

# Evaluation in the Republic of Science. From peer review to open soft peer review

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This paper is a draft version. Comments and suggestions are very welcome.

## 1. Introduction

“No university teacher likes to be reminded of discussions of appointments, for they are seldom agreeable. And yet I may say that in the numerous cases known to me there was, without exception, the good will to allow purely objective reasons to be decisive. However, the decision over academic fates is too often largely a 'hazard'”<sup>1</sup>.

In his well-known lecture *Wissenschaft als Beruf* (1918), *Science as a Vocation*, Max Weber underlined the limitations of an appointment procedure based on building consensus among peers. However, his reflection can also be interpreted as a specific instance of the more general problem of the relationship between objectivity and evaluation. In his lecture, Weber sees Science as both a vocation and a profession. His analysis starts from the differences and analogies of the career and retirement system in German and American universities, which he considers respectively “plutocratic” and bureaucratic.

This presentation isn't focused on studying appointment procedures but rather scholarly peer review. Hence, the link with the arguments of the German sociologist, may not appear so evident at a first sight. However, it suddenly becomes visible if we consider the topic from a philosophical and sociological point of view. From this perspective, peer review procedures are clearly connected both to the role of science within the academia and its influence on the society in general.

A reflection on evaluation procedures involves scientific and moral issues concerning knowledge production and its dissemination. It also involves careers, funding and the basic structure of the “Republic of Science” itself.

The reviewing procedures used today are almost exclusively based on the good will of the reviewers to keep the evaluation on an objective ground. A premise that I consider, like Weber does, largely insufficient and hazardous.

This presentation has three objectives:

- Firstly, it aims at clarifying the motivations and the historical context that led to the birth of peer review.
- Secondly, it aims at reflecting, from a political philosophy perspective, on the impact of

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<sup>1</sup> Weber M., *Wissenschaft als Beruf*, p. X.

evaluation procedures on the government of the Republic of Science. To put it in simple terms: is the Republic of Science a proper Republic? Which form of government should be chosen for an Open Scholarly Community on the web?

- Thirdly, it aims at proposing a novel approach to peer review that could be adopted in Open Scholarly Communities on the Web. I call this approach “open soft peer review”.

## 2. Peer review as embodiment of the evaluation matter

The universality of science is the result of a long transition process, in which the origin of peer review represents a milestone. Despite its relevance for modern and contemporary science, however the concept of peer review and its practices have been studied very little: for instance, there is no knowing of when the current denomination was born and there is no serious and well-documented reconstruction about the different experiences realized before the late post-war period. The birth of modern *peer review* is generally associated with that of the first scientific journals, namely with the *Philosophical Transactions* printed and published under the aegis of the London Royal Society, and connected with the two conditions that made it possible: the development of the printing technology<sup>2</sup> and the birth of Science Academies<sup>3</sup>. England was one of the first nations in developing a commercial culture of printing and publishing, and in addition, it was the scene of crucial accomplishments for the definition of the science validation protocols that are still extant.

In the birth of peer review the invention of Natural Philosophy and the institution, by the English crown, of the Royal Society – i.e. the national Academy - placed in London were crucial. London was, by that time, both the heart of the book market and of the Stationers' Company. Formally, all those involved in publishing books, journals, newspapers, fell into the category of “*Stationer*”<sup>4</sup>, namely the members of the company formally recognized by queen Mary in 1557 “to oversee the 'art and mystery' of printing”. The Stationers’ activity strongly conditioned the scientific praxis: the meaning and communication of knowledge of all kinds depended increasingly on print, and it was through the agency of the Stationers that printed materials both came into being and reached their users. In this way, knowledge depended on the Stationers<sup>5</sup> and in London the districts devoted to the book business became a sort of university *de facto*: as Thomas Sprat, the author of the Royal Society history, stated “Not only the best *Natural*, but the best *Moral* Philosophy too,

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2 On this see in particular Adrian Johns’s monumental work, *The Nature of the Book. Print and Knowledge in the Making*, Chicago University Press, Chicago 1998.

3 See Mario Biagioli’s study on the transition from external (public censorship) to internal review (academic reviewing). Biagioli M., "From Book Censorship to Academic Peer Review", *Emergences*, Vol. 12, No. 1 (2002), pp. 11-45.

4 Part of the company were booksellers, printers or wholesalers, publishers, editors and compositors, representing well distinguished and articulated roles, all included in the wider category of *Stationer*.

5 Johns A., *The Nature of the Book*, cit. p. 60.

may be learn'd from the shop of *Mechanicks*"<sup>6</sup>.

Books and printed materials of all kind were subjected to registration in the *register book of copies* of the Stationers' guild. It was a hand written book that was guarded by the company "clerk" and that could be reproduced by him in court in case of refutations. The person who wished to exercise rights on a copy (usually a Stationer and hardly ever the author – whose name did not appear in the register) had to go personally to the Company head and pay a small amount of money for registration<sup>7</sup>. The exact record standard in the register varied very little, and the registration (entrance) was the document exerting an authority on customary law and assuring a "perpetual tenure based in company conventions". The register was a memorial of great authority depending on several rules, including not written ones, and retracing the priority in case of refutation was no simple task<sup>8</sup>. In those cases, evaluators were called for intervention who had to decide on ambiguous cases and that were selected by the court or the parts. Thanks to such decisions "that was the identity of a text established its stability guaranteed, and its authorship fixed"<sup>9</sup>. The court developed an elaborate empirical taxonomy of similarity-difference between texts: a book could be judged as damaging towards the owner of the "original" copy if represented an "abstract", "summary", "translation" or "paraphrase" of another. In these actions, the Stationers' Company had to judge on contents, therefore in case of specialistic works, just like for scientific literature, there was need of specialized evaluators. Moreover, for the purpose of this reconstruction, it is interesting to notice that in such a system the persuasion that a text's author might have a unique and privileged right in deciding its destiny was all but predictable. Hardly ever did the writers use the register in person, and to no citizen of the Republic of Letters was the exemption from these practices guaranteed: regardless of his social status, when knocked to the printing house's door, the author was always in trouble<sup>10</sup>.

