Paper mills, fraudulent authors, and editorial responses

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Introduction

Misbehavior in the field of scientific research is not a new phenomenon, and one that probably dates back to the earliest scientific experiments, the earliest scholarly endeavor, and the earliest published articles. Indeed, plagiarism has been recorded back to Greek times and the plagiarism-checking company, Turnitin has a nice article tracing its history [1]. In journal publishing, one of the earliest articles to consider this type of bad practice was published in The Irish Monthly in 1879 [2].

The first article retraction is reported to be in 1756 when a notice appeared in Philosophical Transactions. The author, Benjamin Wilson, requested his article to be retracted due to recognizing problems with the research [3]. In this instance the retraction was not due to fraud, but it serves as a reminder that the scholarly record has always included problematic and misleading science.

More recently there have been well reported scandals collected and included in the database, Retraction Watch. The database catalogues problems, bad behavior, and fraud appearing throughout scholarly communication, including editors, reviewers, publishers, institutions, and of course, authors. Errors happen at all stages of scholarly communication, and although regrettable, they can often be explained without blame. However, fraud and unethical practices constitute a much more serious aspect of scholarly endeavor.

There are various definitions of fraudulent and unethical behavior, which usually (but not always) cover the same problems. For example, in the United States, the National Science Foundation defines research misconduct as belonging to one of three categories: fabrication, falsification and plagiarism. However, outside these three neat categories, it also recognizes other types of misconduct such as ghostwriting and other authorship and research ethics issues [4]. One point of note is the illegality of such behaviors. Fabrication and falsification may be penalized through legal systems, for example if grant money has been used inappropriately or the researchers have deliberately misled others. However, many behaviors considered unethical in the publishing and scholarly environment are not illegal, and judicial systems cannot be used to control or prevent them. Plagiarism is an interesting case in point here, since it is not illegal—although infringement of copyright is, and there is considerable overlap between the two activities.
When it comes to authorship fraud, such behaviors are not usually illegal whilst they remain highly unethical. Usually, the only penalties can be levied by employers using terms of employment conditions to dismiss staff or other disciplinary measures. This essay will explain different authorship problems and the relatively new problem of paper mills and will suggest some appropriate editorial responses.

**Authorship Problems**

In the first decade of this century there was a great deal of concern over pharmaceutical research, and the ghost- and guest-authorship issues associated with this. These unethical practices were centered on medical communications companies, who often work for pharmaceutical companies to help authors write and publish their pharma-funded research. Whilst most companies work completely ethically, there were cases where the communications company was supplied with data and the “story” to tell. They were also given the names of “authors” who were to be credited with the articles, even if they had never seen them and there was no correspondence with them [5,6].

The problem itself had started to emerge in the late 1990s, and a study published in *JAMA* in 1998 [7] reported that 11% of studied articles in major medical journals had evidence of ghost authors, and 19% had honorary authors (heads of departments, or influential individuals added to a paper to confer respectability).

Concern over ghost authorship and the influence of pharmaceutical companies led to the 2016 International Society for Medical Publication Professionals (ISMPP) Code of Ethics. This guide provides ethical benchmarks for all medical publication professionals (and can equally be applied in other disciplines). The guide has since been updated [8].

Many editors turned to the Committee on Publication Ethics (COPE) for help with authorship issues, and it has since issued a great deal of support as guidelines and flowcharts to help editors identify and respond appropriately to potentially fraudulent activity (e.g., “Systematic manipulation of the publication process” flowchart [9]).

Another insidious authorship problem is whether the named individuals deserved to be named as authors, according to the International Committee of Medical Journal Editors (ICMJE) criteria [10]. Guest authors are those who do not fulfil all (or any) of the ICMJE criteria but are included because they either confer respectability on an article or expect to be named because of their relationship with the authors or the research—for example, heads of department. It is still common in some institutions and some regions of the world for the head of department to be named as an author. In some cases, this is a reasonable request because of their involvement with the work for their laboratory or department, but in many it is simply a way for a person in power to obtain credit for more research than they have actually undertaken [11].

