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Jean-François Bach, Denis Jérôme

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INSTITUT DE FRANCE
Académie des sciences

The challenges facing scientific edition

Protractors : Jean-François Bach – Denis Jérôme

Report adopted by the Academy June 24, 2014

Executive summary

The French Academy of Sciences recommends that the procedures followed to allow dissemination of scientific publications be reorganized along two complementary axes, on one hand, via open archives, and Institutional Open Access on the other, financed by national agreements between the State authorities and the publishers, ensuring throughout that academic standards for scientific quality are preserved.

Open archives

Open archives are to be seen as complementary to publications in journals with referee committees and should be developed to enable constant conservation of our scientific knowledge bases. It is, however, a model that has not, as yet, permeated all specialty-intensive cultures and, if it were to be generalized, there is a need for incentive measures. These archives could, moreover, serve as a base to establish so-called “epijournals”, the underlying principle of which is to add expertise to existing archived articles. Notwithstanding, application of this solution would prove limited and complex and would generate infrastructure costs calling for analysis and perspective before decisions are taken.

Institutional Open Access

The “pay-as-you-read” model has demonstrably reached its limits: the excessive costs enforced by certain publishers and lack of accessibility to most articles – running contrary to the principle of free access to the results of publish research activities. Reorganizing on the basis of embargos could only be justified in as a transitional mode, limited in time.

Condemning the traditional method, however, must be tempered on two points:

- Hybrid formulae, that for example enable the authors to allow free access to their articles with the proviso of payment of an Article Processing Charge (APC) may be deemed acceptable, provided the process does not lead to a double payment, *i.e.*, using a sliding, wedge system whereby the APCs for a given year serve as the base reference for the subscription rate for the following year;
- Certain reviews – in a very restricted number – simply will not be able to switch over to a free access system, given that such a change would be totally incompatible with their current economic business model.

Gold Open Access, in its current distributed format, carries the inconveniency of not allowing proper cost validation, inasmuch as the APCs are set unilaterally by the publishers, with whom isolated research scientists find themselves in a weak position to defend their desiderata.

Constant budget negotiation, based on global values for current subscription costs, is absolutely necessary between State authorities and the publishers, to extend the logic of a national license so as to include the Open Access option, and allowing the situation to evolve to a flat, centralized subscription rate (*viz.*, *Institutional Open Access (IOA)*): a single, plural-annual contract should be agreed between State authorities and each publisher, organizing free access to all articles for which one of the authors belongs to the establishment who sign the agreement, immediately the said articles go on-line at the publisher’s site. A coefficient of reassessment would serve as a guarantor for stable revenues for the publisher. The articles in question would be stored in open archives, identical to their edited format.

Negotiation of the terms of each flat agreement should be entrusted to the Couperin Consortium and efforts should be deployed to enlarge the framework of this approach to at least the European level.

The IOA model is compatible with the Gold Open access model for any article not covered by the scope of the license and for publishers who have not signed this national agreement. However, what remains to be answered is the question of journals that operate fully in Gold Open Access, such as the PLOS journals. It is difficult to imagine how the Consortium could come to agreements with such journals. On the other hand, we could envisage an institutional aid to partly or fully subsidize the APCs where the scientific quality of the articles has been attested on a national scale.

Preservation of scientific quality

The need for peer-reviews by academic research scientists of the articles received by journals must be reaffirmed and referee participation in the final decision to publish or reject should be encouraged.

Reference and use of the impact factor of an article, deemed inappropriate to the assessment of research scientist careers, must once again be denounced.

The Academy of sciences is aware that its findings and recommendations apply to those sciences and specialties that come under the Academy's remit, but may prove more difficult to apply in the fields of social sciences and humanities – which have their own sets of criteria.

Summary

The development of Internet has changed the scene of scientific publishing, leading to a co-existence of several models for access of research scientists to the publications' contents. Clarification is necessary now, to favour free access to the information, for a regular or even decreasing budget outlay, whilst adhering to the fundamental principle of critical assessment of articles through peer-review and the existence of journals to which the research scientists are attached. To attain this objective, solutions are forthcoming and are examined here in a critical and realistic manner.

