

A XXI-century alternative to XX-century peer review

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Abstract

The paper starts with a brief review of some criticisms of the Peer Review system – labelled *ex-ante top-down PR system* – for the evaluation of academic works. The critiques are grouped into efficiency and effectiveness criteria. It then goes on to analyse the roles of Peer Review and how good the system is at fulfilling those roles. The paper then proposes an alternative system for evaluation of academic works: an Open Access system – labelled *ex-post bottom-up Peer Comments system* – that takes full advantage of the technologies of information and communication to secure a speedy and efficient dissemination and evaluation process; moreover, one that enhances the research interaction within the academic community.

The editor would welcome comments on this paper.

Introduction

The last two decades have seen an increasing number of academic works on the issue of evaluation systems and specifically on Peer Review (PR): this is a system by which academic works are evaluated prior to being put in the public domain through publication. The evaluation is done by experts in the subject/field and thus by peers. The evaluation by PR may relate to a variety of means of dissemination: from book proposals to chapters in edited books, to papers submitted for presentation at conferences or for publication in academic journals. It is on the last that most of the writings on PR concentrate and so will this paper.

Though the main issue which authors have considered in writing about PR is indeed evaluation of academic works, the PR system has wide implications also for the dissemination of such works and indeed for the way academics communicate their results. The PR system, in fact, affects whether a work is published or not and, if so, in which journal; moreover, the process leading to the final evaluation affects the speed with which an academic work is put into the public domain.

The PR system has been in operation for a long time and it is therefore legitimate to ask why it has come in for increasing criticisms in the last few years. I suggest that this is for the following reasons. First, the fact that there has been an increase in evaluations in general: we seem to be living in an audit and control culture and this may be inducing people to start asking whether it is all necessary and indeed whether this type of culture encourages academic endeavours. Second, the proliferation of papers and journals is leading to increasing work to meet the demands of the PR process and, indeed, to overload for many reviewers² of submitted papers. A third – and in my view most relevant – factor is that changes in the information and communication technologies (ICTs) are making the old system redundant. Essentially, what I am saying is that – whether the commentators realize it

¹ Emeritus Professor of Applied Economics and Director, Centre for International Business Studies, London South Bank University. I am grateful to the following academics for useful comments on earlier drafts of this paper: N. Acocella, B.S. Frey, D.A.Gillies, M.Gillies, M. Rigby, A. Rosselli, A. Sparkes and M. Tiberi. The paper first appeared in www.lsbu.ac.uk/cibs. Since then I have received several welcome comments. I encourage readers of this version to send me their comments and ideas for improvements in the system here proposed. ietogg@lsbu.ac.uk

² In relation to the PR process I am using the terms reviewer and referee interchangeably.

or not – our critical attitude to PR is emerging because there is a way out. It is on this last point – on the way out – that this paper focuses and makes suggestions.

The next two sections consider issues of efficiency and effectiveness in the PR system; section four analyses the role of PR and section five proposes a different system of interaction and evaluation. The last section summarises and concludes.

Efficiency and effectiveness issues

Most authors who have written on PR accept that we need a system for evaluating the worth of a work and for assessing whether it is good enough to be put into the public domain. While some academics have written in favour of retaining the system (Lederberg, 1978; Garfield, 1986; Legendre, 1995), many question it and propose improvements.

There are two broad lines of criticisms; the first relates to issues of efficiency: how good the PR system is in relation to its costs. The second line relates to effectiveness: how good is the system at doing what it is supposed to do; this latter issue will be discussed in the next section.

As regards costs, Campanario (1998a and b) gives an excellent review of various studies relating evidence from several disciplines and showing that – in addition to the paid for administrative and editorial time - the editors and referees invest in the PR system a very large number of uncompensated hours. Ginsparg (2002) also tackles the issue of costs. He starts by noting that revenues per published article vary considerably from circa 1000 to 10000 dollars. What is revenue for journal publishers is a cost for libraries and journals buyers in general. The lower figure pertains to journals edited and published by not-for-profit organizations such as academic and professional associations, rather than by commercial publishers. However, not many journals are run on a not-for-profit basis because, in the last two decades, commercial publishers have gradually taken over most of the scholarly publications.

