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The Case for a Technology Solution to the Ethics Crisis in Academic Publishing

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ABSTRACT

This article integrates existing theory from distributed computing and cryptology with gray literature from industry to provide a comprehensive description of the minimum requirements of a technological solution to the current ethics crisis in academic publishing. The paper argues that such a solution could significantly reduce the biases and misconduct that now exist in the academic peer review process. Theory suggests such a system could operate effectively as a distributed encrypted telecommunications network where nodes are anonymous, do not trust each other, with minimal central authority. To incentivize the academic community to join such a community, the paper proposes a new pseudo-cryptocurrency called litcoin (literature coin). This litcoin-based system would create economic scarcity based on proof of knowledge (POK), which is a synthesis of the proof of work (POW) mechanism used in bitcoin, and the proof of stake (POS) mechanism used in various altcoin communities.

KEYWORDS

Cryptography, Ethics, Litcoin, Proof-of-Authority, Proof-of-Knowledge, Proof-of-Stake, Proof-of-Work, Publishing, Timestamping

INTRODUCTION

Tarnished Ethics in Academic Publishing

Most laymen assume the process of academic peer review is robust, anonymous, and impartial. However, as many researchers would probably agree, it is often none of these. The Internet revolution has been a double-edged sword for academic publishing. While the average cost of journal publication has plummeted, the number of journals of dubious quality has spiraled. While the probability of plagiarism is now much higher, articles with minor text reuse are often termed plagiarized. While virtually any published work is now freely available to subscribers, filtering such work for quality and originality is now more complex.

Most of us probably agree that academic authors and reviewers make honest mistakes. However, as this article will evidence, not all the behavior of academic community members is honest. For instance, Fang, et.al. (2012) examined 2,047 retractions in biomedical and life sciences journals and found 88% were attributed to either error or misconduct. This raises the issue of review validity. A common author experience is three radically different reviews for the same paper: one recommending acceptance, one requesting major changes, and one recommending rejection. Hanley (2013) and

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Starbuck (2003) indicated that reviewer dissensus often causes top journals to reject high quality papers, while accepting low quality ones (Lodahl & Gordon, 1972; Pfeffer, 1993).

Article review mistakes can have serious negative consequences. For examples, Andrew Wakefield's flawed study of the measles, mumps, and rubella vaccine (Deer, 2014) and Hwang Woo-suk's fraudulent study of cloning (Sang-Hun, 2009) have had major negative repercussion. (Yong, 2012). Sage Publications recently retracted sixty papers from one of its journals. In one such case, a reviewer used a phony name to give a glowing review to his own work. Furthermore, according to a 2011 report in the *Journal of Nature Reviews Drug Discovery*, the results of two-thirds of sixty-seven key studies analyzed by Bayer researchers from 2008-2010 could not be reproduced.

The prestigious Proceedings of the National Academy of Science once published a paper entitled "Female Hurricanes are Deadlier than Male Hurricanes" (Jung et. al. 2014), because of the organization's own submission guidelines:

The review process is conducted anonymously for all submissions, except NAS members' own contributions, where the reviewers are known to the author and their names are published…. https://www.pnas.org/page/authors/reviewers

In other words, if you are a NAS member, you may be able review your own paper or those of people you know. In 2002 and 2010, two papers published in those proceedings claimed that a pesticide called atrazine was causing sex changes in frogs. Both papers were examined by the same prestigious editor, who was a colleague of the paper's lead author. The author preselected this editor, and both papers were published without a review of the data on which the paper was based. The Environmental Protection Agency (EPA) could not reproduce the results of either paper (Campbell, 2013).

Heuristic criteria related to authors' social relations, writing style, doctoral origins, and current affiliations can play major roles in review bias, because such heuristics can be used to avoid the difficult burden of deeply evaluating an article (Yong, 2012). To demonstrate this, Ceci & Peters (1982) identified several papers published by faculty from prestigious departments. Next, they copied and resubmitted the papers to the same journals, but with phony author names and affiliations. Of the nine papers not deemed plagiarized, eight were rejected by sixteen of eighteen reviewers.

There is also evidence of a "complex language bias" in journal article reviewing (Armstrong, 1980). In the best-known study of this issue, faculty from three prestigious universities evaluated previously published research. The investigators rewrote the articles in two different versions, one with straightforward language, the other with more complex language. Reviewers rated the complex language versions more highly.

Mahoney (1977) presents evidence of "confirmation bias" which means that reviewers tend to favor research that does not deviate very much from prevailing wisdom.

Michael Eisen, a biologist at UC Berkeley, and a founder of the *Public Library of Science* (PLOS) was quoted in the following *Wall Street Journal* article (Campbell, 2013):

We need to get away from the notion, proven wrong on a daily basis, that peer review of any kind at any journal means that a work of science is correct. What it means is that a few (1-4) people read it … and didn't see any major problems. That's a very low bar in even the best of circumstances.

That same WSJ article (Campbell, 2013) also quotes Professor Larry Wasserman, of Carnegie Mellon University:

The peer review system that we currently use … is a centralized, secretive system that allocates scarce resources (reviewers' time) by fiat. We need to scrap the whole system and build a new one that recognizes that science is first and foremost a marketplace of ideas. We should replace pre-