

Science, journalism, democracy and technology

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ABSTRACT:

Journalism has a vital and urgent role to play in societies that are increasingly the paymasters for and the recipients of scientific and technological development in which they have little or no say. What amounts to the gagging and blindfolding of citizens in the science-policy debate is in contrast to the rapidly growing demands for increased democratisation throughout the world, which, as an important part of the agenda, have included demands for democratisation of science and the scientific informing of democracy. Whether they are being immediately heeded or encouraged, citizens continue to pressure governments and the science establishment for greater transparency in science policy and development, along with a greater share of the discussion about the application of such policy and development. This paper will seek to show that most areas of the “public sphere” appear no longer capable of facilitating this broad social movement. However, new public demand, and the facilities of new technology indicate that journalism, which has thus far failed to demonstrate any great interest or ability in resolving science issues in the public sphere, can be seen as positioned to take on this function – even if by default – in the 21st century.

This paper sets out to demonstrate that both the social responsibilities of the media and their economic imperatives may be satisfied – and the laity’s democratic demands met – by an approach to science by journalism that uses new attitudes and new technologies to engage the various publics with the science-based issues confronting them. Faced with growing public distrust of science and scientists, as well as increasing indifference to traditional news media, the task must be more than ever to ensure that science is not isolated and insulated from the public, but rather that it be opened up to new forms of public engagement and public scrutiny. In short, we propose that what are seen as looming social problems arising from new technologies may be largely dealt with *using* new technologies.

As Soroka (2002) sets out as the basis for his argument on agenda-setting, relationships between mass media, the public, and policymakers are at the centre of both political communication and everyday politics. It is vital to acknowledge that current scientific developments are themselves now potent ingredients of political communication and everyday politics and, as such, are deeply involved in the relationships between mass media, the public and policymakers. It is also important to acknowledge that in a new era of scientific development and, to an extent never before experienced, lay publics in an increasingly democratic world are finding themselves confronted by challenges for which the democratic system was never intended and has not evolved to handle. Bohman (1999) is among the growing number of commentators who argue that scientific and technological developments are rupturing – or have the power imminently to rupture – the long-accepted social norms by which members of democratic societies recognise and respond to each other. For Bohman, the scope of social and political decision-making seems to have narrowed as the ability of the available regulatory mechanisms for self-rule are seen as less able to control the processes of globalisation – and especially technoscience. Bohman puts forward the proposition that the challenges represented by globalised technoscience, for example, are as fundamental and wide-reaching in their effects as were the challenges of the 19th century, from which democracy and the modern public sphere emerge. But in the 21st century, it is democracy itself, as well as democratic traditions, that is failing to come to grips with science, even as science takes up an increasingly larger part of the social and political stage with its “new uncertainties” (Hennen 1999: 305). Hennen argues that, in seeking to accommodate the scientific and technological system, lay people find they can no longer rely on traditionally confirmed beliefs or traditional social ties and, as Bohman has suggested, these include normal democratic processes. Thus, without a voice in the science discussion, citizens also find themselves without a voice in the larger political debate in which the scientific debate is embedded.

More than 40 years ago, Habermas (1971) asserted that, because of the privileged socio-political position of science and scientists, and the economic and military circumstances surrounding modern science, the very results of research that are of the greatest

practical consequence are the most inaccessible to the public. Describing the preconditions for dialogue between scientists and the public's representatives, politicians, as "unfavourable" (p 79), Habermas made the point that functioning institutions at that time could not be depended on as the bases for public discussion about science among the general public. "On the other hand, the specialization of large-scale research and a bureaucratized apparatus of power reinforce each other only too well while the public is excluded as a political force" (p 79).

Science has become even more client-oriented, secretive and impenetrable for lay publics since Habermas's strictures. As Westwick (2000) demonstrates, scientists willingly colluded with governments in national security measures to hide research outcomes as the Cold War progressed, and beyond. And we can see in the warnings of Dean (2002) and Hotz (2002), and the observations by Tickner & Wright (2003) that the conditions noted by Habermas have become much intensified. The secretive corporate grip on current and proposed science grows ever tighter through patenting, while military/science cooperation at all levels is now hidden behind a shroud of "anti-terrorist" legislation (Orr 2004, Glanz 2004) in which many scientists are willing collaborators, even to the extent of having their research outcomes hidden from each other (Cohen 2003).