Another important element influencing the publication of learned books, was the fact that no printing house in London could afford specializing only in scientific literature, which had a very limited market and was a high risk enterprise. A prominent example was Pitt's *English Atlas*, whose publication, despite the excellent credentials (and the scientific patronage of the Royal Society)

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6 Cited by Johns A., *ivi*, p. 74. With the term "Mechanick" were meant the pressmen. In Europe, the fact that philosophical knowledge lived both in shops and in books and academies was a well-known and shared.

7 To see an example of "entry", see again Johns A., *ivi*, p. 216.

8 Note that the presence of different conditions for specific cases tended to complicate things remarkably. Some examples may be the "*salvo*", the "*blocking entrance*" and the "*caveat*". The condition called "*salvo*" (*salvo iure cuiuscunque*) included the possibility of discovering a new entry, previous to the one registered. By registering a generic title, the registration of future titles on a given topic could be prevented (so-called *blocking entrance*). The *Caveat* consisted in a (non-written) agreement between a Stationer and the Clerk concerning a title. Note also that the Clerk's task was extremely important. He was the guardian of the register and, since 1643, obtained also from the parliament the power of dismissing all pamphlets. See Johns A., *ivi*, p. 218.

9 Johns A., *ivi*, p. 223.

10 Henry More stated: "I have forty times more trouble in printing a book than I have in writing one"; cit. in Johns A., *ivi*, p. 103.

came to a stop at the first volume of the eleven expected. For printing, authors (be they Newton, Boyle, Hobbes or Flamsteed) needed huge funds and scientific books were expensive goods, for both producing and buying. Also for this reason, the first and most important difficulty for an author consisted in convincing a Stationer to print<sup>11</sup>.

Certainly because of these difficulties, the Royal Society's natural philosophers, authors of books destined to a scholarly public and to a niche market, inaugurated and experimented solutions through intervening with resolution in the world of Stationers<sup>12</sup>. It was noticed that in England there was no way, for a scholar, of self-managing the print process. The accomplishments of the Royal Society fell within that ambit:

- first, the Royal Society obtained (together with the Oxford University) the liens of printing scientific works thus becoming a guild's publisher. This was a precondition for printing books.
- Second, it was granted the authority of choosing its own booksellers and pressmen. In 1660-61 John Martyn and James Allestry were chosen, with whom a strict agreement was established.
- Lastly, the Royal Society council decided that no book could be granted a licence unless previously vetted by at least two members of the council itself, in order to guarantee it would not conflict with the projects and the works of the Society<sup>13</sup> (a first example of peer reviewing).

Writers developed several strategies for resisting the threats caused to their works. In addition to deciding their alliance and cooperation as a group, in order to protect themselves, philosophers who aimed at becoming authors gave birth to new communication techniques, among which scientific journals, whose printing and publishing protocols, as we may see, would limit the actual powers of printers and booksellers. Furthermore, the Royal Society had to tackle directly the building of safe conventions for the production, manipulation and reception of written and printed objects containing theories of natural philosophy. It was in this context that members of the English academia gave birth to the first peer reviewing practices: presentation and perusal, plus the registration which simulated the one of the Stationers' Company.

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11 A solution that had effect within the Royal Society, and also elsewhere in Europe, was the self-financing by the authors (and the readers' subscriptions). The main obstacle was finding subscribers that trusted the publishing enterprise. See also on this the suggestion by poet F.G. Klopstock, that proselytized also among other followers of the Enlightenment (Woodmansee M., *The Genius and the Copyright: Economic and Legal Conditions of the Emergence of the 'Author'*, Eighteenth-Century Studies, Volume 17, Issue 4, Summer 1984, 425-448, in particular pp. 440-41, online at: <http://www.compilerpress.atfreeweb.com/Anno%20Woodmansee%20Genius%20&%20Copyright.htm>).

12 See Sprat T., *History of the Royal Society*, Martyn, London 1667; Birch T., *The History of the Royal Society of London* (1756), reprinted Johnson, New York 1968.

13 Cited in Johns A., *ivi*, p. 494.

The presentation was a public act, often mediated by the secretary of the Society, that became compulsory in May 1661: each member who published a work had to give a copy to the Royal Society; afterwards, the present deserved an answer— typically, a fellowship. The perusal consisted in a detailed reading of the work by experts of the same Academy. The assessment of the evaluators had to be transmitted to the author and their outcome should not become public.

It might be worth noticing that both the presentation and the perusal were forms of *ex post* peer review (the second could also be realized on non-printed manuscripts, but in that case was considered less important. Sometimes, a text was submitted to public readings and then recommended for publishing). After perusal the works were included in a register; the registration, as Boyle said, occurred “[to] secure [authors] against the usurpations, not the industry or out-doings of others”<sup>14</sup>, thus for deciding the priority of an individual in a scientific discovery<sup>15</sup>.

Printing was an alternative to registration, and books<sup>16</sup> gave birth to a form of wider (because directed towards the outside) and different publicity compared to those of the registers, which on the contrary mostly counted within the scholarly community. This difference was well known by the Royal Society, which deliberately separated the two moments. Beyond this dimension, it is worth noticing that communication was very important for the Royal Society. It stated itself “parliament”<sup>17</sup> meaning with that its own representativeness of the nation, while it opened to the international public of the readers through its publications, which had good reputation including beyond the Channel. The need to communicate successfully was therefore as important a part of the experimental philosophy as the experimenting itself, and the first condition to be a philosopher was the readiness to communicate<sup>18</sup>.

It was in this context that came to light a publication genre that came forward as a valid means for publishing perused articles: the scientific journal. The first issue of *The Philosophical Transactions* appeared in 1665 edited by Henry Oldenburg<sup>19</sup>, secretary, mail master and guardian of the Royal Society’s registers. Oldenburg’s attempt was aimed at expanding the value of the Royal Society’s register beyond the Society itself, and the role of editor of the *Philosophical Transactions* and of guardian (*gatekeeper*) of the register constantly crossed.

