

News and Perspectives

Authorship-for-Sale: From Fake Papers to Forensic Scientometrics

Cliff Dominy, JMIR Correspondent

Abstract

Detecting and dismantling paper mills is a persistent and increasing problem in science. In this *News and Perspectives* article, JMIR Correspondent Cliff Dominy continues his series on [fraudulent science](#), reporting on tools and practices for detecting paper mills and other authorship-for-sale schemes.

Key Takeaways:

- Paper mills are gaining traction, selling not just fake scientific manuscripts, but textbooks and patents too.
- The boom has been fueled by the ease with which AI can produce credible manuscripts, and it's placing increasing strain on an overloaded peer-review system.
- Forensic scientometrics is emerging as an automated, scalable solution for detecting fake science and the people who profit from it.
- Detection, collaboration, and systemic reform are needed to address the problem and restore trust in the scientific record.

This article continues Cliff Dominy's series on fraud in science. Read his previous article on identity theft in academia [here](#).

Fraudulent science pays—the equivalent of over US \$117 million, according to [a recent preprint](#) that tracked and exposed a paper mill named Pharmakon Neuroscience Research Network (PNRN). Over a 10-year period, PNRN had embedded itself within legitimate publishing brands and generated 120 fake academic papers in 56 academic journals.

It was a win-win scenario; PNRN made undisclosed sums of money and the 312 scientists involved in the scam pocketed millions in new research funding derived from the deception. Unfortunately, the PNRN saga is not an anomaly, but likely the leading edge of a growing problem in academia. The biggest losers: science and trust in the scientific record.

Faking It to Survive

For the desperate few, struggling within a publish or perish ecosystem, the incentives, pressure, and temptation to cheat can overwhelm.

By typing “Authorship-for-sale” into your browser, you can access the murky world of fake science. Much like a fast-food menu, it helps if you know what you want and what you can afford. A first authorship on a legitimate preaccepted paper might cost [several thousand dollars](#). If that's a bit rich, then a more affordable coauthorship might be of interest.

If buying real science is beyond your budget, consider an AI-generated manuscript in a fake journal from a non-existent publisher, which will set you back just a few hundred

dollars. The paper will look legitimate, with a scientific index identifier and a reassuring ISSN journal number—all fake, of course.

Paper mills are not new, and thanks to AI, they are quietly polluting our knowledge base [on a daily basis](#). Academics, publishers, and journal editors are becoming increasingly concerned with the practice and are taking steps to detect these forgeries before they enter the scientific record.

Characteristics of Paper Mills

- Fraudulent commercial enterprises that write and sell authorship slots for fake research manuscripts
- Tend to be large-scale, with high-volume output
- Often produce papers that focus on lower-stakes, lower-profile research methods or topics
- Papers include fabricated, plagiarized, or manipulated images, tables, and data (accelerated with widespread availability of AI)
- Papers can amass high numbers of citations through coordinated citation rings, including using fabricated references or self-citations to other articles within the same paper mill
- Tactics have expanded to include cash bribes to journal editors and offers to guest-edit issues (sometimes using stolen identities of legitimate researchers)

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A Signal Emerges From the Noise

Detecting these forgeries requires identifying signature patterns in papers that can be flagged by automated screening systems. Leslie McIntosh, MPH, PhD, is the Vice President for Research Integrity & Security at Digital Science, and senior author on the PNRN preprint. McIntosh, an

informatician by training, first detected an elevated authorship-for-sale signal in the literature in 2016 followed by a sharp rise in 2020. She notes that it's estimated that "2% of all journal submissions across all disciplines originate from paper mills." [Paper mills](#) are opportunists; the dates coincided with broader acceptance of open science publishing practices in academia fueled by the arrival of generative AI.

Reese Richardson, PhD, is a meta-scientist at Northwestern University in Illinois. Richardson, who researches the science of producing science, explains, "Paper mills are not a one-product business—they sell papers, patents, [and] book chapters." Essentially, their services can help solve any advancement problem from academic promotion to visa applications, and even entrance into medical school.

