Routledge Handbook of Public Communication of Science and Technology

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Science journalism

Publication details
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Published online on: 19 Jun 2014


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Science journalism
Prospects in the digital age

Sharon Dunwoody

Introduction

Science journalism is an increasingly imperilled occupation that, perversely, is needed now more than ever. In a world where both citizens and advertisers increasingly control their own delivery of information via online channels, the kind of legacy mass media that have long served as the principal employers of science journalists—newspapers and magazines—are faltering in many countries. Journalists cut loose from these media organisations are scrambling to find their footing elsewhere. It will be years before successful models for delivery of substantive science journalism emerge from the bevy of experiments now under way.

And yet, science journalism has never been more important. Citizens of the globe are buffeted by one issue after another—the potential impacts of GM crops; the mysterious die-off of bees; individualised medical treatment via genomics; climate disruption; the prospect of bringing extinct species back to life—and have few places to turn for independent, evidence-based information. Historically, most people have depended on mediated channels, those ubiquitous packagers of information intended for large numbers of readers/listeners/viewers, where they typically encounter science information almost inadvertently as they watch TV news, read their morning newspaper or page through a magazine from the corner news stand. While that is still the case in many countries, today’s citizens rely increasingly on volitional searching of the Internet for their information. The science journalists are there, blogging and placing stories in a variety of web-only outlets. But finding that good information requires effort on the part of the individual searcher, effort that the typical individual rarely expends.

This chapter discusses these conundrums and what they portend for the future of science journalism. It first tracks the historical evolution of the field, then moves to characteristics of modern science journalists and their media outlets. It ends by returning to the challenges that lie ahead.

A brief history

Science stories have appeared in the mass media for as long as these channels have existed. Who wrote those stories, on the other hand, has varied over time and across cultures. Scholars in a
number of countries have sought to track the evolution of popular science in their respective cultures (see, for example, Bauer and Bucchi 2007; Broks 2006; Burnham 1987; Golinski 1992). What they find is a process initially characterised by scientists’ efforts to share knowledge as widely as possible, followed by a retrenchment that moved scientists away from direct contact with publics and, in Broks’s words, transformed the public ‘from participants to consumers’ (Broks 2006: 33). In this characterisation of the process in Britain, scientists in the late eighteenth century sought to diffuse scientific understanding throughout the culture, assuming substantial benefits would accrue in the course of the integration of science with the workaday world of ordinary folks. By the nineteenth century, however, the relentless advance of specialised knowledge began to create a chasm between scientists and society. Broks describes this as evolution from ‘the Enlightenment ideal of “experience”’ to ‘the early nineteenth-century construction of “expertise”’ with scientists morphing even further by the end of the nineteenth century into an even less accessible category of beings called the ‘professional expert’ (Broks 2006: 28). As scientists withdrew from the world of popularisation, the construction of popular science narratives was turned over increasingly to journalists.

Burnham (1987) captures the same trend in the United States. By the late nineteenth century, several popular science magazines were already established – pre-eminent among them Scientific American and Popular Science Monthly – and newspaper editors were happy to reprint texts of science lectures and to publish scientists’ reflections on natural phenomena such as meteor showers. The scientists themselves were equally willing to invest time and energy in public communication endeavours. Scientists in the latter part of the nineteenth century tended to view popularisation as part of their job.

In the early twentieth century, however, increasing specialisation and professionalisation pushed scientists to see themselves as apart from everyday people. As scientists developed their own languages, their own training regimens and their own reward systems, communication with others outside the occupation became less of a priority. To make matters worse, major scientific societies began to punish scientists for daring to popularise by ostracising offending individuals and even denying them access to rewards, such as membership in honorific societies. Goodell’s classic book The Visible Scientists (1977) is replete with examples of how even senior, accomplished scientists were subjected to sustained repercussions as a result of their popularising efforts. Although, as I argue later in this chapter, popularisation has again become au courant for many scientists, residual hostility within the scientific culture makes it a risky behaviour even today. But, back in the early twentieth century, too much of an investment in popularisation could ruin a scientist’s career, so many scientists left the world of popularisation to journalists and the mass media.

