

Public Understanding of Science

<http://pus.sagepub.com/>

***Public Understanding of Science* – a peer-review journal for turbulent times**

Martin W. Bauer and Susan Howard

Public Understanding of Science 2012 21: 258

DOI: 10.1177/0963662512443407

The online version of this article can be found at:

<http://pus.sagepub.com/content/21/3/258>

Published by:



<http://www.sagepublications.com>

Additional services and information for *Public Understanding of Science* can be found at:

Email Alerts: <http://pus.sagepub.com/cgi/alerts>

Subscriptions: <http://pus.sagepub.com/subscriptions>

Reprints: <http://www.sagepub.com/journalsReprints.nav>

Permissions: <http://www.sagepub.com/journalsPermissions.nav>

Citations: <http://pus.sagepub.com/content/21/3/258.refs.html>

>> [Version of Record](#) - Apr 19, 2012

[What is This?](#)

Editorial: *Public Understanding of Science* – a peer-review journal for turbulent times

Martin W. Bauer and Susan Howard

Scientific publications began as the exchange of polite letters among Gentlemen of Leisure interested in natural philosophy, during the period of the European Enlightenment in the 17th and 18th centuries. The 19th century saw the proliferation of national academies of sciences and societies for the advancement of science to the wider public. The formation of scientific disciplines was to follow, each with its own reviews for reporting new theories, observations and experiments to peers, and for critiquing the work of others in public debate. In the 21st century, this enterprise of scientific publication has grown to gigantic proportions – narrowly defined as “producing peer-review journal articles.” Databases of scientific publications (Scopus, ISI, Eigen-factor) track something in the area of 12,000 scientific journals (for example Web of Science, 2009: 11,261 journals, of which about 1/5 are social science), and something in the area of 700,000 published papers per year (2009). Such estimates differ widely and depend on the database. Björk et al. (2009) put this figure at 1.35 million for 2006, and Scopus (at www.SCimago.com) puts this figure at over 30 million citable documents for 2010. However we count, the bulk of this production is still located in the USA and in Europe, but Asia and Latin America are catching up fast. And all this remains a conservative measure of the real scientific effort. Most tracking exercises have a bias towards English language, the lingua franca of modern science, leaving many linguistically conscious researchers with a tough dilemma between pride in the mother tongue or an international impact. Moreover, even within the English language context, databases are incomplete, and some journals exist “off map.”

With a total of 465 papers peer-reviewed and published between January 1992 and December 2010, *Public Understanding of Science* is clearly a small fish in this large publishing ocean, and also a small fish within its own world, the social sciences. All the same, PUS strives vigorously to support the work of researchers studying the modern scientific mentality in a global perspective.

PUS works for its authors: the impact story so far

Citations impact has become the currency by which to identify and trade information about academic journals, and academic researchers increasingly depend on it for their careers. But impact ratings come in many different forms and format. It is necessary to establish some perspective on the matter.