Guest authorship may be the reason why some authors are able to publish huge numbers of articles. For example, Yuri T. Struchkov was a Russian researcher who published over 2,000 articles, or approximately one article every 4 days in the 1980s. Whilst such output may have been legitimate, there was also concern that he obtained this quantity of publications through influence rather than through his own research. He worked in Russia and managed the crystallography equipment at his institute. Such equipment was in short supply so many researchers came to use it, and it was suggested that in payment for using the equipment his name was included in resulting papers [12,13].

**Buying Authorship**

In 2013 one of the first reports [14] was published of a system whereby authors could buy their way onto papers. Called “China’s Publication Bazaar,” the report in *Science* exposed an apparently new type of fraud—one in which companies sold authorship. The report described the journalist being approached by a company with an invitation to pay for authorship on an article which had already been submitted and accepted by a credible journal. The company were now offering authorship for sale—i.e., anyone willing to pay them could have their name added to the list of article authors. There were already article authors (presumably legitimate) but the business allowed them to sell co-authorship for a fee, some of which was retained by the company, and some given to the real author(s).

The article reported a 5-month investigation by *Science* reporters that uncovered a market in which corrupt scientists were willing to sell and buy authorship, using unethical companies who masqueraded as language editing services. In some cases, editors were also complicit in the market for authorship [14].

Several years later, in 2019 Retraction Watch reported a Russian company that was auctioning authorship [15]. The site blatantly advertised the sale of articles that had been submitted to, or accepted by, Web of Science or Scopus-indexed journals. Starting at $500 and rising according to the status of the journal and the position of authorship, the site had (at the time of the Retraction Watch 2019 article) 344 articles for sale on its website.

The saying “publish or perish” is well known, and it is also a recognized fact that many researchers feel under a great deal of pressure to publish—which can lead to unethical behaviors. Some authors, however, are simply dishonest. In the case of the pharmaceutical ghost authorship cases mentioned above,
although it may have been sufficient for the authors to have an additional article to add to their publication list, they were often paid by the pharmaceutical companies. In the cases of guest (or honorary) authorship, no money was usually paid to the guest author or by the guest author since the fact (or expectation) of having an additional article was usually sufficient incentive. The cases of ghost and guest authorship which had been well documented for several decades were to become commercialized with the emergence of “paper mills.”

**Paper Mills**

According to Wikipedia, the term “paper mill” in relation to academic authorship fraud dates to the mid-19th century in universities where students shared papers and submitted works produced by other students [16]. Although more commonly referred to as an “essay mill,” the term “paper mill” has become the term used in academic publishing, and the earliest reference I can find to this term dates back to 2014.

The 2014 article that appears to mention this term for the first time in relation to journal publications was published on the blog site, The Grand Locus [17]. The article reports finding a large number of articles with the title “something and something else: a meta-analysis” (“something” being replaced with a unique topic in each article). The author of the blog site looked at a sample of the 32 papers found indexed in MEDLINE and found that they had identical structures, figures, and overlapping text. One clue to the fact that these were duplicate papers with just the subject changed was that the same grammatical mistakes were found in multiple papers. After some investigation the authors contacted a Chinese website that offered them authorship of a paper for $10,000.

In the past few years, the subject of paper mills has become one of growing concern, and there have been some large-scale investigations leading to rejections. At the end of 2022 the Institute of Physics announced retraction of 494 papers largely due to paper mills. Most of the papers were published in its conference series, where editorial oversight was apparently deficient in checking submissions or undertaking sufficient peer review [18].

Another high-profile case concerned Hindawi (owned by Wiley) that retracted over 500 articles in September 2022 and a further 1,200 articles in early 2023. Again, these were mostly from special issues managed by guest editors in 16 journals, where article publications were identified after publication [19].

In light of the concerns that this is a growing problem, and one that can be difficult for smaller journals to catch before publication, COPE undertook a study of the problem in partnership with the STM organization and Maverick Publishing services [20]. COPE defines paper mills as “the process by which manufactured manuscripts are submitted to a journal for a fee on behalf of researchers with the purpose of providing an easy publication for them, or to offer authorship for sale” [20]. Paper mills are commercial companies that create articles (often copied from already-published articles, or submitted by corrupt authors), and then sell authorship. Corrupt authors will pay to have their name added as an author.