Forces other than those of commercial secrecy, financial self-interest and national security are also at work in the limiting of the science information access to the publics. As Parsons (2001) points out, science finds it hard to accept democracy's apparently irrational forces of popular belief, so scientists tend to avoid engagement in the public policy debate, often out of fear of having their findings given the same value as popular prejudice. Further, as Roth & Lee (2004) argue, a common science attitude is blatant opposition to the possibility of a general scientific literacy, maintaining that science is an elitist calling and that it requires an intelligence and special skills far beyond what "average" people could attain. Indeed, even with the intervention of popular science writers - those who write popular science books, and the specialist science journalists - most people remain merely passive observers of science's "black box" (Appleyard 1999). Appleyard contends that "without an awareness of the critical interface between science, ourselves, and our society, science writing becomes an essentially meaningless catalogue of events or, at worse, a vacuous fan letter" (p 5). Clearly, this form of communication provides no platform for the performance of democratic citizenship. There is no critical interface.

Along with the demand for more and better science and technology information, much recent energy, especially in Europe, has been expended on theories and practices aimed at developing public voices. Grunwald (2003) points out that this energy flows in part from the efforts of parliaments and governments in Europe in seeking to increase pluralistic expertise as input to their deliberations in many areas, including science and technology. The bases for the "democratisation" of science and the "expertising" of democracy are not only the growing demand for a workable citizen democracy

throughout the world, combined with new insistence on stripping away science's claims to elite privilege, but also the grievous and very public failures of science and its institutions, including governments, in the late 20th century. This can be summarised as what Grunwald (2003) defines as the dynamics of widespread public dismay caused by the indirect effects of science and technology in society or what Fischer (1999) calls a "techno-pessimism" in Western nations resulting from at least 25 years of progressive outrage (p 295). According to Dickson (2001), scientific advance has almost always – and often legitimately – been accompanied by public qualms about what might go wrong if things go out of control, qualms that have only been reinforced by a series of well-publicised instances in which things *have* gone out of control.

As Nowotny (2003) explains, the better-educated-than-ever population that inhabits the modern "agora" is also highly articulate. In the liberal Western democracies, experience of participation has taught many citizens how to express their views and articulate their demands, she continues. "Today, there is a widespread expectation that science not only ought to listen to these demands, but also can satisfy them" (p 151). A larger community is insisting loudly and logically that its voice should be heard and that at least some of its claims are as valid, on democratic grounds, as those of the more circumscribed scientific communities, Nowotny concludes.

What is now apparent, however, through the work of such researchers as Hargreaves, Lewis & Speers (2003) as well as the extensive European literature on democratisation of science and "scientification" of democracy, is that whatever science it is that lay publics clamour for, it is not the science that the "attentive" fraction of the population want or the science establishment, including science journalists, have wanted to provide. It is now quite obvious from the British research or parallel work in the US, such as that cited by Field & Powell (2001), that lay publics are generally and keenly interested in science *as they perceive it affects them*. Very few members of most publics are interested – or need to be interested – in the "facts" of science or about the alleged scientific method. That is, they do not want or need the kind of "scientific literacy" that the likes of tireless commentator Jon D. Miller (1998) and the US National Science Foundation have long insisted they must have. Attempts by science journalists, with the support of the science establishment, to change the state of "public science literacy" have been spectacularly unsuccessful. Weigold cites National Science Foundation polling figures to suggest that the public can be divided into at least three segments according to levels of interest in science: attentive, science-interested, and other. Weigold (2001) estimates that between 10 and 14% of adults are "attentive" to science, another 44% can be characterised as "science-interested". The remainder – as few as 42% -- are really not interested in science or may be interested in what they imagine is science but what would be considered non-science or pseudo-science by the NSF. An unfortunate reality, according to Weigold, is that two-thirds of even the attentive public cannot pass what Miller (1986: 66) describes as "a relatively minimal test of scientific literacy".

This may well be bad news for specialist science journalists, but it is not bad news for journalism – it can be seen as some of the best news journalism could expect, given journalism’s rather dismal recent past (McChesney 2003). It suggests an enormous opportunity for journalists, journalism and journalism education – as well as the media organisations that employ journalists -- to identify and, as far as possible, satisfy a clearly apparent and very substantial appetite for “explanation” of and participation in the science *issues* surrounding every individual in the post-industrial world: to provide a voice to go with the eyes and ears of their audiences. In Appleyard’s “brave new worlds” of science (1999), journalism may be the last man standing of the social institutions that traditionally provide citizens with a forum. As de Burgh (2003) puts it, recent exposures of the damage wrought by unaccountable powers on the environment and on social fabrics and of the inability of our political systems to defend us underline the need for professionals who scrutinise, evaluate and hold to account. Only journalists can perform these functions, de Burgh insists. Indeed, he maintains, journalists are often the only guarantors of truth-telling and human rights. If citizens continue to demand explanations and participation in policy decisions about science and technology, as they certainly appear to be doing, then journalism alone may well be responsible – even by default – for supplying or at least facilitating supply of explanations and participation.