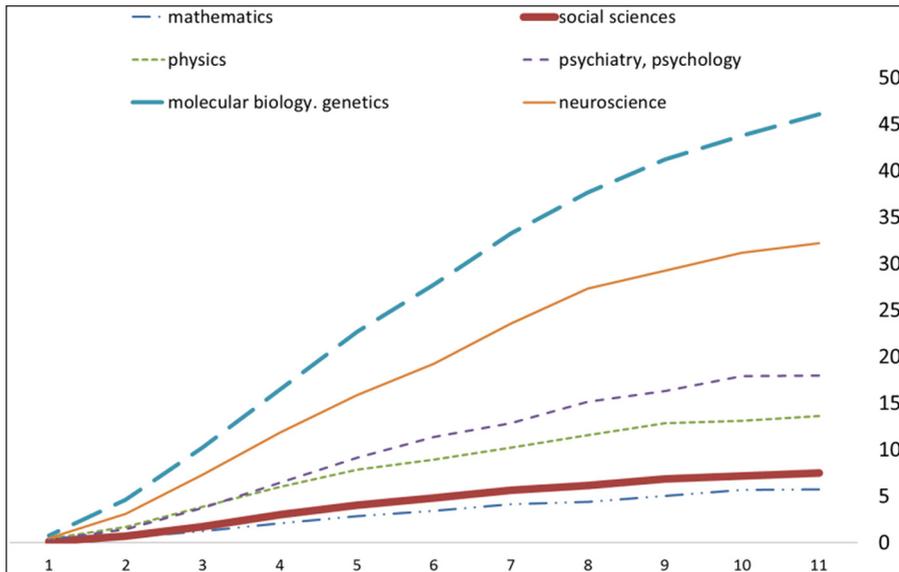


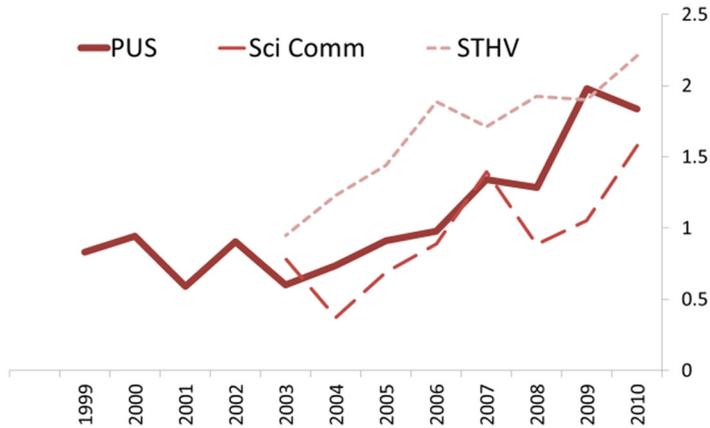
Figure 1. The expected average citations in different fields of research after a number of years of publication.

Source: *Times Higher Education*, 12 March 2009; Thomson Reuter, 1998–2008.

Figure 1 shows that, considering only the period 1998–2008, the citation record varies widely between different scientific pursuits. After ten years, you can expect an immunology paper to have been cited 45 times; for a mathematics paper this is five times at the most, and in the social sciences where PUS promotes its authors and serves its readers, the expectation is an average of just six citations over ten years.

The average social science paper is cited less than once within two years of publication, However, PUS's latest 2-year impact factor is 1.838 (2010). Papers published in PUS are thus likely to get a considerable boost. The 5-year impact of PUS has been 2.124 in 2009 increasing from 1.400 in 2007, which is slightly below expectations, and could improve. According to the "Web of Knowledge," between 1998 and the end of 2011, PUS has been cited 4,042 times (3,356 without self-citations), or about six to seven times on average. The h-index of the journal for that period is 30, meaning that PUS has so far championed 30 papers that have at least 30 citations (note that the ISI database does not include the first seven years of PUS, when it published some of its most globally cited and influential papers on the PUS debate).

This record compares well with its immediate competitors, which are *Science, Technology and Human Values* (STHV) and *Science Communication* (SciComm), as shown in Figure 2. STHV and SciComm are increasing their impact with a consistent gap between them. PUS has left the company of SciComm and is now trailing STHV (the leader of the three). The 2-year impact has steadily increased for all these journals, from below 1 in the early 2000s to closer to 2 in recent years. PUS is often grouped among the history and philosophy of science journals, where it takes 2nd place among 36 outlets, a steadily improving rank in recent years. Among the outlets of communication research, PUS was number 5 out of 67 in 2010. All in all, this amounts to a proud performance and a promising prospect for the future of its community.



| Journal | Results | Times Cited | Cited without Self-citation | Average Citations per Item | h-Index |
|---------|---------|-------------|-----------------------------|----------------------------|---------|
| PUS | 617 | 4101 | 3415 | 6.65 | 31 |
| STHV | 463 | 3862 | 3552 | 8.34 | 28 |
| SciComm | 435 | 2151 | 1833 | 4.92 | 21 |

Figure 2. The increasing 2-year impact factor for PUS, STHV and *Science Communication* from 1999 to 2010 (source: ISI indicators) and comparison of the journals on current citations and h-index.

Note: The articles included in the table are from 1997 to 2012 (as PUS records on ISI do not predate 1997). The information provided here was collated using ISI "citation reports" for the journals, on 26 January 2012, at 2.30 pm. The results column here includes editorial contributions, book reviews and special issue introductions, hence its higher number than our figure (465) in the following section.

With a larger number of papers than the other two journals, PUS generated also more citations over the 15-year period from 1997 to 2011, while the average citations per PUS item is slightly lower than that of STHV, but higher than that of SciComm. PUS has a slightly higher ratio of self-citations (17%) than the other journals. On the h-index, PUS compares favourably with the other two, in the last 15 years producing 31 papers with at least 31 citations. We do not, of course, see STHV and SciComm solely as competitors, but also parts of a community to which we hope to contribute.