There are two main issues connected with costs: (1) costs in relation to the type of provider of editing and publishing services, i.e. not-for-profit versus commercial providers; (2) costs built-in into the system of selection of papers to be published: this is largely independent of the type of providers as in (1).

Regarding (2) we should note that the monetary costs of getting a paper published grossly underestimate the actual social costs for the research community and society as a whole. This is because a considerable amount of the work which goes into journal publication – over and above the actual development of research and production of papers by authors - is done on a voluntary basis by academics as part of their professional activities. This includes, in particular, the activities of referees and in many cases those of the editors themselves. This is what is discussed by Campanario, who, however, also notes that most academics consider these jobs as part of their professional duties and that the jobs are – indirectly – compensated because they count towards career advancement³.

³ A. Sparkes has pointed out to me that refereeing is now such a widespread activity that it no longer counts for career advancement.

Neither Campanario nor Ginsparg consider the opportunity costs of the PR activities. This is time that the academics might have been spending on their own research/scholarly or didactic activities: thus there is a heavy opportunity cost for each published article under the current PR system – whether run under for-profit or not-for-profit regime - and therefore a heavy social cost for the research community⁴.

It could be claimed that the review process and its many rounds help to improve the paper. This may indeed happen in many cases. However, the situation may also be problematic in many others. As anyone who has received two or three referee reports knows, they are often ambiguous and inconsistent: Ref A may like the parts that Ref B dismisses; Ref C misunderstands a whole section of the paper. These are not problems specific to one or two referees: they are faults of the system; any of us who has been a referee is bound to have fallen into one of these problems which, moreover, we have all experienced at some point in our career from the other side, i.e. when submitting papers or, for some of us, as editors⁵. The problem is endemic to the system: as referees, we all read a paper with our own preconceptions and frameworks in mind; often we read it very quickly as the number of requests from journal editors increases. In extreme cases the paper may be damaged by the author's attempts to fit in comments by successive referees and indeed by adding bogus references in the attempt to ingratiate editors and reviewers; a practice that, incidentally, also distorts citations indices.

Ginsparg (2002) notes that editorial and administrative costs are escalating under the pressure of increasing number of submissions. Some editors are calling for systems in which the authors and/or their institutions pay for each submitted or accepted paper: a practice already operated by some journals. While this move may help publishers and editors in meeting their costs, it does not deal with the social costs issue because it ignores who the ultimate payer is. The truth is that, whether the costs are borne by libraries or by authors/institutions, the ultimate payer is the taxpayer. Most libraries are publicly funded and thus, if the library bears the cost, it is the public that pays and the opportunity cost of excessive payments is the fact that higher library expenditure leaves fewer financial resources for the funding of research or the employment of extra lecturers. However, the situation is no different if the authors/institutions were to pay: the burden would be on the department/institution and thus, ultimately, on the taxpayer: again in this case also there would be an opportunity cost of excessive departmental or library outlays in terms of forgone academic services to which the extra outlays could have been allocated.

These considerations points to two sets of conclusions. First, that – unless there are clear quality gains by having commercial publishers as providers - a not-for-profit system of production and dissemination of journals is in the overall interest of the scholarly community and of society. Second, that it is in the interest of the research community and society as a whole to minimize the amount of resources involved in the process leading to publication.

⁴ A perceptive analysis of the problems and costs of evaluation systems applied to research can be found in Frey and Osterloh (2007).

⁵ The author has been Associate Editor of *Transnational Corporation*.

Effectiveness: what is Peer Review for?

Let us now turn to the other issue, the one which has been the subject of most critiques of the Peer Review system: effectiveness. This immediately begs the question: effectiveness in relation to what? Therefore the question of what is Peer Review for and what role it is supposed to play in academic works. Before we attempt to answer this question let us analyse more closely the characteristics of Peer Review, a system which I would like to call *ex-ante top-down PR system* (abbreviated to PR) because it is characterized by the following:

- (i) It is a system of *ex-ante* review because the peer review process intervenes prior to publication and is, indeed, instrumental to it.
- (ii) It is also a *top-down* system because the peer review is set in motion and applied by the editors who together with the referees have power over the decision to publish or not to publish.

