A Tipping Point for Electronic Journals?: A Comparison of Highly Cited Journals in Six Disciplines

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Since the seventeenth century, academic journals have played a major role in disseminating knowledge within the academic community. These journals have also become a marker of quality that is used in the promotion and tenure process at most universities. Within this highly static system, some journals have developed a higher level of credibility and prestige than others.

The introduction of the World Wide Web in the early 1990s began a series of changes that are just now having a significant impact on the academic publishing system. For the first time, journals were published that never appeared on paper. Traditional journals began re-thinking their models and migrating toward online distribution.

This study is the first in a series of snapshots taken at three-year intervals that will track trends unfolding in academic publishing, focusing on elite journals in six disciplines, including communication. It focuses primarily on the migration of journals from print to hybrid (print/electronic and electronic/print) to online. The research questions for this study are:

1. How extensive is the migration to electronic publishing among elite journals in the sciences and social sciences?
2. Has the migration to electronic publishing varied according to discipline?
3. Do journals in the field of communication stand out in relation to their peers in the sciences and social sciences?

Background

The appearance of the first online journals in the mid 1990s coincided with the rising costs of journals and constricting library budgets within most universities. Yet, these mostly free journals provided little competition to the entrenched publishers who distributed serials in print and were seen by the academic users as largely inferior. By the turn of the century, however, major publishers realized that it was in their best interests to occupy part of the electronic space while at the same time protecting their "cash cow" printed materials.

Once publishers began to make electronic copies available as an adjunct to their dominant print products, advantages of the electronic versions became apparent. These included greater user access and unique search and archival features. During the past ten years, most print journals have introduced controlled electronic access while retaining their print distribution. The next logical migration is from "p-e" journals where the print product is dominant to "e-p" journals where the electronic is the dominant product.

A major breakthrough in the move towards electronic publishing came in 2008 when the American Geophysical Union (AGU), the primary professional organization of 58,000 geophysics scientists and academics, announced that it would begin publishing its 19 journals exclusively online starting in January 2011. There has been expectation among many in the academic community that there would be a gradual migration to electronic publication.

AGU made the electronic journal their version of record almost ten years ago in 2002. In their 2008 announcement to AGU members in an article entitled, "The Demise of Print," (Albarede, 2008) they listed two primary reasons for their electronic-only decision: (1) The printed version would differ from the electronic version, which can offer animation, video and interactive material; and (2) Economics. AGU decided that the additional costs of producing a print journal, including paper and postage, should be borne only by those who subscribed to that format. They surmised that as the number of print-only subscriptions dropped, the cost per print subscription would rise creating further disincentive for print distribution.

Announcements like that of AGU have led some experts to assume that migration to electronic distribution will be a homogeneous tide sweeping the entire academic community quickly. Others believe that the migration will vary greatly according to discipline and that there will be much more heterogeneity in the process.

A study conducted by the Association of Research Libraries (ARL) in the United States in 2007 examined the process of migrating to electronic-only journal publishing and the dynamics of the transition process. The authors interviewed academic librarians, journal publishers, and society and university press staff. They concluded "while reports

of the death of the printed journal are premature, its role in the institutional marketplace faces a steep decline in the coming 5 to 10 years." The ARL study made a compelling financial case for electronic distribution:

> Financial disincentives to keeping print ultimately will outweigh dwindling demand and squeeze out all but the most popular or tactile of titles. Financial imperatives will draw libraries first—and ultimately most publishers also—toward a tipping point where it no longer makes sense to subscribe to or publish printed versions of most journals. As libraries move to e-only, publishers will see print subscriptions limited to individuals, the least lucrative element of the base. (Johnson, 2007)

As early as 1998, Drexel University in Philadelphia, Pennsylvania began a project to migrate to an electronic journal collection. It was one of the first universities to begin a fundamental shift to electronic journals. By 2002, they had increased their electronic titles from 200 to 8,600 and had decreased their print titles from 1,710 to 370. A survey of faculty and graduate students at Drexel in 2002 revealed that they spent much less time locating and obtaining library-provided articles when they are available electronically, and the electronic collection was well read, with highly favorable outcomes. (King, 2002)

