables researchers to spread their work more widely and increase their chances on getting cited, on gaining impact and thereby on building their career. Universities and funding agencies encourage their researchers to publish online.[2] Governments, too, more and more require that the research they support is published open access.[3]

Laakso et al. divide the rise of the academic open access movement into three phases.[4] During the pioneering years, from 1993 to 2000, (groups of) scholars began to publish on technically simple platforms that were mostly supported by volunteers.

The period 2000 - 2004 were called the innovation years, in which now well-known players like BioMedCentral (BMC) and Public Library of Science (PLoS) began their publishing activities. Established printed journals started to digitize their contents and publish them on portals to increase their visibility. Several web

[2]Peter Suber. *Open Access*. Essential Knowledge. Cambridge, Massachusetts: MIT Press, 2012. URL: http://mitpress.mit.edu/books/open-access (visited on 06/22/2014), pp. 14-15.

[3]Editorial. "Gold on hold". In: *Nature* 494 (Feb. 28, 2013), p. 401. DOI: 10.1038/494401a. URL: http://www.nature.com/news/gold-on-hold-1.12490 (visited on 06/22/2014).

[4]M. Laakso et al. "The Development of Open Access Journal Publishing from 1993 to 2009". In: *PloS ONE* 6.6, e20961 (June 13, 2011). DOI: 10.1371/journal.pone.0020961. URL: http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0020961 (visited on 06/22/2014).

declarations were drawn up to define open access and the new system was more and more discussed at conferences.

During the consolidation years, from 2005 to 2009, the growth of open access articles decreased to about 20% per year, whereas during the innovation years the average annual growth was approximately 37%[5]. Software, licensing agreements and quality standards were introduced and gained acceptance. Lastly, research funders began to support open access publishing and set aside funds to pay author fees.

1.2   Open access publishing

Open access can be defined in many ways, but the most common used definitions are those by the declarations of Budapest, Bethesda and Berlin. The latter two state that a publication is open access when:

> The author(s) and copyright holder(s) grant(s) to all users a free, irrevocable, worldwide, perpetual right of access to, and a license to copy, use, distribute, transmit and display the work publicly and to make and distribute derivative works, in any digital medium for any responsible purpose, subject to proper attribution of authorship, as well as the right to make small numbers of printed copies for their personal use. (Bethesda Statement[6] and Berling Statement[7])

> The Budapest statement has more specifically defined open access as:

> [an article's] free availability on the public internet, permitting any users to read, download, copy, distribute, print, search, or link to the

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[5]The exact dividing line between the innovation years and the consolidation years is debatable. Between 2003 and 2004, the growth of articles declined from 37.6% to 18.1%. In 2005, the growth had risen again to 35.7%. From 2006 onward, the annual growth lay around 20%. The growth in the number of journals already began to decline in 2002. (Laakso et al., "The Development of Open Access Journal Publishing from 1993 to 2009", p. 7)

[6]*Bethesda Statement on Open Access Publishing*. June 20, 2003. URL: http://legacy. earlham.edu/~peters/fos/bethesda.htm#definition (visited on 06/24/2014).

[7]*Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities*. Max Planck Gesellschaft. Oct. 22, 2003. URL: http://openaccess.mpg.de/286432/ Berlin-Declaration (visited on 06/24/2014).

full texts of these articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose, without financial, legal, or technical barriers other than those inseparable from gaining access to the internet itself. The only constraint on reproduction and distribution, and the only role for copyright in this domain, should be to give authors control over the integrity of their work and the right to be properly acknowledged and cited.[8]

Thus, everyone with access to the internet should be able to read and use open access publications according to their will, without having to pay for it and without risking being sued for breaches of copyright law, provided that they correctly attribute the work to the original author.

In the journal publishing industry, there are two ways to make works open access. The first is the Gold Open Access route, in which articles are published in an open access journals. In this model, articles are submitted to the publisher, are often peer reviewed, and the rights are mostly signed over to the publisher.[9]

In the Green Open Access route, authors can themselves upload their work in an online archive. They retain the rights over their work, but the archive doesn't provide pre-publication peer review. In general, though, these archives enable uploading of articles that have been peer reviewed and published elsewhere before. Sometimes, post-publication peer review is also possible. The archives can always be crawled individually by search engines, but those that use the Open Archives Initiative (OAI) Protocol for Metadata Harvesting (PMH)[10] can also behave together like a single grand repository that can be searched all at once.[11]

A small part of open access journals uses a hybrid model, which allows authors to pay a fee to make their articles freely available in a journal that traditionally uses a subscription model. In 2008, 20.4% of all scholarly articles was available open access: 8.5% Gold Open Access, 11.9% Green Open Access. Of

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[8]*Ten years on from the Budapest Open Access Initiative. setting the default to open.* Budapest Open Access Initiative. Sept. 12, 2012. URL: `http : / / www . budapestopenaccessinitiative . org / boai - 10 - recommendations` (visited on 06/24/2014).

[9]Suber, *Open Access*, pp. 52-56.

[10]*Open Access Initiative Protocol for Metadata Harvesting*. Open Access Initiative. URL: `http://www.openarchives.org/pmh/` (visited on 07/23/2014).

[11]Suber, *Open Access*, pp. 52-56.

the Gold Open Access articles, 62% was available immediately after publication, 14% through delayed open access and 24% through hybrid open access.[12] More recent numbers estimate that about 17% of articles indexed in the ISI Web of Knowledge index are now published in Gold Open Access journals, while about 25% of all peer reviewed articles is available through Green Open Access.[13]

1.3 Pricing policies

Whatever the route, there are always costs involved in the set up and maintenance of an open access platform. Publishers have several options to recoup these costs. Some use advertisements, membership fees and subscriptions to cover their costs.[14] Others are subsidized by a university, library, foundation, society, museum or government agency.

Another popular method is to charge an article processing charge (APC), which is mostly paid by the author's employer or funder. Almost 90% of the time, these are waived or lessened for authors from developing countries or via an institutional membership or sponsor. All publishers can diversify their funding with revenues from print editions, advertising, priced add-ons or auxiliary services.[15]

Björk and Solomon distinguish three principles for charging APCs.[16] In the first, the publisher charges the author for submitting the manuscript or for publishing the accepted article. Some charge two APCs, the first for submitting and

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[12]Laakso et al., "The Development of Open Access Journal Publishing from 1993 to 2009", p. 2.

[13]Richard Wellen. "Open Access, Megajournals, and MOOCs". In: *SAGE Open* 3.4 (2013). DOI: `10.1177/2158244013507271`. URL: `http://sgo.sagepub.com/content/3/4/2158244013507271` (visited on 06/27/2014), p. 1.

[14]Panayiota Polydoratou et al. "Open Access Publishing: An Initial Discussion of Income Sources, Scholarly Journals and Publishers". In: *The Role of Digital Libraries in a Time of Global Change*. Ed. by Gobinda Chowdhury, Chris Koo, and Jane Hunter. Vol. 6102. Lecture Notes in Computer Science. Springer Berlin Heidelberg, 2010, pp. 250–253. DOI: `10.1007/978-3-642-13654-2_30`. URL: `http://link.springer.com/chapter/10.1007%2F978-3-642-13654-2_30` (visited on 06/27/2014), pp. 252-253.

[15]Suber, *Open Access*, pp. 136-139.

[16]Bo-Christer Björk and David Solomon. "Pricing principles used by scholarly open access publishers". In: *Learned Publishing* 25.2 (2012-04-01), pp. 132–137. DOI: `10.1087/20120207`. URL: `http://www.ingentaconnect.com/content/alpsp/lp/2012/00000025/00000002/art00007`, pp. 135-137.

a fast screening of the manuscript and the second for publication after thorough peer review.

In the second principle, the publisher charges the same APC for all articles or bases the APC on some characteristics of the article. The latter is quite common, especially with publishers that run several journals. The APC can vary according to length, format and type of article.

The third principle entails a uniform APC for all authors and discounts or waivers for some categories of authors, mostly those in developing countries. These APCs are often paid by the author's employer or funder, who can get discounts via an institutional membership.

In another article, Björk and Solomon researched the heights of author fees. They found that the average APC was just above $900 USD. However, prices could vary from below $200 USD for publishers in developing countries to $4000 USD for a few high-impact journals. 25% of the articles were published in journals charging less than $200 USD. Commercial publishers charged higher APCs, while universities and university departments charged the lowest APCs. Most APC funded open access publishing was found to be in scientific, technical and medical publishing.[17]

According to Van Noorden, possible explanations for the great differences in pricing include additional subsidies and large profit margins at commercial publishers. These, however, can only account for a small part of the differences. A more important explanation is that new open access publishers can start with the latest technology and workflows, while some established publishers have to adapt their old systems to the new model. They often also publish in print and use antiquated workflows for typesetting, peer review, file-format conversion and other chores. Since this leads to more work to achieve the same quality as open access only publishing, these established publishers need to charge higher APCs to recoup their costs. Selectivity and value-adding might also account for a small part of the variation, although it is contested whether these really are special traits of

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[17]David J. Solomon and Bo-Christer Björk. "A study of open access journals using article processing charges". In: *Journal of the American Society for Information Science and Technology* 63.8 (2012), pp. 1485–1495. DOI: 10.1002/asi.22673. URL: http://onlinelibrary.wiley.com/doi/10.1002/asi.22673/abstract (visited on 06/27/2014), pp. 1492-1493.

more traditional publishers.[18]

1.4 Fraudulent practices

The combination of charging high sums of money and easy online publishing forms an incentive for less ethical journal publishers. To describe them, academic librarian Jeffrey Beall has coined the term "predatory publishers". According to Beall, these journals publish about 5-10% of all open access articles. However, more conservative estimates take the line that only less than 1% of all author-paid open access papers is published by predatory journals.[19]

Predatory publishers are specialists in vagueness and deceit. Most of the time they hide the names of their owners, editors and reviewers and their business address.[20] If they do list editors and reviewers, those are mostly credible people who have never been asked at all or who have in vain requested to be removed from the publisher's website after negative experiences. When there are contact details listed on the publisher's website, these are often fake or non-existent. A lot of predatory publishers claim to be based in the Western world, while they actually reside in countries like India, Pakistan or Nigeria.[21]

Likewise, they are dishonest about their journals. Most predatory publishers set up websites that resemble those of legitimate online publishers. The journals that are listed on these websites are of low and questionable quality and have titles that look like those of legitimate journals.[22] Furthermore, the journals usu-

[18]Richard Van Noorden. "Open access: The true cost of science publishing". In: *Nature* 495 (Mar. 28, 2013), pp. 426–429. DOI: 10.1038/495426a. URL: http://www.nature.com/news/open-access-the-true-cost-of-science-publishing-1.12676 (visited on 06/27/2014).

[19]Declan Butler. "Investigating journals: The dark side of publishing". In: *Nature* 495 (2013). DOI: 10.1038/495433a. URL: http://www.nature.com/news/investigating-journals-the-dark-side-of-publishing-1.12666 (visited on 06/27/2014).

[20]Peter Suber. "Ten Challenges for open access journals". In: *SPARC Open Access Newsletter* 138 (2009). URL: http://legacy.earlham.edu/~peters/fos/newsletter/10-02-09.htm#challenges (visited on 06/22/2014).

[21]John Bohannon. "Who's Afraid of Peer Review?" In: *Science* 342.6154 (2013), pp. 60–65. DOI: 10.1126/science.342.6154.60. URL: http://www.sciencemag.org/content/342/6154/60.short.

[22]Jeffrey Beall. "Predatory publishers are corrupting open access". In: *Nature* 489 (Sept. 13, 2012), p. 179. DOI: 10.1038/489179a. URL: http://www.nature.com/news/

ally cover very broad subject areas and claim to be "international", "scientific" or "scholarly peer-reviewed". Meanwhile, their business models are unsustainable, based on nothing other than APCs.[23] Most often, there is also no strategy for long-term digital preservation.[24]

With regard to their workflow, too, predatory publishers lack ethics. Most of them send spam mail to researchers with requests to join editorial boards or submit manuscripts. Once a manuscript is accepted for publication, the author receives an invoice for an author fee that had not been mentioned before. Apart from this, predatory publishers often publish plagiarised articles and other forms of fraudulent research.[25] They are all the more likely to do this, because most of them don't conduct peer review and sometimes also bypass the copy-editing process.[26]

It is hard to say with certainty to what extent researchers are aware of the problems with predatory journals. Since these journals send mails to many researchers at a time, it is to be expected that quite a large number of researchers has had experience with them. Indeed, Beall claims that he receives hundreds of mails from scientists complaining about predatory journals.[27] Also, over the past few years academics have published articles in credible journals to warn their colleagues that they should be careful to whom they send their papers (see for example Haug[28]).

However, it is not likely that all academic fields experience these problems to the same extent. Publications in journals play a more important part within the sciences and social sciences. Humanities scholars make more use of monographs and therefore would probably come across predatory journals less often

predatory-publishers-are-corrupting-open-access-1.11385 (visited on 06/23/2014).

[23]Charlotte Haug. "The Downside of Open-Access Publishing". In: *New England Journal of Medicine* 368.9 (2013). PMID: 23445091, pp. 791–793. DOI: 10.1056/NEJMp1214750. URL: http://www.nejm.org/doi/full/10.1056/NEJMp1214750 (visited on 06/27/2014).

[24]Jeffrey Beall. "Predatory Publishing". In: *The Scientist* (Aug. 1, 2012). URL: http://www.the-scientist.com/?articles.view/articleNo/32426/title/Predatory-Publishing/ (visited on 06/23/2014).

[25]Beall, "Predatory publishers are corrupting open access".

[26]Beall, "Predatory Publishing".

[27]Beall, "Predatory publishers are corrupting open access".

[28]Haug, "The Downside of Open-Access Publishing".

than researchers in other fields.[29]

Some researchers that are aware of the problem try to expose predatory journals by sending them manuscripts containing fake research. In Serbia, for example, Djuric created a fake article and sent it to the International Journal of Very Important Multidisciplinary Research (IJVIMR). This journal, that officially published articles about daisy gardening, mainly contained articles about computer science and other sciences. Djuric's article was accepted within a day and without peer review, but he still received an invoice for an APC. After publication, Djuric revealed that the article was a hoax and the publisher removed it from its website without any notice.[30]

While Djuric wrote his fake paper himself, other researchers have theirs generated by computer software. The most notable example is SCIgen, which was created in 2005 by three students from MIT and used to expose a specific conference.[31] SCIgen creates papers full of technical jargon, common phrases, graphs, diagrams, citations and LaTeX-powered typography. Since 2005, several researchers have used SCIgen-generated articles to show the lack of quality in the peer review process of dubious journals and conferences.[32] More credible publishers have been misled as well. In early 2014, Springer and IEEE removed 120 papers from their subscription services after computer scientist Labb had discovered they were fake and created with the use of SCIgen.[33]

Deliberately submitting fake papers is not considered a very ethical practice by many. The authors often feel justified by the fact that it helps them to expose unethical practices of publishers and journals. However, others have pointed out

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[29] Borgman, *Scholarship in the Digital Age*, pp. 180-222.