Because these companies want to have as many articles as possible, such articles are frequently based on templates, or are the same articles with the topic, chemical, condition, etc., changed. In isolation each article may look quite acceptable, and it is only when multiple articles are compared that they can be identified as the same article with a topic or other change to make them sufficiently unique that they are not picked up by plagiarism tools. (However, sometimes they are picked up by plagiarism tools because the templates are too similar!) An excellent overview of the workings of a paper mill can be read on Retraction Watch [21].

Such companies may operate at a “conference” level—providing multiple papers affiliated with a conference, or a special topic, and submit them to journals that have such special issues, often with guest editors who are not as experienced as the main journal editor, on the assumption that editorial oversight will be lax and not identify the similarities between the articles. There is also the problem of a complicit editor—i.e., a person who is in league with the paper mill, perhaps being paid to accept their articles [22]. Such companies will also try to influence the review process and suggest fraudulent reviewers if the journal asks for suggestions.

One case reported to me personally concerned two papers submitted to a journal at the same time, and using such similar templates that the editorial office spotted them as potentially fake. The editorial office then put the papers into the plagiarism checker and discovered that they were based on an article published a few years ago in another journal. In this case the company had taken an already-published article and dishonestly reused it twice as a “new” article, each article having a different set of authors (who would have paid for their names to be affiliated with it). It is also likely that there are other versions of this same paper submitted to other journals, each with different authors, in the hope that they will be published.

**Why Do Authors Do It?**

To pay for authorship is a risky strategy for any researcher, since being discovered could lead to immediate dismissal from their employment and an end to their career. However, it is unlikely that there will be any legal recourse. It is also likely that the risk is lower than it appears at first, since practices of
confidentiality and the threat of libel action may prevent any institution sharing information about a fraudulent researcher. Therefore, they could easily find employment elsewhere, especially because it is likely that any prospective employer will not question the legitimacy of the researcher being named as an author so long as the topics of the publications appear legitimate.

In addition, as mentioned above, the pressure to publish may incite authors to take advantage of these companies to help their careers, especially if they have been unable to obtain sufficient publications to advance. Whilst many institutions would consider such behavior fraudulent and lead to immediate expulsion of the authors, some institutions are complicit, since these additional publications also add to the publication list of the institution and help its own ranking.

The Size of the Problem

It is impossible to accurately assess the scale of the problem, but there is concern that it is growing rapidly. The investigation done by COPE and its partners found that the incidence of suspect papers being submitted to journals at six publishers was in the range of 2% to 46% [20]. It appears that journals will receive a few articles, but if they are accepted a large number will subsequently be submitted.

What Editors Can Do

There is no easy way to identify paper mill articles, and no tools that can identify fraudulent authors. Some guidance is provided by COPE and STM [20] and Byrne and Christopher [23], which can be of some assistance. In summary, the following points should be noted by all editors and publishers.

- Editors should be aware of the potential problems of paper mills and other author problems and be vigilant.
- Any submission done on behalf of an author (i.e., from a generic or company email address) should be investigated.
- Any submission from an institutionally based author that does not have an institutional email address should be questioned.
- Any change of authorship after submission should be considered suspicious and investigated.
- Editors should never exclusively use suggested reviewers (unless they are credible people already known to the journal); asking authors to suggest reviewers is very useful where obtaining reviewers is difficult, but in general an editor should use at least one reviewer from the journal's own database or the editor's own network.
- Guest editors should be trained and monitored to ensure that quality does not slip, and that fraudulent authors do not take advantage of special issues.
- Special vigilance should be undertaken with conference proceedings since peer review quality is often lower than the regular journal.
- Any report of problematic publications should be investigated, and every journal should be willing to retract articles where fraud or significant error is detected.
- Retraction Watch database may be of use to investigate any suspicious behavior, to see if the author has been identified in any previous scandals.

Conclusion

Authorship fraud and bad practice is a problem that has existed for many years probably back to the start of research communication. Guest and ghost authorship have been replaced as the main ethical issue by the growth of a business in which individuals can buy the position of author on research articles. Companies are emerging which either create spurious articles or copy already-published ones, and then sell authorship. Scholarly journal editors should be alert to these kinds of publication misconduct to keep the scientific integrity.

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