The mass media’s interest in science has remained steady throughout the centuries. The technology of warfare, discoveries of planets and entire galaxies (not to mention Martian canals!) and advances in medical care were easy for journalists to sell to their editors. These editors did not care that a topic was scientific, only that it was novel and likely to grab the attention of their readers. Canvas the issues of any newspaper of the eighteenth, nineteenth and early twentieth centuries and you are likely to find stories that we would today classify as ‘science’ in the broadest sense.

Still, few journalists by the mid-twentieth century would have defined themselves as science writers. Specialist reporters are expensive and, consequently, rare in most media organisations. Editors believed strongly in the ability of a good generalist to cover anything and worried more about the by-products of cozy relationships between journalists and their sources than about the need to apply specialised knowledge to complex topics. Through much of the twentieth century, in fact, a common practice in American news media was to rotate reporters across beats every few years to prevent the pitfalls of reporter/source intimacy.
A few specialised science reporters did gain a foothold in newspapers and wire services early in the twentieth century in Britain and the United States. But it took the technological innovations catalysed by World War II, post-war decisions by governments in several countries to invest in scientific research, the space race of the 1960s and the growing environmental concerns of the 1970s and 1980s to galvanise media organisations into finding science and environmental reporters to cover what loomed as some of the major stories of the century. Gregory and Miller (1998) characterise this post-war period as the time when science journalism became an organised, visible and increasingly powerful presence in journalism.

The numbers of science reporters burgeoned in many countries over the course of the twentieth century (see, for example, Metcalfe and Gascoigne 1995 on Australia). In addition to the establishment of country-specific organisations of science writers, global associations such as the World Federation of Science Journalists arose, and formal science journalism training was provided at universities around the world. With increased numbers of journalists, coverage also increased as a number of longitudinal studies demonstrated for the latter part of the twentieth century (Metcalfe and Gascoigne 1995; Bucchi and Mazzolini 2003).

Despite the flowering of science journalism during this time, it is important to remember that science reporters – like most classes of specialist reporters – have always constituted a small subset of all journalists in media organisations around the world. Thus, science stories remained relatively minor components of media coverage. An analysis of science coverage by four Greek newspapers, for example, found that the proportion of the news hole given over to science ranged from 1.5 to 2.5 per cent (Dimopoulos and Koulaidis 2002); similar to what Pellechia (1997) found in the United States and to what Metcalfe and Gascoigne (1995) found in Australia. In Greek newspapers, political coverage accounted for some 25 per cent while sports made up 15 per cent of stories (Dimopoulos and Koulaidis 2002).

By the end of the twentieth century, a sea change was under way. New communication channels were cropping up that permitted readers/viewers to implement their own information-seeking practices. While the legacy media – newspapers, television, radio – continue to play important roles in the science information diet of many consumers around the world, today’s lay person relies increasingly on the Internet. A Wellcome Trust survey of British adults and young people found the Internet to be the channel of choice for information about medical research for 23 per cent of adults and 35 per cent of young people; adults were more likely to indicate a preference for television (29 per cent) while young people were less likely to prefer these channels (27 per cent and 13 per cent respectively). American data from 2010 showed that, while television has long been the preferred channel for science information, for the first time the Internet was running neck and neck with television (National Science Board 2012).