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14 Johns A., *ivi*, p. 484.

15 Of the two existing registers, one book was devoted to the registration of letters, the other to the theories (hypothesis) – and the access (to both) was restricted. It is noticeable also that the Royal Society kept the right of modifying the works before registering them. The procedure suggested by Oldenburg for guaranteeing the authorship of inventions to their legal authors and for preventing usurpation thus became a protocol. However, the role of the Royal Society always remained weak and the authority of the registers did not expand beyond the scholarly community.

16 The books were kept in the Royal Society archive and library, and there could be consulted.

17 The same metaphor is used by Kant in the *Contest of faculties* (See *Streit der Fakultäten*, A 41). For a comment on this excerpt, see Di Donato F., *Università, scienza e politica nel Conflitto delle facoltà*, Bollettino telematico di Filosofia Politica 2006, online at: <http://bfp.sp.unipi.it/dida/streit/ar01s04.html>

18 Johns A., *ivi*, p. 472.

19 Oldenburg managed the new journal with great independence both from a financial and an editorial point of view and *The Philosophical Transactions* were identified for long with his person.

The birth of the new genre provoked changes both in the market and in the forms of the scholarly communication<sup>20</sup>. Journals posed practical and legal problems that with books did not exist: they required open and unlimited licences, they needed many referees and a large amount of contents. Also for this reason, they opened to the contributions of foreign scholars and to the internationalization of science. Furthermore, it must be noted that the problems currently indicated (slowness, plagiarism, personal, political and also scientific conflicts, fraudulent behaviours, low expertise, excessive conservatism) already existed by that time<sup>21</sup>.

In the peer reviewing praxis realized by the English periodical, it was the whole journal that was written up, not the single articles as it is today. At least in the beginning, in addition, the contents themselves were hardly referable to an author other than Oldenburg, who, even when received manuscripts from abroad, used to publish more paraphrases in his own hand and short anonymous reports rather than original texts. A specific feature of the English scholarly communication system was that the peer review process was destined to domestic products (taking place within the Royal Society), while censorship interested books imported from abroad. Thus the peers were fellow countrymen<sup>22</sup>. Thanks to publications, academies recruited new peers, expanded their networks and encouraged the institution of new academies. In the relationship between scientists and politics, peer review was crucial because credit (and independence) of the institution depended on the reliability of the published texts and on the network of philosophical commerce among the members of the Academy. Thus, peer review represented in the beginning a prudential tool, and hardly ever could innovative works pass the screening of the Royal Society and be printed.

Generally, the credit of publications did not spread in a uniform way. Meanwhile, however, scientific publications became a precondition for joining the Academy – and publications, appearing on the institution's academic journals, expanded the credit of the institution itself. This way, manuscripts started to bear credit. And for the working of the machine, it was crucial that this "academic banknotes" be printed<sup>23</sup>. Between the XVII and the XVIII century, the peer review system broadened its jurisdiction. Born as a technique related to particular subjects and internal to specific academies, its use was then expanded to the scholarly outcome assessment in general. While distinguishing the different moments (presentation, perusal, registration, publishing) is not an easy task, we may notice that because of the close link between scientific societies and their journals the peer review system became an integral feature of the first journal publishing system and, more generally, a publishing protocol in the XVIII century Republic of Letters. Afterwards, it spread widely and was institutionalized as a tacit but universally acknowledged praxis within the

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20 For a survey on the history of European journals, see Dooley B., Sabrina Baron (edited by), *The Politics of Information in Early Modern Europe*, New York, Routledge 2001.

21 On allegations of plagiarism and encroachment of first modern-age Natural Philosophy, see again Johns A., *ivi*, pp. 461 and following.

22 On the contrary, it was in Paris when long-distance evaluation first started, anticipating the praxis of the blind peer review. See Biagioli M., "From Book Censorship to Academic Peer Review", *cit.*

23 Biagioli M., *ivi*, p. 20.

academia.

### 3. Is the Republic of Science a proper republic?

The peer review procedure played a fundamental role in defining the structure of scholarly communities. It marked the relationship between institutions and the political and religious establishment. Institutions were cautious of embracing new ideas. Publishing innovative and revolutionary theories was a double-hedged weapon: on one hand, it increased the prestige and visibility of the institution; on the other hand, there was the risk of stepping into the ground of political and religious subjects with the consequence of reducing the institution's autonomy. The procedure of Peer review contributed to define the boundaries of the Republic of Science. Writing and publishing books and essays was the sufficient and necessary condition to be a member of the “State of virtuosi”.

The term “*respublica literaria*” that appeared for the first time in a letter sent by Francesco Barbaro to Poggio Bracciolini in 1417, quickly spread all over Europe and in it was already frequently used during the first half of XVI century. The term had two semantic poles: in his general meaning it was used as a synonym of “Letters” and “Knowledge”, in a more defined meaning, which began to be used during the second half of the XVII century, it was used to refer to the international scholarly community as a whole.

Since the beginning, the term “Republic” was often used as a synonym of Academy and University. The Republic was an organization somewhat similar to a state, with a well-defined jurisdiction. It was however, a very special kind of state in which its citizens, the “body of scholars”, were members of a cosmopolitan society that crossed the border of national states. The Republic was grounded on two universal principles: Freedom and Equality. The *respublica literaria* was a society without a formal government and written rules. Its only postulate was the freedom in “public use of reason”. “A huge society of spirits, wrote Voltaire, spread all over the world and all over independent”<sup>24</sup>.

*Respublica* stands for public *res* (thing, object). The problem of whether this kind of society could be considered a proper republic, as a *forma regiminis*, was subject to a vivid debate. Christian Loeber addressed this issue in his *Dissertation Politica* (1708). He asked himself if the *republica literaria* could be considered a state from a legal perspective. Despite his conclusion was affirmative, he also stated that the *republica literaria* wasn't a true *forma regiminis*.

It's worth noticing that the latin locution is a political expression and comparisons between the scholarly republic and political states were not uncommon at the time. Despite the *republica literaria* was a non-state, its members considered themselves citizens of a real state.