PR is not the only possible *ex-ante top-down* system of validation: in the past the decision to publish or not was taken mainly by the editors without the refereeing process; a few journals still apply this system. An alternative system of validation – one which is not *ex-ante* and *top-down* but *ex-post* and *bottom-up* – will be introduced in section five.

As far as I can see PR is supposed to perform the following roles.

- (a) Weeding out papers which are very obviously not up to standard; this is usually done by the editors on the basis of a first quick read and prior to any review process by outside referees.
- (b) Guidance to readers as regard fields of specialization which tend to vary from journal to journal; the editors and the referees assess whether the paper falls within the sphere of interest of the journals and its readership.
- (c) Guidance to editors in the allocation of limited journal space. This is probably the most important function of the PR system. Most journals – particularly the prestigious ones – receive far too many applications for the available journal space and they need an allocation mechanism that scales down the supply of papers to the demand by editors (constrained by the journal's space); the reports from reviewers are the filtering mechanism for such allocation.
- (d) At second level from (c) the system is also used as guidance for jobs and grants allocation in the academic community. Such allocation is strongly influenced by the type of journal in which the research is published.

Points (a) and (b) are considered fairly unproblematic and most criticisms concentrate on (c) and related (d). Campanario (1998a) and Bedeian (2004) report a number of criticisms which include the following issues.

- Credentials of participants in the system and specifically how referees are chosen⁶.
- Reliability and accuracy of reviews and inconsistency among reviewers.
- Inability to spot ground-breaking works (Horrobin, 1982; Gans and Shepherd, 1994; Campanario, 1995).

⁶ Campanario reports that some studies show evidence that appointed referees pass on the job to more junior colleagues. In a conversation with a colleague on this issue she mentioned to me that the practice was well known in her department and that – when working for her doctorate - she used to be asked by her supervisor to write reports on papers he had been asked to referee.

- Inability to weed out very poor works⁷.
- Bias in favour of statistically significant results and thus denial of publication to relevant non-significant results.
- Bias against research that replicates existing results.

Obscurity of the text seems to correlate highly and positively with acceptance into highly-rated journals (Campanario 1998a: 195). There are also reports of unethical behaviour in the process (Campanario, 1998b). Many authors seem to conclude that whether a work is accepted by a journal or not may be accidental, depending on who reviews it (Bedeian, 2004; Campanario, 1998a); indeed, some argued that there does not exist a universal standard of 'what is fit for publication' within which referees can work and against which they can make their assessment. Ginsparg is quite explicit on what we should not expect from the PR system; he writes:

"...peer-reviewed journals do not certify correctness of research results. Their somewhat weaker evaluation is that an article is a) not obviously wrong or incomplete, and b) is potentially of interest to readers in the field. The peer review process is also not designed to detect fraud, or plagiarism, nor a number of associated problems - those are left to posterity to correct." (p.2)

In spite of these acknowledged difficulties, the PR system is seen as the 'gold standard' in quality assurance for academic works. The PR process is widely used not only for space allocation in journals but also as a filtering system for jobs and grants applications (d): if an article has been published in a prestigious journal it gives the author a strong basis for jobs and grants applications. Moreover, in the UK the process is used in the so-called Research Assessment Exercise (RAE) in which the government – through its higher education funding body - decides on the allocation of research funds to universities according to periodic rating of departments' research strengths. The latter are assessed – to a large extent – on the rating and prestige of the journals in which staff have published over the assessment period. It is known that – within the RAE process - in most subjects, a journal article is rated higher than a chapter in a book or a research monograph on the basis that the journal article has undergone a stricter PR process.

Though many academics would acknowledge the problems of PR in relation to publications, some of these problems seem to be forgotten when it comes to the impact on jobs and research funding allocation. It is as if, though we know that the metal we are dealing with is not pure gold, when it reaches its final destination, the 'jobs and research funding allocation desk' we treat it as pure gold. Yet, it is at this second level that the impact on individual academics' lives⁸, on the research community and on the direction of research, is most felt.

⁷ Campanario cites research reporting that the editors of a specific journal "...tend to accept about 10 percent of manuscripts they should have rejected, and rejected about 10 percent of manuscripts that should have been accepted" (p. 194).