According to Leydesdorff and Probst (2009) the journal *Public Understanding of Science* is an up-and-coming contribution to the interdisciplinary field of Communication Research. This field is historically and presently situated within Political Science and Social Psychology. In a set of 179 journals from political science, social psychology and communication, PUS has emerged by 2007 as one of 28 journals (first factor of inter-citations among 179 journals) with a clear pattern of citation and being cited in the communication community where PUS is a detectable newcomer. Later in the year, we will look more closely at the inter-citation patterns of PUS, and its positioning within the social sciences.

Finally, citation impact of any piece of writing in PUS is at the end of a longer chain of intermediary activities, which are supported by the publishers and word of mouth. The attention to work published in PUS is indicated by a range of intermediary scores:

- In 2010, PUS articles were downloaded 77,885 times in full-text format, 6% more than in 2009. Clearly, the range of reading is much wider than the citation score.
- By 2010, PUS was accessible to 4,231 institutions through individual, institutional or block subscriptions.
- By 2010, 4,617 people signed up to receive e-alerts of tables of contents and keywords; up from 1,134 subscriptions in 2006.
- 102,644 individuals visited the PUS pages on SAGE Journals Online in 2010; viewing on average between 2 to 3 pages. 39% of these calls came from Europe, 37% from the Americas, and 15% were of Asian origins. Overall, these visits are from 188 different countries.

What does PUS publish?

Between January 1992 and December 2010, PUS published 465 peer-reviewed papers. Until 2008 there were 20–25 papers per year grouped in four issues; in 2009 and 2010 this increased to 50 papers in six issues per year. From 2012 onwards, PUS will publish eight issues and aim at about 65 papers per year plus book reviews. We did a content analysis exercise on this corpus, determining for each paper the types of science, topics or concepts, the research methodology and the origin of the empirical data. This allows us to paint a picture of the practice of PUS research that should be helpful for future contributors to PUS.

Topics and sciences in PUS research

Nobody expects PUS research to be a mirror image of scientific research activities. More likely its pages represent those areas of science and technology which seek or receive public attention, often in the context of controversies. Figure 3a shows the changed coverage of different sciences from the early to the more recent period. The big topics of PUS are “science in general,” genetics and biotechnology, physics, the environment and climate change. Food, medicine and health have their presence as well. Less frequent are topics like psychology, mobile phones, computers and IT, geology or forensic science. The big shifts in recent years are the following: science in general gets less coverage which indicates the quest for specific issues; physics and nuclear power are less present; nanotechnology is the new issue in that field of research. Not surprisingly, genetics and biotechnology increased coverage in recent years, and issues like evolution, natural history, chemistry and sport have appeared. Statistics made a small appearance in PUS in recent years, and we suspect it will increase its presence. The community is widely worried about “public misunderstandings” of it.

Another angle of PUS research is the themes, topics or concepts under which the analysis is presented. Again we can ascertain some coming and going in that respect. Figure 3b shows some 30 discrete topics and their prevalence over the years. Nobody will be surprised to see that the big themes of PUS are the representation of science, public engagement, science communication, public perception, attitudes, risk perceptions and science literacy. These seven topics define two thirds of PUS coverage. Other themes include science journalism, methodology, informal learning, science museums, and science and religion. Striking are the shifts over time. Literacy, science museums, ethics, risk perception, the image of scientists and science journalism received relatively less coverage, while public engagement, science communication, public perception