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24 Cit. by Bots, Wacquet, *La Repubblica delle Lettere*, Il Mulino, Bologna 1997, p. 28.

Analysing which were the conditions and the barriers to become citizens of this state and would help understanding the original structure and organization of the Republic of Science and its evolution. However, such a analysis lies outside the scope of this work.

I will focus my attention on trying to answer the question whether the form that the Republic of Science has taken in the last 100 years could or could not be considered a true republic.

A republic can be defined as a *forma regiminis*, based on a number of principles *a priori* (in our case freedom and equality) and on the separation of powers. Under this model, the state is divided into branches or estates, and each estate of the state has separate and independent powers and areas of responsibility. The normal division of estates is into the Legislative, the Executive and the Judicial.

Under this conditions, all citizens should in theory be able to take part in the legislative function. However, in practice the possibility to take part in this function requires that the individual belongs to a scientific institution. The executive estate is given to a part of the community, on the basis of meritocratic and democratic criteria. In most cases the participation in the executive function depends on career. Rectors are no more students, as it was at the beginning of the History of Universities in Bologna, but rather full professors. They are elected by peers among the whole academic body. The system of Judicial power obeys to more complex rules. Like in the origins, access of new members to the community is regulated by various evaluation and selection mechanisms. These involve a larger number of actors than the scholarly community itself including states, international regulatory organizations, publishers, and tax-payers in general who are the principal source of funding as well as the principal beneficiaries of Scientific Research.

Let me now consider the last point more closely. Still nowadays in the traditional Republic of Science, the young scholar is introduced to the rules of peer reviewing during his postgraduate education and the PhD qualification is still considered as the main eligibility requirement for the peer basic rank. The assessment among peers is based on a unique and general principle: that through publications all may be considered comparable to anyone. Peer review dynamics, however, follow different and specific logics according to disparate subjects– within which it is possible to observe several general trends.

Considering only the Human and Social Sciences, especially in Europe, peer reviewing in the narrow sense does not actually exist because the book (monograph, edition) is the main publishing tool while journals represent a minimal fraction of the whole amount of scientific publications<sup>25</sup>. The *ex ante* evaluation of books takes place according to rules decided within the

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25 In a recent meeting held in Florence by Firenze University Press and the CRUI (“L’Editoria Universitaria tra Ricerca e Mercato”, Firenze 12 Giugno 2007, programme online at



specific communities of the different subject sectors (it is very often a matter of tiny and self-referential communities). Editorial series are provided with scientific committees, whose members carry out a previous quality control (that is often realized simply in the “presentation” of the work by a “peer”). Afterwards, it is generally the author (or, whether he is not steadily employed, the teacher with whom he cooperates) who pays for printing the book with the research funds granted by his own institution or through other funds. Journal publications are less important for career promotion purposes; journals have a very reduced market<sup>26</sup>, and are funded through subscriptions. It is remarkable that in SSH subjects “core journals”, on which the Impact Factor is calculated, do not exist. Niche journals in the different foreign languages (academic communities being national) are very numerous, and there is wide discretion in assessing their relevance. Some journals do not use peer reviewing in the true sense of the expression, rather they directly request articles to the authors. Somehow, in the Humanities selection is realized *ex post*, and in the case in point mostly through book reviews (a genre that was born with the first scientific journals and that is extremely widespread). The discussion on peer review by academics of those subjects is almost absent<sup>27</sup>.

Also because of these structural differences, the so-called “serial price crisis” has mostly assailed the STMs. Since the late post-war period, the problem for libraries has become handling the growing expense forced by the purchase of “core journals” which, having proved basic and irreplaceable goods and because of the oligopolistic editors’ policies, have experienced a jump in prices<sup>28</sup>. In order to handle the bound expense of buying the “core journals”, libraries have dramatically reduced the purchase of Humanities and Social Sciences books and journals and of journals that are not indexed in the SCI. In practice, the policy of a few powerful publishers have strongly reduced for the general public the access to a good part of scientific products, most of which is funded by public funds<sup>29</sup>.

The advent of the Internet and the Web, has given a great boost towards the access to

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<http://epress.unifi.it/online/nuovaeditoria/>), Mario Bressan, member of the “Comitato di Indirizzo per la Valutazione della Ricerca”, showed how in Italy, in some humanity subjects (such as classical philology) books amount to over the 95% of all publishing.

26 See Minon M., Chartron G., *Etat des lieux comparatif de l'offre de revues SHS, France-Espagne-Italie*, 2005, [http://archivesic.ccsd.cnrs.fr/sic\\_00001561/fr/](http://archivesic.ccsd.cnrs.fr/sic_00001561/fr/); note that, except for rare exceptions such as the one cited here, data and serious studies on the publishing market in the SSH are lacking. Also recent reports such as the one by OECD of 2005 (*Working Party on the Information Economy. Digital Broadband Content: Scientific Publishing*, online at <http://www.oecd.org/dataoecd/42/12/35393145.pdf>) and the 2006 European Commission report (*Study on the economic and technical evolution of the scientific publication markets in Europe*, online at: [http://ec.europa.eu/research/science-society/pdf/scientific-publication-study\\_en.pdf](http://ec.europa.eu/research/science-society/pdf/scientific-publication-study_en.pdf)) do not offer data on these subjects.

