

The Status of Scientific Publication in the Information Age

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Abstract

The principal argument of this paper is that existing practices of scientific publishing ill-fit information-oriented sciences which are fundamentally concerned with complexity, constraint, uncertainty and contingency. It is argued that better exploitation of the full gamut of technological possibilities for scientific communication could support a much richer coordination of understanding between scientists. The barriers to achieving this lie with mechanisms of scarcity production in education, which are fundamentally driven by out-dated publication practices.

The argument builds on the social ontology of Searle, suggesting that scientific publishing declares “status functions” which simultaneously declare scarcity at many levels of education - in the process feeding economic mechanisms within education which have become pathological. In response, I argue that a richer ecology of types of communication by scholars exploiting and experimenting with new technologies can not only mitigate the pathology of publication, but can create better conditions for the advancement of learning and coordination of scientific understanding.

1 Introduction: Social Ontology and Academic Publishing

A published academic paper is a kind of declaration:

“the board of such-and-such a journal agrees that the ideas expressed in the paper are a worthy contribution to its discussions.”

It is, in effect, a license to make a small change to the world. Alongside the license comes other prestige indicators which carry value for individuals: in today’s academia, publications help to secure the position of academics in universities (without them, they can lose their jobs). Beyond publication itself, citations serve as ‘evidence’ of approval of a community. Fame and status as a “thought leader” (Sismondo 2013) comes from many citations, which in turn brings invitations to keynotes at conferences, editorial roles, expert advisory positions, through to secondary studies of an author’s work. Fundamentally, there

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is a demarcation between ‘academic celebrity’ and everyone else: academic publication counts because it is (or is perceived to be) scarce. This state of affairs raises ontological questions about how the social world of science and education works.

Searle (Searle 2011) calls these declarations ‘status functions’: particular kinds of speech act by which he argues *social reality* is constructed. Searle argues that the entities of the social world - institutions, money, monarchs and nation states manifest as status functions. He argues that it is the declaration of a status function which, if the person making it has sufficient ‘deontic power’ and the community within which it is made upholds it (through what Searle calls “collective intentionality”), then the status function will be binding in its context. The idea is recursive: the deontic power of a person or community declaring a status function is also subject to status functions: “she is a scientist/editor/president...” and so on.

Declarations are oriented in practices and conventions involving people and technologies. In the case of science, practices involve the investigation, corroboration, falsification and publication of new work. As Feyerabend (Feyerabend and Hacking 2010) indicates, scientific practice involves not only the rational evaluation of theories, but also the individual egos of scientists. The way that status functions become established through editorial boards reinforces the “deontic power” of those upholding them sometimes making intellectual positions resistant to critical attack. Scientific publication is part of the dynamic relationships between the content of intellectual inquiry, the persons of scientists and the structure of society. In reality, many journals struggle to make effective status declarations as evidenced by numerous publishing ‘scandals’ such as Sokal (Sokal 2009) or Vamplew (Safi 2014), yet publication practices within the academy remain largely unchallenged.

1.1 Constraints and status functions

Searle’s assertion that reality is constructed in language is vulnerable to critique - particularly the charge of “linguistic reductionism”, or what Bhaskar (Bhaskar 2008; Archer 2000) calls the “linguistic fallacy”. These criticisms are defensible if Searle’s assertion is that reality is *constituted* by language. However, a weaker, and more defensible interpretation is that reality is *constrained* by language, and that every declaration of *status* is also a declaration of *scarcity*: the declaration of the status of something is also a declaration of what something else is *not*.

In academic publishing, reviewers and editors have the deontic power to make the status declaration for a particular article. Depending on the quality of the journal, this is also a ‘scarcity’ declaration: publication in some journals is more difficult (and therefore more scarce) than in others. The upholding of deontic power by editorial boards feeds into other processes of status declaration which relate to the relative worth of different publications. Algorithmic processes overseen by international agencies responsible for indexing published work make higher-level declarations about the relative statuses of journals. These processes are driven by citation indexes where highly cited work will reflect on the statuses of the author, their institution and the journal. Authors in academic communities uphold the declarations of journal editors and authors by citing work, whilst scientific indexing agencies uphold the declarations inherent in citation practices by ranking journals, and international university ranking

agencies declare the relative statuses of institutions.