The increasing popularity of the Internet as a channel for information meant something had to give. And that something, in many countries, has been citizens’ reliance on newspapers. The decline in newspaper advertising and the slower but steady decline in buyers over the years have led newspapers to shed staff and, in many places in the United States, even to reduce frequency of publication. Figures from the US Department of Labor’s Bureau of Labor Statistics indicate that the newspaper industry as a whole in the United States declined by 40 per cent over the course of a decade (Zara 2013). There has been a correspondingly large drop in dedicated science sections. In 1989, weekly science sections in US newspapers numbered 95; by early 2013, only 19 survived. Since the primary employer of science journalists in the United States has long been newspapers, this change has forced many journalists to redefine what it means to be a journalist (Zara 2013).
Science journalism today

So where does all this leave the science journalist? In some countries, these journalists feel embattled. But in other cultures, they continue to thrive and the occupation, by all accounts, continues to grow. Systematic data are hard to find, but anecdotal accounts suggest that science journalists in the United States increasingly find themselves on their own, in the ranks of freelancers as their former media organisations downsize (Brumfiel 2009). Conditions in Canada and Britain, while not yet critical, show similar patterns. Faced with the need to become entrepreneurs, science journalists in these countries have embraced new media as a cheap and sometimes effective way of reaching publics. Additionally, the crisis in the United States has led journalists to experiment with new information delivery structures; I address this topic later in the chapter.

Elsewhere in the world, science journalists seem to be holding their own, according to an analysis of data from hundreds of science reporters from around the world. Taking advantage of data from four surveys of science journalists archived at SciDev.Net, Bauer and colleagues sought to construct a picture of ‘global science journalism’ in the twenty-first century (Bauer et al. 2013). The researchers used data from a survey of 179 participants in the 2009 World Conference of Science Journalists, held in London; a survey of 320 journalists from Latin America conducted in 2010 and 2011; a subset of data from a larger survey project from six regions, primarily developing countries; and original survey data from 93 additional journalists primarily from Africa and Asia, gathered in 2012. While the researchers caution that the complex nature of this aggregated analysis makes it hard to argue for the generalisability of the sample, global comparative data are so rare that this study deserves some attention.

Bauer et al. (2013) found that, while men continued to hold the majority of science journalism positions in Europe, Africa and Asia, women accounted for fully 45 per cent of the sample and actually trumped men in Latin America (55 per cent women versus 45 per cent men). University degrees were common attributes, as was journalism training; 26 per cent indicated receiving science writing training specifically while 19 per cent had general journalism training. One in ten held a doctorate. More than half had worked as science journalists for ten or fewer years, and half reported being in full-time positions. While these journalists reported they were writing more stories for the Web, they also noted that their work for more traditional print sites had increased. Among these working journalists, job satisfaction remained high. That is, respondents were reasonably satisfied with their autonomy, with access to scientists and with their ability to serve their audiences responsibly. What that last factor meant, according to these journalists, was the opportunity to inform and explain.

So science journalism sounds like great work if you can get it. But like all occupations, it is beset by its own sets of issues, some of them grounded in journalism generally and others driven by the idiosyncracies of science. Below, I discuss a few of them before returning to further consideration of the shift to the Internet and its implications for the roles of science journalists.

Science news is overwhelmingly about medicine and health

For media outlets in many countries, the bulk of what passes for science writing is all about medicine and health. Bauer tracked what he called ‘The medicalisation of science news’ (1998) in the British press in the latter half of the twentieth century, and Pellechia (1997) found that a set of elite US newspapers focused on medicine and health in more than 70 per cent of their
stories during the same period. Einsiedel (1992) encountered a similar dominance of health topics in an analysis of science stories in seven Canadian newspapers. Television is a more eclectic medium in most countries, with an often strong focus on natural history and environmental issues. But here, too, medicine and health often dominate (Gregory and Miller 1998; León 2008; Lehmkuhl et al. 2012).

In a study of science coverage in a leading Italian newspaper over the course of 50 years, Bucchi and Mazzolini (2003) also found that biology and medicine accounted for more than half of the stories. But they noted that the medicalisation of science was particularly pronounced in stories written for the newspaper’s special supplements and sections, while science news featured on the front page was dominated by physics and engineering stories. This suggests that science journalists may be making a conceptual distinction between news and news you can use, with the latter focusing more heavily on health and medicine topics.