27 Cognitive science and psychology are an exception, probably because of Stevan Harnad, who gave birth to a wide debate on digital publishing and *peer review*. See on this Hirschauer S., *Die Innenwelt des Peer Review. Qualitätszuschreibung und informelle Wissenschaftskommunikation in Fachzeitschriften*, online at: <http://www.sciencepolicystudies.de/dok/expertise-hirschauer.pdf>

28 See for a historical and sociological survey of the problem, Guedon J-C., *In Oldenburg long shadow: Librarians, Research Scientists, Publishers, and the Control of Scientific Publishing*, ARL Proceedings 2002, online at <http://www.arl.org/resources/pubs/mmproceedings/138guedon.shtml>

29 In particular the SSH research.

scientific results by the public. More generally, the on-line diffusion of scientific publications is transforming the terms of the scientific discourse, making also a partial rearrangement of the Republic of Science necessary. As a knowledge communication tool, the web shows far more better characteristics both for the public and for the authors. During the Nineties, especially scientific journals have started to appear also and then (in some cases) exclusively on-line, a transition which is radically transforming the terms of scientific communication. A policy that is becoming popular among researchers, in these latest years, is the open access publishing<sup>30</sup>: since the main goal of scientific authors is enabling the widest diffusion of their publications, rather than their selling (academics are not rewarded by the sale of their texts – but rather by being read and quoted), many have understood that the open access meets this requirement. But there is also another transformation going on within the scientific communication: likewise, it is going towards open access while affecting knowledge producers, that is to say authors. It is a matter of peer review transformation and the birth of new forms of scientific literature. It is a matter, also, of a copernican revolution in the selection process – and, in an extensive meaning, in the way in which the judicial function is exercised in the Republic of Science.

#### 4. An open soft peer review system

There are important differences between printing and the new word technologies (the Internet and the World Wide Web) which, as we shall see, influence both the peer review and the shape of scientific publishing. More specifically, the traditional model of scholarly communication, and in particular the peer review system, do not chime in with the funding principles of the web. It is a matter of architectonic cleavages<sup>31</sup> with a strong philosophic and political impact. The main

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<sup>30</sup> The Open Access movement was born in 2003 to promote the open access to public funded research literature. “Our mission of disseminating knowledge is only half complete if the information is not made widely and readily available to society” is written in the Berlin Declaration. And also: “New possibilities of knowledge dissemination not only through the classical form but also and increasingly through the open access paradigm via the Internet have to be supported. We define open access as a comprehensive source of human knowledge and cultural heritage that has been approved by the scientific community.” For an essential bibliography on open access, see: *Berlin declaration on Open Access to Knowledge in the Sciences and Humanities* online at [http://www.zim.mpg.de/openaccess-berlin/berlin\\_declaration.pdf](http://www.zim.mpg.de/openaccess-berlin/berlin_declaration.pdf); P. Suber, *Open Access News*, online at <http://www.earlham.edu/~peters/fos/fosblog.html>; The “Open Access Special” on the *Journal Research Information* of June and July 2006, online at <http://www.researchinformation.info/features/junjul06.html>; Nature debate on Open Access, online at <http://www.nature.com/nature/focus/accessdebate/index.html>; *Open Access Bibliography: liberating scholarly literature with e-prints and open access journals*, online at <http://www.digital-scholarship.com/oab/oab.htm>. Very recently, also the European union has promoted a policy favourable to open access.

<sup>31</sup> “Architectonic” is here meant in a kantian sense, as “art of the system” (on this, let me take the liberty of referring to my hypertext, *Conoscenza e pubblicità del sapere. Le condizioni della repubblica scientifica a partire dall'Architettonica della ragion pura di Kant*, BtFP, 2005, online at

<http://bfp.sp.unipi.it/dida/arch/>). On the web architectonics see Berners-Lee T., *Design Issues. Architectural and philosophical points*, online at <http://www.w3.org/DesignIssues/>.

difference lays in the definition of quality, as Tim Berners-Lee explains<sup>32</sup>:

“Many documentation systems used to be designed for particular collections of information, and one could assume that the information in such a system had achieved a certain quality. However, the Web itself cannot enforce any single notion of quality. Such notions are very subjective, and change with time. To support this -- to allow users to actually use the web even though it contains junk as well as gems -- the technology must allow powerful filtering tools which, combining opinions and information about information from many sources, are completely under the control of the user”.

These statements imply that, on the Web, selection is realized *after* publication and not *before*. The Web does not try to promote a single notion of quality, since quality is defined according to personal yardsticks of judgement that, as such, change with time; thus, the power of censoring (or better: of filtering) information must be given to users rather than to central authorities. “Human knowledge is not a tree, it is a web. How can we give the user the subjective perception of higher quality, while maintaining an open Web for people whose criteria are different? The answer is through filtering. Unlike censorship, which is the forceful prevention of one person's communication by another, filtering is the control by the reader of what he or she reads. The trick is to allow the user to chose another person, or another group's, criteria of selection. This is what happens when a user selects from one of a choice of portals. More sophisticated systems involve white lists of "desirable" sites, or black lists of "undesirable" sites to be selected. This sort of information about information is known as metadata. Metadata in general includes all the information which publishers and librarians keep about information. The Semantic Web languages (such as RDF) allow metadata to be exchanged freely between different parties. As the richness of metadata grows, so users will be able to combine criteria to hone their searches and guide their browsing. And the Web will be left unconstrained by a central authority deciding what information is appropriate for everyone.

“There will, always be trash out there, and gems. Remember that you don't have to read the junk. And also remember that the unimportant notes of today maybe the foundation of revolutionary new ideas tomorrow”. The current Web model is actually based on the ideas expressed by its inventor in the extract cited above. From a technical point of view, there are still advances to realize,<sup>33</sup> while from a socio-cultural point of view in the latest years important news have been

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32 Berners-Lee T., *The World Wide Web- Past, present, future. Exploring Universality*, 2004, online at URL: <http://www.w3.org/2002/04/Japan/Lecture.html>

33 The application of the philosophical principles expressed by Tim Berners-Lee in the previously cited article consists in the semantic Web, an evolution of the WWW designed for overcoming some shortcomings implied HTML, the Web mark-up language. One of the main practical purposes of such a trend is making information on the Web manageable by machines. A more detailed description of these aspects is beyond the aim of this article. For a brief reasoned bibliography on the semantic web (for the use of non experts) see Di Donato F., *Web semantico: breve linkografia ragionata*, aprile 2005, self-archived document available at: <http://bfp.sp.unipi.it/~didonato/ovre/telema/ws.html>.

observed. The Web 2.0 has experienced the birth and diffusion of the so-called *social software*, that is to say the appearance of collaborative sites (among the most famous: youtube, flickr, myspace, delicious, plus ebay and amazon.com themselves) which create actual social networks, flourishing from the idea of using the web as a delocalized desktop technology in which one can store its contents (such as videos, photos, musical creations, but also scientific bibliographies or personal libraries), and share them with others. An important feature is the fact that contents are annotated by users with metadata (mainly the so-called *tags*, but also comments, evaluations, votes, lists): metadata hold great value within the relative social network, also since they aid the selection of information by the reader. Thus, the scholarly communication model that is currently gaining ground is open (universal), decentralized, and doesn't enforce a single notion of quality<sup>34</sup>. Furthermore, the new system is conceived for managing far more information than the previous, and, at the same time, it fosters communication within the web niches sharing common interests.