[30] Dragan Djuric. "Penetrating the Omerta of Predatory Publishing: The Romanian Connection". English. In: *Science and Engineering Ethics* (2014), pp. 1–20. ISSN: 1353-3452. DOI: 10.1007/s11948-014-9521-4. URL: http://link.springer.com/article/10.1007%2Fs11948-014-9521-4 (visited on 06/27/2014), pp. 9-14.

[31] Philip Ball. "Computer conference welcomes gobbledegook paper". In: *Nature* 434 (7036 Apr. 21, 2005), p. 946. DOI: 10.1038/nature03653. URL: http://www.nature.com/nature/journal/v434/n7036/full/nature03653.html (visited on 06/24/2014).

[32] Djuric, "Penetrating the Omerta of Predatory Publishing: The Romanian Connection", pp. 4-5.

[33] Richard Van Noorden. "Publishers withdraw more than 120 gibberish papers". In: *Nature* (Feb. 24, 2014). DOI: 10.1038/nature.2014.14763. URL: http://www.nature.com/news/publishers-withdraw-more-than-120-gibberish-papers-1.14763 (visited on 06/24/2014).

that not all dubious looking journals are necessarily predatory. Inexperience also accounts for some of the dubious practices, like mass mailing researchers and disclosure of author fees only after accepting the manuscript for publication.[34]

Likewise, fraudulent practices are not confined to publishers. In a meta-analysis of surveys that ask researchers after research misconduct, Fanelli found that on average 2% of scientists admit to have falsified research at least one. Almost 34% admitted other questionable research practices. And this is probably only the tip of the iceberg.[35]

A study among 2,047 biomedical and life-science research articles listed as retracted by PubMed in May 2012 revealed that 43.4% of the retractions was caused by fraud or suspected fraud, 14.2% by duplicate publication and 9.8% by plagiarism.[36] The share of retractions for fraud had increased ten-fold since 1975. Most of the fraud was conducted in countries with a long-standing research tradition, like the United States, Germany and Japan and occurred mostly in high-impact journals. China and India, that don't have a long-standing research tradition, saw the most cases of plagiarism and duplicate publication, mostly in low-impact journals.

A possible explanation for the high number of retractions due to (suspected) fraud in high-impact journals is that they have higher visibility are and therefore more scrutinized than low-impact journals.[37] Another important explanation is that researchers feel pressured to publish, which could make them care less about ethical standards and publication bias.[38] They may exploit predatory journals to get tenure and promotion at the expense of more credible researchers, whose

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[34]Haug, "The Downside of Open-Access Publishing".

[35]Daniele Fanelli. "How Many Scientists Fabricate and Falsify Research? A Systematic Review and Meta-Analysis of Survey Data". In: *PLoS ONE* 4.5 (May 2009), e5738. DOI: 10.1371/journal.pone.0005738. URL: http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0005738 (visited on 06/27/2014), p. 10.

[36]Ferric C. Fang, R. Grant Steen, and Arturo Casadevall. "Misconduct accounts for the majority of retracted scientific publications". In: *Proceedings of the National Academy of Sciences* 109.42 (2012), pp. 17028–17033. DOI: 10.1073/pnas.1212247109. URL: http://www.pnas.org/content/109/42/17028.abstract (visited on 06/27/2014).

[37]Fang, Steen, and Casadevall, "Misconduct accounts for the majority of retracted scientific publications", p. 17031.

[38]Björn Brembs, Katherine Button, and Marcus Munafò. "Deep impact: Unintended consequences of journal rank". 2013. URL: http://arxiv.org/abs/1301.3748 (visited on 06/27/2014), p. 9.

research is tainted by association with dubious articles in the same journal.[39]

Because predatory journals often conduct little to no peer review, they are more likely to publish fraudulent research. It also makes them able to publish faster, thereby forcing more credible publishers who also compete for author fees to shorten their peer review process. This makes it more likely that they too will publish dubious papers.

1.5   Possible methods to stop predatory journals

Predatory journals are not only a problem for academics and publishers, but also for the public. The rise in fraudulent research could mean that they lose their trust in science and scientists.[40] It is therefore important that methods are found to fight predatory journals.

According to Beall, the key to solving the problem lies within the research community. Scholars should resist the temptation to publish quickly. They should also learn to identify fraud and share information on fraudulent practices on scholarly social networks. Libraries should remove predatory publishers from their online catalogue.[41]

The chance that researchers suppress the inclination to publish many articles within a short time is quite small. The responsibility for this lies more with committees that decide upon hiring, grants, fellowships and promotions. They could choose to evaluate their candidates' work in a holistic way, by assessing the quality of publications in combination with activities such as mentoring students and colleagues, teaching, lecturing and editorial and administrative services.[42]

This, however, is a very time-consuming and subjective way of evaluating. Moreover, as was mentioned before, peer review itself forms part of the problem with predatory publishers. In the traditional journal publishing process, peer review is conducted outside the view of the public. This makes it hard to check whether an article has actually been reviewed and to what extent. Proposals for

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[39]Beall, "Predatory publishers are corrupting open access".

[40]Brembs, Button, and Munafò, "Deep impact: Unintended consequences of journal rank", pp. 19-20.

[41]Beall, "Predatory publishers are corrupting open access".

[42]Borgman, *Scholarship in the Digital Age*, p. 58.

new forms of peer review therefore often focus on a more open process, for example after publication. In such a process not only researchers, but also journals could be reviewed. Some even suggest to do away with journals altogether and let researchers upload their papers on the internet, where they can be reviewed by peers. While this would definitely solve the problem of predatory publishers, it also creates new challenges.

Because of the time it takes to properly peer review academic work, tenure and promotion committees often use a more mechanistic evaluation method by looking at the number of publications in high-prestige journals. As Suber argues, though, high prestige does not necessarily also mean high quality and can even interfere with it.[43] Some studies even suggest that high-prestige journals are more likely to publish fraudulent research.[44]

What's more, the great reliance on metrics is seen as one of the main causes for fraudulent research practices. The Journal Impact Factor (JIF) especially is regarded as a matter of concern. It can be misleading and is liable to manipulation.[45] Predatory publishers can thus create a high JIF for their journals to lure researchers into publishing their papers with them.

For example, the IJVIMR where Djuric submitted his paper had a high JIF. Because of the great stress that universities and governments in Serbia place on publications in journals with a high JIF, many researchers published their papers in this journal. Only after Djuric's hoax was revealed did the journal lose its. JIF[46]

Despite their shortcomings, the JIF and similar metrics are popular instruments in the evaluation of researchers. This makes it unlikely that the pressure to publish will diminish anytime soon. Thus we will have to turn to measures to detect and communicate fraud more effectively.

Beall himself has started to collect information on predatory publishers and

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[43]Peter Suber. "Thoughts on prestige, quality, and open access". In: *Logos* 21.1 (2010), pp. 115–128. DOI: `10 . 1163 / 095796510X546959`. URL: `http : / / booksandjournals . brillonline . com / content / journals / 10 . 1163 / 095796510x546959` (visited on 08/07/2014).

[44]Fang, Steen, and Casadevall, "Misconduct accounts for the majority of retracted scientific publications", p. 17030.

[45]Djuric, "Penetrating the Omerta of Predatory Publishing: The Romanian Connection", p. 3.

[46]Idem, pp. 7-18.

journals and to publish them on his blog, Scholarly Open Access.[47] This blacklist proves to be very slow and time-consuming, as can be judged from the fact that Beall also has a long list of publishers and journals that he still needs to verify.

Some of the journals on Beall's list are also members of organizations that list credible publishers and journals, like the Directory of Open Access Journals (DOAJ) and the Open Access Scholarly Publishers Association (OASPA). To emphasize the importance of ethical practices among their members these organizations, together with the Committee on Publication Ethics (COPE) and the World Association of Medical Editors (WAME) drew up a list in December 2013 of principles that publishers and journals should adhere to. Apart from this code, all member organizations have introduced a strict admission policy for new members of their organization in which peer review also plays an important role. Other similar organizations have introduced rules and regulations for their members in order to increase their credibility.

Strategies to combat predatory journals are currently revolving around black- and white-lists and open forms of peer review. There is also ongoing research into the use of metrics, which have been identified as a problematic factor.

In the next chapter, the criteria will be researched that are used by black- and white-lists to determine which publishers and journals are credible. Also, it is considered how they could improve these criteria to better suit their purpose.

Various proposals for new forms of peer review will be examined more closely in chapter three. After discussing some of these proposals, some characteristics are distilled that an ideal open peer review system should have in order to fight predatory journals.

Chapter four is dedicated to metrics. First the currently popular metrics and their advantages and drawbacks are discussed. Then the possibility is investigated to design a metric that gives an adequate picture of a journal's impact on the academic world and society without giving publishers and editors the opportunity to manipulate the metric.

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[47]Jeffrey Beall. *Criteria for Determining Predatory Open Access Publishers*. Nov. 30, 2012. URL: http://scholarlyoa.com/2012/11/30/criteria-for-determining-predatory-open-access-publishers-2nd-edition/ (visited on 06/21/2014).

"Finally, conclusions will be drawn regarding the abilities of the different approaches to fighting predatory journals, whether it be on their own or in conjunction with each other. It will also be shown that platforms already exist which fulfil one or more functions of journals. Some conclusions are formed about their ability to fight predatory journals, as well, possibly replacing journals as they exist today.

Chapter 2

Blacklists, white-lists and their criteria

2.1 Introduction

In October 2013, Science published an article by John Bohannon in which he described his experiment with open access journals.[1] In ten months time, Bohannon had produced 304 computer-generated 'scientific' articles and had sent them to an equal number of open access journals.

While the articles where not scientifically sound, more than half of the journals accepted them. Among these were journals owned by large publishing companies like Elsevier and SAGE, and by prestigious academic institutions, scholarly society journals and journals for which the topic of the paper was highly unsuitable.

Bohannon had selected these journals from the Directory of Open Access Journals (DOAJ) and Jeffrey Beall's list of predatory publishers. Out of the 304 titles, 167 were from the DOAJ, 121 from Beall's list and 16 were listed by both.

Although his selection criteria were severely criticized (see for example

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[1] Bohannon, "Who's Afraid of Peer Review?"

Redhead,[2] Suber[3] and Eysenbach[4]), Bohannon did expose a problem with black- and white-lists: there is often some overlap between the two. This is caused by a combination of overly relaxed criteria for membership of white-lists and too strict criteria upon which blacklists base their search for rotten apples. In both cases, new and inexperienced journals may be included in the list before they have really proven themselves, followed by sometimes long and complicated retraction procedures.

In this chapter, several people and organizations are examined that list trustworthy or dubious open access journals. First the blacklists are reviewed and then the white-lists. For each list, the way they ensure that the journals they list possess some standard of quality is examined and it is discussed how they could be improved to better suit their purpose (in- or excluding predatory journals). Finally, it is considered which criteria work best to fight predatory journals without laying too much suspicion on new, inexperienced journals.

2.2   Blacklists

Beall's blog is the best known and most comprehensive blacklist, but others also try to warn their peers about dubious publishing practices in their own way. In this section the blogs by Beall and Richard Poynder are discussed. While Beall bases his analyses mainly on journal's websites, Poynder interviews publishers that are accused of dubious practices and tries to get the truth out of them. Whether this results in more thorough evaluations is a question that will be considered below.

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[2]Claire Redhead. *OASPA's response to the recent article in Science entitled "Who's Afraid of Peer Review"*. Open Access Scholarly Publishers Association. 2013. URL: `http://oaspa.org/response-to-the-recent-article-in-science/` (visited on 05/31/2014).

[3]Peter Suber. *New "sting" of weak open-access journals*. Oct. 3, 2013. URL: `https://plus.google.com/+PeterSuber/posts/CRHeCAtQqGq` (visited on 06/22/2014).

[4]Gunther Eysenbach. *Unscientific spoof paper accepted by 157 "black sheep" open access journals - but the Bohannon study has severe flaws itself*. 5 October 2013. URL: `http://gunther-eysenbach.blogspot.nl/2013/10/unscientific-spoof-paper-accepted-by.html` (visited on 06/27/2014).

Jeffrey Beall

Predatory publishing was first brought to Beall's attention in 2008 by spam email solicitations from questionable journals, most of them located in developing countries.[5] Beall decided to list them and warn other academics about them through articles and on his own blog, Scholarly Open Access.

To determine whether a publisher or journal can be regarded as predatory, Beall uses a variety of criteria.[6] First he compares their content, practices and websites to ethical standards established by organizations like the Open Access Scholarly Publishers Association, the Committee on Publication Ethics and the International Association of Scientific, Technical and Medical Publishers. These will be discussed in more detail in the next section.

Secondly Beall compares the same elements to the practices of predatory publishers he knows. These have been divided into four categories: Editor and Staff, Business Management, Integrity and Other Practices.

With regard to Editor and Staff, Beall suspects fraud when:

- there are no editors or editorial/review board;

- the owner of the publisher is listed as the editor;

- there is no academic information about the background of the editors;

- there is sufficient evidence that the editors are not competent enough to act as publication gatekeepers;

- two or more journals have the same editorial board;

- the constitution of the editorial board looks suspicious, for example because of board members that are made up, have never given permission to use their names or never contribute to the journal.

In the category of Business Management, Beall distinguishes five criteria. He is on the alert if the publisher:

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[5]Richard Poynder. *The OA Interviews: Jeffrey Beall, University of Colorado Denver*. 2012. URL: http://poynder.blogspot.co.uk/2012/07/oa-interviews-jeffrey-beall-university.html.

[6]Beall, *Criteria for Determining Predatory Open Access Publishers*.

- is not transparent about his publishing operations;

- does not digitally preserve the articles;

- solely depends on author fees as a source of income;

- immediately starts publishing more than one journal, using the same template for each of them;

- only discloses information on author fees after an article has been accepted for publication.

In the field of Integrity, there are seven indicators of dubious behaviour. If the journal:

- incorrectly claims a connection with a certain field,

- has a country of origin in it's name that is not it's real country of origin,

- claims a made up impact factor or other measure

- sends spam mails;

- incorrectly claims indexing in legitimate indexing and abstracting services or in made up services;

- does too little to prevent fraudulent research from being published;

- uses author suggested reviewers without checking their credentials,

then Beall suspects there's something wrong with it.

Other Practices include:

- publishing articles copied from elsewhere without proper crediting;

- a new publisher who claims to be leading;

- a publisher in a developing country who claims to publish from a Western country;

- minimal to no copy-editing;

- publishing papers that are not academic;

- and hiding the publisher's location behind a "contact us" page with only a web-form.

Apart from this list, Beall also has a list of practices that indicate poor journal standards but are not downright predatory practices. For example, some publishers could send large numbers of emails to solicit manuscripts, while promising unusually fast peer review and using an email address from a free email supplier like Yahoo or Gmail. Others fail to list important information on their website, such as their contact details, authors fees and licensing policy information. Also suspicious are: the use of journal titles that contain unlikely combinations of research fields or look like titles of established journals; the copying of texts and photographs from other websites without proper reference; and poorly maintained websites.