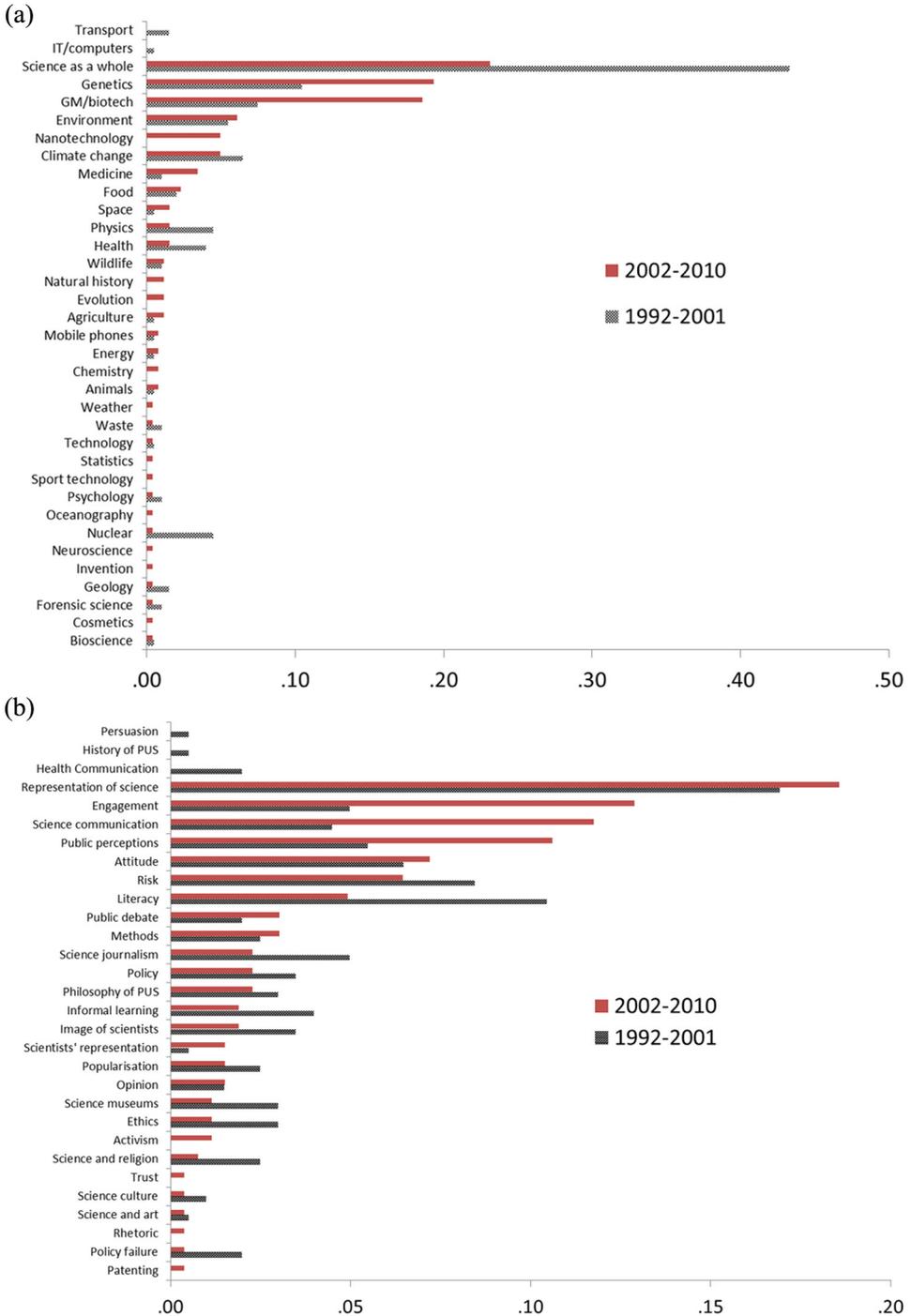


Figure 3. (a) Sciences covered by PUS research as proportion of all papers published in two periods: 1992 to 2001 and 2002 to 2010 ($N = 465$). (b) Topics and concepts deployed by PUS research published in two periods: 1992 to 2001 and 2002 to 2010 ($N = 465$).

studies, scientists' representations and forms of activism receive more attention by researchers in the field.

The methodology of empirical PUS research

The typical PUS paper is a questionnaire-based survey study of public perceptions, a content analysis of mass media, or a case study of a public engagement event. Critical discussions are clearly welcome. These types of methods characterise two thirds of PUS output so far. But in recent years, more critique is tied up with empirical studies rather than the purely discursive. Historical studies, lab and field experiments and evaluations of public engagement activities remain mainstays of the journal, while film and bibliometric studies, ethnographic observations, network logic and discourse analyses increase their presence. The range of methods in PUS is widening over the years, and this should be so. PUS does not favour quantitative nor qualitative enquiries, but seeks to promote cutting edge investigations that move the debate. PUS is clearly catholic and instrumental in its view of methodology. It encourages a diversity of data streams and analytic approaches. The key concern remains the clarity and acuity of analysis and not the "mind-boggling" sophistication of methodology where it remains unclear whether anything other is served than a rhetoric of impression making or a modern form of esotericism.

Internationalisation: which countries does PUS report on?