⁸ A poignant fictional story of the impact of the RAE on individual academics is told in Sparkes (2007). In a written exchange, Sparkes has pointed out to me how 'bluntly negative and destructive' reports can destroy a young academic.

Scholarly activities and the management of gates

Points (c) and (d) above mean that the most important function of the *ex-ante top-down PR* process is its gate-keeping role giving or denying access to journal space and – indirectly - to academic jobs and research funds. The process leads to a decision to open or shut the entry gate for publication into a particular journal; in effect, in most cases, the management process results in the shutting of the gate: the most prestigious journals may have a 90 percent rejection rate. This leads the author whose paper has been rejected to try another journal. To continue with the 'gates' analogy it is as if the authors, finding the first gate shut to their papers, go along the path to the next gate and then the next till they may manage to find one that opens for them.

Once the authors find themselves in the field of published works, their pieces are available to readers and thus the PR system performs its dissemination function: readers are, partly, guided in their choice of which works to consider by the prestige of the journal in which papers have been published, as well as, of course, by the field of specialization of the journal.

To continue with the analogy of gates, our authors now find themselves in the green field of published authors; they have left behind outside the gates the miserable authors whose works have not been accepted for publication. However, the field of publication is not the point of destination but only a necessary staging post.

Here comes the impact of the process on point (d), i.e. the effects on jobs and grants allocation. It is well known that people and institutions with responsibility and power to allocate academic posts and/or research funds, in assessing the quality of candidates or of applications are, to a large extent, guided by the worth of their publications as indicated by the quality of the journal in which they have been published. The British RAE - mentioned in section two - is also based on a second stage PR system.

All our authors need to use their reputation as published authors to access the next even greener field: the luscious field of academic jobs, promotions, grants allocation. To have access to these, a further selection process will be in operation depending on the reputation of the journal in which the works have been published. So, from our green field where the published authors are assembled they will all try to move on and pass through further gates, and here comes selection again. There are several gates leading to different shades of green in the grass: from the very deep green of top jobs in top institutions to the paler green of less prestigious jobs. Whether our authors get in the very deep, brilliant green field of most prestigious jobs or in one of the progressively paler green field depends on the reputation of the journal in which they have published. Some authors who have published in less prestigious journals may never progress towards this second set of gates.

The gates analogy is here kept deliberately simple and schematic. In practice, other elements affect the passage into the second set of gates: books publication and the reputation of their publishers is taken into consideration in the social sciences and the humanities; conferences seem to count more in the physical or engineering sciences; the reputation of one's institution counts towards grants allocation; in the social science and humanities, the ideological perspective of the research may affect the ability of its authors to proceed through the first set of gates (to the field of published works) and to the second set, to the field of jobs and grants.

Thus PR is very influential on two levels: in the dissemination process (i.e in which journals the paper is published, if any) and in the assessment of performance of individuals and institutions. These two levels affect both the allocation of academic jobs and of research funds. Moreover, when PR is applied also to the assessment of institutions (as in the RAE), the two levels of assessment result in cumulative costs; to those costs of the PR system highlighted in section two must be added the costs of the RAE for the British academic community. The latter are enormous as the evaluation system requires a large central administration system as well as administrators at each university and of, course, the investment of considerable time by academics themselves to prepare their own and their institution's cases.

The PR system may serve reasonably well editors and publishers in their main problem of space allocation; but how well does it serve the research community and society? Not very well I would say for the following reasons some of which emerge from the critical literature cited above.

- The introduction of long delays between completion of a paper and its publication. The review process in each journal takes months; as most papers are sent to several journals consecutively, the lag between completion of a paper and its publication may be counted in years. This is a problems for the authors but also for the research community as further developments in an area in which an author has made a contribution are delayed.
- The very high private and social costs of the system as argued in section two.
- The possible distortion of research paths introduced by the authors' race to get into the more prestigious journals: authors, under pressure to get into top journals, may incline to work in areas, paradigms, ideological frameworks acceptable to specific journals. Authors may adjust their behaviour and work to meet targets – including the target of making it into a specific journal - rather than to advance research and science (Frey and Osterloh, 2007)⁹. This is a trend which would not matter if it applied to few cases only, but can be serious as the practice becomes widespread under the pressure from institutions such as the British RAE¹⁰.
- A built-in bias against papers that are very innovative and outside the established paradigm. The reason for this is that most referees and editors work within well established paradigms, while ground-breaking research by its own nature and definition is something outside the standard paradigm. When refereeing, the reviewers will read a paper with the mind frame of the paradigm they are working under; what is presented to them may appear as strange, unusual, not properly researched; it may be something presented in a new and untried language or framework. If the readers of this piece think that all this is nonsense and that any competent person is able to spot 'the great work' they should consider evidence from the history of science as in Gillies (2006a and b): researchers who are now