However, even the idea that audiences might have a reason to want to participate in debates about science is barely acknowledged in news media. In Hornig-Priest’s description of journalism’s response to the cloning of Dolly the sheep (2001), media’s attention – media’s science attention notably – is like water flowing downhill: it seeks the path of least resistance, contrary to conventional beliefs about the political role of journalism. An ideology that relies on journalism to pursue issues not otherwise in the public eye implicitly supports established interests, if only by nurturing a false sense of security, Hornig-Priest argues.

For example, a content analysis of newspapers over the nine years to mid-September 2005 shows that, while newspapers published articles containing references to nanotechnology, and to some extent, descriptions of what it is, especially the extraordinary claims made for it, little space was given to acknowledging that a serious dispute exists about the safety of or ethical doubts about this technology (Fig.1). This is despite the warnings of scientists and ethicists – in the news media. Solomon (2004), for instance, writing in the *Canberra Times*, says this “hot” research area carries immense claims for its potential impact and that its ethical challenges are likewise potentially profound. “The potentially large-scale impacts of nanotechnology highlight – and make more urgent – questions about its broader social implications,” Solomon writes (p 12). Analysis of five Australian capital-city newspapers shows that, of a total of 570 items published that mentioned nanotechnology, only 42 (about 7.4%) dealt with the issues. A total of 385 articles mentioned nanotechnology without further discussion, while 143 articles (about 25%) went on to describe nanotechnology or some application of the technology. In *The Sydney Morning Herald*, of 86 published items that referred to nanotechnology, only nine (or about 10%) dealt with the issues. *The Daily Telegraph* over

a similar period published 50 items, four of which (8 percent) mentioned doubts about safety. News Ltd's national broadsheet, *The Australian*, published 232 items over the period, 16 of which (7%) included information about safety concerns. The Brisbane *Courier-Mail* carried 114 reports on nanotechnology, nine (8%) of which mentioned the issues, while *The Advertiser*, of Adelaide, published 88 articles on nanotechnology, of which four, or 5%, dealt with the issues. Significantly, most mentions of concern in all newspapers came in reviews of recent books containing such warnings.

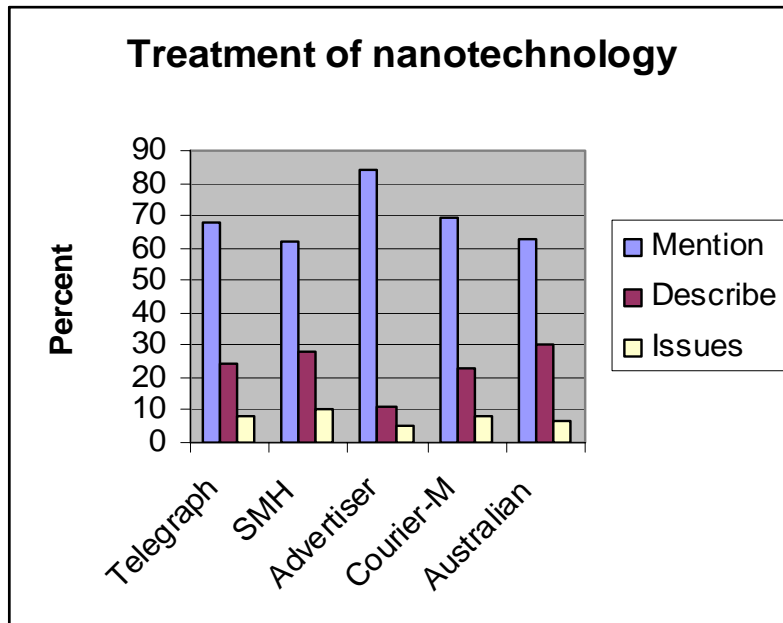


Fig 1: Percentages of nanotechnology articles' principal themes in the nine years to September 2005.