It is the declared objective of the present editor to globalise the coverage of PUS papers, because public understanding of science and the modern scientific mentality is a global issue. The corpus of PUS contains empirical data reports from 40 different countries. The range of countries covered every year in the pages of PUS has increased from around 10 to 20–25 in recent years. This is a promising trend towards internationalisation of the debate.

The record so far shows that the US, UK, Canada, Australia and New Zealand cover two thirds of PUS empirical reports. One could call this the traditional Anglo-Saxon world, which clearly dominates the empirical focus of our investigations. The rest of Europe adds another sixth to the corpus of research, which leaves a final sixth of papers to Asia, Africa and Latin America. While in the second period PUS lost further contributions from places like Russia, Uganda, South Africa, Bulgaria and the Czech Republic, it gained insights into Switzerland, Sweden, South Korea, Greece, Zambia, Turkey, Taiwan, Slovenia, Nigeria, Israel, Columbia, Argentina and Latin America as a comparative whole. The dominance of this English speaking world is declining when it comes to the origin of empirical observations in PUS, which from the point of view of globalising the debate can only be applauded. Linguistic purists might deplore the "decline" of English styles in our pages. However, this complaint we have not yet come across, which testifies to the efforts of the editorial office.

Beyond the purely empirical state of affairs, we can expect, with suitable encouragement from the editorial team to bring this about, that the future will show more contributions from Asian countries. In Japan, China, India, Korea and Taiwan there is now critical mass and lively debate of public understanding of science, which increasingly manifests itself in research contributions of global relevance. The same is true in Latin America. The African continent as yet lacks critical mass to contribute to PUS research, but again as with