⁹ The introduction of targets has become very widespread also in the British National Health System (NHS) and this is leading to behaviour distortions on the part of health workers under pressure from their managers to perform well. The devastating effects of all this has been highlighted by some high profile failures in hospitals (Carvel, 2006: 9 and 2007:14).

¹⁰ Here is an example of undergoing adaptation of behaviour. There are currently plans to modify the RAE system more away from PR and into using metrics including citation indices. Change in behaviour are already occurring and there is talk of establishment of 'citation clubs' (Corbyn, 2007) and of pressure on authors by editors of journals for more citations of their own journal's works.

acknowledged as having made ground breaking contributions saw their efforts rejected by their peers working in different paradigms.

It could be argued that the latter problem does not matter that much because many works will reach the public domain eventually. However, when a piece of research is ground-breaking and very important there is also urgency in publishing and in wide dissemination for the following reasons: (a) the author may want to establish intellectual priority; (b) the research community would benefit from early release of results and from potential further developments following interaction between readers and authors; moreover, some research may be very relevant for human life or for business and the economy; (c) for some academics delays may lead to loss of tenure with long term effects on individuals, families and research communities.

Most academics would agree that a system of evaluation and dissemination of academic works is needed, though many would also agree that the current PR system is imperfect. Some have proposed amendments mostly at the margin, that is the type of amendments that leave the basic tenets of the system in place: the conclusion seems to be that imperfect though the system is, it may be the best available on offer. The next section challenges the last statement in the light of alternative systems made possible by the new technology.

A different system of gates management?

As mentioned above, it could be argued that – given the space constraints – the current PR system is the best available. This may have been the case till a decade or so ago; however, here is where the new technology comes in and it is in this light that possible alternatives must be considered.

What do we want from an evaluation and dissemination system? We may not all agree on the details, but in reality most people might agree that we want a system with the following characteristics.

1. An efficient system that absorbs less compensated and uncompensated, private and social resources than the present one.
2. A system that cuts the length of time between the completion of a paper and its appearing in the public domain and thus its availability to the potential readership.
3. A system that substantially reduces the probability of shutting the publication gate to ground-breaking research works.
4. A system that weeds out the very poor papers.
5. A system that alongside the evaluation function performs an interaction function within the community of researchers.

Regarding points 3 and 4, I would like to make the following comments. Gillies (2006a and b) notes that most people in charge of resources allocation and selection are obsessed with avoidance of type I error that is with avoiding letting through the gates poor papers. However, type II error – not letting through ground-breaking research results – has much more serious consequences for the research community and society in general.

Regarding point 5, Bedeian (2004) stresses that the interaction between author, editor and referee makes the end product - the published paper - the result of a social

interaction; in effect the published work becomes a social product often different from the original product sent to the journal. Frey (2003) comes down strongly against one aspect of this type of socialization of the academic work because he feels that the anonymous referees have excessive power to impose their views on the author and that the work may end up not reflecting the original views. He concludes in favour of laying the decision power entirely in the hands of editors who have more invested interests in the success of the journal than anonymous referees.

I see social interaction as a very important part in the development of research; however, it does not have to be the specific power-based social interaction built into the current PR system as discussed by Bedeian and by Frey as above. The information and communication technologies offer us the potential for a new system of evaluation, dissemination and indeed interaction within the research community. Open Access systems - in which research papers are placed in the public domain with some pre-selection by the site editors - are already in existence in many subjects. For example, in economics RePEc and NEP perform this function; Ginsparg (2002) mentions arXiv in relation to physics. He is concerned with the efficiency of the scholarly communication infrastructure and favours the use of Open Access in order to achieve speedy and low cost dissemination; however, he thinks that a form of PR is still necessary in order to validate the worth of research works and to aid selection for jobs and grants allocation. Therefore, he favours a double system in which Open Access in internet sites secures a fast and low cost dissemination while a later publication with prior PR process gives a mechanism for selection in jobs and grants applications¹¹.

