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Review

French scientific medical journals confronted by developments in medical writing and the transformation of the medical press



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ABSTRACT

The present review article details developments in medical writing and the ongoing transformation of the scientific medical press. With these twin revolutions, French-language scientific medical journals are at a crossroads: are they going to become vehicles of teaching, of popularization, of liaison between members of medical societies, of general public information contributing to decision-making in the field of public health? Or will they maintain their scientific status? Under certain conditions, a move toward French/English bilingualism could be the solution to maintain and advertise their scientific level, while contributing to the quality of medical teaching in French and to the worldwide influence of the French language.

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1. Introduction

Since the end of the 20th century, scientific medical publishing has been on an exponential course. In 2017, Van Noorden et al. [1] reported that 39 million biomedical articles had been published between 1990 and 2015 in the Web of Science data-base alone, and that the number of references cited in each was in constant expansion. In this scientific landscape, two economies are intertwined, as Ghislaine Chartron, Chair of documentary engineering in the French technical academy, the *Conservatoire National des Arts et Métiers*, puts it [2]: a symbolic economy of exchange of ideas, fundamental to scientific progress, and an economy of goods, in the form of texts that are the final outcome of an editorial process. And, for scientists, this interaction has modified medical writing and transformed the scientific medical press, in a two-fold movement of which the present review seeks to interpret the main underpinnings.

2. Developments in scientific medical writing

During the 1970s, the editors of several English-language scientific medical journals transformed the way of writing the “scientific articles” – also termed “research articles”, “original articles” – by means of which the results of medical research are published and

medical knowledge is advanced. Convinced of the need to forego the “literary” style, in which the author’s ideas, experience, renown and manner overshadow the content as such and the scientific demonstration, they advocated a scientific writing technique using a standardized five-section template: abstract, introduction, material and methods, results, and discussion. Various rules governed the types of study: prospective, cohort, randomized, meta-analysis; but all obeyed the fundamental requirement to contribute something new to the existing data for there to be any hope of being published [3–6]. One of these editors, J.A. Farfor [6], who was a great lover of the French language, had some harsh but perfectly justified and, unfortunately, always topical, words to say about French scientific medical writing at the time, and did not mince them in an Editorial he wrote for the *British Medical Journal* (BMJ): “There are two schools of medical writing in France: those who want all French research to be published in English; and those who remembering that France is the cultural head of a great francophone community, believe that not to publish in French is a betrayal. Both groups are having difficulties and disappointments because neither realises the importance of the techniques of medical writing, as distinct from the language in which reports are written”.

With the accent firmly placed on concision, clarity and rigor, to facilitate both translation and quick reading, this technique, spelled out in the instructions to authors, soon spread to all types of scientific article and, alongside English versions of the title, abstract and keywords for journals publishing in non-English languages, became a structural key-stone for any author hoping to have their work analyzed, and possibly published, in a journal displaying that iconic

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bibliometric index, created by Eugene Garfield [7]: the “impact factor” (IF).

Following on from this structural resolution, which has now become classical, several other developments have likewise tended to standardize instructions to authors, use of statistics, Abstract writing, data sharing and ethics.

2.1. Standardization of Instructions to authors

Since the early 2000s, the recommendations to authors laid out by the ICMJE (International Committee of Medical Journal Editors) [8], translated into 10 languages (<http://icmje.org/recommendations/translations/french2017.pdf>) and adopted by more or less all medical journals, have been enriched by guidelines on how to write up research studies. Translated into French in 2015 by the monthly physiotherapy journal *Kinésithérapie la revue* [9], the guidelines have been adapted according to the type of study - CONSORT for randomized controlled trials, STROBE for observational studies, PRISMA for systematic reviews, STARD for diagnostic tests, COREQ for qualitative studies, CARE for case reports, SPIRIT for clinical trial protocols - all are available on the EQUATOR website (www.equator-network.org/), and a large number of journals now require authors to specify the guidelines governing their study.

2.2. Lies, damned lies and statistics

The 2000s also witnessed the questioning of how authors use statistical methods in their articles, and especially the sacrosanct *P*-value less than 0.05 defining the “significance” of the results. Thus, in 2016, a study in the Journal of the American Medical Association (JAMA) reported that 96% of published *P*-values were claimed to be significant (<0.05), while hardly any articles analyzed the power of their statistical tests [10]. At the same time, reproducibility was notably poor [11], with several adverse effects: a plethora of scientifically pointless studies, with 27% of articles never cited at all [2], a waste of precious time, and what amounts to a huge misappropriation of funds.