**Science news on television remains scarce**

Analyses of science news on television in Europe find not much of it (de Cheveigné 2006; León 2008). Television news typically attends only sporadically to science topics, and broadcast stories emphasise the entertainment aspects of scientific discoveries and processes at the cost of in-depth, explanatory and critical treatment (Metcalfe and Gascoigne 1995; LaFollette 2002; León 2008). A recent analysis of science in BBC news programming offered a slightly more positive picture of the situation in the UK. Analysis of news coverage over the course of three months in both 2009 and 2010 found that one in four news programmes included at least one science news item, as well as that fully half of the main television news bulletins contained science news reporting (Mellor et al. 2011).

What about television programmes dedicated to science? In an analysis of television science programmes in 11 European countries, Lehmkuhl et al. (2012) found great variation in the number and nature of such programmes and concluded that market structure was a major predictor of that diversity. For example, with the exception of Britain, most science programming occurred on public service channels. The more such channels available in a country, the study found, the more science programming. However, few science programmes in any of these countries were dedicated to science news. The most common types of programming were either longer-form, magazine-style coverage of science issues (such as Britain’s Horizon, Germany’s Terra X or Austria’s Newton) or what the team called ‘advice’ programmes, often health-related with question and answer structures.

An early analysis of a set of British documentary science programmes noted the heavy overlay of certainty that accompanied the programmes: ‘Television presents science as producing unambiguous and intractable knowledge’ (Collins 1987: 709). Recent studies also found that TV coverage of science – like much of science journalism – neglects uncertainty. A content analysis of BBC science coverage, for example, noted that only one in five sources in broadcast news stories urged caution in evaluating scientific claims (Mellor et al. 2011).

Drama plays a major role in much of science television programming and, according to scholars, can often trump public understanding of science goals. Silverstone (1985) studied the making of a science documentary for the BBC Horizon series and tracked the gradual takeover of the storyline by producers. Scientists eventually lost control of the narrative, he concluded, via a production process that privileged the kind of dramatic tension that only skilled film-makers could provide. In a similar vein, Hornig concluded of Nova documentaries that the programmes maintained the ‘sacredness’ (1990: 17) of science by portraying scientists as special and distinct from others.


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Coverage of science follows journalistic norms

Media coverage of science looks a lot like coverage of other arenas, principally because the primary drivers of coverage patterns are not the content areas on which stories are focused but, instead, the production infrastructure through which that content must pass.

For example, science stories – like all journalistic accounts – tend to be *episodic* in nature. That is, journalists are more likely to produce shorter stories about concrete happenings than longer, thematic stories about issues. Underlying this pattern is the rapid pace of most media production processes. Daily or, in the case of Internet news sites, hourly production cycles cannot wait for months-long scientific processes to spool out. Journalists produce stories about pieces of processes and hope that faithful readers will be able to knit together a larger picture from these bits of narrative fabric.

Episodic coverage does not lend itself well to discussions of process. So, not surprisingly, analyses of science stories find few descriptions of the research methods employed. Dimopoulos and Koulaidis (2002) found that nearly 75 per cent of the science stories they analyzed from four Greek newspapers contained no reflection on the methodological *how* of the scientific process, and discussion of that dimension in the remaining stories was brief and superficial. Einsiedel (1992), too, noted that most of the Canadian stories her team analyzed virtually ignored process details. And a study of the coverage of scientific research in Dutch newspapers (Hijmans et al. 2003) found, similarly, that most stories eschewed complex process information.

Science journalism, again in ways typical of other types of journalism, seeks to hang stories on *traditional news pegs*, characteristics of real-world processes that are proven audience attention-getters. Those pegs include timeliness, conflict and novelty. Thus, for example, rather than dip into a scientific research process at some haphazard stage, the science journalist waits until the completed work is on the cusp of publication in a scientific journal. That moment of publication offers a prized timely angle, an opportunity to grab the attention of a reader/viewer with the words: ‘In today’s issue of *Nature* …’.