However, I feel that we could go a step further and develop a system that takes full advantage of the ICTs; I therefore propose the following *ex-post bottom-up Peer Comments system* (henceforth abbreviated as PCs).

- Use of Open Access sites categorized by fields of specialization for each subject. Research papers to undergo a first selection designed to (a) weed out the crankish papers and (b) make sure that - as far as possible - they pertain to the right field of specialization. The latter point is designed to help readers as well as authors.
- For each paper published on Open Access the editor should open an electronic 'Comments Link' inviting readers to send comments which - following a vetting to weed out crank or offensive contributions - will then be placed on the Link site. These open debates should be positively encouraged as a way of developing research; they are a way of recognizing that research is a social activity and the interaction of various researchers can aid progress. As already noted Bedeian (2004) stresses that papers published in journals are the result of social interaction between author, editor and referees. The type of social interaction proposed here differs from the one discussed in Bedeian because: (a) it is based on a potentially much larger number of commentators; (b) it is not power-based in the sense that the commentators do not have the power to stop the paper being put into the public domain: it is already there; and (c) the comments are signed unlike the anonymous referees reports.
- Academic associations could encourage the publication - in books or in dedicated e-journals - of selected 'Readers', i.e. collections of papers and their critiques - mostly already available on Open Access sites - with a specific focus in order to give further

¹¹ This approach is curious in view of Ginsparg critical attitude towards the quality assurance of the PR process cited in section three.

guidance to readers¹². Ginsparg (p. 7) cites the case of successful Mathematical Reviews, published by the American Mathematical Society.

- The publications of articles on 'Literature Surveys' should be encouraged in order to help readers sift through the large amount of literature now available. In fact doctoral students world wide engage in this useful activity; papers from this part of their effort are usually not published; we should encourage their publication because it may provide a useful feed back for authors and other interested researchers. It could be argued that good literature reviews are not easy and they need a considerable more experience than that of the average research student. I tend to agree with this and I suggest that experienced people should also get involved in this.
- Reviews of web articles as well as of books should be encouraged as they perform a very valuable service; this would reverse a trend of the last couple of decades which have seen the downgrading of book reviews for the purpose of the RAE or jobs and grants applications. This downgrading discourages authors from employing their time in reviewing activities and deprives the community of a useful tool for selection and discrimination of which papers/books to read.

The above system I call *ex-post bottom-up Peer Comment* for the following reasons. First, to stress that the comments occur after the paper has been put into the public domain. Moreover, it is bottom-up because the comments and reviews are not power-based: the commentators do not have the power to stop the paper going into the public domain.

Among the advantages of this system are the following.

- It secures quick dissemination of research ideas and results.
- It is very cost efficient because both private and social costs are very low.
- The bottom-up approach is likely to give better assessment because of the large number of potential contributors against the few referees in the *ex-ante top-down PR* system
- One further advantage of the PCs system is that those who are prepared to read the relevant papers and write criticisms are likely to be people interested in the specific topic and thus their criticisms are likely to be relevant.
- The wider dissemination of papers on e-sites has a major advantage: within a large readership and potential commentators we are more likely to have a few who can spot the occasional ground-breaking research than if we confine such a task to very few referees as in the present PR system.
- The Link site for comments invites people to participate disclosing their identity rather than anonymously. The lack of anonymity has the advantage that, if someone has a brilliant idea following the reading of the original paper, s/he will not be tempted to hold it back for fear of losing attribution – as may happen under the current system of anonymous referees. They know that whatever comments they place on the site will be attributed to them. Moreover, openness is likely to lead to more positive developments and the process would strengthen the social character of research: further progress along the line of specific papers would emerge from critiques and discussions. It could, however, be claimed that the

¹² In the 1950s and 1960s the American Economic Association – through the publisher Allen & Unwin - issued a series of 'Readers in Economics' collecting major published articles in a specific field. They were – at the time – very useful reference texts particularly for researchers working in institutions/countries not well endowed with library resources. As I write I can look on my shelves at Readers in 'Business Cycles', in 'Price Theory', in the 'Theory of Income Distribution' and in the 'Theory of International Trade'. The aim and format of XXI century Readers would differ by taking account of the opportunities offered by the new technologies as well as of the scholarly infrastructure proposed here.

lack of anonymity discourages academics from making negative comments. This is possible; however, we should not forget that the internet interaction spans the whole globe; while someone in Britain may not want to offend co-researchers whom they are likely to meet often and/or who may have power over jobs allocation, they may be less worried about academics further afield.