- 1 - The current system, based on the reader-payer model is becoming increasingly unacceptable, not only because of the excessive fees enforced by the editors but also through lack of accessibility to most of the articles
- 2 - The "green system" (via subscriptions with free access after an embargo period) can be justified on an interim basis but calls for regulation with a view to reducing embargo time and ensuring cost control.
- 3 - An "Open Archives Access" approach offers an attractive solution, but it has not as yet permeated all the cultures, field by field. They are complementary to peer-reviewed publications, but cannot replace them because of the embargo rules and because they do not lend themselves to studies involving commonly used search engines. To do this, we would probably have to establish general incentive procedures. Moreover, they can serve as bases to create "epijournals", the principle of which is to add expertise to existing, published articles. This as yet experimental, application is a limited solution and leads to infrastructure overheads that we must analyse carefully and place in prospective. As a general ruling, it would be appropriate to provide content certification tools to the archives.
- 4 - The so-called Gold Open Access, with free access for all immediately following publication – the cost being borne by the authors in the form of an "article processing charge" (APC) – is in line with the objective of providing universal access to the results of public research. In its current "distributed" format, there is a setback inasmuch as it is not easy to control the veracity of costing since the APCs are established unilaterally by the publishers. Through lack of accompanying measures, the system cannot provide a guarantee against practice of excessive pricing.
- 5 - The hybrid formula – which in subscription-based reviews enables authors to grant free access to an article, provided an APC is paid - is a sort of 'intermediate gold' access which is only acceptable in a transition framework, given that a double payment is involved: the subscription fees are not diminished and the amount due for the APC (often quite 'steep') are difficult to negotiate inasmuch as the authors are isolated in the process. However, it could have a fully justifiable position if it is organised with a smooth wedging of funding, *viz.*, with the APCs of a given year offsetting the drop in subscriptions of the following year.
- 6 - It transpires that none of today's prospective systems can be neglected and support should be forthcoming for all forms of public initiative that aim at producing balanced combinatory formulae, that respect the needs off the various communities involved. The French Academy of Sciences, however, has a marked preference for an Open Access model with a centralized negotiation mechanism, which still remains to be developed.
- 7 - A complete transformation of public research subscription budgets into aids for publications in certified reviews is necessary, as is a round of negotiation between the State authorities and the publishers to generalize single, national licenses that would be transposed to the new system.

At the same time, the logic underpinning the national license, for a regular budget, must be extended to incorporate then concept of free access, introducing an evolution of the principle of Open Access integrating a centralized flat fee subscription: a single multiannual subscription contract should be negotiated between the public authorities and each publisher, specifying which titles are eligible, organizing free and immediate access via the publisher's site to all the articles of those reviews where one of the authors is employed by the institution that negotiated the subscription, consequently with payment of the flat fee plus a coefficient of revaluation designed to assure stable revenues for the publisher. Articles published in this system could also be archived as open access documents in the published format.

In contradistinction, certain additional services proposed (based on the nature of the data contents) would be excluded from the general contract agreement and commercialised separately by the publishers in the form of a "premium offer", designed to compensate for a shortfall of subscribers from both industrial and service sectors, due to the changeover to an open access policy and provided the central payment system becomes an accepted worldwide practice.

Negotiation of the basic features for each flat fee agreement should be entrusted to the Couperin consortium.

The model could be called the *Institutional Open Access* (IOA) and would be compatible with the "gold" Open Access model (APC) for those articles not covered by the scope of the license.

Centralized fee rate negotiations leave room for the publishers and establishments who have not signed the national agreement: under this hypothesis, diversity offered by the other systems could continue to apply.

However, in reference to the gold access with an APC for each article, those research scientists invited to pay an APC should be supported in this process by their institution. The order of magnitude for aid here could amount to 1 000€/article, distributed between annual standing credit allocations, project based allocations and independently from specific aids provided by intuitions for publications by their employees.

- 8 - Reviews will be certified – whether they are part of the national agreement or not – according to publishers' editorial "good practice" and this decision must be motivated in priority by the intrinsic quality of the articles and the dissemination of knowledge, as is generally assured by those reviews directed by learned societies. The scientists' freedom of choice must be preserved, including the option to publish their articles in non-certified reviews but thereby accepting the extra costs incurred.
- 9 - The prime need for peer-review by other academic research scientists before publication must be reaffirmed.** In a more general framework, participation of academics in the final approval decisions, as is the case for journals edited by learned societies and academies.
- 10 - Reference to the impact factor of reviews is not appropriate for statutory career assessment of the research scientists and should be quashed.**
- 11 - The issues addressed here cannot be solved only on a national scale and it is therefore important and indeed urgent that effort be undertaken to see the agreements extended at least to European level.**

Short report

The advent of Internet has led to a very positive evolution of scientific publications but has accelerated, at the same time, the current crisis in the publishing world, questioning as it does the very model on which the international system of scientific and technological information (STI) base was established. The crisis is mainly due to the unbeatable increase in subscription fees, forced on all the universities and institutions by a small number of publishers, thus preventing free circulation and dissemination of the articles. Another issue is the difficulty to pin down relevant information because of rapid progression and sheer numbers of articles in an increasing number of reviews, often of mediocre quality. Lastly, the inappropriate referral to the impact factor of the journals used to assess the research authors themselves had led to an exaggerated form of elitism that, in fact, only benefits a few of these reviews.