A 2010 report by the Center for Studies in Higher Education at the University of California, Berkeley examined scholarly communication and faculty values and needs in seven disciplines. Harley and her colleagues interviewed 160 faculty, administrators, graduate students, and librarians across 45 research institutions. The study provided insight into what faculty valued in choosing a publication venue. They concluded that the stature and selectivity of the publication outlet and the appropriateness for targeted audiences were the most important to scholars. Scholars also told the researchers that they looked for the most selective journals when submitting their work; scholars in the sciences said that high-impact publications were very important for garnering research grants throughout their career. The study points out that the high cost of journals is actually perceived by faculty "to block the flow of knowledge." (Harley, 2010)

A study released by the American NGO Ithaka S+R in 2010 provided further insight into faculty attitudes towards online publishing. The 2009 installment of a longitudinal survey (2000, 2003, 2006, 2009) received responses from 3,025 faculty from colleges and universities in the United States that grant bachelor's or higher degrees. The

study concluded "faculty attitudes suggest that a tipping point has been passed for journal current issues, and, with certain narrow exceptions, that print editions of current issues of scholarly journals are rapidly becoming a thing of the past." The study points out, however, that the transition from print to electronic books will take much longer. The report goes on to say "all signs indicate that faculty are widely prepared for a complete transition away from print to digital-only for current issues of scholarly journals." Faculty in the sciences feel most strongly about it, followed by those in the social sciences, and then the humanities. In summarizing the results of the large study, the report said "in the eyes of faculty, electronic versions of journals are now utterly mainstream…digital versions are clearly the medium of choice for most faculty members, even among humanists." (Schonfeld, 2010)

Methodology

A content analysis was conducted of journals in six disciplines. Three disciplines in the social sciences were studied: business, communication (which includes journalism), and social psychology; three disciplines in the sciences were examined: geology, meteorology, and physiology. These particular disciplines were selected because of the similarity in the size of their journal lists. The lists of journal titles from each discipline was defined by the *Journal Citation Reports* (*JCR*) in the ISI Web of Science database. *JCR* is a comprehensive resource that evaluates and compares journals using citation data from more than 7,500 scholarly and technical journals from more than 3,300 publishers in over 60 countries. *JCR* analyzes data on 5,900 journals in science and technology and 1,700 journals in the social sciences. It is important to note that many factors influence citation rates or impact factors, such as language, journal history and format, publication schedule, and subject specialty. Harley's 2010 study confirmed that citation indices are used by many tenure and promotion committees as an indicator of an article's impact in the field, though it is not a sole mark of good scholarship, particularly since such metrics do not comprehensively capture import and visibility.

The lists of journal titles and their impact factors were obtained from *JCR*. To find additional information about the journals, *Ulrich's*, a source of bibliographic and publisher information for more than 300,000 periodical titles, was consulted.

Characteristics of journals studied included publisher, frequency, cost of print subscription, cost of electronic only subscription, cost of print plus electronic subscription, and whether or not the journal was peer reviewed. While the dates that journals began publication in print format were available, the dates of conversion from print to electronic were not easily available in either *JCR* or *Ulrich's*. In some cases journal websites were consulted to gather this information.

The 5-year ranking and 2008 ranking (the latest available) were recorded for each title. The number of journal titles in each discipline was: business 77, communication 45, social psychology 49, geology 42, meteorology 52, and physiology 74. *JCR* chooses titles for comparison by a combination of criteria: publishing standards, editorial content, international diversity of authorship, citation data, and timeliness of publication. The selection and evaluation of journal titles listed in *JCR* is an on-going process with titles being added and deleted at any time. The examination was a census of all 339 journal titles. All were currently active and all, except for one of the business journal titles, were peer reviewed.

Results

The analysis clearly showed that journals available only in print are an endangered species. Of the 339 journals examined, only six are offered exclusively in print, a dramatic transition in less than fifteen years. Of the six journals available only in print, five are in the social sciences. Only meteorology had a print-only journal title among the sciences. For the three social science disciplines, business had three, social psychology had two and communication had none. (Table 1).