Such a transformation exerts great influence on the scientific evaluation system from not only a theoretical, but also and especially a practical point of view: the great transformation concerning “evaluation” consists in that it is not relevant any more its coming before publication and its realization by “a few experts” (the new *medium* does not require it because within the web space restrictions imposed by paper do not prevail, and because the cost of on-line publications is nearly not influenced by quantity growth).

This condition modifies the access to the Republic of Science: in the web era, “peer” means something different from professional rank or affiliation to any academic institution, qualifying anyone who wants and is capable of offering relevant contributions to scientific research<sup>35</sup>. In the model ushered by Wikipedia, for instance, the peers are such since they contribute to the writing of a collective text. On Google, the authority of a site (that is of a “source”) depends on the algorithm PageRank, based on the number of sites linking it (i.e., citing it): this is also a form of peer reviewing (even though alternative to the one used within academia) exerting a strong impact – all those people using Google, that is to say millions of users, trust this form of evaluation<sup>36</sup>. More

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34 Vice versa, the traditional model of scholarly communication is closed and centralized and is based on a notion of quality defined from on high. See Barbera M., *Humanities and Semantic Web. L'autore e il ricercatore nell'ambiente digitale*, Padova, giugno 2007, online presentation at: <http://www.presentations.barbz.org/padova07/>

35 Anderson C., *Technical solutions: Wisdom of the crowds*, Nature (2006) online all'URL <http://www.nature.com/nature/peerreview/debate/nature04992.html>. Notice that this idea was all but unknown also to the followers of the Enlightenment. Kant, for instance, argues something similar in the Contest of Faculties, when claims that, beside the scholars (*Gelehrter*) that belong to the university, there are others, disengaged from the gild, attending amateurish scientific issues, by vocation (I. Kant, *Der Streit der Fakultäten*, 1798, A 5). Thus, according to Kant, the only requirement for being considered a scientist and being treated as such, is to speak to the public through texts, that is to publish scientific works.

36 A comparison between the Impact factor and PageRank has been done by Bollen J., Marko Rodriguez and Herbert Van de Sompel, “Journal Status”, *Scientometrics*, vol. 69, no. 3, December 2006; Preprint online at: <http://arxiv.org/abs/cs.DL/0601030>. Van de Sompel wrote, together with Carl Lagoze, the OAI metadata harvesting protocol (see “The open archives initiative: building a low-barrier interoperability framework”, *Proceedings of the 1st ACM/IEEE-CS joint conference on Digital libraries*, 2001, online at: <http://portal.acm.org/citation.cfm?id=379449>). The group coordinated by Van de Sompel, today hosted in the

generally, on the Web many sites enable their readers to choose how and what to see: they pose the same problems of selection that within the academia are solved through peer reviewing, provided they do not raise the issue *ex ante*, i.e. before publication, but *ex post*, once a “piece of information” is already online.

Scholarly communication has developed techniques for selecting manuscripts before publishing, but not after, since within academia stands the (almost obsessive) belief that “peer reviewing” and “scientific quality assessment” are synonyms, and not that the first is a specific case of the second. The new socio-technological framework fosters the birth and diffusion of evaluation models (also) successive to publication, alternative to peer reviewing and that may be ordered as follows<sup>37</sup>:

*A. Open peer review.* It is a kind of peer review that is put in practice *ex post*, once a text has already been published. In practice, there exist several forms: an example consists in leaving the possibility to the readers of commenting on the text likewise it happens in blogs. The journal *Nature* has tested it (with scarce success), but in the discussion on the peer review system<sup>38</sup> boosted in November 2006, several reports show that the open peer review experiments are numerous and successful<sup>39</sup>.

*B. No peer review.* An alternative consists in skipping the traditional peer review process, leaving entirely to the reader the task of assessing the scientific quality of a text. On the web it is possible to

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Los Alamos National Laboratory (LANL) Research Library, has devoted its research to metrics alternative to the Impact factor based on Social Network Analysis (for a complete bibliography of the group see Herbert Van de Sompel’s homepage, online at: <http://public.lanl.gov/herbertv/>).

37 For other classifications see: Dall’Aglio P., “Peer review and Journal Models”, pp. 8-11; Rodriguez M., Bollen J., Van de Sompel H., “The convergence of Digital Libraries and the Peer-Review Process”, *Journal of Information Science*, 2005. Preprint at arXiv:cs.DL/0504084. Rodriguez et al themselves suggest a theoretical model “in which the peer-review process is mediated by an OAI-PMH peer-review service. This peer-review service uses a social-network algorithm to determine potential reviewers for a submitted manuscript and for weighting the relative influence of each participating reviewer’s evaluations”.

38 The debate has involved more than twenty authors (two thirds of which were North Americans, the rest from West Europe) from the STMs and the public, that may discuss on a dedicated blog the suggested tracks (see *Peer-to-peer*, Nature’s blog “For peer reviewers and about peer-review process” is online at <http://blogs.nature.com/peer-to-peer/>). In the five sections (Systems, Quality and value, Ethics, Technical Solutions, Perspective), plenty of room is dedicated to the transformations occurred in the knowledge accreditation system in the Web era, and the possible alternatives to the traditional peer review. Half of the official authors have presented some experiences of *open peer review* in the bio-medical field and the related problems; some has exposed and discussed ethical issues related with the problem of evaluation; some others have been devoted to the social and technological aspects characterizing the current paradigm of scientific communication. The journal *Nature* is testing alternatives to the traditional scientific journal and peer review system: the ultimate example of such a policy is *Precedings*, the new online publishing initiative at: <http://precedings.nature.com/>.