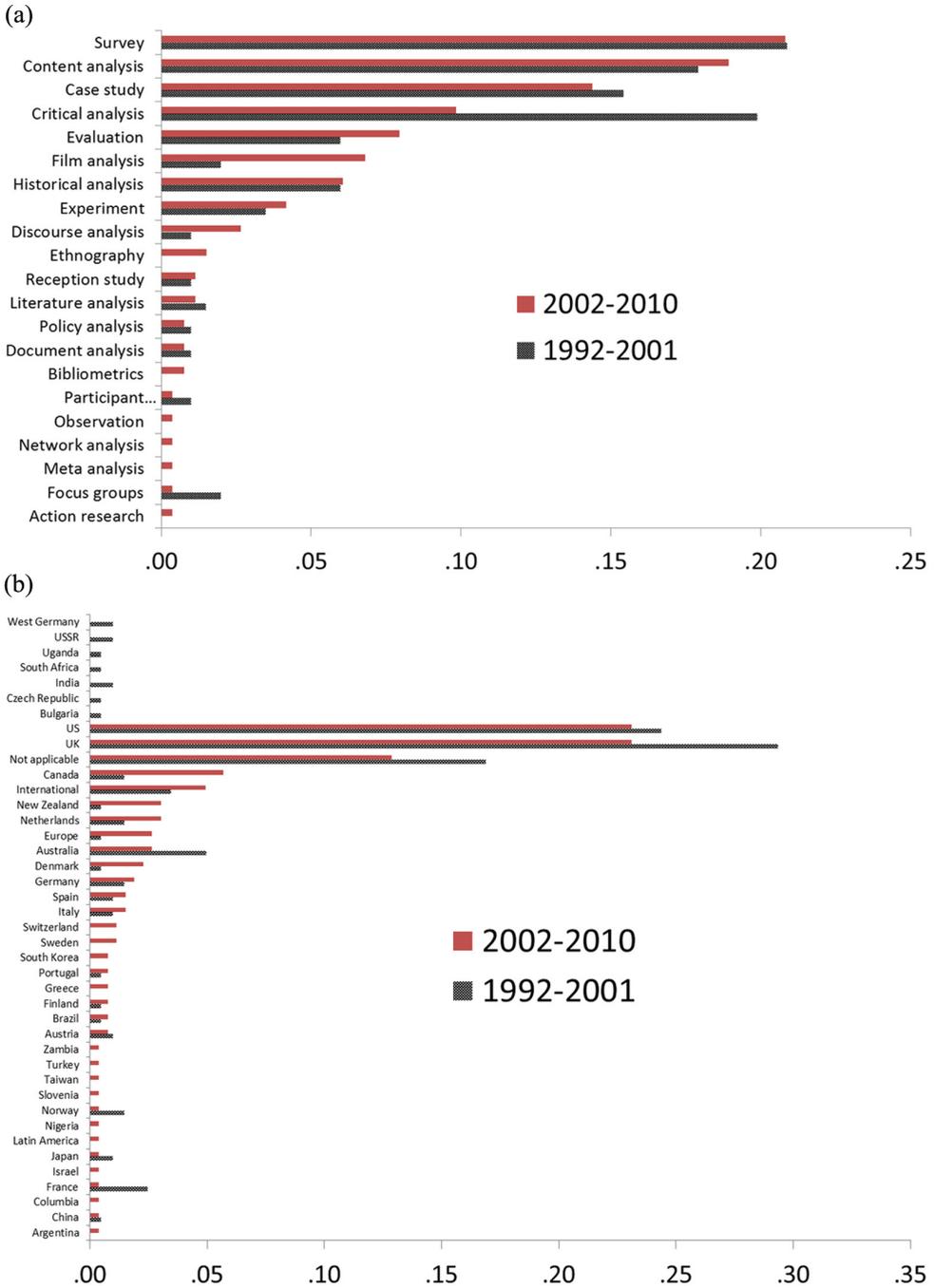


Figure 4. (a) Proportion of studies in PUS that used a particular method of investigation. (b) Origin of data that are reported in PUS papers as proportion of published articles in two periods: 1992 to 2001 and 2002 to 2010 ($N = 465$).

so many things, here the future is likely to be in Africa as well. As the centre of gravity of scientific production moves East and South, so must the debate and analysis of the modern scientific mentality. PUS can expect that the encounters of modern science with traditional and non-European cultures will produce interesting research topics, and throw a new light on the integration of science and common sense in years to come.

The relations between impact and influence among PUS papers

The formal citation record produces the most highly cited papers for any period of the journal. And for some time it has been known that people cite other papers for many different reasons: as a short-hand for a concept, to show off intellectual capital, to mark allegiance, to return favours etc. However, citation and “influence” might not be the same things. To test this intuition we conducted a small online survey among PUS readers and authors. Late in 2011, we asked, among other things, which three papers were particularly influential in their PUS research and practical outreach work. Of those asked and twice reminded ($N = 1,986$ at the final reminder), 206 responded.¹ As many men as women responded, 60% of whom were social scientists, 18% natural scientists, and 9% with a humanities training. The median age was early 40s (25–83), and about 12 years (2–52 years) in the current job. Of the respondents, 91% have recommended PUS to colleagues or students in the past, and many also read *STHV* and *Science Communication*.

Our respondents identified as many papers as there were respondents: 206; 44% of all PUS publications since 1992 were indicated. Respondents mentioned up to three papers, and we noted whether a paper was mentioned first, second or third. 460 votes were cast, 2.2 on average. 185 papers (90%) received one, two or three votes, 10% received more votes; the maximum vote was 24. We summed votes and ordered ties by first, second or third choice.

Table 1 shows on the left-hand side the 15 papers that were most often identified as “influencing their work,” and on the right-hand side the 15 papers with the most “citations reported by ISI” and thus visible in the public eye. The differences are remarkable. First, we must note that ISI only picks up papers published after 1997, while our influence survey shows clearly that a number of earlier papers in PUS had considerable influence in the field. Here we note the classic papers by Brian Wynne, Bruce Lewenstein, Jon D. Miller, Geoff Evans and John Durant, Anders Hansen, Massimiano Bucchi and Robert Farr. None of these “influential papers” makes it into the ISI citation ranking because they are early contributions. Second, we have several papers which make it into the “influence section” but not (yet) into the “citation hits”: here we find papers by Bauer et al., Allum et al. and Pardo and Calvo. The two rankings overlap in five papers. Both highly cited and influential authors are Alan Irwin, Patrick Sturgis et al., Anabela Carvalho, Jon D. Miller and Steve Miller. These are key contributors to the PUS debate on both criteria. The citations do not match the influence ratings in papers provided by Weingart, Kerr, Jasanoff, Bord, Gaskell et al., Einsiedel, Yearley and Zehr. These authors find their way into scientific papers; they might not necessarily be at the top of the researchers’ minds. It appears indeed, that citation and influence might not be the same. However, we don’t want to draw too many conclusions from this, but indicate that “impact” might mean many things.