Altogether, Beall's work seems to be very thorough and much appreciated. However, this does mean his analyses are quite time-consuming, resulting in an incomplete list of verified predatory publishers and a backlog of doubtful publishers that need yet to be examined in depth. Thus, researchers can not solely rely on Beall's list and should also make their own evaluations. In the meantime, the backlog could raise suspicions against publishers and journals that are well-meaning but inexperienced, making it harder for them to attract high-quality research.[7]

Apart from that, the dividing line between predatory and poor journal practices is very thin. For example, in an interview with Richard Poynder in 2012,[8] Beall implied that he finds it predatory behaviour when publishers call themselves an institution, while their address is just an apartment. On his website, however, he lists this practice under poor journal practices. Conversely, editors who only disclose information about author fees after accepting an article for publication do not necessarily have bad intentions. They could also be inexperienced and unaware of formal publisher practices.

In the same interview, Beall indicates that he looks especially at publishers that originate in developing countries, including the ones that are located in

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[7]Butler, "Investigating journals: The dark side of publishing".
[8]Poynder, *The OA Interviews: Jeffrey Beall, University of Colorado Denver*.

Western countries but are run by people from developing countries.[9] This could indicate a bias towards otherwise credible publishers, just because of where they are located. Critics also complain that Beall bases his analyses mostly upon publishers' websites, instead of engaging in conversation with them.[10] For example, Paul Ginsparg, founder of arXiv, calls Beall "a little bit too trigger-happy".[11]

In March 2013, Beall set up an appeal procedure for publishers who wish to be removed from the blacklist. When a publisher sends in his appeal request, a four-member board of advisers reviews the publisher's website and operations conduct and then advises Beall whether or not he should remove the publisher from his list. Beall does not state anywhere how many appeal procedures he receives and how many of those are granted.

All in all, Beall's blacklist seems to be a help in the fight against predatory journals, but caution is needed. While the list can serve as a deterrent,[12] it is never complete and can include well-meaning, inexperienced journals. It is therefore advisable that researchers also make their own analyses before sending their articles to a journal. Beall's criteria could help them greatly in this, but will not always lead a decisive answer.

Richard Poynder

One point of criticism to Beall is that he doesn't get into touch with the publishers he accuses of predatory behaviour. Journalist Richard Poynder does exactly that. For his blog *Open and Shut?* he has conducted several interviews with publishers that are seen as dishonest. In this section his reasons for choosing certain publishers and his criteria for deciding whether they are predatory or not are reviewed.

Bentham

In April 2007, Bentham Science Publishers announced that it would launch 300 open access journals. This large number raised suspicions about Benthams integrity, especially since at that time it did not yet have 100 journals running. Ben-

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[9]Ibidem
[10]Butler, "Investigating journals: The dark side of publishing".
[11]Bohannon, "Who's Afraid of Peer Review?", p. 62.
[12]Suber, "Ten Challenges for open access journals".

tham later reduced the number of open acces journals to 200, but it would still need to approach a lot of researchers worldwide to acquire the needed editors and authors. As lots of emails to these researchers were badly targeted and requests to be removed from the mailing list were being ignored, suspicions increased.

Poynder first tried unsuccessfully to get in touch with Matthew Honan, Chief Editor of Bentham, via email. Eventually he obtained the phone number of Honan, who agreed to an interview. This interview did not reassure Poynder on the trustworthiness of Bentham, since most of Honan's answers consisted of denials and vague answers.[13]

Dove Medical Press

A few months later, Poynder became interested in Dove Medical Press after complaints voiced by Gunther Eysenbach, Editor-in-Chief and publisher of the Journal of Medical Internet Research. He felt that he was being spammed by the company and regarded the fact that the company was run by someone with almost the same name as the publisher of Dove Medical Press, was suspicious. Both companies would run vanity presses.

However, when Poynder contacted the company he got prompt answers, the editor appeared to be well experienced and the peer review system seemed to be in order. As for the spamming accusations: Dove Medical Press just seemed to have been a little too enthusiastic in trying to recruit researchers, but not in an illegal way.[14]

Sciyo

In december 2009, Poynder received an email from Sciyo, announcing that it would stop charging APCs for the articles it published and that it would start paying royalties to authors who contributed to their OA books. Poynder got in

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[13]Richard Poynder. *The Open Access Interviews: Matthew Honan*. 2008. URL: `http://poynder.blogspot.nl/2008/04/open-access-interviews-matthew-honan.html` (visited on 06/22/2014).

[14]Richard Poynder. *The Open Access Interviews: Dove Medical Press*. 2008. URL: `http://poynder.blogspot.nl/2008/11/open-access-interviews-dove-medical.html` (visited on 06/22/2014).

touch with the CEO, Aleksandar Lazinica, who told him that Sciyo planned to do away with APCs altogether in the future and publish journals and books without any charge to anyone. At the time of the interview, it was not clear what would be the new business model.

Between the emails, Poynder did some web research which told him that Sciyo was originally founded as In-Tech. This company had already been accused of fraudulent practices in the past, especially with respect to email invitations to researchers. These complaints had not stopped with the change of the company's name.

Poynder then contacted some complainers. One of them told him that he wasn't comfortable with the plans of Sciyo to pay authors royalties. He thought it would be primarily Sciyo that would benefit, since authors would be required to advertise their work, which would increase the views of Sciyo's website and thereby give it a better ranking within the scientific community. Another one was concerned about the peer review system: articles he had send to Sciyo's journals had been hardly peer reviewed and some had been published without a notice to the authors.

When confronted with these accusations, Lazinica first admitted that the peer review system needed to be improved. He added, however, that in his view peer review is outdated and that papers should better be reviewed by the readers, thus after publication. Since the website of his company claims something different, Poynder regarded this as suspicious, all the more since Sciyo was a member of the OASPA, which requires good peer review and no spamming activities from its members.

Poynder went on to contact the OASPA about this. President Caroline Sutton forwarded their email conversation to Lazinica. The latter then denied that Sciyo and In-Tech were the same company and stated that no one could yet say anything about Sciyo's peer review process until it had actually published something. Nevertheless, the OASPA took Sciyo's name from their website and asked the company to apply again for membership, upon which OASPA would review its practices and policies.[15]

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[15]Richard Poynder. *The OA Interviews: Sciyo's Aleksandar Lazinica.* 2010. URL: http://poynder.blogspot.nl/2010/02/oa-interviews-sciyo-aleksandar-

InTech

Some time after the interviews with Sciyo, Poynder discovered that the company had reverted its name to InTech and was still being accused of the same malpractices as before: spamming, bad peer review and a lack of transparency. In his subsequent correspondence with the company new questions arose about the way books are published, about a survey the company had conducted among its researchers and about the way it had communicated the outcomes os this survey to the public.

Meanwhile, the publisher had hardly given any royalties to authors, nor had it abandoned publication charges for its journals. Poynder finally got in touch with the newly appointed marketing director, Nicola Rylett, who said she had plans for improvement. After this interview, Poynder decided to give InTech the benefit of the doubt and to see whether the company would be able to improve its publishing process.[16]

OMICS Publishing Group

In 2011, Poynder's attention was drawn to OMICS by Jeffrey Beall, who had pointed at the large number of titles of the company, many of which had a broad coverage. At the time, the company had published at least one article that the company itself admitted should never had been published. Apart from this, there were complaints about copying names and parts of texts from other journals and about spamming authors via email.

On visiting the company's website, Poynder found little to no information about ownership and peer review. Researchers on forums complained about being added to the editorial boards of OMICS journals without giving permission. The editor of another journal emailed him to complain that OMICS had tried to make an author pay for republishing a paper that the first journal had already published.

After several attempts to get in touch with OMICS, Poynder received an email which stated that the company was working on the problems Poynder had

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lazinica.html (visited on 06/22/2014).

[16]Richard Poynder. *The OA Interviews: InTech's Nicola Rylett*. 2011. URL: http://poynder.blogspot.nl/2011/10/oa-interviews-intechs-nicola-rylett.html (visited on 06/22/2014).

mentioned. Further questions about the ownership of OMICS, however, were not answered. Poynder then went on with a web search, upon which he found that the managing director of OMICS Publishing Group, Srinu Babu Gedela, was also related to other organisations. Eventually, he got an interview with Gedela, but the latter was not able to remove Poynder's doubts.[17]

Hindawi

Hindawi Publishing Corporation was the first subscription publisher to entirely convert to Open Access. The fact that it managed to set up 400 journals within a short time-frame and that it mass mailed researchers to acquire editors and authors for its titles led many to believe that Hindawi was a predatory publisher. Today, however, Hindawi is regarded as a respectable publisher.

Nevertheless, the International Scholarly Research Network, set up by Hindawi, was for a short time on Beall's list of predatory publishers. And in 2012, one of its journals was accused of citation manipulation in two of its articles. Although these problems were soon solved, Poynder found it hard to determine the quality of Hindawi's journals, as he could not find accurate or meaningful data on them.[18]

Ashdin Publishing

In the comments on the interview with OMICS, Poynder found some serious accusations towards Jeffrey Beall. Some of these were signed by Ashry Aly, founder and owner of Ashdin Publishing. He asserted that Beall had tried to blackmail him to pay thousands of dollars for a reassessment of his company. The emails Aly forwarded to Poynder were sent from an address containing the name of a web-based email service. Aly himself proved to have worked for Hindawi Publishing and there to have been regarded as a hard-working individual.

[17]Richard Poynder. *The Open Access Interviews: OMICS Publishing Group's Srinu Babu Gedela*. 2011. URL: http://poynder.blogspot.nl/2011/12/open-access-interviews-omics-publishing.html (visited on 06/22/2014).

[18]Richard Poynder. *The OA Interviews: Ahmed Hindawi, founder of Hindawi Publishing Corporation*. 2012. URL: http://poynder.blogspot.co.uk/2012/09/the-oa-interviews-ahmed-hindawi-founder.html (visited on 06/22/2014).

Ashdin Publishing was on the website of Beall, because he had found cases of significant plagiarism and because Aly had used another name while communicating with researchers. Meanwhile, seven journals published by Ashdin were on the list of the DOAJ. That raised the question with Poynder whether Beall was perhaps biased against publishers from developing countries or whether the DOAJ was not strict enough when evaluating journals for membership.

In the interview, Aly denied the plagiarism, but affirmed the use of a pseudonym because it was an easy name in all languages. He further stated that he indeed believed to have been blackmailed by Beall, and that the latter was trying to bribe all small publishers. While this was a serious accusation, Poynder has not looked into it further. He also could not make out whether Aly was a predatory publisher or not.[19]

Evaluation

Poynder has taken a rather close look to Jeffrey Beall and his blacklist. In fact, several publishers he contacted were suggested to him by publications from Beall. Poynder also uses some of Beall's criteria to determine whether a publisher is trustworthy or not. Most notably he asks them about setting up a large number of journals in a short time, mass-mailing researchers with invitations for editorial boards and manuscripts, their peer review processes, the ownership of the companies and cases of plagiarism.

Unlike Beall, Poynder sometimes gives these publishers the benefit of the doubt. Indeed, the more he writes about Beall, the more he gives voice to the already mentioned criticisms on Beall. As he concludes in the case of Hindawi, mass-mailing and setting up many journals at once does not necessarily have to mean that the publisher can not be trusted.

From these experiences it can be concluded that hard criteria to determine whether or not a publisher is definitely predatory are not that easy to specify. In the next section it will be discussed what whitelists deem minimal criteria for credible publishers.

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[19]Richard Poynder. *The OA Interviews: Ashry Aly of Ashdin Publishing*. 2013. URL: http://poynder.blogspot.co.uk/2013/01/the-oa-interviews-ashry-aly-of-ashdin.html (visited on 06/22/2014).

2.3   Whitelists

In December 2013, the Directory of Open Access Journals (DOAJ), the Open Access Scholarly Publishers Association (OASPA) and the Committee on Publication Ethics (COPE), together with the World Association of Medical Editors (WAME) published their joint *Principles of Transparency and Best Practice in Scholarly Publishing*. From these principles, each organization derived its own membership criteria.

In this section first the joint principles are examined and then the various membership criteria of the separate organizations. Also, the membership criteria of two other journal organizations are regarded: the International Association of Scientific, Technical and Medical Publishers, and the Open Humanities Project.

Lastly, Quality Open Access Market (QOAM) is discussed. This Dutch organization does not count journals among its users, but academics. Via a Journal Score Card these users can analyse journals they have experience with as an author, editor and/or reviewer. QOAM thus hopes to provide researchers with reliable information on pricing and quality of journals.

Finally, conclusions will be drawn regarding the question which criteria these organizations have in common and which seem to work best.

Principles of Transparency and Best Practice in Scholarly Publishing

The *Principles of Transparency and Best Practice in Scholarly Publishing* were developed to determine what sets apart legitimate journals and publishers from non-legitimate ones.[20] They provide rules on peer review processes, governing bodies, editorial teams or contact information, author fees, copyright, policies on research misconduct, ownership and management, websites, journal names, policies on conflicts of interest, access policies, revenue sources, advertising policies, publishing schedules, archiving policies and direct marketing activities.

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[20]*OASPA Principles on Transparency and Best Practices in Scholarly Publishing*. 2013. URL: http://oaspa.org/principles-of-transparency-and-best-practice-in-scholarly-publishing/ (visited on 06/15/2014).

In general, a publisher or independent journal should have a professional website on which information about these items is clearly stated. Users must be able to access the journal without financial barriers and should be approached in a respectful way when the publisher tries to induce them to contribute to the journal.

If a member fails to meet these criteria, the organization the journal or publisher is connected to will get in touch with them to address the concerns that have been raised. If that doesn't lead to the desired result, the membership of the publisher or journal will be suspended or terminated.

Directory of Open Acces Journals (DOAJ)

The DOAJ was founded in 2003 by Lars Bjørnshauge, a library scientist at Lund University in Sweden.[21] The organization aims to "support the transition of the system of scholarly communication and publishing into a model that serves science, higher education, industry, innovation, societies and the people"[22] in all kinds of ways.

When a publisher wishes to add a journal to the DOAJ, he must first fill in a form on the website. Then, a member of DOAJ will try to assess the journal's quality and the extent to which the journal is dedicated to open access. Publishers and journal owners are recommended to be as open as possible about the journal's aims and scope, editorial board, author guidelines, description of the quality control system and the Open Access statement and to state this information clearly on the journal's website. This includes information on digital preservation and archiving, user's rights and author's fees. Publishers and journal owners are also referred to the Code of Conduct of the OASPA[23] .

Open Access Scholarly Publishers Association (OASPA)

The OASPA was established in 2008, partly as a response to the growing number of open access publishers with dubious practices. The organization consists

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[21]Bohannon, "Who's Afraid of Peer Review?", p. 61.