The absence of print-only titles, however, did not automatically mean a large number of electronic-only journals. Currently there are only four among the elite journals that were examined, mostly in the sciences. The science disciplines had three e-only titles: geology had one e-only journal title, meteorology had two. Physiology had none. The three social science disciplines had only one e-only journal title among them, a communication title, *Journal of Computer-Mediated Communication*, which began as

an e-journal. Business and social psychology had none. (Table 1) Two of the four e-only titles are published by Wiley-Blackwell, a leading science and technology publisher.

The great majority of journals shown in Table 1 (97%) are in transition between print and electronic (329 of 339 journals). These are hybrid journals that have already transitioned to offering electronic access, but have not made the leap to exclusive electronic distribution. The data could not be broken down to discriminate between those that were print-electronic (where the print version is the journal of record) vs. electronic-print (where the electronic version is dominant). Anecdotal evidence shows that this migration from print-electronic to electronic-print is occurring at a rapid pace.

The journals that have made a total migration to the electronic tilt heavily towards the sciences. Only one of six journals still offered exclusively in print is in the sciences. Likewise, seventy-five percent of the electronic-only journals in the study were in the sciences. The 2008 announcement of the American Geological Union indicates that the sciences will continue to set the pace.

While the conventional wisdom is that print-only journals would have a higher impact than electronic-only journals, this is clearly not the case. Table 2 shows that the four electronic-only journals examined have higher ISI impact factors than five of the six print-only titles. The *Journal of Computer-Mediated Communication* had the highest impact factor of the four electronic-only journals (1.901); *Business History Review,* a print-only title, had the lowest impact factor (.25).

There are so few journals in the electronic-only domain that have achieved ISI rankings, it is important to describe the migratory pattern of each. As the only social science electronic-only journal in this study, The *Journal of Computer-Mediated Communication* (*JCMC*) deserves notice. It has been e-only and open-access from its beginning in 1995. According to the journal's website, "the founding editors had the vision to make *JCMC* an open-access, online journal. This, combined with high quality standards, proved to be a recipe for success." It became an official journal of the International Communication Association in 2004. Its 2006 acceptance rate was 20%

(with an additional 28% accepted with revisions). As stated earlier, *JCMC* has the highest ISI impact factor among the four electronic-only journals examined in this study.

The meteorology journal, *Space Weather,* and the Geology journal, *Geofluids*, stand out because they are the only journals in this study to have migrated from print/electronic to electronic-only format. In both cases, they are relatively new journals--both born in the digital age. *Space Weather* is published by the American Geophysical Union, another professional association leading the way toward e-formatted publications, and began in 2003. *Geofluids* began in 2001 and is published by Wiley-Blackwell, which publishes more than 1400 scholarly, peer-reviewed journals and, according to its website, is the largest society publisher.

Environmental Research Letters, one of meteorology's two e-only journal titles, is published by IOP Publishing, the publishing arm of the Institute of Physics. It began as an e-only journal in 2006. Their website states that "we were the first to publish all of our journals in electronic format. We have continued this reputation for innovation with the full digitization of our complete Journal Archive in 2002."

A sub-analysis of communication journals provides some insight into the nature of the elite journals being examined in this study. There are 451communication journal titles listed in WorldCat, an online union catalog of 1.5 billion items from thousands of libraries around the world. From that universe of 451 titles, *Journal Citation Reports* selected 45 journals, or 10 percent, to be represented. Table 3 lists the 45 journals. Less than one-third of the communication journals relate to the mass media, a point of contention among those who do research in the field. Experienced scholars in journalism and mass communication would probably reference several journals as "prestige" within their field that are not tracked in *Journal Citation Reports*.

Generally speaking, communication journals have a lower impact than their peers in either the sciences or social sciences. Table 4 compares the impact factors across disciplines. Physiology journals were rated the highest (3.972); communication journals were the lowest (.958). However, communication's impact factor was not that much lower than geology's (1.139). While these numbers are not related directly to the

migration of print journals to an electronic format, they reveal the relative standing of communication journals among part of the higher education universe.

Discussion

Forecast of trends often outrun performance, and that clearly was the case in this study. While the organs of academic disciplines appear to have reached a psychological turning point as they reconcile themselves to electronic-only publication, the numbers of journals that have actually taken the plunge and abandoned print is quite low. Journals have made a remarkably quick transition to the electronic environment during the past decade, and appear to be catching their breath as they sit at the p-e/e-p transition point. Nearly all of the journals in the study have introduced electronic format, but letting go of the paper subscription will not be easy or automatic.