This state of affairs pushed methodologists and editors of renowned journals to publish in The Lancet a series of articles on research waste (<https://www.thelancet.com/series/research>). And, in 2016, the American Statistical Association highlighted researchers’ abuse of the concept of statistical significance, detailing the main methodological biases to be avoided and the importance of associating *P*-values to an estimate of statistical power [12]. Then, recently, 72 statisticians came together to advocate lowering the significance threshold to $P < 0.005$ (<https://www.nature.com/articles/s41562-017-0189-z>) with *P*-values between 0.05 and 0.005 being considered “suggestive”. They further argued that only “suggestive” results justified pursuing the research by concentrating on eliminating methodological biases and enhancing sample power [13].

2.3. The development of the abstract

The abstract of an original article is its storefront, and how it should be written has undergone considerable development since Farfor’s princeps article of 1976 [6]. The rules of scientific medical writing at that time came down to clarity, concision and the bare use of technical terms, repeated as often as necessary, without introducing synonyms, and eschewing adverbs in favor of figures and percentages [3–5]. These rules seemed hard to stick to; in a 2015 study of the impact of various good writing criteria and of terms employed in more than a million articles drawn from eight scientific disciplines, Weinberger et al. [14] found that articles were more often cited when they had lengthy abstracts using

long sentences full of adjectives and adverbs and everyday terms rather than technical jargon. In the 1980s, abstracts began to be “structured”, with between 5 and 9 sectional headings; but this came to be challenged and new models were tried out: abstract with illustration, abstract replaced or supplemented by a few bullet-points known as “highlights”, or else by a podcast.

2.4. Data sharing

An epidemic of affairs of research misconduct – the most recent being the Lachmann affair [15] – and failure to reproduce certain major findings, alongside the development of technologies enabling easy and massive digital storage of research data, combined to raise the issue of data sharing. In 2013, considering this to be critical for science in the 21st century, the European Commission, the American government’s National Science Foundation and the Australian Department of Industry, Innovation and Science jointly set up the Research Data Alliance, providing the infrastructure needed for data sharing in science (<https://www.rd-alliance.org/about-rda/who-rda.html>). In 2014, the PLoS group made it mandatory to describe, archive and enable access to the data of all studies submitted to any of its journals. In 2015, the publishing house Elsevier lent its support to data sharing by encouraging authors writing in its journals to deposit their data in a “cloud” registry of their own choosing - such as Mendeley® Data -, setting up a link to the registry on the submissions sites of the journals it publishes (<https://www.elsevier.com/about/company-information/policies/research-data>). And on July 1st, 2018, the ICMJE made data sharing obligatory for all prospective clinical trials submitted to its affiliated journals [16]. This is no easy task: scientists must meticulously archive the data for every step of their research in a permanent registry, notwithstanding any problems of compatibility and confidentiality that make the process time-consuming and costly.

2.5. Ethics, transparency and integrity

Now that publishing has become critical to scientists’ careers - and income . . . -, while society is demanding the most complete transparency possible in scientific research, ethical standards and integrity have since the turn of the century taken on a prime importance in scientific medical publishing [17,18]. Scientific journals were proactive in this regard at the international level, setting up the Committee on Publication Ethics (COPE) in 1997; this is an association of editors whose initial aim was to share cases of misconduct between journals. They went on to create a website (<https://publicationethics.org/>) providing a wide range of resources for writers and editors to enhance ethical standards and integrity.

In France, the health professions press and publishing confederation (<http://www.speps.pro/index.php>) brought out guidelines for biomedical journals, while the HAS health authority (<https://www.has-sante.fr/portail/jcms/c.1018620/fr/criteres-de-qualite-des-revues-et-journaux-de-la-presse-medicale-francaise>) drew up 19 quality criteria. In 2017, the Conference of Medical and Odontology Schools signed a charter of ethics and deontology (http://unice.fr/faculte-de-medecine/contenus-riches/documents-telechargeables/doc_faculte/V3_Charte_facultes_medecine_odontologie_2017.pdf), which advocated reinforcing the structuring of articles published in French-language journals, stressing the fact that ethical and deontological shortcomings and lack of integrity are all too common and engender public mistrust of medical expertise.