These moments also tend to coincide with points in a process recognised – or designated – as salient by the scientific culture. Journalists typically *buy* into the legitimising structures of sources (Fishman 1980), uncritically accepting sources’ designation of what is important and worthy of notice. Scientists, thus, can easily sell the argument that journalists must respect scientific process and, for example, wait for peer review to take place before embarking on a wider dissemination of research results. Scientists often complain that journalists pay undue attention to mavericks and outliers, but studies of media coverage of contested science suggest that those stories overwhelmingly reflect the views of the scientific mainstream (Goodell 1986; Nelkin 1995).

This reliance on news pegs also means that coverage of a long-running issue waxes and wanes with the presence/absence of pegs. Scientists and policymakers will struggle for decades, for example, to understand the mechanisms of cloning and to explore means for society to adapt to the technique’s many tantalising and alarming possibilities. But coverage of the issue will erupt only when *something happens* in a journalistic sense – when a prime minister formally announces a new initiative, when a team of scientists unveils the first cloned cat, when a religious group lodges a complaint. While the disjunction between coverage and process can be disconcerting to some scientists, others have learned to take advantage of reporter dependence on news pegs and have become facile at guiding coverage. For example, if an important paper is about to be published in a journal, scientists may hire consultants to help them *market* their discovery to the press by appealing to the demand for news pegs. The resulting press conferences and reporter *exclusives* may be more influential in generating coverage than the original papers themselves.
The most important audiences for journalists have long been their editors and their sources. While their real audiences – members of the public – have historically had only sporadic access to the newsroom, a science writer is in daily touch with her sources and her bosses. Thus, coverage is more likely to be responsive to the priorities of these individuals. This may seem unpersuasive to scientists, who feel that journalists often run roughshod over them and treat their information in cavalier manner. But studies of media coverage of science have demonstrated repeatedly that the scientific culture is a powerful driver of what becomes news about science. Dorothy Nelkin, in her seminal book *Selling Science* (1995), reflected that media science stories overwhelmingly represent scientists as successful problem-solvers. Such coverage is not accidental, she notes; the scientific culture actively cultivates its image as society’s major tool for reducing uncertainty. The invisibility of audiences is changing with the increased access that the Internet affords readers/viewers to journalistic work; I return to this topic at the end of this chapter.

Two long-standing journalistic norms – objectivity and balance – have come under intense scrutiny in the twenty-first century. Both arose as surrogates for validity, that is, as ways of compensating for journalists’ inability to determine whether their sources’ assertions are true or not. They are particularly salient in science journalism as much of science is contested terrain. What is a journalist to do when credible scientists make contradictory claims about a particular issue? The occupation responds: default to objectivity and balance (Dunwoody 1999; Dunwoody and Konieczna 2013).

In a world where the science journalist cannot declare what is most likely to be true, objectivity demands that the reporter go into neutral transmitter mode and focus not on validity but on accuracy. That is, rather than judging the veracity of a truth claim, the journalist concentrates instead on representing the claim accurately in her story. The issue is no longer whether the claim is supported by evidence but, rather, the goodness of fit between what a source says and what a journalist presents.

Similarly, when a science reporter cannot determine who is telling the truth, the norm of balance suggests that he represent as many truth claims as possible in the story. When validity is impossible, in other words, a good fall-back position is comprehensiveness. The journalist is, in effect, telling the reader: ‘The truth is in here somewhere’.

But Boykoff and Boykoff (2004), for example, argue that balance too often means giving truth claims equal space even when they are not, in fact, equally valid. They use the example of global warming coverage in US newspapers to demonstrate that, even in the face of burgeoning consensus among scientists that humans are making a substantive contribution to warming, many media accounts still give significant play to global warming outliers who dispute the trend. Mooney and Nisbet (2005) find similar patterns in coverage of the debate in the United States over teaching evolution in the biology classroom; attempts to balance the arguments of biologists and creationists, they claim, confers legitimacy on both sides in the minds of readers.