The French Academy of Science has decided to address all three aspects, prioritizing the question of the how scientific publications should be financed. The two other aspects are independent but will be dealt with in the framework of the new model that needs to be created.

Reframing the economic model to accommodate a general Open Access protocol

The aim that should be sought – for both practical and ethical reasons – is immediate, free and universal access to the results of scientific research, already shared by the scientific communities and today by public authorities round the world.

The traditional reader-payer system is condemned either to disappear completely or at least to cease being the dominant model.

Moreover, the excessive fee charges by some publishers, forcing the scientific institutions to subscribing at very high cost to bundled review offers, many of which are of little use to them – is a situation that is all the more shocking that the contents of the articles and their level of expertise is assured by the scientists for free – this fact alone being conducive to an amplification of the rejection of the model in question.

Various technical barriers that hampered the universal dissemination of knowledge and know-how have mostly fallen and progress here continues to improve and perfect the tools available. But the Internet can also be illusory, *viz.*, that everything is easy and free. No-one should contest the fact that scientific editing and publishing is a profession where improvisation has no part to play; on the contrary, it calls for special professional skills and implements technical processes that incur specific costs. Seen in this light, it is a sector that merits having a balanced economy based on a fair remuneration for the services offered and deployed. We must therefore seek such a balance in which each actor has a justified place and where the guiding principle will be freedom of access to information.

The models

Green Open Access

This approach would entail a part rearrangement of the current situation, in which, we recall, a majority of articles remain inaccessible, as indeed are the earlier documents. The rearrangement would be via subscriber access in the reader-payer mode but with free, generalized access after a 6 to 18 month embargo. This model would not provide immediate access and does not solve the problem of the excessive costs incurred by the subscription

rates. It does not offer long term stability inasmuch as it induces universities with low research activity levels to cancel their subscriptions, and consequently encourages the publishers to impose higher subscription fees. The model should not be encouraged although it can meet specific needs expressed at given times and if this is the case, the model should be improved (*e.g.*, by reducing the embargo delays).

Open Archives

An “Open Archives” procedure would not constitute a valid form of publication - given that there would be no critical review by a reading committee and associate experts of the subject matter – but rather a prepublication process and/or providing accessibility to versions published after the embargo period. Nor do they lend themselves to investigation with commonly used research engines. It is a modern, generous, model, and should be defended as being complementary to the other viable solutions, thus ensuring perennial access to the archival information, independently of the publishers. The degree of acceptability of the model is as yet low in certain specialty fields. *Open Archives* can also serve the purpose of “epijournals”, the principle of which is to add a layer of expertise on articles already registered. This is an experimental application limited to certain areas (mathematics, computer sciences, probably because of cultures that are specific to these fields), but it leads to infrastructure overheads costs that we must analyse carefully and place in prospective. As a general ruling, it would be appropriate, if we wish open archives to be considered as a novel form of publication, to provide content certification tools to the archives and analyse accurately the extra costs incurred. We can note that Open Archives are a necessary component for the IOA model, to which we shall return later.

Gold Open Access

The author (or the employer-institution) pays for the preparation of the article, via the *Article Processing Charges* (APC). Access to “gold” articles is free, immediately afterwards for the entire scientific community and even beyond, in particular for developing countries, where financial support is difficult, even if there can be part solutions through grants and aids.

For an existing review, the changeover from a traditional access to a Gold Open Access raise transition problems, which are inexistent if we refer to reviews created *ex nihilo* under this scheme.

But above all other considerations – and for the system to be viable – we must ensure that the underlying organization makes provisions whereby the research scientists can avail of the means to pay the APCs without significantly cutting back on their personal operations budget allocation. There is a setback to the present distributed system, inasmuch as it is not easy to control the veracity of costing since the APCs are established unilaterally by the publishers. Through lack of accompanying measures, the system cannot provide a guarantee against practice of excessive fee pricing.