Scientific publication ethics primarily concerns the listing of article authors, the problem of “phantom” authors, and plagiarism. Authorship criteria, governing whether or not such and such a person actually contributed to a study, are perfectly well defined [19],

but conflicts can arise as to placing in the list of authors. Several simple rules can prevent such conflict. The order of authors (and most importantly, the first and last author), the article title, the precise research objectives and the journal selected for first submission should all be determined from the outset. Submitting the text to all of the authors at each stage of its development ensures full agreement on the contribution of each participant and the transparency of the research undertaken. The second ethical pitfall is plagiarism: copying the words or ideas of an author whom one fails, deliberately or not, to cite. Two safeguards against plagiarism are that documentary search should be performed from the outset, on predefined criteria, rather than waiting for the Discussion section to be composed, and the selected articles are to be read in full-text, rather than just their abstracts on PubMed. By providing editors with plagiarism detection applications that scan for similarities between texts, medical publishers contribute actively to combatting this plague.

3. The transformation of the scientific medical press

For many decades, the business model of scientific journals, developed by scientific societies, was very straightforward: libraries and readers paid subscriptions. Several ground-shifts have since shaken this model. Firstly, there has been an exponential boom in publication volume, as assessment systems for researchers spread around the world that are based not on research quality but on simple productivity, with resources allocated proportionally to the number of publications. This has been accompanied by competition between universities, dictated by the so-called “Shanghai Ranking” (<https://www.letudiant.fr/etudes/fac/classement-de-shanghai-2018-quelles-sont-les-19-universites-francaises-du-top-500.html>), the surge of open access, developments in peer-reviewing, and misuse of impact factors.

3.1. The surge of open access

In the early 2000s, while several studies conducted by librarians were highlighting price-rises for scientific publications, estimated by the Association of Research Libraries at 175% overall between 1986 and 1998, taking all fields together, a movement emerged known as “open access” (OA) [2]. Launched by the Open Society Foundations - then known as the Open Society Institute -, in phase with strong demand from society that published studies should be promptly made available to all, free of charge, and made practicable by the growth of the Internet, the OA movement was to overturn the business model of scientific journals [17,18,20]. Publishers of high-IF journals rushed into mergers and takeovers, so that by 2008 medical publishing was largely dominated by 5 mega-groups [21], which request authors to pay an Article Processing Charge (APC) for accepted peer-reviewed articles in exchange for providing open online access, free of charge to readers. This so-called “Gold OA” has now become a general rule, with APCs ranging between €1,000 and €5,000 according to the “visibility” and “reputation” of the journal. In parallel, with the London-based BioMed Central group, “predatory” journals appeared on the scene, which have no paper versions but rapid on-line publication with very low APCs, but also very low scientific readership if any [17,18,20], and the “pirate” Sci-Hub website, which hosts articles from gold OA journals, free of charge [20,22]. A 2012 study by the Helsinki Graduate School of Economics showed the progression of OA in biomedicine, with open-access journals indexed in the Web of Science and Scopus data-bases now having almost as great a scientific impact as the IF journals attached to Journal Citation Reports [23].

In France, several measures have accelerated the spread of open access. In 2013, the Conference of University Presidents, the *Grandes Écoles* Conference and 22 research structures signed a partnership agreement in favor of open archives, with free access, hosted on a joint platform called HAL (<https://hal.archives-ouvertes.fr/>). Then the information technology law of October 7, 2016 obliged French researchers to ensure open access to all studies having 50% or more public funding, at the same time obliging publishers to make access to these articles entirely free of charge within a few months of publication [24]. And in 2018, at the annual conference of the League of European Research Libraries, the Minister of Higher Education, Research and Innovation revealed the government’s vision of open science (http://cache.media.enseignementsup-recherche.gouv.fr/file/Actus/67/2/PLAN_NATIONAL_SCIENCE_OUVERTE_978672.pdf). With an annual budget of several billion euros, this plan to generalize open access and to structure and open up research data is part of a European movement under an association of scientific organizations called “cOAlition S”, supported by the European Commission, advocating a policy to oblige European researchers to publish studies funded by national or supranational European organizations in Gold OA journals or platforms. Under this “Plan S” (<https://www.coalition-s.org>), readers would enjoy open access, totally free of charge, to articles as soon as they are accepted for publication, facilitating public access to research and transparency. This European initiative, not taken up in either America or China - an awkward detail... -, has, however, been widely criticized, notably in relation to the roles of scientific societies and medical publishers [25], and the launch, initially planned for January 2020, has been postponed to 2021, with a possible further postponement to 2024 (<https://www.coalition-s.org>).