- From the reader's perspective, there is evidence that the opportunity to read comments and debates is viewed positively: Bedeian reports that "Subscribers either to the *American Psychologist* or the *American Sociological Review* often find that the sometimes-heated interchanges appearing in the Comment and Reply sections can be more intellectually stimulating than the original works being disputed" (p. 211).
- As regards jobs and grants/funds allocation, the proposed system has the following advantages over the PR system: the allocators of grants and jobs can rely on a wider number of potential commentators than the current system and thus will be better able to assess the impact of the paper.
- The development of 'Readers', literature surveys and review articles will support the system and may help readers as well as jobs and grants allocators to find their way through the large amount of papers and comments.

The research community and society would get the maximum benefit - by paying the lowest cost - from this proposed system if the providers of services on these web sites were not-for-profit organizations such as academic and professional associations. The editing of Open Access and related 'Comments Link' sites should be supported by public funds to encourage competent and keen people to engage in them. Yes, there will be also many poor works (including comments) put in the public domain: but this is a problem already present under the current system; at least the cost of these will not be very high. Moreover, in the end readers will have to be discriminating as they have to be now. The transition towards the *ex-post bottom-up PCs* system may have to be gradual to avoid excessive disruption to ongoing processes¹³; it would be facilitated by the fact that the system is changing anyway under the effect of the establishment of many Open Access publication sites. It is a matter of seizing the initiative and moving towards an interaction and evaluation infrastructure for research appropriate for the XXI century.

Finally, I would like to bring to the attention of readers a striking example from the history of physics¹⁴: a case in which a policy of support for (and trust in) authors rather than hindrance through excessive scrutiny and controls led to the quick dissemination of ground breaking research work. Miller (1981: 2)) argues that Einstein famous 1905 relativity paper had all the characteristics of papers that are rejected by referees. It was by a young, unknown author who had neither academic post nor doctorate; The paper contained 'no citations to current literature'; was 'unorthodox in style and format'; it contradicted the main paradigms in the discipline; and the title had 'little to do with most of its content'. It might not have been put in the public domain quickly had *Annalen der Physik* not followed – at the time – a policy with similarities to what is being proposed here. Miller writes on this point:

"As far as we know the editorial policy of the *Annalen* was that an author's initial contributions were scrutinized by either the editor or a member of the Curatorium;

¹³ I owe this point to Mario Tiberi.

¹⁴ I am grateful to my husband Donald Gillies for bringing this example to my attention.

subsequent papers may have been published with no refereeing. [...] Einstein's...paper was probably accepted on receipt." (p. 2)

Summary and conclusions

The paper starts with summarizing critiques of the current system for evaluating research papers: the Peer Review system which is labelled as *ex-ante top-down Peer Review*. Two sets of criteria are considered in the critiques: efficiency and effectiveness; that is how good the PR system is in relation to private and social costs and how good it is in fulfilling its roles. A discussion of roles and functions of the PR system leads to an analysis of its problems.

The last section proposes an alternative system – an Open Access system characterized by *ex-post bottom-up Peer Comments* - one that is more appropriate to the XXI century because it utilizes the new technologies to achieve the following.

- Low cost and speedy dissemination of research papers.
- Encouragement of comments and discussions on papers; these to be put in the public domain under the name of the commentator.
- Strong and open interaction between authors and commentators thus emphasizing the perspective of research as a social process.

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SUGGESTED CITATION:

Grazia Letto-Gillies, "A XXI-century alternative to XX-century peer review", *real-world economics review*, issue no. 45, 15 March 2008, pp. 10-22, <http://www.paecon.net/PAERreview/issue45/lettoGillies45.pdf>