The *hybrid formula* – which in subscription-based reviews enables authors to provide free access to an article provided an APC is paid – is a sort of “intermediate gold” access which is only acceptable in a transition framework, given that a double payment is involved: the subscription rate is not diminished and the amount due for the APC is difficult to negotiate inasmuch as the authors are isolated in the process. This point should be included in concerted European level negotiations.

With the prospect of reducing embargos and controlling costs, it is necessary to work on regulation of the systems as a whole, seen as a series of alternatives to the “traditional” model of subscription and to and support should be forthcoming for all forms of public initiative that

aim at producing balanced combinatory formulae, that respect the needs of the various communities involved. The French Academy of Sciences, however, has a marked preference for an Open Access model with a centralized negotiation mechanism, calling for development.

Incentives for a transition to *Institutional Open Access*

The central issue is how costs are to be transferred from the readers to the authors and the capacity of the latter to cope, following a balanced negotiation with the private publishing sectors or with the learned societies.

To proceed, it is primordial to know, on one hand, the total budgetary allotments for the current scientific information and the amounts that could be re-allotted to a regular budget used to pay all APCs and, on the other, the real publishing costs involved.

On this last point, it would appear that a cost of 1000 € for an APC, compliant with necessary editorial services, could prove to be a sensible basis for negotiation. It can be noted that this figure (1000 €) corresponds roughly to the amount of today's subscription revenues in France, *viz.*, 105 M€ divided by the number of articles published annually, approximately 100000.

However, when we consider the high degree of complexity involved in distributing the amounts need to subscribe to the reviews, in the form of credits allotted to the laboratories to pay the APCs, and the inconvenience generated should the fee negotiations be individualized leaving the authors alone faced with the reviews' subscription departments, it would appear highly preferable to centralize the negotiation phases and to agree to contracts based on Open Access at a national level.

It is necessary to see the subscription budget allocations of public [French] research transformed fully into budgets for aids to publication in certified reviews. Negotiation between the State authorities and the publishers is of prime importance to generalize single national licenses that can be transposed into the new system.

At the same time, the logic underpinning the national license, for a regular budget outlay, must be extended to incorporate free access, introducing an evolution of the principle of Open Access integrating a centralized flat subscription: a single multiannual subscription contract should be negotiated between the public authorities and each publisher, specifying which titles are covered, organizing free and immediate access via the publisher's site to all the articles of those reviews where one of the authors is employed by the institution that negotiated the subscription, consequently with payment of the flat rate plus a coefficient of revaluation designed to assure stable revenues for the publisher. Articles published in this system could also be archived as open access documents in the published format.

In contradistinction, certain additional, so-called "added value", services proposed (based on the nature of the data contents and cross referencing with other articles) would be excluded from the general contract agreement and marketed separately by the publishers in the form of a "premium offer", such as to compensate for a shortfall of subscribers from both industrial and service sectors, due to the changeover to an open access policy and provided the central payment system becomes an accepted worldwide practice.

Negotiation of the base agreement for each flat rate should be entrusted to the Couperin consortium.

The model could be called the *Institutional Open Access* (IOA) and would be compatible with the “gold” Open Access model (APC) for those articles not covered by the scope of the license.

Centralized fee negotiations leave room for the publishers and establishments who have not signed the national agreement.

Generally speaking, the diversity offered by the other systems could continue to apply. However, in reference to the gold access with an APC for each article, those research scientists invited to pay an APC should be supported in this process by their institution. The order of magnitude for aid here could amount to 1 000 €/article, distributed between annual standing credit allocations, project based allocations and independently from specific aids provided by intuitions for publications by their employees.

A hybrid model could prove useful if seen as a transition, *i.e.*, if it includes a smooth wedging arrangement for funding with the APCs for a given year fixing the shortfall of subscription in the following year: after negotiation with the publisher about cost rates for APCs, subscribers who submit accepted articles with carrying an APC tab for Open Access would incur a subscription amount for year N decreased by the amount of APCs paid for year N-1. In this hybrid model, and for a fixed subscription cost, the number of articles published would be limited by the total amount of APCs and the cost of the subscriptions.