With the sweeping announcement of the American Geophysical Union in 2008, the list of e-only journal titles in the sciences could grow rapidly as investigators rush to get results published, as library budgets shrink and as patrons' demands for 24/7 access increase. Faculty members, originally the greatest skeptics about electronic publishing, appear to be undergoing an attitude change, especially in the sciences. Multiple surveys are showing that faculties are becoming more familiar with electronic access and seeing the virtues of this kind of distribution. Presumably, those who are making decisions on academic promotions are also taking note of this transition.

Even more senior faculty members who have been wedded to print publications appear to be changing. A geophysics professor at the University of Oklahoma related his experience of seeing the dying print newsletter of a small professional society he belonged to re-invigorated when the newsletter switched to electronic format. He said not only was the newsletter re-born, but the society as well. The advantages of getting the society's news to its members in a speedy fashion and the cost savings to the society and its members pumped new blood into the organization.

Libraries have been positive about electronic-only access for some time, but want assurances that the electronic record will not disappear when a publisher ceases to

publish a journal. For a library to terminate its print subscription of a journal in favor of the digital-only copy would require a guarantee of access in perpetuity.

JSTOR (Journal Storage), a digitized archive created in 1995 of the back files of selected scholarly journals, provides a security blanket to libraries. JSTOR converts printed scholarly journals into electronic form and stores them in a centralized digital archive that can be shared, accessed, and relied upon by libraries and their users. JSTOR allows libraries to free up space on their shelves, reduce costs of binding print materials, and improve access to scholarly literature. JSTOR offers other advantages: materials would never be lost or checked-out and small institutions could have access to large collections. It was hoped that this early attempt at digital preservation could help to bring about acceptance of electronic publication. With support from the international scholarly community, JSTOR is actively preserving more than 1,000 academic journals in both print and electronic format.

In 2005 JSTOR introduced Portico to focus on the long-term preservation of electronic scholarly journals. The Portico archive is a centralized repository and is open to a scholarly publisher's complete list of journals, including those titles that may be published in electronic format only, or print and electronic formats, or those that have been "reborn" or digitized from print. (Fenton, 2006)

With the anticipation that many journals will convert to e-format only, there has been a recent national effort to ensure that print copies of journals are also preserved. Knowing that some print copies of journals will be preserved has made it easier for many libraries to give up their print subscriptions. The Center for Research Libraries (CRL) in Chicago, Illinois is coordinating an effort to support and encourage print archiving efforts throughout North America. CRL is an international consortium of university, college, and independent research libraries. Most of CRL's collection consists of newspapers, journals, and documents from outside the U.S., including the emerging regions of the world. They have created a searchable registry of information on print archiving initiatives, including projects and serial holdings.

A major concern of journal publishers, like their counterparts in journalism, is whether they can make as much revenue from electronic publication as print publication. In that sense, libraries provide an anchor subscriber for the journals that journalism lacks. Libraries in most countries appear ready and willing to pay for e-journals if they are priced comparably to the previous print version. Publishers have been trying to entice libraries by packaging electronic journals attractively as a group so that libraries can boast of a wide range of journals without having to process and store them physically. This means, however, that university libraries would not need multiple copies for branch libraries as it has in the past. It is unclear how publishers will handle the sale of a single electronically-distributed copy rather than duplicate print copies.

Scientists with their built-in incentive for quick diffusion of scientific information have become leaders in electronic distribution. Social scientists have lagged behind, but appear motivated for change. While large publishers distribute publications across all fields, scientific journals generally have the highest subscription prices and the highest priorities. Even though the social sciences have lagged the sciences in collaborative research, interdisciplinary research and electronic publishing, the same trends that have influenced the sciences are affecting the social sciences, albeit at a slower rate.

The rise of the *Journal of Computer-Mediated Communication* into the ISI impact rankings shows that communication can be a leader in the electronic publication transition among the social sciences. It was the only ISI-listed e-journal among the three social science fields surveyed. The success of the *Journal of Computer-Mediated Communication* and its high reputational value should send a signal to those in the communication discipline that there is a pathway for academic success beyond print publications.