At least one American study indicates that journalists are keenly aware of the problems created by objective, balanced accounts but feel that journalistic norms prevent them from abandoning these behaviours. Dearing (1995) found the expected balancing of extreme points of view in coverage of several scientific issues where healthy majority viewpoints were being contested by outliers. In interviews, the journalists readily acknowledged the likely bogus nature of the mavericks’ positions but then indicated that both editors and audiences expected their stories to treat those positions with respect.

**Training remains contentious, under-studied**

Should science writers be formally trained in science, or should they more properly come up through the ranks of journalism? If one looks across countries, the former seems to trump
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the latter. In some countries, doctoral degrees are highly sought by newsrooms; in others, science writing training programmes increasingly privilege those applicants who have science credentials. The argument embedded in these preferences is not that journalistic training is irrelevant but that a marriage of scientific and journalistic skills will yield better results than will journalistic skills alone.

The value of formal science training seems obvious and, not surprisingly, is strongly endorsed by the scientific culture, which feels that such grounding will produce more accurate and responsible stories. Many science graduate students in search of alternative careers find that science writing has intuitive appeal. Given the robustness of these training beliefs, it is interesting to note that there is little empirical evidence to support them. Only a few studies have been conducted in the United States to explore differences in journalistic quality that can be pinned to differences in training, and none of those studies have found formal science training to be strongly predictive of that quality. For example, Wilson (2000) gave American environmental journalists a global warming knowledge test and then compared the answers of those journalists with formal science training to the answers of those without such training. While formal science education made a modest difference in reporter knowledge, it was trumped by another variable: number of years on the job. Years on the job has proved the best quality predictor in a variety of studies of journalistic work in the United States (Dunwoody 2004). As is the case for most skilled occupations, experiential learning is probably the most critical predictor of job performance.

The great and general shift to the Internet

The availability of the Internet as an information channel has profoundly affected audiences’ patterns of information-seeking. In many countries, traditional, mediated channels are either in holding patterns (television) or are in decline (newspapers) as the public adjusts to the enormous amount of information available to it electronically.

A dominant Internet environment does not, however, necessarily mean an anything goes pattern of information-seeking. The worldwide popularity of sites such as Yahoo! News, CNN, MSNBC, Google News and the New York Times suggests an enduring need for a credible, initial filter on information. We are hungry to keep up with current events, but we continue to depend on journalism to make reasoned choices and to craft readable narratives.

Science journalists have also embraced the Internet as, among other uses, a primary site for story searches. Respondents in one recent study reported spending more than three hours a day, on average, on the Internet. This survey of science writers in 14 European countries found that the journalists relied on a relatively small group of sites – among them EurekAlert!, Nature, BBC News, and New Scientist – for story ideas, and they overwhelmingly agreed that ‘the Internet has made my job easier’ (Granada 2011: 802). Many of them also admitted, however, that such reliance increases their focus on breaking news, a trend that may exacerbate the dominance of episodic narratives over more thematic ones.

Scientists’ use of the Internet, on the other hand, remains more muted. Although many scientists have embraced Internet communication and its promise to link them directly to audiences (see below), others continue to rely on more mediated paths. A recent survey of neuroscientists in Germany and the United States, for example, found that although the respondents believed that new media such as blogs and online social networks do influence public opinion and policy decisions, they reported that they themselves use more traditional outlets – newspapers, television, magazines (both legacy and online) – to keep up with scientific developments (Allgaier et al. 2013).
Finally, the Internet has opened direct communication lines between audience members and both scientists and journalists. Several scholars have begun to study the online interactions between journalists and audiences, particularly through the lens of comments by audience members in response to online science journalism stories. Both Secko et al. (2011) and Laslo et al. (2011) characterise this process as the evolution of unfinished stories. The initial science story, rather than deemed a final product, serves instead as a catalyst for an ongoing narrative construction process in which both journalists and readers participate. Riesch (2011), among others, documents the dynamic nature of such narratives in a couple of case studies in which stories whose narratives become contested disappear from the online sites of major media organisations.