[22]*OASPA Principles on Transparency and Best Practices in Scholarly Publishing*.

[23]*Good practice guidelines for Open Access publishers*. 2014. URL: http://doaj.org/publishers (visited on 06/15/2014).

mainly of publishers who have implemented strict criteria for entry into the association.[24] These criteria are laid down in the *Code of Conduct* and in the *Membership Criteria*.

When applying for membership, a publisher needs to fill in a form. Two OASPA Board members will then judge whether the publisher meets the criteria within the *Code of Conduct* and the *Membership Criteria*.[25]

The *Code of Conduct* consists of ten criteria on the subject of peer review, editorial boards, author's fees, marketing activities, licensing policy, instructions to authors, and the journal's website. Information on these items should be easy to find and direct marketing activities should be conducted in a respectful way. Members are not allowed to do anything that would discredit the OASPA or OA publishing. If they do, their misconduct may be reported to the Board of Directors.[26]

The *Membership Criteria* are more elaborate. This document contains definitions on open access and a large set of diverse criteria. These include criteria on the journal's name and periodicity, barrier-free access to the journal, contact information, author's instructions and fees, peer review, editorial boards, licensing policy, direct marketing activities, advertising policies, ownership, revenue sources, misconduct, conflicts of interest, digital preservation and indexing services.[27]

Committee on Publication Ethics (COPE)

COPE was founded in 1997 and provides editors and publishers of academic journals with information on publication ethics and misconduct. Apart from the Principles of Transparency and Best Practice in Scholarly Publishing, COPE requires that its members follow their *Codes of Conduct for Journal Editors and Publish-*

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[24]Redhead, *OASPA's response to the recent article in Science entitled "Who's Afraid of Peer Review"*.

[25]*OASPA Membership Applications*. 2014. URL: http://oaspa.org/membership/membership-applications/ (visited on 06/15/2014).

[26]*OASPA Code of Conduct*. 2013. URL: http://oaspa.org/membership/code-of-conduct/ (visited on 06/15/2014).

[27]*OASPA Membership Criteria*. 2013. URL: http://oaspa.org/membership/membership-criteria/ (visited on 06/15/2014).

ers.

Journal publishers should help their editors to set journal policies on editorial independence, research ethics, authorship, transparency and integrity, peer review and the role of the editorial team, and appeals and complaints. They should make sure these policies are implemented and reviewed regularly and assist other parties in the investigation and resolution of fraudulent practices.[28]

The duties of journal editors are more extended. They are required to be on good terms with authors, publishers, readers, reviewers and editorial board members. Furthermore, they have to keep an eye on the peer reviewing process, the protection of individual data, research ethics, possible misconduct, the integrity of the academic record, intellectual property, debate, complaints, commercial considerations and conflicts of interest. However, the document does not prescribe exactly how editors should perform these tasks.[29]

International Association of Scientific, Technical and Medical Publishers (STM)

STM is an organization of publishers of research in science, technology and medicine. Here, too, applicants for membership are required to fill in a form and are then reviewed by the STM Board. In their very short *Code of Conduct*, STM requires that journals:

- should not engage in activities that could harm the association or publishing field;

- follow the *STM Ethical Principals for Scholarly Publishing* or other similar guidelines;

- have a clearly stated and visible process and policy for peer review; have editors who are recognised experts in the field of the journal,

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[28]*COPE Code of Conduct for Journal Publishers.* 2011. URL: http : / / publicationethics.org/resources/guidelines (visited on 06/15/2014).

[29]*COPE Code of Conduct and Best Practice Guidelines for Journal Editors.* 2011. URL: http : / / publicationethics . org / resources / guidelines (visited on 06/15/2014).

- have their publishing fees clearly stated and visible on their website.[30]

The *STM Ethical Principals for Scholarly Publishing*[31] contains more detailed information on ethical behaviour for all parties involved in the journal publishing process. In general: all conflicts of interest should be avoided or clearly stated; unpublished manuscripts should be treated with confidentiality; and privileged information may not be used by others without the consent of the author.

Editors should be as independent as possible and carry the sole and independent responsibility for deciding which of the submitted articles should be published. The editor should not base this publishing decision on factors like race, gender and ethnic origin. Furthermore, if an editor finds out about mistakes in an article, he should take the necessary steps to have them corrected. Likewise, he should always investigate accusations of ethical issues and document them.

Publishers should respect their editor's independence and communicate with him on erroneous parts of papers that come to his attention. In publication contracts with third parties these publication ethics should also be mentioned.

Open Humanities Press (OHP)

The OHP is an open access publishing collective in the Humanities. Every two years the members of its Editorial Oversight Group come together to decide on the admittance of new journals that have been suggested by their publishers. Each journal is required to be fully open access and have published at least three issues before applying for membership.[32]

With respect to their editorial standards, OHP journals are expected to have a peer review process that is clearly stated on the journal's website and is generally followed. The editorial board should be high-profile and international, use accepted editorial conventions and publish regularly. The journal should be produced by a non-profit scholarly association or society.

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[30]*STM Code of Conduct.* 2014. URL: `http://www.stm-assoc.org/code-of-conduct/` (visited on 06/15/2014).

[31]*International Ethical Principles for Scholarly Publication.* 2014. URL: `http://www.stm-assoc.org/code-of-conduct/` (visited on 06/15/2014).

[32]*Open Humanities Press Selection Process.* 2014. URL: `http://openhumanitiespress.org/policies.html` (visited on 06/15/2014).

On the technical side, journals should publish their articles full-text and electronically through their website with a recognized OA license such as Creative Commons. They have to comply with the standards of the OHP's technical infrastructure and the Open Archives Initiative Protocol for Metadata Harvesting. Furthermore, they have to make sure that their articles are always accessible, also for people with disabilities. Finally, the journals must be clear about their title, year of publication, volume or issue number, article titles, page or article numbers and table-of-contents where applicable.[33]

Quality Open Access Market (QOAM)

QOAM is a crowd sourcing initiative of the Radboud Universiteit Nijmegen and SURF. This open access platform aims to provide its users with information on price and quality of all journals. Because users themselves can provide analyses of journals, it is also possible to obtain information on new open access journals.[34]

For these analyses, QOAM lets its users fill in a Journal Score Card.[35] This card consists of two types: a Base Journal Score Card and a Valuation Journal Score Card. With the Base Score Card academics can evaluate the editorial information, peer review process, governance and publication process. These include questions about the reviewing and publishing process, the degree to which authors and reviewers can contribute to the reviewing process and the way articles are made publicly available and identifiable. Additionally, users can provide information on publication fees.

The Valuation Score Card asks information about the experience the user has with the journal, whether the journal is transparent, recommended and good value for money. Based on the scores for both cards, journals are labelled as strong, weak, a threat to authors and/or an opportunity for the publisher to make improvements.

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[33]*Open Humanities Press Publication Standards*. 2014. URL: http : / / openhumanitiespress . org / publication - standards . html (visited on 06/15/2014).

[34]*About Quality Open Access Market*. Radboud Universiteit Nijmegen. 2014. URL: http://www.qoam.eu/about (visited on 06/15/2014).

[35]*Journal Score Card*. Radbout Universiteit Nijmegen. 2014. URL: http://www.qoam.eu/journalscorecard (visited on 06/15/2014).

Evaluation

In general, white-listing organizations ask their members to be as transparent as possible about their ownership, editorial team, peer review process, APCs and digital preservation techniques. These are very much the same for all organizations. While most of the responsibilities lie with journal editors, COPE and STM also list the duties of publishers and journal owners.

The organizations whose members consist of publishers generally have a strict admission procedure. Journals are mostly required to have been in existence for some time and have published a certain number of articles or issues. Publishers have to disclose all relevant information about the journal, which is then assessed by an editorial board. If the organization's requirements are not met, publishers are given the chance to make improvements. If these prove not to be enough, the journal is not admitted. When a member journal makes mistakes, it is excluded from membership if it fails to make improvements.

The one exception here is the QOAM, whose users are not publishers but academics. They have to be affiliated to an academic institution in order to verify their identity and thereby avoid fraud. The users make the Journal Score Cards with which journals are evaluated. In contrast to the publishers organizations, the QOAM makes it possible for young journals to be evaluated and thus gain reputation. However, this could also lead to a journal being evaluated too fast after mistakes caused by inexperience. The Score Cards can always be re-evaluated, but until then the journal's reputation is harmed.[36]

2.4 Conclusion

Black- and white-lists are useful in the fight against predatory publishers. Black-lists give a good attempt at naming an shaming and are appreciated for that by many researchers. White-list organizations have drawn up useful rules for good journal practices, but no thorough evaluations could be found as to their effectiveness. It is reasonable, though, to expect that their informational function already benefits the community and helps to fight predatory publishing behaviour.

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[36] *Journal Score Card.*

However, both black- and white-lists have their drawbacks for new and in-experienced journals. Blacklists could add them too easily when they make a slip-up, thereby decreasing the chance that credible researchers want to work with them. This makes it harder for these journals to prove themselves, which is a requirement for membership of a white-list.

The Journal Score Card by QOAM may play a role here. It provides information about the trustworthiness of all journals that members have experience with, even new ones. However, this system is still young and therefore can not provide a full picture of all existing journals.

It would be good if blacklists would first warn the journals they suspect and give them a chance to improve themselves. Most white-lists already have this kind of procedure for members who don't comply with their criteria. Poynder's method of giving suspected journals a chance to explain in public why they act as they do, is also a good idea but very time-consuming.

As for the criteria, these are very much the same for all black- and white-lists. They all require that journals are as open as possible about their editorial management, authors fees, peer review process, licensing policy and archiving methods. Since many predatory journals operate in an obscure way, this openness is an important requirement.

However, even with credible journals the peer review process hardly ever takes place in the open. This can have serious disadvantages. In the next chapter several models are therefore reviewed for open peer review and the way in which they can contribute to the fight against predatory journals.

Chapter 3

New Forms of Peer Review

3.1 Introduction

Peer review in some form or other has been in existence since at least the seventeenth century. Around that time, royal academies came in to existence that were granted the right to determine which scientific books were fit for publication. This kind of peer review, however, had more to do with censorship than with determining the quality of the research.[1]

A century later saw the first examples of journal review, when the royal societies began to ask their members for advice on which papers they should publish.[2] Peer review in this sense was primarily meant to augment the expertise of the editor.[3]

Peer review as a means to determine the quality of the research only became a common part of the scholarly publishing process in the second half of the twentieth century. It was a reaction to the rapid growth of academic research, which was

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[1]K. Fitzpatrick. *Planned Obsolescence: Publishing, Technology, and the Future of the Academy*. New York University Press, 2011. ISBN: 9780814728963. URL: `http://books.google.nl/books?id=ESRqtClh9WgC` (visited on 08/02/2014), pp. 20-21.

[2]Inna K. Shingareva and Carlos Lizárraga-Celaya. "Refereeing Process in Mathematics and Physics: Meaningful Changes and Models for Improvement". English. In: *Publishing Research Quarterly* 29.3 (2013), pp. 271–284. DOI: `10.1007/s12109-013-9325-4`. URL: `http://link.springer.com/article/10.1007%2Fs12109-013-9325-4` (visited on 06/27/2014), p. 273.

[3]Fitzpatrick, *Planned Obsolescence: Publishing, Technology, and the Future of the Academy*, pp. 22-23.

in itself caused by universities stimulating their professors to write and publish more research articles. As the professor's salaries began to depend on publications and grant applications, the number of research articles rose, but the quality of these papers started to decline.[4] Peer review thus became more necessary to determine which papers were of sufficient quality to publish in the limited space that print journals provided.

Nowadays, peer review is used in hiring decisions, competitions for grants and fellowships, and publishing.[5] Although norms and practices vary by discipline, certain functions of peer review apply to all of them: making sure that the published work is correct; certifying the author's work as valid; preserving the reputation of the society, publisher or editorial board responsible for the work; and ensuring that valuable new ideas are introduced.[6]

Although the majority of researchers believes that peer review is the best available instrument to secure a quality standard,[7] the system is far from perfect. In their 2009 survey among 4,037 researchers, Sense about Science found that 81% of them believed that peer review should detect plagiarism, but only 38% thought that it is actually able to do this. With respect to detecting fraud, 79% thought that this should be accomplished by peer review, but only 33% believed that this is really the case.[8]

These statistics are not only worrisome to researchers, but also to publishers. Their prestige depends on the quality of the research they publish. On the one hand, publishers and editors of high-quality journals profit from this, because they receive so many papers that they can afford to be very selective and thereby raise their prestige further. On the other hand, this large number of papers means

[4]Shingareva and Lizárraga-Celaya, "Refereeing Process in Mathematics and Physics: Meaningful Changes and Models for Improvement", p. 274.

[5]Fitzpatrick, *Planned Obsolescence: Publishing, Technology, and the Future of the Academy*, p. 16.

[6]Aliaksandr Birukou et al. "Alternatives to peer review: novel approaches for research evaluation". In: *Frontiers in Computational Neuroscience* 5.56 (2011). DOI: `10.3389/fncom.2011.00056`. URL: `http://www.frontiersin.org/computational_neuroscience/10.3389/fncom.2011.00056/abstract` (visited on 06/27/2014), p. 1.

[7]Sense about Science. "Peer Review Survey 2009: Full Report". In: (2009). URL: `http://www.senseaboutscience.org/pages/peer-review-survey-2009.html` (visited on 05/31/2014), p. 8.

[8]Idem, p. 13.

less time for thorough peer review and thus increases the chance that fraudulent research is published. In the case of books, the prestige of the publisher is even more important. Book reviews give a general idea of the quality of a book, but are not necessarily peer reviews. Hiring and promotion committees therefore also look at the prestige of the publisher when determining the quality of the candidate's work.[9]

A thorough peer review process is thus important to researchers and journals alike. Predatory journals often claim that they conduct peer review, while in reality they don't or only very superficially. In some cases, thorough peer review is conducted and the reviewer gives a negative advise, but the paper is still published with the name of the reviewer written alongside it. Reviewers who then try to have their names removed, are often ignored by the publisher.[10]

To counter these predatory practices, more open peer review processes are needed. When all readers can see the reviews and add their own, false claims about the extent of the review are harder to make. Over the past years, proposals for open peer review systems have been made in all academic fields, and several journals and organisations have built platforms to publicly evaluate academic works. As will be shown, some of these are based on the assumption that publishers can be left out altogether.

In this chapter possible models and their suitability for fighting fraudulent journals are examined. First some proposals for and implementations of open peer review projects are reviewed. From these some common components of open peer review systems are deduced and it is discussed how they could help in the fight against predatory journals. The chapter is concluded by determining how the peer review process should be reformed in order to fight predatory journals.

3.2   Two early examples

First it is worth taking a look at two experiments with open peer review. From 1 June to 30 September 2006, *Nature* conducted an experiment with open peer

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[9]Borgman, *Scholarship in the Digital Age*, pp. 58-65.
[10]Bohannon, "Who's Afraid of Peer Review?", p. 61.

review.[11] All authors of articles that had passed the first editorial selection were invited to have their articles hosted on an open server for public comment. At the same time their paper underwent standard (closed) peer review. All comments on the internet had to be signed and were rated by the editors on their technical and editorial value.