The snapshot taken through this research has established a baseline for the electronic transition. The next installment, reflecting 2009, 2010, and 2011 could show dramatic movement into electronic-only publishing. Publishers are encouraging the move from print to e-only by offering financial incentives to libraries. Libraries can save shelf space and binding costs by converting titles from print to electronic. Library patrons, especially undergraduate and graduate students who have grown up sitting in

front of a computer terminal, are beginning to demand the 24/7 access that electronic journals can provide. The stars are aligned for change.

Societies and associations, as well as major publishers of journal titles in the communication discipline, should look realistically and opportunistically at the advantages of e-only journals. As a field that has relied on its older peer disciplines to lead the way to academic legitimacy, communication has an opportunity to gain more self-confidence and be a leader in the electronic publishing world. It could also bring more of its visual creative research into the electronic world during this transition.

This study examined only six disciplines. More disciplines should be sampled to insure that these disciplines represent broad movements in the sciences and social sciences rather than idiosyncratic behavior. Another limitation of this research was that it focused exclusively on elite journals —publications that have already arrived at a respected status. While the stance of the elite journals is highly important in setting trends because scholars aspire to publish in them, it is also important to know more about the remainder of the academic literature.

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Table 1

Number of Print-Only, Hybrid, and Electronic-Only Journal Titles in Selected Disciplines in *Journal Citation Reports*, 2008

	Print-Only	Hybrid	Electronic-Only
Science Titles			
Geology (N=42)	0	41	1
Meteorology (N=52)	1	49	2
Physiology (N=74)	0	74	0
Science Sub-Total (N=168)	1 (1%)	164 (97%)	3 (2%)
Social Science Titles			
Business (N=77)	3	74	0
Communication (N=45)	0	44	1
Social Psychology (N=49)	2	47	0
Social Science Sub-Total (N=171)	5 (3%)	165 (96%)	1 (1%)
Total Titles (N=339)	6 (2%)	329 (97%)	4 (1%)

Table 2

Comparison of *JCR* Impact Factors of Print-Only and Electronic-Only Titles

	Impact Factor Print-only Titles	Impact Factor Electronic-only Titles
SCIENCE		
Geology		
Geofluids		1.293
Meteorology		
Environmental Research Letters		1.719
Intl J of Greenhouse Gas Control	1.646	
Space Weather		1.432
Physiology	None	None
SOCIAL SCIENCE		
Business		
Business History Review	.25	
Electronic Commerce Res & Apps	1.13	
Emerging Mkts Finance & Trade	.611	
Communication		
Journal of Computer-Mediated Comm		1.901
Social Psychology		
Nebraska Symposium on Motivation	.286	
Review of Social Psychology	.364	

Table 3

Communication Journal Titles Indexed in *Journal Citation Reports*, 2008 (N=45)

Communication Monographs

Communication Research

Communication Theory

Critical Studies in Media Communication

Cyberpsychology & Behavior

Discourse & Society

Discourse Studies

European Journal of Communication

Harvard International Journal of Press-Politics

Health Communication

Human Communication Research

IEEE Transactions on Professional Communication

International Journal of Advertising

International Journal of Conflict Management

International Journal of Public Opinion Research

Interaction Studies

Journal of Advertising

Journal of Advertising Research

Journal of Applied Communication Research

Journal of Broadcasting & Electronic Media

Journal of Business & Technical Communication

Journal of Communication

Journal of Computer-Mediated Communication

Journal of Health Communication

Journal of Media Economics

Journal of Social and Personal Relationships

Javnost—The Public

Journalism & Mass Communication Quarterly

Language & Communication

Media, Culture & Society

Media Psychology

Narrative Inquiry

New Media & Society

Political Communication

Public Culture

Public Opinion Quarterly

Public Relations Review

Public Understanding of Science

Quarterly Journal of Speech

Research on Language & Social Interaction

Science Communication

Technical Communication

Telecommunications Policy

Text & Talk

Written Communication

Table 4

Average Impact Factor of Journal Titles in Selected Disciplines in *Journal Citation Reports*, 2008

Science	
Geology (N=42)	1.139
Meteorology (N=52)	1.937
Physiology (N=74)	3.072
Social Science	
Business (N=77)	1.519
Communication (N=45)	.958
Social Psychology (N=49)	1.931