The scientists’ freedom of choice must be preserved in a large panel of certified reviews known for the quality of their editorial practice. An important point – failing which the models would not be readily accepted by the scientific communities, is that the laboratories would not have to pay for APCs *i.e.*, they should not impact negatively on the already tight laboratory budgets, except in exceptional cases. If authors who are not party to the national agreement choose to publish their articles in non-certified reviews with high APCs or that propose extra services, at a cost, but which the authors wish to acquire, they could pay the difference out of their own research contracts or operational budget. Indeed, this proposal not only calls to question reviews that have come to rely independently on the Gold Open Access mode and who have, moreover, secured an undisputed position in the publishing world.

An Institutional Open Access (IOA) model could also co-exist with Open Access (APC) for certain rare individual cases: the reviews involved would carry free access articles, either IOA or OA for those individual cases cited above and limited access articles.

	Reader access	Author access
Non-subscribers	OA and IOA articles	Free or with an APC for OA
Subscribers not party to the single licence agreement	OA and IOA articles, limited access	Free or with an APC for OA
Subscribers party to the single licence agreement	OA and IOA articles, limited access	Free for IOA

Too many articles in too many reviews

World production of scientific articles has doubled over the past 15 years. Excellent articles are “drowned” in a mass of less interesting articles in far too many reviews with complicated access procedures and often at high cost. Moreover, many mediocre quality reviews are created in just a few days, by “rogue publishers” who take advantage of the Gold Open Access protocol to promote commercial patchwork packages for the sole benefit of their cash register, without any real expertise nor guarantee as to correct referencing and attributions.

One of the attractive features of a Gold Open Access organized by State authorities would lie in making the research scientists responsible in terms of the costs of publications and this would tend to regulate the quality of article and the reviews themselves, thereby enhancing article quality. The rogue publishers would naturally be excluded from the global licenses, and only certified reviews would be involved.

Devious use and reference to review impact factors

Inappropriate reference made to the impact factor of reviews when used to assess research scientist's individual career merits leads to a hyped value being assigned to fashionable research topics appearing in a very limited number of reviews in which, moreover, the criteria for expert critical analysis are not exactly satisfactory.

The prime need for peer-review by other academic research scientists before publication must be reaffirmed. The editorial functions of learned societies must be reactivated.

Free access and better visibility of articles could encourage research scientists and their assessors to move away from the abusive reference to review impact factors and even citation ranking of articles, which could be conducive to the assessor reading the content of the articles in question

The Academy's Recommendations (summarized)

- 1 - The French Academy of Sciences is supportive of all efforts deployed for the purpose of reducing the cost of subscriptions, in particular of the project for a single national license, currently being implemented, whereby the State authorities signing a single contract with each publisher for the benefit of all national institutions. The Academy is desirous to see this procedure extended to the centralized Open Access model at a national level.
- 2 - The French Academy of Sciences would welcome a national analytical accounting system -, audited by the Cour des Comptes [France's National Comptroller's Office] - that integrates costs currently incurred by the scientific information sector and also to see this overall budget, in constant euros, be assigned to a gradual transition to Open Access policy and procedures. Moreover, the Academy expresses the wish that scientists (or via their learned societies) regain control of costs for activities that relate to dissemination of scientific information.
- 3 - The Academy has observed the variety of models that co-exist today. The Academy recommends a more professional approach, to ensure better control of public expenditure here.
Notwithstanding, the Academy considers that among the possible solutions, the Institutional Open Access (IOA) is the model to be favoured, inasmuch as it corresponds to the objective of providing universal access to research results and enables costs to be limited, via centralized negotiation. Payment of APCs should not impact negatively on the already tight laboratory budgets
- 4 - The Academy therefore recommends that Institutional Open Access be organized not only to ensure freedom to read and publish, but also to help improve assessment procedures for research workers and to continuously control the global budget allotments to the IOA system, for the purpose of avoiding excess fees that have degraded the reader-payer system.
- 5 - The Couperin Consortium (or another, similar, specific body) should be entrusted with the overall negotiation and, for those reviews as yet non-integrated to the system, management of the APCs, thanks to existing regulatory skills and large visibility vis-à-vis subscription costs and policies.

- 6 - Local and national archiving, with its high merits in those fields where the practice is accepted, must be improved and extended to all fields, so as to preserve the information and the articles and their visibility-accessibility via search engines.
- 7 - The prime need for peer-reviewing of articles before publication by academic research scientists must be reaffirmed. In a more general framework, participation of academics in the final approval decisions, as is the case for journals edited by learned societies and academies.
- 8 - Reference to the impact factor of reviews should be quashed.
- 9 - The issues addressed here cannot be solved only on a national scale and it is therefore important and indeed urgent that efforts be undertaken to see the agreements extended at least to European level.