In both cases, the average rating lay somewhere around 2 points out of 5, with the editorial values being higher than the technical values. No comment received the highest possible rating and only four comments got 4 points awarded. The editors also actively approached readers to encourage them to take part in the experiment. However, despite these efforts only a small number of people commented on the papers, and only a few of these comments were technically substantive. *Nature* thus concluded that the time wasn't right for open peer review.

Four years later, *Shakespeare Quarterly* was more successful when they set up a hybrid peer review process for their special issue "Shakespeare and New Media".[12] After the usual closed editorial screening, four articles were published online to be openly commented on. In eight weeks, these articles received over 350 comments on originality, accuracy and stylistic and rhetorical merits. Reviewers could give comments on paragraph-level and on the essays as a whole and could include a recommendation on publication. Their comments varied greatly in quality, from very brief and superficial to thorough and challenging. Afterwards the editor and guest editor weighted the comments and made the final publication decision.[13]

As these examples show, the practices of and support for open peer review processes can vary a lot. As critics have pointed out, *Nature* took a conservative approach by giving prevalence to closed peer review. Open and closed peer review took place at the same time, which made it impossible for authors to make

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[11]Editorial. "Nature's peer review trial". In: *Nature* (December 2006). DOI: `10.1038/nature05535`. URL: `http://www.nature.com/nature/peerreview/debate/nature05535.html` (visited on 06/27/2014).

[12]*Open Review: Shakespeare and New Media*. Media Comments Press. 2010. URL: `http://mcpress.media-commons.org/ShakespeareQuarterly_NewMedia/` (visited on 08/10/2014).

[13]Kathleen Fitzpatrick and Katherine Rowe. "Keywords for Open Peer Review". In: *Logos* 21.3 (2010), pp. 133–141. URL: `http://booksandjournals.brillonline.com/content/journals/10.1163/095796511x560024` (visited on 05/31/2014), pp. 133-135.

revisions based on the open comments before submitting the paper for closed review. Furthermore, the open comments had no influence on the editor's decision to publish the article. The experiment thus lacked incentives for both authors and reviewers to participate.[14]

Shakespeare Quarterly, on the other hand, used only open peer review after the first closed editorial screening. The reviewers were encouraged to be as thorough as they wished and their comments had a marked influence on the editors' decision on whether to publish the papers. Authors were given the chance to rewrite their article based on the comments before submitting it for final publication.[15]

Another possible explanation for the difference in success is that the smaller *Shakespeare Quarterly* might have a more dedicated community than the more prestigious *Nature*. Journals are less used within the humanities than within the sciences, but that just might mean that their readers are more committed to the journal than those of more prestigious journals that reach a wider public.

3.3 Models for Open Peer Review

Maybe *Nature* was also too early with its experiment. Over the past years, proposals for and implementations of open peer review systems have increased and gained acceptance. Between these, the varieties in openness, role of editor, author and reviewer, and the stage of the publication process in which the peer review is conducted, are considerable.

Part of these models is based on the assumption that journals are not necessarily needed to publish academic research. In a so-called decoupled research publication system, four functions are distinguished that are commonly performed by the same publisher, but could also be carried out separately by various parties

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[14] Fitzpatrick, *Planned Obsolescence: Publishing, Technology, and the Future of the Academy*, pp. 26-27.

[15] *Open Review: Shakespeare and New Media*.

(see Van de Sompel et al.[16] and Priem and Hemminger[17]):

- Registration: defining which article was published when, to prevent confusion about who first came up with a certain idea.

- Certification: validating an article by giving stamps and feedback.

- Awareness/dissemination: spreading new claims and findings so that other academics may find and read them. This includes preparation of the manuscript, publication, marketing efforts and making sure the work can easily be found.

- Archiving: making sure older academic works are stored permanently and can easily be found.[18]

Peer review in this system belongs to the certification function. In the current situation, each journal has its own peer review process. This means that when a paper is rejected and offered to another journal, a new peer review process starts. Since this leads to extra work for editors and reviewers, platforms have emerged where researchers can have their work peer reviewed before sending it to a journal. As is shown later in this section, this does not necessarily mean that editors become superfluous.

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[16]H. Van de Sompel et al. "Rethinking Scholarly Communication. Building the System that Scholars Deserve". In: *D-Lib Magazine* 10.9 (2004). DOI: 10.1045/september2004-vandesompel. URL: http://www.dlib.org/dlib/september04/vandesompel/09vandesompel.html (visited on 06/27/2014).

[17]Jason Priem and Bradley H. Hemminger. "Decoupling the scholarly journal". In: *Frontiers in Computational Neuroscience* 6.19 (2012). DOI: 10.3389/fncom.2012.00019. URL: http://www.frontiersin.org/computational_neuroscience/10.3389/fncom.2012.00019/abstract (visited on 06/25/2014), pp. 1-2.

[18]Borgman uses only three categories: Legitimization, Dissemination and Access, preservation and curation. Legitimazation encompasses registration and certification. Dissemination is about the communication of research to others. This function is mostly executed by publishers, but scholars also play an important role, especially in the digital world via social media. Access can encompass permission, rights, physical connections and skills to make use of a publication. It could also mean that the content is useful and in a usable form. Archiving and preservation mean that the record is and will be available at all times. Curation "is about maintaining and adding value to a trusted body of digital information for current and future use" (Borgman, *Scholarship in the Digital Age*, pp. 66-68).

Models connected to journals

When open peer review is implemented by a journal, the role of the editor is often even extended. Shingareva and Lizáraga-Celaya found ten models, based on the number of stages and the degree of openness of the editors, authors and referees in each of these stages. The number of stages can range from zero to two. The degree of openness can be completely open, semi-open and closed.[19]

2-stage models

In the case of 2-stage models, the first stage often is a closed one in which the editor of the journal decides whether or not the paper should be published. Only when the answer to that question is yes is the paper sent out for peer review. When necessary, the refereeing process can be complemented by post-review feedback or post-publication comments.

Within this category, Shingareva and Lizáraga-Celaya distinguish four models. In the first, authors, editors and referees are all known to each other. The other three models are semi-open. In all of these, the referee in the second stage can choose whether or not to sign the review. The editor and author can be both known, or either one of them can be anonymous.[20]

2-stage models are currently much in use, for example at journals that use *SAGE Open*.[21] Within their open peer review process, the first stage consists of a double-blind peer review process, in which the author and referee do not know each other's name. The referee only checks the quality of research methodology: whether the research was conducted properly, the discussion accurately summarizes the research, and the conclusion follows logically from the research. The article is then published and readers and academics are invited to give their own comments and share the article. Article-level metrics will then measure the impact of the article.

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[19]Shingareva and Lizárraga-Celaya, "Refereeing Process in Mathematics and Physics: Meaningful Changes and Models for Improvement", pp. 277-282.

[20]Idem, pp. 277-278.

[21]*SAGE Open*. 2014. URL: `http://www.uk.sagepub.com/journalsProdDesc.nav?prodId=Journal202037&ct_p=manuscriptSubmission&crossRegion=eur` (visited on 05/31/2014).

Open science journal *F1000Research* checks articles on their content, quality, tone, format, language and whether they are intelligible. If needed, the editorial board also checks on the data and the way they were gathered. Authors and referees are required to create an account and authors are asked to provide the names of five possible referees, which are then approved by the editorial board. The referees first need to assess whether the article or paper is scientifically sound (well designed, executed and discussed) and to choose an appropriate status from 'approved', 'approved with reservations' and 'not approved'. Articles that receive two or more 'not approved' statuses are removed from the site. In the next stage, the referees fill in the report with detailed concerns and advice on improvements. This report needs to be signed and the reviewer has to state any conflicts of interest. The report is then published on the article and other registered users will be able to publish their own comments on the article or report. The authors can engage in discussion with their reviewers and publish new versions of their articles.[22]

Electronic Transactions on Artificial Intelligence (ETAI)[23] uses the reverse process. In the first round, the peer community can review the article and comment on it for three months. Then the author gets a chance to revise the article according to the comments. In the second stage, the article undergoes closed peer review in which the identity of the reviewers is unknown. The reviewers can only say whether the article should be accepted, since the more detailed discussion has already taken place in the open.[24]

1-stage models

The 1-stage models are variations of the traditional peer review process. In the open pre-review model, editor, referee and author are all known to each other, whereas in one blind pre-review model, they are all unknown to each other. In the

[22]*F1000Research*. 2014. URL: http://f1000research.com/referee-guidelines (visited on 06/27/2014).

[23]*Electronic Transactions on Artificial Intelligence*. May 31, 2006. URL: http://www.etaij.org/ (visited on 06/27/2014).

[24]Eric Sandewall. "Systems: Opening up the process". In: *Nature* 444 (2006). DOI: 10.1038/nature04994. URL: http://www.nature.com/nature/peerreview/debate/nature04994.html (visited on 06/27/2014).

third model, which is currently the most used, the author and editor are known, but the referee isn't. Also much used is the fourth model, in which only the editor is known. These latter two also use blind pre-review.

As with the 2-stage models, the 1-stage models can be complemented by post-review feedback or post-publication comments. Also, they can be extended by other models, where the referee is known, but the editor and author can be either known or unknown.[25]

Removing the anonymity of authors and reviewers means that they can be held accountable for their work: the authors for the quality of the research, the reviewers for the thoroughness of the review. In the case of editors, making known who they are means that they can be held accountable for the peer review process as a whole. When specific editors become known for regularly publishing bad research and not sending out papers for peer review, authors, reviewers and readers can start avoiding their journals until the editors improve their work.

Role of the editor

Furthermore, the role of the editor in these models is greatly extended. Fitzpatrick and Rowe described the aforementioned experience of the *Shakespeare Quarterly* and from there deduced several aspects of open peer review systems that editors have to keep in mind.[26]

Before the project is started, editors need to address several questions regarding the way the review platform is built. The way peer review is conducted depends on the discipline and the values of the editorial board and other parties that are involved in the project. These should be reflected in the tools that will be used. The platform should also help the editor in getting the desired kind of reviews and motivate reviewers to spend time and effort on the project without becoming demotivated by an excess of texts and endless discussions.

During the project, editors need to attract reviewers from their own field and others. Birokou describes a model in which reviewers bid for the right to review

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[25]Shingareva and Lizárraga-Celaya, "Refereeing Process in Mathematics and Physics: Meaningful Changes and Models for Improvement", p. 280.

[26]Fitzpatrick and Rowe, "Keywords for Open Peer Review".

an article.[27] This could ease the role of the editor over time, as bidding patterns give an insight in reviewer interests. A possible drawback of this system is that reviewers could bid on articles that they wish to see criticized and rejected. This would create extra work for editors as they have to check for potential conflicts of interest [28].

Editors also have a task in helping authors and reviewers on their way. To this end, participants should be provided with guidelines on how to use the environment and how to publish their comments. Editors need to write these guidelines and make sure users will be able to find them. Editors also have to oversee the discussions among reviewers and make sure these are held in a respectful way. This will also give them the opportunity to assess the quality of the reviewers and thus to build a community of trusted referees.

Along the way, editors may stumble upon questions that touch on often unspoken organizational and disciplinary values. Fitzpatrick and Rowe, for example, found that while they had feared that untenured scholars wouldn't want to turn in articles, in the end they had to worry about untenured reviewers who were afraid to comment. Another question that could arise is that of ownership of the pre-published articles, reviews and comments. Editors need to provide clear information to their participants on this topic.

The last point editors need to keep in mind, is how to preserve the articles and comments. These should always be available for the evaluation of the project and its participants. At the same time there needs to be a procedure for authors who want to withdraw articles that they deem problematic or want to reserve for publication elsewhere.

While performing these tasks, the editor has the choice to be known or remain anonymous. Anonymity seems a more likely choice in the case of post-publication review, where the editor only provides a quick scan before putting the article online for extensive public review. The more tasks editors have to perform, the more logical it seems that other parties know who they are, since identification increases the responsibility of the editor.[29]

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[27]Birukou et al., "Alternatives to peer review: novel approaches for research evaluation", p. 5.
[28]Idem, 9
[29]Shingareva and Lizárraga-Celaya, "Refereeing Process in Mathematics and Physics: Meaningful Changes and Models for Improvement".

This applies especially to the group review model that Gould suggests.[30] In his view, the editorial board of a journal could review and rate the articles it publishes. Its comments and ratings are then published alongside the article on a blog where others can then post their comments. The editorial board should work pro-bono and be as large as possible, to ensure a light workload for each member and to benefit a larger portion of the research community than at present.

It seems very unlikely that predatory publishers would take the trouble to implement such open peer review models. Full and correct implementation requires a lot of time, money and dedication, while predatory publishers just intend to make a large sum of money in an easy way. If they would make an attempt to build a peer review platform, it probably wouldn't work as well as that of credible publishers who spend more time and effort on it. Thus, over time authors and reviewers would stop using it and warn others about the publisher. The most important condition for this to work is that all credible publishers adopt some kind of open peer review model. When the vast majority of publishers uses open peer review, eventually researchers will come to find it suspicious if a publisher conducts only closed peer review and they will probably start to shun such publishers. If a predatory publisher were to adopt the model of Gould and publish his own review alongside the paper, it would probably be of low quality - possibly even computer-generated - and thus soon contradicted and refuted by authors and readers.

Models independent of journals

Like many others, Shingareva and Lizáraga-Celaya also see opportunities for publishing independently of journals. In most of these, the editor is left out and the article is published without pre-review. After publication, a large group of reviewers can write a review or post comments on the article.[31]

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[30]Thomas H.P. Gould. "The Future of Peer Review: Four Possible Options to Nothingness". English. In: *Publishing Research Quarterly* 28.4 (2012), pp. 285–293. ISSN: 1053-8801. DOI: 10.1007/s12109-012-9297-9. URL: http://link.springer.com/article/10.1007%2Fs12109-012-9297-9 (visited on 06/27/2014), pp. 290-291.

[31]Shingareva and Lizárraga-Celaya, "Refereeing Process in Mathematics and Physics: Meaningful Changes and Models for Improvement", p. 281.

One example is the website *peerevaluation.org*[32] where researchers can upload their papers, alert peers through links to social media and repositories and index their papers in relevant search engines. Their peers can then review, discuss and further distribute the paper, while the website keeps track of these activities and displays an overview of the paper's impact.[33]

Another example is *ResearchGate*, a network environment for academics. It has developed Open Review,[34] where authors can upload their articles and have them reviewed by peers. These referees can either provide a short comment or fill in a structured review on the methodology, analyses, references, findings and conclusions of the article. To guarantee a certain level of quality, contributors need to be affiliated to a research institution and anonymous reviewing is not possible.[35]

PubPeer is a platform solely dedicated to post-publication refereeing. Authors don't need to upload their article, but researchers can search for articles published with a DOI or pre-print on *arXiv.com*. They can then comment on them anonymously and engage in discussions with the first and last author of the article. PubPeer thus enables open discussion about articles that have only undergone closed pre-publication peer review.[36] This makes it possible for readers to point to mistakes that the original referee may have missed and possibly also to unmask publishers that falsely claim to have provided thorough peer review.