This journal was founded at the Science Museum in London. The first issue dates “January 1992.” In the UK, these were enthusiastic times as the Royal Society of London and others were mobilising for a better public understanding of science. However, the great awak-

Table 1. Comparing rankings of “influential papers” to ISI citation data

| Cited as an “influential paper” | | | Citation data from ISI (1997–2011) | | |
|-------------------------------------|---|-------|------------------------------------|--|-------|
| Author (year, issue) | Title | Total | Author (year, issue) | Title | Total |
| Bauer, MW et al. (2007, 1) | What can we learn from 25 years... | 24 | Irwin, A (2001, 1) | Constructing the scientific citizen... | 169 |
| Wynne, B (1992, 3) | Misunderstood misunderstanding... | 23 | Sturgis, P, Allum, N (2004, 1) | Science in society... | 106 |
| Sturgis, P, Allum, N (2004, 1) | Science in society... | 17 | Kerr, A et al. (1998, 1) | The new genetics and health... | 94 |
| Irwin, A (2001, 1) | Constructing the scientific citizen... | 13 | Miller, JD (1998, 3) | The measurement of civic scientific literacy | 92 |
| Miller, S (2001, 1) | Public understanding of science at the crossroads | 10 | Jasanoff, S (1997, 3) | Civilization and madness... | 82 |
| Miller, JD (1998, 3) | The measurement of civic scientific literacy | 8 | Weingart, P et al. (2000, 3) | Risks of communication... | 79 |
| Allum, N et al. (2008, 1) | Science knowledge and attitudes... | 7 | Kerr, A et al. (1998, 2) | Drawing the line... | 69 |
| Miller, JD (2004, 3) | Public understanding of, and attitudes toward... | 7 | Bord, RJ et al. (2000, 3) | In what sense does the public need... | 67 |
| Lewenstein, B (1992, 1) | The meaning of “public understanding of science”... | 6 | Miller, S (2001, 1) | Public understanding of science at the crossroads | 65 |
| Pardo, R, Calvo, F (2002, 2) | Attitudes toward science among the European... | 5 | Gaskell, G et al. (2005, 1) | Imagining nanotechnology... | 61 |
| Carvalho, A (2007, 2) | Ideological cultures and media discourses... | 5 | Einsiedel, EF (2001, 1) | Publics at the technology table... | 55 |
| Evans, G, Durant, D (1995, 1) | Science content and social context | 5 | Carvalho, A (2007, 2) | Ideological cultures and media discourses... | 55 |
| Hansen, A (1994, 2) | Journalistic practices and science reporting... | 4 | Yearley, S (2000, 2) | Making systematic sense of public discontents... | 54 |
| Bucchi, M (1996, 4) | When scientists turn to the public... | 4 | Zehr, SC (2000, 2) | Public representations of scientific uncertainty... | 54 |
| Farr, R (1993, 3) | Common sense, science and social representations | 4 | Miller, JD (2004, 3) | Public understanding of, and attitudes toward... | 54 |

Comment: “influence” is based on reader survey, $n = 206$, December 2011 to January 2012.

ening of the wider public on matters of science should not be left to activism bereft of any evidence or reflection. Critical thinking and empirical investigations must document this mobilisation effort; steering, monitoring, evaluating and benchmarking, and bringing to bear the social scientific analysis, remain the core mission of PUS-at-20.

In this spirit of serving the cause, its authors and readers, PUS celebrates its 20th anniversary. Later in the year we will follow up these reflections with more analysis: on semantic nets of its contents and the networks of inter-citations. This will give another take on the changing contents, and the positioning of PUS in its field of scientific enquiry. Watch this space!

Note

1. At the time of the first invitation, several modes of request were used to reach a sample of those working in the field of PUS. These were emails to: those on the PCST list; those on the PUS London seminar list; and 1,933 users of the journal. The first email was sent on 24 November 2011. The first reminder was sent to the now 1,962 journal users on 14 December 2011 and a final reminder was sent to 1,986 journal users on 10 January 2012. We expect there to be some overlap between the PCST, PUS London seminar and the journal user lists.

References

- Björk B-C, Roos A, and Lauri M (2009) Scientific journal publishing: Yearly volume and open access availability. *Information Research* 14(1): paper 391. Available at: <http://InformationR.net/ir/14-1/paper391.html>
- Leydesdorff L and Probst C (2009) The delineation of an interdisciplinary specialty in terms of a journal set: The case of communication studies. *Journal of the American Society for Information Science and Technology* 60(8): 1709–1718.