From the perspective of scarcity, the less the probability that a paper might be accepted for publication in a journal, the greater the status associated with publication. High ranking journals attract more citations both because they are seen to be more authoritative, and because papers are more prominently publicised on academic search indexes in university libraries and internet search engines. With scarcity comes economic value. Access to published work in high ranking journals can attract a monetary value greater than work published in less highly-ranked journals. Since academic job security is dependent on acceptance by the academy, and since the means of gaining acceptance is to engage with the scholarship in high-ranking journals, publishers can demand a high price from University libraries for access to published work. This cost is passed on to students in Universities, and access to intellectual debate tends to be concentrated within Universities whose own status is enhanced by their position as a gateway to high ranking scholarship.

Universities employ academics who they expect to be publishing in high-ranking journals. Individual academic reputation is enhanced through publication, the status of journals is enhanced by their maintenance of scarcity of publication, whilst the University declares scarcity in the access to well-published academics and to high-ranking journals. Successful publication increases job security because it reinforces the scarcity declaration by the institution. Failure to publish is a recipe for unemployment.

The measurement of the relative status of institutions through league tables is a relatively recent development. Publishing organisations like Thompson-Reuters (*QS Intelligence Unit* n.d.), or the Times Higher Educational Supplement (*THES World Rankings* n.d.) act as de-facto academic credit-rating agencies for institutions, and their judgements have causal effects on institutional viability. Academic ranking has become an industry in itself. It is not uncommon for position in international league tables to be a Key Performance Indicator within University strategies. It affects the ability of universities to attract students, and also in the seeking of new sources of funding in financial instruments like bonds (McGettigan 2013).

To summarise, the problem of publication can be characterised as a network of interacting constraints, which can be related to different kinds of declaration of status or scarcity. Among the most important of these declarations are:

- The declaration of scarcity of publication in journals for authors
- The declaration of scarcity of access to journals by institutions and publishers
- The declaration of scarcity of status of institutions through league tables
- The declaration of scarcity of intellectual work within the universities

2 Status and Publishing before the Royal Society

Before the Royal Society published its transactions in 1667 (alongside the *Journal de Sçavans* (1665) considered to be the first academic journal), publication

was not considered something that scientists ought to do. Prior to this, uses of relatively new printing technology by scientists was not for open discussion of ideas, but for the claiming of priority of a discovery through cryptic messages, using a technique similar to modern cryptographic technologies like *Blockchain*. Without giving anything away in terms of specific details of a scientist's discovery (which might be 'stolen' by other scholars) a scientist might publish an anagram which they would then offer to solve at a later date when ready to elaborate their theory in full. Galileo's anagram for the discovery of the phases of Venus was a way of making a declaration that "Galileo has made a discovery". Kepler's mistaken attempt to solve Galileo's anagram, believing it to be a discovery about Mars (his peculiar latin solution translates to: "Be greeted, double knob, children of Mars" (Nielsen 2012)) is an indication of the competitiveness of science of the time.

Possession of knowledge rather than sharing within an academic community was the principal means of status acquisition in the late scholastic period. To understand this mentality, an analogy might be drawn to an academic today who might be unwilling to have their lectures videoed believing that if their performance in class was captured in a way that could be infinitely replayed and reused, their jobs would be threatened because they would no longer be required to lecture. Equally, many academics today are resistant to blogging because they don't want to 'give their ideas away' (Carrigan 2016).

The scientific revolution of the 17th century brought about transformations not only in scientific practice and epistemology, but transformations in scientific publishing which exploited the technologies of printing. Peer review became a fundamental element in the publications of the Royal Society, evidenced not least in the well-documented bureaucracy which surrounded the publication of the Sprat's History of the Royal Society in 1667 (Sprat 2001). Publishing facilitated the formation of large-scale scientific communities within which reproducible empirical results could be reported and discussed. Publication practice gradually took on the form that we now know it.

The Royal Society's practices of peer review was a change not only in scientific practice and epistemology, but also in the democratisation of intellectual status acquisition. Publication and admittance to the academy was technically available to all. The overthrow of Aristotelian doctrine and the new priority given to observation and experiment supported this democratic movement: the epistemological shift occurred alongside the shift in communicative practice facilitated by technology - Baconian science depended on the technologies of publication as much as the technologies and institutions of publication evolved to support the new science.