Rubriq takes this even farther by giving users the opportunity to rate and comment on journals that they have experience with. The platform is first and foremost intended for reviewing academic papers. Authors need to create an account and pay a fee before their paper can be reviewed. First the editors check for conflicts of interest, ethical statements and plagiarism. Then the article is published online and opened for thorough review by three peers. They too need to

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[32]*Peerevaluation.org*. 2014. URL: `http://peerevaluation.org/` (visited on 05/31/2014).

[33]Birukou et al., "Alternatives to peer review: novel approaches for research evaluation", pp. 5-6.

[34]*Open Review*. ResearchGate. 2014. URL: `http://www.researchgate.net/publicliterature.OpenReviewInfo.html` (visited on 05/31/2014).

[35]Richard Van Noorden. "The new dilemma of online peer review: too many places to post?" In: *Nature News Blog* (2014). URL: `http://blogs.nature.com/news/2014/03/the-new-dilemma-of-online-peer-review-too-many-places-to-post.html` (visited on 06/22/2014).

[36]*PubPeer*. 2014. URL: `https://pubpeer.com/about` (visited on 05/31/2014).

create an account, but don't get to see the author's name during the reviewing. All the referees are requested to fill in a detailed independent and standard review report. The author then receives a compilation of these reports and a list of recommended journals to publish in.[37]

These journals are taken from JournalGuide, which itself uses major indices like PubMed and DOAJ. Journal editors can also request JournalGuide to add their journal. Every journal that JournalGuide lists can be publicly rated and commented on by users of Rubriq.[38] JournalGuide thus resembles QOAM, which was discussed in section 2.3. Both platforms are designed to give their users the opportunity to rate the journals they have experience with. However, JournalGuide only allows authors to comment, while QOAM also asks editors and reviewers after their experiences. Also, the report that can be filled in at QOAM seems to be more detailed than that on JournalGuide. Both sites are quite new, though, and thus still need to prove their full worth. If they would attract many users who would give extensive comments, they could become very useful tools in the fight against predatory journals. They would then make it easier for authors to quickly assess which journals are credible and which aren't. However, as was mentioned before, journals that make mistakes out of inexperience could receive negative comments too quickly and then might have a hard time repairing their reputation.

As Wellen argues, the fee that authors have to pay Rubriq to get their article reviewed could lead to extra costs for authors. They not only have to pay Rubriq, but also the journal they want to publish in. Wellen deems it unlikely that high-prestige journals would want to work with reviews provided by Rubriq or that they should give discounts to authors who have their papers reviewed by the platform. Rubriq would then only be suitable for refereeing articles that are to be published in middle to low prestige journals.[39] Predatory publishers, too, would be very unlikely to lower their APCs. Even if the article is already peer reviewed, they would still claim to provide services in registering, disseminating and archiving academic papers. However, if other journals provided the same services and got

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[37]*Rubriq*. Research Square. 2014. URL: `http://www.rubriq.com/how/process/` (visited on 05/31/2014).

[38]*JournalGuide*. Research Square. 2014. URL: `http://www.journalguide.com/faq#journal-faqs-5` (visited on 08/11/2014).

[39]Wellen, "Open Access, Megajournals, and MOOCs", p. 7.

better reviews on JournalGuide and similar platforms, researchers would be more likely to come to avoid the predators.

In the view of Gould, the publishing of research could also be taken up by corporate sponsors. These sponsors could hire editors to proofread, edit and evaluate the research and place it in the corporate storage. There it could be accessed by others via a fee-structure or on a need-to-know basis.[40] While this would take the wind out of the predatory publishers' sails, it also creates other kinds of problems. Corporations could have monetary reasons to influence the research outcomes and shield research away from the public that they deem unfit and even dangerous for their business. Furthermore, the peer review process would not take place in the open and thus false claims about it can still be made. This would be even easier if the papers are only available to a small set of people who have to ask permission to enter the database. It would be too easy to deny them access if they criticised the corporation too much.

Gould also deems it possible that not only journals, but also academic articles can be done away with. He believes that it should be enough to just publish the raw material and let everyone draw their own conclusions from it.[41] This, too, would leave out predatory publishers, unless they would claim that they can build a special platform for the data. Since they try to make money without putting much effort in the quality of the platform, they would probably soon be exposed. A more significant problem with just publishing raw data is that it takes specialized knowledge to correctly interpret them. People outside the academic field would have a hard time to read the data correctly and could easily draw the wrong conclusions from them.

3.4   Features of an ideal peer review system

Open peer review systems help to improve the quality of the research published by increasing the visibility of the work of authors, reviewers and editors. Especially revealing of the editor's role is an important element in the fight against predatory journals. Open peer review systems that include this function should also have the

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[40]Gould, "The Future of Peer Review: Four Possible Options to Nothingness", p. 289.
[41]Idem, p. 292.

following features.

Pre- and post-publication review   Predatory journals often claim to conduct pre-publication review while they hardly ever do so. When open post-publication review becomes the standard, such claims can more easily be falsified. Also, when all participants can clearly see which journals make such claims, after some time fewer and fewer researchers will be inclined to offer their papers to them.[42]

Another option would be to make it a standard to publish the article with an editorial review, as in Gould's model described in 3.3. It seems unlikely that predatory journals will take the trouble of writing such a review, thereby making it easier to become unmasked. The major drawback would be that editors could withhold controversial research from the public and thereby slow down scientific progress. It is therefore necessary that a variety of research publication outlets remain in existence so that authors have the choice to offer their article to another platform.

Total transparency   To ensure the publication of controversial research, total transparency of reviews and ratings is also needed. In a closed review model, reviewers who have to decide whether a paper is fit for publication might be tempted to refute the paper because they don't feel comfortable with the paper's conclusion. This goes for editors as well as for reviewers from outside the journal. When all reviews and ratings are visible, readers will be able to scrutinize them and focus the reviewer's attention on the question of probable importance of the paper.[43]

Time limit?   The question whether there should be a fixed time period during which papers can be reviewed, depends on the publication stage in which the review is conducted. In the case of pre-publishing review, the answer is unquestionably yes. Authors need time to rewrite their paper and editors need time to

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[42]Nikolaus Kriegeskorte, Alexander Walther, and Diana Deca. "An emerging consensus for open evaluation: 18 visions for the future of scientific publishing". In: *Frontiers in Computational Neuroscience* 6.94 (2012). DOI: `10.3389/fncom.2012.00094`. URL: `http://www.frontiersin.org/computational_neuroscience/10.3389/fncom.2012.00094/full` (visited on 05/31/2014), pp. 2-3.

[43]Idem, p. 1.

decide whether or not to publish it.[44]

With post-publication review on the other hand, there doesn't seem to be a need for a time limit. Authors should always be allowed to improve their paper, even long after publication. It should always be possible to correct debunked papers. Initially misunderstood papers should be able to eventually get the credit they deserve.[45]

Likewise, the statistical information that goes with the articles should always be available. This may affect trustworthy journals that made a bad start in a negative way, but this effect should lessen as they improve their work. Predatory journals, however, are more likely to continue to perform badly. Their place in the ranks should not be greatly improved just because they happen to have done a better job on just a few recent articles.

The danger is, however, that researchers will be deluged with publications of various quality, which they all have to assess for themselves. One paper can have multiple versions, due to the ever increasing amount of comments. This also creates more work for the editors, who have to moderate the discussions.[46] While this could expose predatory journals who don't take the trouble, it is also possible that post-publication peer review will become limited to a select body of works that produce a lot of concern and discussion. Also, reviews, comments and discussions could become scattered all over the internet. The question is then whether search engines will be able to link articles and reactions to each other.[47]

Dedicated community   The success of an open peer review system depends largely on the expertise of its users. It is therefore important that the system attracts a dedicated community of expert researchers who can assess the published papers and their journals in a correct manner. These dedicated participants could then attract more researchers from within and outside their research field and encourage other journals to participate in open peer review systems.

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[44]Fitzpatrick and Rowe, "Keywords for Open Peer Review", p. 138.

[45]Kriegeskorte, Walther, and Deca, "An emerging consensus for open evaluation: 18 visions for the future of scientific publishing", p. 4.

[46]Shingareva and Lizárraga-Celaya, "Refereeing Process in Mathematics and Physics: Meaningful Changes and Models for Improvement", p. 282.

[47]Van Noorden, "The new dilemma of online peer review: too many places to post?"

A dedicated community will also make it easier to find good reviewers. In the current system most of them are selected on basis of their credentials. Open peer review opens up the way for referees to show their expertise, interest and engagement and thereby makes it easier to involve experts from other fields for the review of interdisciplinary articles.[48] The bidding for review system as described by Birukou could give an insight in reviewer interests, enabling editors to find reviewers more easily. However, extra work in this system is created if reviewers start bidding on articles that they want to criticize and reject since editors would then have to check for potential conflicts of interest.[49] On the other hand, when the reviews are published on the papers, the reviewers will be exposed and more balanced reviews will be added.

Openness of editors It is not uncommon for predatory journals to claim that their editorial boards contain well-known names. Where they actually are a member, openness makes it possible for other participants to hold them accountable for their work. When they are incorrectly mentioned as editors, they can falsify these claims and expose the predatory journal. If it would become common for editors to publish an editorial review, like Gould suggests, it will become easier to expose predatory journals that don't take the trouble or publish a fake review. These editors could try to withhold papers containing controversial research from the public, but these practices could be exposed in evaluations of the journal.

Evaluation of all participants Apart from the editors, the authors, reviewers and journals should also be evaluated to determine the quality and trustworthiness of their work and to hold them accountable for it. This increases the probability that authors publish good research, that reviewers conduct thorough reviews and that editors and journals implement good systems for registering, certifying, disseminating and archiving the research they publish.[50] When the majority of the journals uses open peer review, researchers will come to find it suspicious if a journal doesn't participate and will probably start to avoid that journal. Since preda-

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[48]Fitzpatrick and Rowe, "Keywords for Open Peer Review", p. 137.

[49]Birukou et al., "Alternatives to peer review: novel approaches for research evaluation".

[50]Fitzpatrick and Rowe, "Keywords for Open Peer Review", p. 140.

tory journals are the least likely to put much effort into implementing and maintaining open peer review systems, they would be among the first to be shunned.

Authentication   Evaluation of all participants requires some form of authentication.[51] Every journal, article and person should be assigned a unique verification number. When an author submits a manuscripts to a journal, the paper receives a verification number that is connected to the author and journal in a database held by a third party. Likewise, the numbers of the reviewers and of the editor of the journal are connected to the paper. This should enable refuting false claims by predatory journals about their editors and the papers they have published.

Ownership by a third party   Ideally, the platform on which the peer review is conducted is not owned by a publisher, but by an independent party. This party should assign verification numbers to all articles, journals and persons and connect them in the right way. Furthermore it should be responsible for keeping all articles and reviews available, so that information about ownership of papers remains visible. This third party can then serve as a judge in cases of false claims by predatory journals about editorship and published articles.

Persistence   All articles and reviews should always remain available.[52] This should prevent cases in which journals try to massage their performance figures by deleting negative reviews and articles containing bad research. For credible journals that make mistakes out of inexperience this could have a negative effect. However, they should get better reviews as they learn from their mistakes and start performing better. And if persistence of articles and reviews could make new journals think more thoroughly about their practices before they start publishing, that would only be an improvement for both journals and public.

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[51]Kriegeskorte, Walther, and Deca, "An emerging consensus for open evaluation: 18 visions for the future of scientific publishing", pp. 3-4.

[52]Fitzpatrick and Rowe, "Keywords for Open Peer Review", pp. 138-139.

3.5   Conclusion

According to Sense about Science, in 2009 84% of the respondents believed that "without peer review there would be no control in scientific communication".[53] Peer review thus is deemed an essential instrument in the fight against poor and fraudulent research. As is argued above an open peer review system could also be helpful in the fight against predatory journals.

To make peer review work as a method to fight predatory journals, it is necessary to reform the system and make open peer review systems the default. Such a system should not only allow researchers to review each others work, but also to assess the quality of the journals. Peer review could also be conducted without the interference of journals and editors, but then predatory journals could still make false claims about their performances in the registration, dissemination and archiving of research. These claims, however, should be easier to refute as they take place more in the open than the current peer review system.

As most advocates of open peer review agree, though, peer review alone, even when completely open, is not enough to fight predatory journals. They should be complemented by metrics, user statistics, social-web information and citations that measure the impact of the paper both shortly after publication and over a longer period. Also, evaluative metrics need to be added to assess the quality of editors, authors and reviewers and to expose fraud. Users should be able to choose which instruments they want to use and be given the possibility to design their own metrics.[54] However, as shall be argued in the next chapter, current metrics have their own drawbacks and need to be improved and complemented before they can correctly be used to meet these ends.

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[53] Sense about Science, "Peer Review Survey 2009: Full Report", p.10.

[54] Kriegeskorte, Walther, and Deca, "An emerging consensus for open evaluation: 18 visions for the future of scientific publishing", p. 3.

Chapter 4

Metrics

4.1 Introduction

As was mentioned in 1.5, researchers' reputations are commonly measured by their scientific output. Since peer review can be labour-intensive, time-consuming and subjective, metrics are used to give a more direct and objective picture of research quality and impact.

However, these metrics are often used in the wrong way. Tenure and promotion committees value publications in high-prestige journals. Prestige, though, says little to nothing about the quality of the research.[1] Also, just because an article was published in a high-prestige journal doesn't mean the article itself will become very influential. Furthermore, metrics only measure a limited set of academic artefacts and their impact on the academic community.

More importantly, though, current metrics are notorious for their manipulability. Journals can manipulate their citation scores to create a higher Journal Impact Factor (JIF). Predatory publishers use this gameability of the JIF to lure credible researchers into publishing their papers with them.

If metrics can be gamed, are they still useful in the evaluation of journals? Is it possible at all to design a trustworthy metric? In this chapter an attempt will be made to find an answer to these questions. First the currently most used metrics for journals are discussed, their shortcomings are determined and the various ways

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[1] Suber, "Thoughts on prestige, quality, and open access".

that have been tried to overcome them are discussed. To conclude, the possibility
is examined to design a metric that measures prestige and impact of a journal, but
can not be gamed.

4.2   Current metrics

When it comes to journal metrics, the best known metric is the Journal Impact
Factor (JIF) designed by Garfield. Since the JIF in its current form contains sev-
eral flaws, other similar journal metrics have been designed over the past years.
Internet and social media have further inspired the use of web-based metrics or
altmetrics to measure impact within a shorter time period and on non-academic
users.