Identifying expansive paper mill operations will require detection tools that operate just as broadly. That is the goal of [forensic scientometrics](#), which McIntosh refers to as "the investigative science of science."

Detecting Deception

Forensic scientometrics aims to examine manuscript content as well as the authors, journals, and publishers within the paper mill network. However, some challenges remain.

At the text level, AI detection needs to be improved to flag artificially generated text in documents. Since AI detectors are trained on AI-generated text, without continual updating, they will always lag behind the technology. Sometimes they are just plain wrong. In 2024, Forbes magazine famously [reported](#) that the US Declaration of Independence (1776) had been identified as 98.51% AI-generated by detection software. Clearly, adopting AI detectors as a stand-alone technology will not be enough. Richardson proposes that "we attack the [publish or perish] incentives that brought us to this precipice," describing the AI generator/detector arms race as "an unwinnable game altogether."

A more promising approach for McIntosh is to use bibliometrics, the statistical analysis of publication data, to look "at the relationships among researchers." Who are these researchers, where do they work, and how are they funded? Where are the individuals in their career, and what is their publication output and their relationship with other coauthors? McIntosh's approach uses an analogy from the art world—you can forge a painting, but it's much harder to fake its provenance, the paper trail that leads an artwork back to its creator.

Citations provide another signal, with false manuscripts having elevated levels of ghost or zombie citations, or self-citations within the paper mill family. Throw in additional provenance checks on publishers, journals, and indexing and you have a series of dependable trust markers that together inform detectors of the authenticity of a manuscript.

Coauthors generally share expertise in the same area in legitimate manuscripts, but paper mills might simply order coauthors according to their author slot; an oncologist collaborating with an oceanographer on an astronomy

manuscript, for example, might raise an eyebrow or two. Additionally, author affiliations should be verified against their earlier work. Paper mills tend to alter affiliations to avoid institutional scrutiny, occasionally substituting private addresses and hotels for official academic appointments.

In forensic scientometrics, no single red flag is a cause for concern, but a succession of them provide a signal for greater scrutiny by an editor.

Rebuilding Trust

A number of tools and initiatives exist to detect potential paper mill papers, from publisher-specific initiatives like Wiley's [Paper Mill Detection Service](#) to cross-publisher platforms like the [STM Integrity Hub](#).

Rebuilding trust in science and the scientific record requires preventative efforts and further collective action.

Nathaniel Gore is the Product Development and Partnerships Director at JMIR Publications and the developer of [opensci.id](#), an initiative that will add a new trust metric to academic publishing: a layer of identity verification. He sees the authorships-for-sale problem as a "failure of infrastructure," noting, "authorship-for-sale is low-risk today because identity is easy to fabricate and publishers don't share information across journals—verified identity changes that."

An industry-wide collaboration between publishers and institutions, [United2Act](#), is also taking collective action to address this. One of the key objectives is the development of a shared verification framework through which all stakeholders can authenticate authors, reviewers, and editors in publishing.

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institutional will are
converging for the first time.*

Reese Richardson, PhD

Alongside these efforts, [systemic reform](#) might also be necessary. Advocates of the [Slow Science](#) movement, for example, have called for key changes to the current publish-or-perish [fast-science culture](#) that incentivizes and enables paper mills. The group's chief call is for a focus on quality over quantity when it comes to research output—fast science, like fast food, isn't healthy; good science needs time to cook.

The development of these industry-wide collaborations and movements is reason for optimism. Richardson confirms that, for the first time, "awareness, tools, and institutional will are converging." Gore agrees, adding that paper mills have "given publishers, institutions, and funders a shared incentive to build a trust infrastructure that didn't exist before."

Keywords: paper mills; scientific misconduct; artificial intelligence; peer review; research integrity ; scientometrics; fraudulent research; scholarly publishing; AI

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