39 See Greaves J. et al, *Nature's Trial of open peer review*; Sandewall E., *Opening up the process. A hybrid system of peer review*; Koop T., Pöschl U., *An open, two-stage peer-review journal*; Koonin E., Landweber L., Lipman D. and Dignon R., *Reviving a culture of scientific debate*; Groves T., *How can we get the best out of peer review? A recipe for good peer review* (2006) (all the cited articles are online at : <http://www.nature.com/nature/peerreview/debate/index.html>).

realize it:

1. putting *preprints* in the authors' websites. Thus, the reader is already able of assessing the scientific quality of a published text (he might deduce elements of evaluation from the "context" in which the article appears, comprehending, for instance, information concerning the institution in which the author works, his position, his further publications; and/or from the "social network" to which he belongs: which persons he knows, with whom has cooperated or cooperates, etc.).
2. storing the document in an institutional repository (such as the one of one's own university) or in a subject archive (like arXiv.org, E-LIS, RePEc, etc.).
3. cooperating with sites such as Wikipedia, that allows the articles to be edited from the public.
4. allowing, more generally, to note and evaluate the documents: an example may be the review system to the Amazon.com books<sup>40</sup>.
5. Using very simple software such as blogs for writing and/or marking articles and thus submitting them to the comment of the public; nowadays many (also academics) researchers make use of this tool.

Traditionally, a journal's prestige was built around a name (of a publisher, an institution, a scientific society or a research group) and, in the past, it needed a long span for consolidating. Nowadays, on the Web trust is built in a different fashion – in a quicker way and obeying to different logics. Scientific publications themselves are undergoing a transformation, while the functions of the actors involved change<sup>41</sup>. Richard Akerman<sup>42</sup> has analyzed alternative ways of conferring the functions of the publications that have traditionally been discharged by publishers: the mediation role that the publisher generally takes upon himself, for instance, may be undertaken by institutional repositories or by libraries, or be managed autonomously by authors. According to Akerman, the journal itself is not essential for the life of the article<sup>43</sup>, and the blog, considered nowadays an authoritative source by researchers may continue prevailing also in the stage of the

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40 Akerman R., "Evolving peer review for the internet", *Nature* (2006), online at: <http://www.nature.com/nature/peerreview/debate/nature04997.html>.

41 Five features characterizing the scholarly communication system, regardless of contingent issues such as technology: 1) registration (ensuring the priority of discoveries); 2) certification, that is to say assessing the legitimacy of scientific knowledge; 3) awareness, that is making scientists updated on the latest discoveries; 4) archiving (for long term preservation); 5) reward, that is recognizing the value of outcomes and rewarding authors. See H. E. Roosendaal and P. A. T. M. Geurts, *Forces and functions in scientific communication: an analysis of their interplay*, in M. Karttunen, K. Holmlund, and E. Hilf (edited by) CRISP 97, *Cooperative Research Information Systems in Physics*, 1997 online at: <http://www.physik.uni-oldenburg.de/conferences/crisp97/roosendaal.html>.

42 See his blog: *Science Library Pad. Thoughts on the use of technology and other issues for science libraries and science publishers*, online at: [http://scilib.typepad.com/science\\_library\\_pad/](http://scilib.typepad.com/science_library_pad/)

43 Alternatives to traditional journals are: Atmospheric Chemistry and Physics, Philica, Naborj, Plos One, Living Review. For a brief description of these and other journals, see dall'Aglio P., *Peer review and journal models*, pp. 4-6.

scholarly production assessment. Alternative forms to journals comprehend also overlay journals, which select contents already present on the web<sup>44</sup>.

C. *Soft peer review*<sup>45</sup>. Dario Taraborelli proposed some ideas on a last type of alternative to peer reviewing, in my opinion more revolutionizing and more adhering to the spirit and the principles of the Web. It is a matter of using collaborative metadata stored in “online reference managers” (such as del.icio.us, citeUlike, Connotea<sup>46</sup>) for evaluating scientific contents. The benefit of such a system consists in the possibility of managing great data quantities, already available on the web – while traditional journals, though big, have difficulties in managing a high number of articles. Thus, Web 2.0 “soft” evaluation systems may be an answer to the problem of evaluation that traditional actors of scholarly communication (authors, but also publishers and institutions) should not ignore. The so-called social software may offer to the academic system new tools and evaluation standards, based on:

(1) “*Semantic metadata*”. Collaborative sites managing bibliographies control a large amount of information that is structured on the tags inserted by users and other predefined categories. On citeulike, for instance, when I insert a book’s metadata I classify it according to a category which is defined by the system (for example “Social Sciences”) and then I assign the title one or more keywords (that is, the “peer\_review” tag characterize the sources that I read working on this article). The possibility of aggregating the tags linked to the single titles inserted by users, may become an efficient system for offering semantically structured information on great quantities of contents, without additional efforts and costs.

(2) “*Popularity*”. It is possible to use popularity markers. The most common in the academic world consists in citations, but there exist others, such as, for instance, visualizing beside a source the number of persons that have stored it in their personal library (a feature provided by del.icio.us); knowing how many people have downloaded a file (counting the number of downloads)<sup>47</sup>; or also

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44 There are already famous examples of this kind, such as Postgenomic, <http://www.postgenomic.com/>, which aggregates scientific blog posts (those dedicated to biosciences) and uses them in several ways: it allows for instance seeing the researchers’ ranking of the most linked sites, of the most used keywords, of the most cited articles.