Journal Impact Factor

In 1972, Eugene Garfield designed the JIF in order to rank journals according to
the extent to which their articles were cited. The JIF measures the total number of
citations in a given year made to all content the journal has published in the two
previous years. This number is then divided by the total number of citable items
published by the journal within the same time-span.[2]

Nowadays the JIF is calculated by Thomson Reuters for over 10,000 journals
and is published in its yearly Journal Citation Reports. It was originally meant as a
tool for American universities to select the best journals for their libraries, but now
also influences decision making in research grant allocation, hiring and promotion
of academic staff.[3]

It is partly because of this great influence that the JIF is highly criticized

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[2]E. Garfield. "Citation analysis as a tool in journal evaluation". In: *Science* 178 (1972),
pp. 471–479.

[3]Lutz Bornmann et al. "Diversity, value and limitations of the journal impact factor and al-
ternative metrics". English. In: *Rheumatology International* 32.7 (2012), pp. 1861–1867. ISSN:
0172-8172. DOI: 10.1007/s00296-011-2276-1. URL: http://link.springer.
com/article/10.1007%2Fs00296-011-2276-1 (visited on 06/27/2014), p. 1861.

for its limitations (see for example Kapeller,[4] Delgado-Lopez-Cozar[5] and Born-mann[6]). Often a journal has a few articles that receive many citations, and a lot that are only cited a few times. Tenure and promotion committees, however, tend to treat an article that was published in a highly cited journal as more important, no matter how many citations the article itself received.

Journal editors can game the JIF to improve their journal's score. Predatory journals abuse this to attract more papers. They are helped in their efforts by a lack of control variables in the JIF's formula. For example, there is no correction for number of authors, the extent to which the publication is accessible, and the number of self-citations. There should also be a way to correct for article type, as reviews and data-rich analyses attract more citations than methodological or theoretical articles.

The lack of transparency doesn't help either. Thomson Reuters' database is only accessible to subscribers, which makes it practically impossible to reproduce the JIF. This is even harder because it is not clear which articles are deemed to be citable and thus included in the formula. Complaining about a certain routine of indexing is therefore very difficult.

Lastly, the Impact factor has a limited scope. It only looks at journals, conference proceedings and monographs in sciences and social sciences. These have to be included in Thomson Reuters' Web of Science database, which has strict rules for the inclusion of new journals. Furthermore, the database mainly covers works in English, which is especially a disadvantage for local journals in countries of emerging science. And the time limit of two years forms a problem for academic fields where citations take more time to develop, like many in the social

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[4]Jakob Kapeller. "Citation Metrics: Serious Drawbacks, Perverse Incentives, and Strategic Options for Heterodox Economics." In: *American Journal of Economics & Sociology* 69.5 (2010), pp. 1376 –1408. DOI: 10.1111/j.1536-7150.2010.00750.x. URL: http://onlinelibrary.wiley.com/doi/10.1111/j.1536-7150.2010.00750.x/abstract (visited on 06/27/2014).

[5]Emilio Delgado-Lopez-Cozar and Alvaro Cabezas-Clavijo. "Ranking journals: could Google Scholar Metrics be an alternative to Journal Citation Reports and Scimago Journal Rank?" In: *Learned Publishing* 26.2 (2013), pp. 101–114. DOI: 10.1087/20130206. URL: http://www.ingentaconnect.com/content/alpsp/lp/2013/00000026/00000002/art00007 (visited on 06/27/2014).

[6]Bornmann et al., "Diversity, value and limitations of the journal impact factor and alternative metrics".

sciences and humanities.[7]

As Suber points out,[8] the JIF is especially disadvantageous for young journals.[9] They are only included after two years. Tenure and promotion committees tend to give preference to papers in journals with a JIF as a sign of their quality and prestige. This makes researchers reluctant to publish in new journals, especially when they are open access.

Other journal metrics

The limitations of the JIF have inspired numerous other journal metrics. Thomson Reuters itself has introduced in its Journal Citation Reports metrics that include citations in less (Citation Immediacy Index) and in more than two years (5 year Journal Impact Factor), to account for differences between fields.[10]

The Eigenfactor that was developed by Carl and Ted Bergstrom also measures citations over 5 years. It takes the quality of citations into account by giving more weight to citations from highly cited journals. To counter practices of excessive self-citation, Eigenfactor does not include this kind of citations at all.[11]

In 2010, Henk Moed introduced the Source Normalized Impact per Paper (SNIP).[12] This metric takes into account that some fields attract more authors and thus citations than others. It therefore compares the journal's citation impact to the citation potential in its field. This makes it possible to directly compare any journal to another. SNIP uses a time-frame of 3 years and only looks at citations from and to peer-reviewed articles.

Another well-known metric is the Scimago Journal Rank (SJR). This metric uses the database of Scopus, which indexes about 20,000 journals from all aca-

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[7]Borgman, *Scholarship in the Digital Age*, p. 158.

[8]Suber, "Ten Challenges for open access journals".

[9]Suber, "Thoughts on prestige, quality, and open access".

[10]*Journal Citation Reports metrics*. May 22, 2012. URL: http : / / admin - apps . webofknowledge.com/JCR/help/h_index.htm (visited on 06/18/2014).

[11]*Eigenfactor Methods*. University of Washington. 2012. URL: http : / / www . eigenfactor.org/methods.php (visited on 06/18/2014).

[12]Henk F. Moed. "Measuring contextual citation impact of scientific journals". In: *Journal of Informetrics* 4.3 (2010), pp. 265 –277. DOI: 10.1016/j.joi.2010.01.002. URL: http: //www.sciencedirect.com/science/article/pii/S1751157710000039 (visited on 06/20/2014).

demic fields.[13] Like many other metrics, the SJR is based on the Google PageRank algorithm. It measures citations over three years and gives more weight to citations from highly cited journals. It also takes into account the thematic closeness of the citing and the cited journals.[14] The SJR ignores self-citations above 33% and is especially advantageous to new journals.[15]

The Journal h-index also uses Scopus, but can use other databases as well. This metric is calculated by taking the least number of publications in a journal, each of which is cited at least h times. It can be calculated over one or more years and bears information on the number of highly cited articles. The journal h-index is dependent on a journal's age, its visibility and the degree unto which articles can be cited.[16]

The Journal h-index, together with some variants, is also used by the metric system Google introduced in 2012.[17] Google's database consists of about 40,000 journals, conference proceedings, collections and series from repositories like arXiv in several languages and from several places and disciplines. Google metrics are accessible to everyone and thus more transparent than those of Thomson Reuters and Scopus.[18]

Each of these metrics solves some of the problems encountered in the JIF. The Eigenfactor corrects for excessive self-citation by not including self-citations at all. The SNIP and SJR can be calculated more than once in a year, which makes them less vulnerable to editorial manipulation.[19] Scopus' larger database

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[13]*SJR SCImago Journal & Country Rank.* SCImago. 2007. URL: http://www.scimagojr.com (visited on 06/20/2014).

[14]Vicente P. Guerrero-Bote and Félix Moya-Anegón. "A further step forward in measuring journals' scientific prestige: The SJR2 indicator". In: *Journal of Informetrics* 6.4 (2012), pp. 674–688. ISSN: 1751-1577. DOI: 10.1016/j.joi.2012.07.001. URL: http://www.sciencedirect.com/science/article/pii/S1751157712000521 (visited on 06/20/2014).

[15]Delgado-Lopez-Cozar and Cabezas-Clavijo, "Ranking journals: could Google Scholar Metrics be an alternative to Journal Citation Reports and Scimago Journal Rank?", p. 9.

[16]Bornmann et al., "Diversity, value and limitations of the journal impact factor and alternative metrics".

[17]*Google Scholar Metrics.* Google. 2012. URL: http://scholar.google.nl/intl/nl/scholar/metrics.html (visited on 06/19/2014).

[18]Delgado-Lopez-Cozar and Cabezas-Clavijo, "Ranking journals: could Google Scholar Metrics be an alternative to Journal Citation Reports and Scimago Journal Rank?", pp. 1-15.

[19]Henk F. Moed et al. "Citation-based metrics are appropriate tools in journal assessment provided that they are accurate and used in an informed way". English. In: *Scientometrics* 92.2

gives new and foreign journals more chance to gain prestige. Google Scholar Metrics are even better accessible. The Journal h-index gives extra information on journals by adding the number of highly cited articles.[20]

Other problems, however, still remain or are even added. Like the JIF, the SJR and SNIP are liable to a sudden sharp rise in the journal's score after the publication of one very influential article. Furthermore, papers appearing earlier in the measure period receive more citations than papers published later in the period. This is becoming more important as more papers are published online first.[21]

The Journal h-index can only be used for comparisons within academic fields. It can be gamed by authors through self-citations and by editors through increasing review articles. It is disadvantageous to new journals and does not take into account that journals with high values can change their citations. Neither does it provide information on the number of exceedingly cited items, which makes it hard to compare the prestige of journals with similar values.[22]

Google Scholar Metrics only indexes journals that have published at least 100 papers over the last five years. This could be disadvantageous for new journals. The metrics are also prone to data manipulation, as is shown by the example of computer scientist Ike Antkare. Although he doesn't exist, Antkare is listed by citation metrics that use Google Scholar's database as one of the most influential scientists, thanks to the use of auto-citations within his computer-generated articles.[23] Lastly, Google Scholar Metrics don't exclude self-citations and give preference to publications with a high number of articles.[24]

(2012), pp. 367–376. ISSN: 0138-9130. DOI: 10.1007/s11192-012-0679-8. URL: http://link.springer.com/article/10.1007%2Fs11192-012-0679-8 (visited on 06/27/2014), p. 372.

[20]Bornmann et al., "Diversity, value and limitations of the journal impact factor and alternative metrics", p. 1864.

[21]Moed et al., "Citation-based metrics are appropriate tools in journal assessment provided that they are accurate and used in an informed way", p. 373.

[22]Bornmann et al., "Diversity, value and limitations of the journal impact factor and alternative metrics", p. 1884.

[23]Cyril Labbé. "Ike Antkare one of the great stars in the scientific firmament". LIG Laboratory, Université Joseph Fourier, Apr. 14, 2010. URL: http://hal.inria.fr/docs/00/71/35/64/PDF/TechReportV2.pdf (visited on 06/24/2014).

[24]Delgado-Lopez-Cozar and Cabezas-Clavijo, "Ranking journals: could Google Scholar Metrics be an alternative to Journal Citation Reports and Scimago Journal Rank?", pp. 6-18.

4.3 Altmetrics

The journal metrics mentioned so far are all based on citation counts. Apart from the disadvantages that were listed above, citations also take time to evolve and only measure a limited set of research artefacts and their impact within the research community. Over the past years, the internet and social media have inspired several web-based metrics or altmetrics that should overcome these limitations.

In 2013-2014, the National Information Standards Organization (NISO) interviewed thirty researchers, librarians, university administrators, scientific research funders and publishers about their views on altmetrics.[25] According to NISO's report, altmetrics are generally described as "metrics that are alternative to the established citation counts and usage stats - and/or metrics about alternative research outputs, as opposed to journal articles".[26]

Examples of altmetrics include usage log data from social media and the web portals of scientific publishers, aggregator services and institutional library services.[27] These do not only evaluate books and articles, but also newer research output types, like data, software and videos.[28] These data can also give a picture of the groups of readers that are invisible to citation metrics, like medical professionals and patients.[29]

Thelwall et al. researched eleven altmetrics to determine how well they correspond with citation-based metrics.[30] This research was very limited in scope and time, but it did provide evidence that most altmetrics correspond well with citations, although the authors could not determine to what extent. Most of the

[25]"NISO Altmetrics Standards Project White Paper". Version 4. In: (June 9, 2014). URL: http://www.niso.org/apps/group_public/document.php?document_id=13295&wg_abbrev=altmetrics (visited on 08/08/2014).

[26]Idem, p. 4.

[27]Johan Bollen et al. "A Principal Component Analysis of 39 Scientific Impact Measures". In: *PLoS ONE* 4.6 (June 2009), e6022. DOI: 10.1371/journal.pone.0006022, p. 2.

[28]"NISO Altmetrics Standards Project White Paper", pp. 5-6.

[29]Thomas Jones, Sarah Huggett, and Judith Kamalski. "Finding a Way Through the Scientific Literature: Indexes and Measures". In: *World Neurosurgery* 76.1-2 (2011), pp. 36 –38. DOI: 10.1016/j.wneu.2011.01.015. URL: http://www.sciencedirect.com/science/article/pii/S1878875011000192 (visited on 06/20/2014), p. 38.

[30]M. Thelwall et al. "Do Altmetrics Work? Twitter and Ten Other Social Web Services." In: *PLoS ONE* 8.5, e64841 (2013). DOI: 10.1371/journal.pone.0064841. URL: http://www.plosone.org/article/info%3Adoi%2F10.1371%2Fjournal.pone.0064841 (visited on 06/27/2014).

time, altmetrics could only identify the occasional exceptional or above average article. There was, however, a difference between performance on article and on journal level.

Although they are generally generated on article-level, altmetrics can also be grouped or aggregated for journals, institutions, countries, and other parties. It is possible, though, to group things that cannot be compared, for example because of different time scales. This applies especially to cases where the underlying metric is unavailable.[31] For predatory journals it is thus quite easy to massage their altmetrics score.

On article level, too, altmetrics can be hard to calculate and easily manipulated. For correct calculation, all users would have to refer to the same source, but social media users, such as tweeters and bloggers, often refer to different places for the same article. For some types of sources it is difficult to measure the usage, which means that it can be tempting to leave them out. Also, the use of scholarly outputs and social media vary per country and discipline [32]. Furthermore, articles with sexual and comical titles may attract unreasonably high attention that says nothing about their importance. Lastly, altmetrics are difficult to compare because of different characteristics. On some platforms, attention increases over time, while on others it stays the same or even decreases.[33]

4.4   Is it possible to design a perfect journal metric?

None of the aforementioned journal metrics can be considered as the ideal metric to measure journal impact and prestige. Indeed, in a comparison of 39 metrics, Bollen et al. found that popular journal metrics like the JIF and the Scimago Journal Rank and Cites per Doc are the least suitable for this purpose.[34] They rather measure popularity and represent the most particular view of scientific impact. To more accurately measure prestige, usage-based metrics and citation-based social network measures are better indicators. The usage-based metrics in particular

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[31]"NISO Altmetrics Standards Project White Paper", pp. 10-11.

[32]Idem, pp. 9-12.

[33]Thelwall et al., "Do Altmetrics Work? Twitter and Ten Other Social Web Services.", p. 2.

[34]Bollen et al., "A Principal Component Analysis of 39 Scientific Impact Measures".

measure a kind of impact that is closest to what is generally believed to be scientific impact.

These findings were partly affirmed by Bornmann and Leydesdorff.[35] They compared seven citation-based metrics with the scores that peer reviewers of F1000 had given to the papers they had reviewed. The journal metrics showed the least correlation with the F1000 scores. The authors also concluded that metrics should be used alongside peer review, since the first can only measure impact and the latter also accuracy and importance.