Are scientists losing or gaining control?

For much of the twentieth century, scientists avoided public contact and, as a result, knew much less about public communication processes than did the journalists who contacted them. That gave journalists an edge in their relationships with their sources, but that has begun to lessen as scientists have come to realise the value of public visibility and take active steps to structure their own public images. Twenty-first-century scientists increasingly come equipped with media training, and have begun to communicate directly with publics on their own through popular science books, blogs and websites.

Such visibility can be harmful, as many burned scientists still ruefully report, but the social and scientific legitimacy that can attend such visibility is luring many scientists into acquiring greater communicative expertise. Several studies demonstrate that media coverage makes a scientist’s work look more important not only to members of the public (including funders) but also to other scientists; for example, media visibility of peer-reviewed, published work increases the number of citations of that research in the scientific literature (Phillips et al. 1991; Kiernan 2003). As a result, scientists in all disciplines are acquiring communication skills and are learning to take advantage of communication professionals employed by their organisations. These scientists report not only regular interactions with journalists but also beliefs that those interactions are good for their careers (Peters et al. 2008).

On the other hand, the onslaught of new information channels and the increasing ubiquity of user control means that all information creators are increasingly finding themselves buffeted by audience reactions. Scientists have always chafed at their perceived lack of control over public representations of their work. In 2002, scientists in the UK established the Science Media Centre, initially through the Royal Institution of Great Britain. The centre defines its mission as one of helping scientists to become better communicators, but it also seeks to intervene early in the course of media coverage of science issues by staging briefings and otherwise providing expert reactions to breaking news, compiling fact sheets about specific science topics that are becoming newsworthy and even by engaging in independent analyses of scientific papers for journalists. These efforts have been welcomed by many but have led some journalists to suggest that the centre functions as a large-scale science PR agency that tries to control the science agenda, as seen in a series of articles in Columbia Journalism Review’s online version. Despite this controversy, similar centres now exist in other countries and are proposed for yet more.

Whither the science journalist?

Have we entered an era in which science journalists gradually lose their media platforms and find themselves increasingly eclipsed by savvy scientists keen to promote their research brands? Not yet. But as legacy media platforms struggle to maintain audience share, science journalists
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are being forced to become more entrepreneurial and to look for new ways to explain to their audiences the profound scientific developments under way. These journalists have embraced social media channels – Facebook, Twitter – not only to maintain contact with sources and peers but also to build their own personal brands. Today’s successful science writer may work from home, where she maintains a highly visible blog (ideally hosted by a legacy media website), tweets regularly about topics that fit within her declared area of expertise (specialisation is the name of the game), freelances articles (again focused on her niche) to magazines and online sites and hopes that the synergistic effect of these activities will give her visibility, credibility and a book contract.

In some countries, journalists are banding together in non-profit organisations in order to maintain traditions of investigative and explanatory journalism. The groups rely on a wide variety of funding mechanisms, principally foundation and private donations, and often give their work free of charge to media organisations willing to publish the stories. One of those non-profits, InsideClimate News – which specialises in covering energy issues and environmental science – was awarded a Pulitzer Prize in 2013 for its reporting on an oil spill in the Midwestern United States that journalists broadened into an analysis of national pipeline safety issues (InsideClimate News Staff 2013).