45 The expression, as far as I know, has been coined by Dario Taraborelli in the post: “Soft peer review? Social software and distributed scientific evaluation”, *Academic productivity*, 2007, online at <http://www.academicproductivity.com/blog/2007/soft-peer-review-social-software-and-distributed-scientific-evaluation/>. See also Coen L., “An Academic’s Perspective: Social Software and New Opportunities for Peer Review”, *Library2.0*, 2007, online at: [http://liblogs.albany.edu/library20/2007/02/social\\_software\\_and\\_new\\_opport.html](http://liblogs.albany.edu/library20/2007/02/social_software_and_new_opport.html)

46 del.icio.us (<http://del.icio.us/>) is a social bookmarking site in which it is possible online archiving one’s own bookmarks and sharing them with others; Citeulike (<http://www.citeulike.org>) and Connotea (<http://www.connotea.org>) work in a similar way, and allow archiving and sharing of bibliographical entries and whether possible, of actual documents.

47 See Bollen J, Van de Sompel H, Smith JA, Luce R., “Toward alternative metrics of journal impact: A comparison of download and citation data”, *Information Processing & Management*, Vol. 41, No. 6., December 2005, pp. 1419-1440.

analysing the acknowledgements in articles<sup>48</sup> (on a par with citations) for tracing the trust of authors and readers.

(3) “*Hotness*”. An example may be the rating attributed to a resource by readers (with an equivalent procedure to what happens on the *venere.com* site, which allows to see the evaluations on the available hotels given by users). This is a short-term popularity indicator, that as such risks of being susceptible to fashions.

(4) “*Collaborative annotation*”. The on-line bibliographical managers allow content collaborative marking to users. Footnote insertion is a common researchers’ activity that is possible to transpose from the paper to the Web (the most interesting tool for this matter being Zotero<sup>49</sup>). The difficulty of using such comments for evaluation purposes consists in the capacity of “quantifying” the evaluations contained in comments; if the search of a solution to this problem goes beyond the purpose of these pages, suffice it to say that there actually exist several criteria and tools that we may use in order to assess the quality of science.

*Ex post* peer review— being nothing but public, free and unlimited use of reason – is nowadays a true alternative to the traditional *ex ante* peer review; if combined with traditional practices, the new assessment techniques, enabled by the mediatic revolution we are currently experiencing, may give a stimulus towards a democratization of scholarly communication – and especially towards an enlargement of the process on which the evaluation of the outcomes is based, that, as it is well-known, is an essential moment in the making of the Republic of Science. At least in the Human and in great part of the Social Sciences, adding indicators and tools like the ones above mentioned would not modify the principles of scholarly communication, that on the contrary would result enriched by greater elements and perspectives for assessing the quality of outcomes.

I come to my conclusions: if nowadays peer reviewing is invoked to provide for continuity with the previous tradition in the context and the transition stage<sup>50</sup> between print and digital era (it is

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48 Giles LC, Councill IG, “Who gets acknowledged: Measuring scientific contributions through automatic acknowledgment indexing”, *PNAS*, Vol. 101, No. 51. (21 December 2004), pp. 17599-17604, online at: [http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list\\_uids=15601767](http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=pubmed&dopt=Abstract&list_uids=15601767).

49 Zotero (<http://www.zotero.org>) is similar to Citeulike and Connotea, even though it presents slightly different features, probably more suitable for Human Sciences research. For the time being, however, it does not allow resource sharing with other users.

50 In some subjects this transition is still ongoing; in others it has already happened (starting from the second half of the Nineties). On the transition to online publishing and the peer review see the original and leading viewpoints of Ryder M., *Print vs. Online Scholarly Publishing: Notes and reflections on the peer review process*, 1997, online at [http://carbon.cudenver.edu/~mryder/aect\\_97.html](http://carbon.cudenver.edu/~mryder/aect_97.html). On the transformations occurred to the peer review in the transition from print to digital era, see also the following contributions of Stevan Harnad, well-known Open Access evangelist: Harnad S., *Implementing Peer Review on the Net: Scientific Quality Control in Scholarly Electronic Journals*, in Peek, R. & Newby, G. (Eds.) *Scholarly Publication: The Electronic Frontier*, Cambridge MA, MIT Press, 1996 pp. 103-108. Harnad S., (1997) “Learned Inquiry and the Net: The Role of Peer Review, Peer Commentary and Copyright”, *Learned Publishing* 11(4) pp. 283-292; Harnad S., *The Invisible Hand of Peer review*; Harnad S. and Hemus M., *The Impact of Electronic Publishing on the Academic Community. Session 1: The present situation and the likely*



the peer review itself, is said, and not paper the one ensuring scientific quality) – however its birth is closely linked to printing and to scientific journals, and influenced by them. It is not by chance that in the 2.0 Web era its concept and practices are undergoing important transformations.

Nowadays researchers may find information they are looking for even without journals, and there are impact measures of an article that are alternative to the Impact Factor, that may be applied to source collections (journals, but not only) much wider and more relevant, both in action and in influence. It is possible also to increase contents, present and future, on the web, creating new services for the scientific debate going on in the web. By using suitable software tools, scientist may use the web itself for researching, and sharing not only the outcomes, but also raw data, sources and processes of research itself, and giving birth to new discussion spaces. The wider a discussion on a text, the more the available data on its value. And thanks to the available devices and services, it may be possible to select information according to the taste and the needs of the single researcher; with an important consequence from a philosophical and political point of view: consisting in the choice of trusting a little more in the future, putting as much information as possible at its disposal, as well as the suitable tools for selecting and choosing, according to (what will be, in their opinion) the best.

This certainly isn't a trivial challenge. In fact, evaluation implies selection and we already discussed the importance of selection in the Republic of Science. How can we face this challenge? I began by citing Weber and I will conclude citing him once again: While the only common virtue is intellectual honesty, in the end “we shall set to work and meet the 'demands of the day,' in human relations as well as in our vocation. This, however, is plain and simple, if each finds and obeys the demon who holds the fibers of his very life.”<sup>51</sup>

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<http://www.portlandpress.com/pp/books/online/tiepac/session1/ch5.htm> (Harnad's texts are all open accessible on the web and may be reached from his homepage, at <http://www.crm.umontreal.ca/~harnad/>).

51 Weber M., *Wissenschaft als Beruf*, p. online at: XXX