But in one of these items, entitled "The End of Evolution", *SMH* science editor Deborah Smith (2003) writes that even scientists working at the advancing edge of nanotechnology are concerned that this "small science" will make humans obsolete or at least change the human species forever. Smith quotes bioengineer Professor Alan Goldstein, director of Biomedical Engineering and Science at Alfred University in New York, as saying that, while research on cloning, embryonic stem cells and genetic engineering has grabbed the headlines, bioengineering has slipped under most people's radar. Goldstein warns that bioethicists have disastrously underestimated the trajectory of this technology. By harnessing the power of nanotechnology, the ability to assemble materials one molecule at a time, it will become possible for bioengineers to design materials to replace or repair every part of the human body, which will unleash the temptation to enhance our abilities and senses, he tells Smith. "Humans will metamorphose." Smith writes that Goldstein predicts the result will be something he dubs *Homo technicus*, a creature with so many modifications and containing so many "smart" materials, it will no longer qualify as *Homo sapiens*. "*Homo technicus* won't see like us, breed like us, feed like us or need like us," Goldstein is quoted as saying.

Smith reports that Goldstein wants to see a constructive debate that will lead to clear boundaries for his area of research. He maintains that, while bioethicists wring their hands about the morality of human cloning and politicians battle about where they may or may not obtain stem cells, nanotechnology is moving towards the elimination of the cell altogether as the fundamental unit of life. "Issues of human cloning won't mean much when humans are no longer the dominant species."

Scientists in Australia also have voiced concern over society's grasp of nanotechnology issues. Smith (2003) writes that Dr Peter Binks, chief executive of Nanotechnology Victoria, a state government initiative to commercialise nanotechnology research, is one who sees an urgent need for public discussion. "We need to start the debate now, with whatever information we have, and continually refine our perspective," Binks is quoted as saying. The head of CSIRO's Global Aid plan, Dr Vijoleta Braach-Maksvytis, who was formerly co-director of CSIRO Nanotechnology, tells Smith the convergence of technologies, including nanotechnology, is certainly worth talking about. "We're looking at a completely different world. What it will look like in detail we can't tell yet. But it will be disruptive. And we should be talking about it, in very loud voices," she is quoted as saying. "And I passionately believe we have an extraordinary moment in history as a global people to rethink where we want to take the world with this new technology."

Science democratisation and the Internet

This new technology, however, may indeed obtain a forum through new media technologies, which have opened promising avenues for news providers to offer lay audiences some measure of participation in the decision-making process of science-and technology-policies.

Apart from its obvious multimedia capabilities, the most important, feature of the Internet in this context is its vast capacity for interactivity, and its resulting ability to decentralise. With the increasing popularity of the Internet, the public did not wait until the mainstream media provided them with participation opportunities. Just as part of the democratic change has included the perceived right not only to question authority but also to engage in dialogue with authority, part of the recent revolution in communications is that citizens are now obtaining the means to do precisely that. Enabled by new technologies that make publishing literally as easy as typing, there has been a vibrant and unprecedented explosion of the so-called participatory publishing (PP) – "the act of a citizen, or a group of citizens, playing an active role in the process of collecting, reporting, analysing and disseminating news and information" in order to "provide independent, reliable, accurate, wide-ranging and relevant information that a democracy requires" (Bowman & Willis, 2003, p9). This is a form of unmediated communication of public affairs – directly to and from ordinary citizens – via a range of

Internet-based platforms such as email lists, bulletin boards, newsgroups, online forums, chat rooms, podcasting and, most importantly, weblogs – a form of online journals where individuals can present and update their information and viewpoints on anything of interest. These PP ventures have claimed victories in some recent political scoops, including the downfall of the former US Senate Majority Leader Trent Lott in 2002, the coming to the Presidency Office of the once little-known reformist Roh Moo Hyun in South Korea, and the recent fall from grace of veteran CBS journalist Dan Rather.

The demand for participation in science and technology itself has been a crucial driving force behind this new phenomenon. During its early days, the blogosphere (the world of weblogs) was primarily a place for tech-savvy people to discuss different social and technical aspects of new technology and web design – and this did not substantially change until the aftermath of September 11 and the subsequent war in Afghanistan (Hiler, 2002). By early 2005, though, Technorati – a weblog performance monitoring service – was tracking more than nine million blogs about any topics worldwide, with about 700,000 blog posts about science being found at any one time (Secko, 2005). While it is difficult to know exactly how many of these deal with science policy and how many are not written by scientists, the number does reflect a huge demand for public participation in science-related matters. Also, some of most successful non-weblog PP ventures so far deal mostly with science and technological development. For example, Slashdot.org, which recorded 10 million unique readers each month (with about half a million contributing articles) when it turned seven year old in 2003, is a cooperative website, where users discuss every complicated topic from the latest software, new cancer treatments to emerging problems associated with global warming or political moves in space affairs.