In a special issue of the journal *Journalism*, devoted to ‘Science Journalism in a Digital Age’, contributors pondered the impact of the channel revolution on science journalism. Issue editor Stuart Allan (2011) notes that the those impacts may be both salutary and daunting. The Internet wild west offers science journalists the opportunity to engage directly and transparently with a variety of audiences, from everyday people to scientists; the interactive nature of social channels makes it possible for users to understand science in more profound ways; science journalists who build storytelling skills across platforms have the potential to communicate science in ways far more powerful than before. The *New York Times*’ multi-platform story, ‘Snowfall: The Avalanche at Tunnel Creek’, chronicling the death of a group of world-class skiers caught in an avalanche in the mountains of the north-west United States, offers an example of that potential.

But Allan also asks us to be aware of the possible downsides of this brave new world. The Web, like a black hole, demands constant feeding. Journalism becomes a 24/7 occupation in which stories become rapid-fire processes with no obvious end points. Building science news stories for Internet consumption presents many challenges, among them the need for constant updating, managing the speed with which information must be turned into narrative and maximising the brevity of those narratives, so critical to audiences with only seconds to spare.

Fahy and Nisbet (2011) suggest that journalistic roles will expand to accommodate these twenty-first-century changes. While some journalists will continue to embrace such long-standing roles as the need to analyse and then explain, the need to illuminate wrongdoing, the need to monitor the landscape in order to alert audiences to important changes, new communication modes will draw science journalists into new roles. Among them, note Fahy and Nisbet, are the role of curator, who aggregates and makes sense of existing news and commentary; the role of civic educator, who uses the news of science as a means of informing audiences ‘about the methods, aims, limits and risks of scientific work’ (Fahy and Nisbet 2011: 780); and a role that they label the ‘public intellectual’, journalists who not only synthesise but also interpret via a point of view.

We are too early in the process of change to determine what occupational modifications will strengthen and which ones will fade. Scholars are just beginning to explore the impacts of these changes, making it difficult to assess the societal risks and benefits that accompany them.
Other difficulties also will attend future efforts to study the behaviours and products of science journalists. Prominent among them is the question of just who constitutes a science journalist. Studies in the past have relied on organisational affiliation as an important component of that definition. But in a world filled with freelancers, many of whom work for a magazine on one day and for a government research laboratory on another, separating the science journalist from the non-journalist will prove daunting.

Similarly, what is a science news story? Does a tweet count? A blog post? And even when a story looks like the traditional stereotype of a news narrative, when is it a finished narrative? In an electronic publishing environment where reporters and editors can make corrections, fiddle at will with content and even remove a story altogether (Riesch 2011), how do scholars determine the point at which story evaluation should take place?

What has not changed, however, is the commitment and passion of science journalists. In my home town of Madison, Wisconsin, the local newspaper’s long-time science writer Ron Seely retired, in part, because he was disheartened by the decline of journalism in these smaller urban areas. While the newspaper, regretably, has no plans to replace him, Seely quickly found a new home with the non-profit Wisconsin Center for Investigative Journalism, where he will continue a 30-plus-year career of covering complicated science and environmental issues (Fuhrmann 2013). His excitement about this next stage of his career is infectious and serves as a reminder that science journalism done well can have tremendous societal value. Societies now need to figure out how to maintain this capacity.

Key questions

- How can science journalism survive the decline of legacy media such as newspapers and magazines?
- In what ways do Internet publishing conditions change what constitutes a science news story?
- How would you define a science journalist in the twenty-first century? How is this definition different from that of 50 years ago?

Notes

1 This chapter has been substantially revised with particular attention to better capturing the work of science journalists globally and updating our understanding of how Internet and market forces are affecting journalistic practice.
2 See survey reports at www.wellcome.ac.uk/About-us/Publications/Reports/Public-engagement/WTX058859.htm; accessed 31 July 2013
4 The series begins with Fox and St. Louis 17 June 2013, continues with Eliott et al. 19 June 2013 and culminates with Brainard and Winslow 21 June 2013; www.cjr.org/the_observatory/
5 www.nytimes.com/projects/2012/snow-fall/#/?part=tunnel-creek

References

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