Whatever they measure, though, all journal metrics we have seen so far are liable to gaming. This means that predatory publishers could always manipulate them to calculate a high impact score and thus make it look like their journals are high-prestige. Indeed, in an attempt to design the perfect metric for measuring the quality of an academic's papers and his/her overall productivity, Gagolewski found that all metrics can always be gamed, because no metric can take into account all unexpected or possibly nonsensical input.[36] There is no reason to believe that a journal metric could anticipate such input. Therefore, it is not advisable to use only one metric in the evaluation of a journal's impact and prestige. A combination of multiple metrics, or multiple metrics next to each other, is still mathematically equivalent to a single metric, just one that is more complex. But that complex metric, too, has the same gameability disadvantage. It could, arguably, be much harder to game, though.

4.5   Conclusion

Predatory publishers game journal metrics to make it look like they publish high-prestige journals. The metrics that are currently most popular, like the Thomson

[35]Lutz Bornmann and Loet Leydesdorff. "The validation of (advanced) bibliometric indicators through peer assessments: A comparative study using data from InCites and F1000". In: *Journal of Informetrics* 7.2 (2013), pp. 286 –291. DOI: 10.1016/j.joi.2012.12.003. URL: http://www.sciencedirect.com/science/article/pii/S175115771200106X (visited on 06/27/2014), p. 290.

[36]Marek Gagolewski. "Scientific impact assessment cannot be fair". In: *Journal of Informetrics* 7.4 (2013), pp. 792 –802. ISSN: 1751-1577. DOI: 10.1016/j.joi.2013.07.001. URL: http://www.sciencedirect.com/science/article/pii/S1751157713000540 (visited on 06/20/2014).

Reuters JIF, are the least suitable for measuring the prestige and impact of journals in such a way that they can not be manipulated. Moreover, it does not seem possible to design one specific metric that can do this.

One solution to this problem would be to use more than one metric in the evaluation of journals. Which metrics are used depends on what is to be measured: popularity or prestige, directly after publication or over a longer period and only within the academic community or also outside. Ideally, metrics are combined in such a way that together they measure all of these aspects. And even then they don't give a full view and can probably still be gamed. It will, however, be more difficult to game all of them (or the equivalent more complex metric) at the same time.

More important, though, is that metrics are used in the right way. Currently, journal metrics are used to evaluate the success of individual researchers. Individual metrics generally only measure citations and not the degree in which a researcher contributes to other aspects of academic life, such as education and peer review.[37] This encourages researchers to focus on publishing articles in high-prestige journals, without paying much attention to the trustworthiness of the journal.

As is argued in the previous chapter, it is also possible to combine metrics with evaluations and ratings by researchers who have worked with the journal. Those researchers can themselves be evaluated by means of peer review and metrics, which should make them less keen to be too strict or too mild with the journal. Also, journals could be left out altogether, which should shift the focus of researchers' evaluators to the individual articles and their impact within the academic community and society. If they lose importance, publishers will have less reason to behave in a predatory way.

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[37]Moed et al., "Citation-based metrics are appropriate tools in journal assessment provided that they are accurate and used in an informed way", p. 375.

Chapter 5

Conclusions and Future Work

5.1   Introduction

The world of academic journal publishing is dependent on trust. Editors and readers have to trust that the research they set eyes on is original, conducted and analysed properly and free of errors. Researchers and readers have to trust that papers are properly peer reviewed and that reviewers don't plagiarize rejected papers.

Predatory journals and other dubious research publication practices show that this trust can always be betrayed. Predatory publishers excel in dishonesty about their identity, journals and publication practices. This makes them more prone to publishing fraudulent, plagiarised or duplicate research articles. This does not only contaminate research findings, but also reflects poorly on trustworthy research that is published alongside these false papers in the same journal.

Over the years, several possible solutions have been presented to stop predatory publishers. In this thesis three kinds of them have been discussed: black- and white-lists, open peer review models and new metrics. It has been researched how these measures could be optimized to better suit their purpose and if one of them could serve as the ultimate solution against predatory journals. However, all of them have their particular drawbacks that make them unsuitable as the sole solution of the predatory publishers problem.

Black- and white-lists try to make a clear distinction between trustworthy and dubious publishers and journals. They do so by setting standards and peer

reviewing journals that want to join white-lists or wish to be removed from a blacklist. Over the years their rules and regulations have become more standardized, partly because of collaborations between several white-lists and other interested parties. Their main drawback, however, is that it takes time for journals to prove themselves worthy of membership of a white-list. As long as they aren't on such a list, researchers feel more reluctant to submit their articles to them, regardless of the journal's quality. Meanwhile, blacklists could easily add new journals for mistakes they make out of inexperience. Also, membership of a white-list doesn't automatically mean that the journal will never engage in dubious practices. Researchers hence do best to also evaluate the journals they want to publish in themselves.

Open peer review models should make clear which journals conduct proper peer review, in contrast to the lack of peer review at predatory journals. However, such a system often requires that all papers are being published directly upon submission, thus increasing the chance that poor research is being taken for truth until the first reviews say otherwise. A closed pre-publication stage is therefore desirable, but with mechanisms to determine the quality of the screening.

In the case of metrics, the ones that are currently in use the most are the least appropriate for measuring journal impact and prestige. Most notably, they measure too little and predatory publishers can manipulate them to create high scores for their journals. As discussed in chapter 4, though, it is not possible to design a perfect metric. It is thus best to use several metrics, based on various data and in combination with peer review. Equally important is that they should be used in the right way.

This last point shows the underlying problem for the fight against predatory journals. Tenure and promotion committees often lay too much stress on quantitative measures in their evaluation of researchers. Teaching, peer reviewing and the supervision of post-graduate students are hardly ever counted in the evaluation. These committees also tend to use the wrong measures, such as journal metrics to evaluate individual articles. Researchers opting for tenure and promotion thus become focused on publishing as much as they can in high-prestige journals, without paying much attention to the trustworthiness of the journal.

5.2 Decoupled publishing

Because of these problems some have argued that journals should be done away with altogether. Instead, separate platforms should be used for certifying, disseminating and archiving academic research publications and evaluating other players in the field.[1] In the long run, such platforms should also be able to analyse consumer preferences and to point readers to other articles of interest and relevance.[2]

Certification

In fact, such platforms are already in existence. Some of them, like F1000 and Rubriq, have been discussed in chapter 3. To them we can add megajournals like BioMed Central and PLoS, that enable authors to submit their rejected paper to another of the publisher's journals with the peer review of the rejecting journal attached to it. In some fields, it is also possible to send an article with peer review to a journal of another publisher. However, some publishers claim their editors are reluctant to allow this. These editors argue that they have spent time to build a relationship with their reviewers and feel that this trust is violated when the review is sent to another publisher.[3]

The Third Reviewer is a forum where researchers can share opinions about recently published research on microbiology and neuroscience, regardless of the journal it was published in. The site enables reviewers to comment on papers from some major venues anonymously, under a nickname or using their real name.[4]

MathSciNet is the digital version of Mathematics Review. Its database contains reviews, abstracts and bibliographic information on mathematics. Users can search for indexed literature on author name, journal name, period and subject

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[1]To date, there seem to be no separate platforms that have taken on the registering function. All platforms that are listed here can verify when a paper was submitted to them, but whether this will be enough to settle possible disputes about who cam first with an idea will have to be proved.

[2]Brembs, Button, and Munafò, "Deep impact: Unintended consequences of journal rank", pp. 20-21.

[3]House of Commons Science and Technology Committee. "Peer Review in scientific publications. Eighth Report of Session 2010-12". In: (July 28, 2011). URL: http://www.publications.parliament.uk/pa/cm201012/cmselect/cmsctech/856/85602.htm (visited on 06/27/2014), pp. 49-50.

[4]*The Third Reviewer*. URL: http://thirdreviewer.com/ (visited on 06/27/2014).

classification. The site also provides reviews on current literature by selected reviewers.[5] They are also allowed to give subjective comments on papers and their reviewers.[6]

The Institute for Computer Sciences, Social Informatics and Telecommunications Engineering and the European Alliance for Innovation have developed the *e-Scripts* submissions management system. Here, the title and abstract of every submitted paper is posted online for 2 weeks during which period interested reviewers can bid to them. At the same time, authors and editors can also nominate candidates. At the end of the two weeks, the editor approves an ordered list of candidates based on both the bidding and the nominations. Reviewer invitations are then sent out, starting at the top of the list.[7]

To better assess the quality of the reviewers, *e-Scripts* makes use of *UCount*. This tool measures the reputation of reviewers through surveys into community opinions on the value of researcher's contributions. Every 3 months it publishes a ranking of reviewers based on these surveys. Where possible, the scores of the reviewers in these ranking are also displayed in the editor's lists of candidates [8].

Dissemination

Mendeley is a webportal which researchers can use to work together on papers and disseminate them among peers. With the article manager and bibliography database, researchers can create their personal library of articles which they can annotate and bookmark. This library is accessible online from any computer and can be shared with other users.[9]

As Wellen points out, Mendeley can learn a lot about its users' behaviour and interests.[10] This could enable the platform to recommend articles to researchers, analyse resource usage and measure impact and productivity of researchers. Be-

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[5]*MathSciNet*. American Mathematical Society. URL: http://www.ams.org/mr-database (visited on 06/27/2014).

[6]Priem and Hemminger, "Decoupling the scholarly journal", p. 5.

[7]Birukou et al., "Alternatives to peer review: novel approaches for research evaluation", p. 5.

[8]Idem, pp. 8-9.

[9]*Mendeley*. Mendeley Ltd. URL: http://www.mendeley.com/features/ (visited on 06/27/2014).

[10]Wellen, "Open Access, Megajournals, and MOOCs", p. 9.

cause of this power, Mendeley was acquired by Elsevier in 2013. The acquisition caused some anger among researchers who feared that Elsevier would abuse Mendeley to undermine free science.[11] However, as Wellen argues, it is also possible that users of Mendeley will eventually force Elsevier to behave more ethically.[12]

CiteULike is also a portal for storing, organising and sharing research papers. When users add an article to their library, CiteULike automatically retrieves the citation details. Like Mendeley, CiteULike is accessible online from every computer.[13] Similar websites are Zotero and BibSonomy.

Thomson Reuters has built Incites, a tool to assess the productivity and citation impact of researchers, institutions and countries. Users can select their preferred citation metrics, build reports with trends and contexts and share their findings with other users.[14] The metrics are generated from Thomson Reuters' database of publications from 1981 to the present.[15]

With Impact Story, too, users can create their own impact reports, but mostly with the use of altmetrics like blogposts, Facebook public posts, tweets and data from video sites like Youtube and Vimeo. Citations are counted as well, but only from sources that have given permission to use their data. Thomson Reuters Web of Science and Google Scholar are not included, but Scopus is.[16]

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[11]David Dobbs. "When the Rebel Alliance Sells Out". In: *The New Yorker* (Apr. 12, 2013). URL: http://www.newyorker.com/tech/elements/when-the-rebel-alliance-sells-out (visited on 08/14/2014).

[12]Wellen, "Open Access, Megajournals, and MOOCs", p. 9.

[13]*CiteULike*. Oversity Ltd. URL: http://www.citeulike.org/home (visited on 06/27/2014).

[14]*Incites*. Thomson Reuters. URL: http://incites.thomsonreuters.com/ (visited on 06/26/2014).

[15]Lutz Bornmann, Rüdiger Mutz, and Hans-Dieter Daniel. "Are there better indices for evaluation purposes than the h index? A comparison of nine different variants of the h index using data from biomedicine". In: *Journal of the American Society for Information Science and Technology* 59.5 (2008), pp. 830–837. DOI: 10.1002/asi.20806. URL: http://onlinelibrary.wiley.com/doi/10.1002/asi.20806/abstract (visited on 06/27/2014), pp. 287-288.

[16]*Impact Story*. URL: http://impactstory.org/faq (visited on 06/26/2014).

Archiving

The best known website for research archiving is arXiv.org, which stores papers on physics, mathematics, computer science, non-linear sciences, quantitative biology and statistics. The website allows registered authors to submit their papers and update them while also maintaining the former version. Users can anonymously search for papers and keep updated through RSS feeds and subscription to automatic email alerts.

Of course, this list is not exhaustive. The number of online academic research platforms is changing rapidly, with platforms being built as well as being closed down. In January 2013, for example, the well-known social bookmarking site Connotea was closed down because of excessive spam problems and the advent of more widely used social media.

5.3   One online platform?

The list of platforms does, however, highlight some developments. When platforms are dedicated to just one or a few fields, these are mostly in the exact sciences. This could well be because scientists most often disseminate their ideas through articles, while the humanities and social sciences prefer books. That does not mean that the latter are not familiar with the problems with predatory journals, but the matter does seem less pressing in these fields.

The platforms also differ in the extent to which they let their users participate. Sites that are dedicated to finding and sharing papers sometimes also enable users to work together to create a paper. Others only allow retrieval and dissemination of existing papers. When it comes to review, not all platforms allow all users to engage in the discussion. If they do, the degree to which reviewers can comment anonymously differs as well. Websites that evaluate metrics not always give users the opportunity to add or design their own. Furthermore, some of them rely mostly on citation-based metrics, while others give preference to altmetrics.

As mentioned in section 3.4, a multitude of platforms could well lead to articles being overlooked and discussions not being held. The question is then

whether one or a few platforms could be built that encompass all functions and fields. Such a platform could include all the features of the open peer review system as described in section 3.4, plus the possibilities to work together on and share and archive all publications. This would reduce the need for journals, although a system of pre-publication review could still be implemented.

The platform should be accessible to everyone, but all users should create an account so they can be authenticated. Peer reviews, metrics and ratings would then be able to expose fraudulent behaviour by editors, who could eventually be excluded from the platform.

The question is, however, whether such a platform would be feasible. As several academic fields prefer distinct kinds of research publications, all of these would have to be supported by the platform. It would then not only need to include journal articles, but also for example books, software and extensive datasets.

Furthermore, there is the question of ownership. Ideally, the platform would be owned by a consortium of universities and other research institutions. This consortium would have to consist of enough members to prevent one or a few of them becoming powerful enough to influence the research and discussions published on the platform, for example by directing users' attention to certain research findings while making others less visible.

Lastly, the platform should make it possible to evaluate editors and journals. Over time, disseminating research completely independent of publishers might become possible and form an important deterrent for predatory publishing behaviour. For now, however, publishers continue to play a part in the research publishing process. Communication about predatory behaviour by journal publishers is thus still needed in the shape of black- and white-lists, peer review and metrics or ratings.

To make publishers completely redundant, a change of perspective would be needed with regard to the importance of publishing academic books and journals. As long as these form the main criteria for tenure and promotion, researchers will keep trying to reach their goals by publishing as much as they can, even within predatory journals. Likewise, less ethical publishers will keep trying to find ways to make money out of this system. As long as methods are not developed to evaluate researchers in other ways than by article output, predatory publishers

will keep being part of the academic research publishing world.

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