Mainstream news sites have more or less caught this wave, allowing a number of participatory opportunities, from “have your say” sites and on-line polls to recorded interviews. In recent years, some mainstream online news outlets – especially those run by giant publishers, broadcasters and Internet service providers in the US, Europe and Australia – have gone beyond allowing news consumers to “have your say” or record a meaningless vote by providing them with opportunities to *interact* with news providers, including specialist journalists and experts, as well as their fellow users – via platforms such as online forums and weblogs. One promising model to achieve successes in this move, proposed by Platon & Deuze (2003), is a system that resembles Indymedia – a global PP venture that has gained substantial influences on public engagement in problems associated with globalisation. In this model, Internet technology permits instant interaction between readers and writers, such that the process of creating news is transparent to all. Readers can contribute to stories and see the contribution appear immediately in the pool of stories publicly available. Readers can see editorial decisions being made by others. Although this kind of news production may appear too radical for traditional media journalism, Platon & Deuze make a case for its adoption by mainstream news media. They say mainstream media may see Indymedia as a

professional “competitor-colleague” journalism which may prove to be the crucible for new ways of reconnecting journalism, news and media professionals with ideals of shared access and participatory storytelling (p 351).

However, as noted above, it appears, science matters have been a neglected subject for this sort of participation – except for a few considerable attempts by MSNBC, GuardianUnlimited, BBC News Online and some other Internet giants. Initial steps towards such a forum are celebrated by science journalists Radford (*The Guardian*), Ahuja (*The Times*) and Whitehouse (BBC News Online) in their separate contributions to an article in *The Scientist* (Anon 2004). The three journalists comment on the opening of the science-publication site Open Access Now, at biomedcentral.com/openaccess and openaccess@biomedcentral. Radford comments that, although readers want their information filtered for them by someone they trust (the journalist) and that the access is so far principally a tool for journalists, readers should also have access freely and publicly to information they have already paid for "upfront and in advance" through taxes (p A2). Ahuja reports that she is now able to direct inquirers to original research papers. "When parents ask me whether they should give their child the MMR vaccine, I recommend that they seek out Dr Wakefield's original papers and see for themselves whether his work establishes a credible link" (p A3). Whitehouse writes that he is aware that some of his readers will want to see for themselves the data contained in his science stories. "It's really nice when you write a story to be able to have a link that sends readers straight to the original research paper. That is what the Internet is for and you can't do it in any other medium" (p A3). Such a service is obviously where real engagement with science could be achieved and where answers to specific questions and responses to specific anxieties could be evaluated and pursued further.

In recognising this opportunity, journalism has to aggressively change if it wants to be successful in dealing with the demands for science and technology forums. As the Internet as a news medium has reached or is reaching a mainstream status in terms of audience sizes and promises to continue its impressive uptake along with better bandwidth for, more dependence on, better skills in and greater enjoyment of Internet usage (Nguyen 2003), journalism will benefit from a vigorous embracing of the interactive online communication technologies to lead to real engagement with science's stakeholders. Citizens should now be able to actively “talk” in real time with authorities – scientists, science journalists and science-based corporations – when authorities make themselves available, as well as with each other. There is an urgent need for what Deuze (2004) calls “a horizontal integration of media”, which involves the presentation, not necessarily simultaneously, of a news-story package through different media, such as a website, a Usenet newsgroup, e-mail, SMS, MMS, radio, television, teletext, print newspapers and magazines. Journalists need to offer web sites, discussion groups, access to on-line journals and to scientists themselves if they are to provide audiences with the science information they want and need.

Here is where citizens could become “science literate” as far as they need or want to be. Journalists, however, must also function as they always have by winnowing the issues, preventing overloading of the discourse with a Babel of voices while still allowing voices from all sides to be heard. As Platon & Deuze (2003) propose, the interactive media model does not necessarily remove control over the news from journalists, and journalists working in this “public” system are still gatekeepers. To be more exact, journalists are now not only gatekeepers but also forum leaders, moderators or facilitators (Bowman & Willis, 2003) of debate on social issues, none more important than those on science and technology.

Research on the use of multimedia in “democratising” the news media is already intense and pressure for greater citizen participation in science policy and directions will certainly become a major focus soon. This has major consequences for journalism education. Journalists already in the field are unlikely to alter radically their explicit or vaguely understood models of the way scientific information is or ought to be communicated: the power of precedence is great and the persuasive logic of newsroom socialisation is difficult to defy. The task of bringing journalism about science through a transition from orthodox autocracy to acknowledging and supporting citizen participation is an urgent one for professional journalism training.

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