3 The Internet

Where classical science was characterised by certainty, science in today's 'information society' concerns *uncertainty* - whether it is the probabilistic modelling of economics or patterns in DNA, the analysis of big data, the investigation of quantum fields or the study of ecologies. The computer's capability to analyse and visualise uncertainties has become the dominant feature of the modern scientific landscape across almost all disciplines. Information itself is, at least from the mathematical perspective of Shannon, a measure of uncertainty. We

have, over the last 60 years or so, experienced an epistemological shift. Yet our means of scientific communication is largely unchanged from the earliest days of the Royal Society.

Mis-alignment between discursive practice and a transformed epistemology may be a root cause of present problems with the publication model, and the education system which sustains it. Journals struggle to get reviewers, publishers have become over-powerful and marketised education is increasingly unaffordable. The pathologies of mis-alignment have been noted by numerous scholars. Bateson, for example, addressed the Regents of the University of California in 1978, arguing that “Time is out of joint” (Bateson 1980). He noted that:

So, in this world of 1978, we try to run a university and to maintain standards of “excellence” in the face of growing distrust, vulgarity, insanity, exploitation of resources, victimization of persons, and quick commercialism. The screaming voices of greed, frustration, fear and hate.

It is understandable that the Board of Regents concentrates attention upon matters which can be handled at a superficial level, avoiding the swamps of all sorts of extremism. But I still think that the facts of deep obsolescence will, in the end, compel attention.

In applying what Bateson castigates as the ‘obsolete’ Newtonian quantitative techniques to themselves, Universities have become slaves to the logic of the market, adopting practices which have reduced their running costs, employing adjunct lecturers rather than full-time faculty, whilst increasing their revenues (Brown 2010). As the market determines which departments survive, which academics are hired and fired, the ecology of scholarship within the academy is increasingly under threat.

That this is occurring in a technological world where the internet provides an abundance of knowledge and learning opportunities is a curious paradox. Universities appear to have maintained their ability to declare the scarcity of education (evidenced by rapidly rising fees), and publishers - whilst coming under attack - have survived efforts to transform their practices, including the Open Access movement.

There have been attempts to address this crisis. In the early 2000s, the realisation of the technological abundance of knowledge suggested that it might be possible to bypass the institution altogether. Guerrilla tactics to open up closed journals have appeared, with Sci-Hub being the most famous example (Bohannon 2016). New models of peer-review have been introduced alongside new models of open access publishing (Anderson 2004). Yet the “scarcity problem” remains: open access offers authors or institutions to ‘buy’ increased chances of citation, leaving other aspects of the publication system intact.

4 Concluding remarks: Towards the Intellectual communication of uncertainty

The scientific revolution of the 17th century was effected with parallel initiatives in epistemology and the technologies of communication. In the 21st century, despite an epistemological transformation and explosion of available technologies

of communication, the exploitation of those technologies for scientific communication has been highly restricted, closely modelling the publication practices of the 17th century, and in many cases, using digitalisation to reinforce scarcity.

The use by researchers of social media, video, blogs, open e-learning tools, or contributions to email lists remains constrained to a relatively small groups within academia. This may partly be because such activities carry little status in the assessment of intellectual contribution. There have in recent years been calls for the publishing of research data (rather than research papers) led by Tim Berners Lee's appeal for 'Linked Data' (Amit 2011), but there remains little incentive for authors to do this. At the same time, questions are asked about the reproducibility of research results (Collaboration 2015) - one of the foundational propositions behind the classical science paradigm: there is a suspicion that scientists 'hide' behind their papers.

Behind the question about the use of new media is a deeper question about the coordination of scientific understanding, and particularly the coordination of scientific understanding of *uncertainty* or *constraint*. If human communication is, as philosophers and sociologists from Husserl to Giddens have argued, a *coordination of expectations*, then there is a clear difference between coordinating expectations with scientific results which are believed to be objective and certain, and information-oriented sciences which are *uncertain* or *contingent*. How might scholarly expectations be coordinated in an uncertain world?

On YouTube it is artists rather than academics who have harnessed the power of video for coordinating expectations within their communities. New media has afforded new mechanisms for communication and status enhancement. An uncertain world requires not the presentation of definite results and proof, but rather the determination and coordination of the constraints of individual understanding. In such an environment, it becomes increasingly difficult to make distinctions between knowledge and teaching. Rather than the single objective description of the academic paper, the multiple, and sometimes contradictory descriptions of intellectual work represented in social media, video, open data, blogs, open-source tools, and video may provide the richest means of coordinating understanding and action between scientists, and address the current misalignment between our technologies and our epistemology.

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