3.2. The development of peer-reviewing

Following World War II, the concept of peer-reviewing of articles submitted to scientific journals, under editorial control, appeared on the scene and was progressively adopted by biomedical journals. The first major study of peer-review in medicine was published in 1985, in the form of a book by one of the editors in chief of the BMJ [26]. In 1989, two prestigious journals, BMJ and JAMA, organized the first congress on the subject (<https://peerreviewcongress.org/index.html>), now held every 4 years in Chicago.

This key stage of scientific assessment is in poor health. Far too many articles still fail to respect the rules of scientific writing, and far too many reviews are terse and unscientific or ignore the rules of reviewing as laid out on the EQUATOR website, while the time taken for peer-review often exceeds 3 months. The more pessimistic observers think that only Artificial Intelligence can save the day, but others have ideas for improving this vital part of medical editing. One study reported that training in reviewing, blind reviewing or the use of a reviewing checklist did little to improve quality, but that an opinion from a statistician and implementation of Open Peer-review (simultaneous publication of the reviewing report, with both author and reviewer aware of each other’s identity) had appreciable effect [27]. According to a former editor of the American Journal of Health-System Pharmacy, improving review quality mainly involves personal effort on the part of the reviewer [28]. Including patients in the review process, as suggested by the BMJ [29], or post-publication reviewing are two ideas which in coming years may revolutionize the traditional peer-review process. At the same time, some official recognition is beginning to be accorded: more than 25,000 scientific journals now offer reviewers, once the editorial decision has been made, a points system on the Publons website (<https://publons.com/home/>). Unfortunately, the authorities, in selecting and promoting candidates within the

academy, do not always take any account of this form of work, so essential to quality scientific publishing.

3.3. Overuse of the impact factor

Since the 1970s, securing an impact factor gives a journal entry in the bibliometric journal, Journal Citation Reports, which ranks journals in various medical specialties (<https://clarivate.com/products/journal-citation-reports>).

In France, in the space of just a few years, this bibliometric index has become a key factor in files analyzed by the national universities' council to rank practitioners applying for an academic career and to decide on their advancement through the administrative grading system that determines what they are going to be paid. Since 2007, it has also been the basis for calculating the "SIGAPS" scores of the Scientific Publications Analysis and Management System by which university health-care structures and their teams are allocated the 60% of the budget for teaching, research, and innovation which the parliament fixes each year under the health-system financing law, and which exceeded €2 billion in 2016 (<http://www.fhpmco.fr/2016/05/19/circulaire-relative-a-la-campagne-tarifaire-et-budgetaire-2016-des-etablissements-de-sante/>). A 2017 study of factors stimulating practitioners working for the Paris Hospitals Board to publish highlighted the importance of this score: 63% and 52% claimed to be motivated by peer recognition and career advancement, respectively, but 17% were also looking for SIGAPS points [30].

In 2018, in the journal of the national federation of French research workers, the historian Michel Blay wrote that "In becoming technical and industrial, science increasingly ignores the issues of thought and philosophical argument that govern relation of knowledge, including scientific knowledge, to other forms of intellectual, life, action and ethics", [31], tracing the path by which scientific articles moved from being a means of communication between researchers in the 20th century to becoming, in the 21st, the marker of scientific productivity. . .

4. What future for French-language scientific medical journals: bilingualism?

The overwhelming domination, in terms of impact factor, of English-language journals in the Journal Citation Reports might suggest that their French cousins have no future at all, not least considering that, in the national ranking examination, French juries find it perfectly natural to use an English-language text for the article analysis component. . . There are, however, some signs that French might endure as a language of medical science. In 2016, the Catalogue of French-Language Medical Websites, CISMef, launched its LiSSa data-base for scientific literature in the health field (<http://www.chu-rouen.fr/cismef>), dedicated to medical literature in French. In January of the same year, the French National Academy of Medicine (<http://www.academie-medecine.fr/wp-content/uploads/2016/01/Communiqu%C3%A9-vot%C3%A9-le-26-janvier.pdf>) declared itself in agreement with the Medical Faculty Deans that medical academic application files should include a teaching score, known as SIAPS (for Individual Score of Teaching Aptitude in Health) based on teaching articles published in French. And on April 15, 2019, no less prestigious a medical journal than Lancet Global Health published a plea (in French, no less!) to stop excluding French speakers from the worldwide health research field [32]. These measures in favor of the worldwide French language, however, run up against two major obstacles. Firstly, SIAPS scores are not counted in allocating resources to fund research. And secondly, scientists want to maximize the audience for their work, which

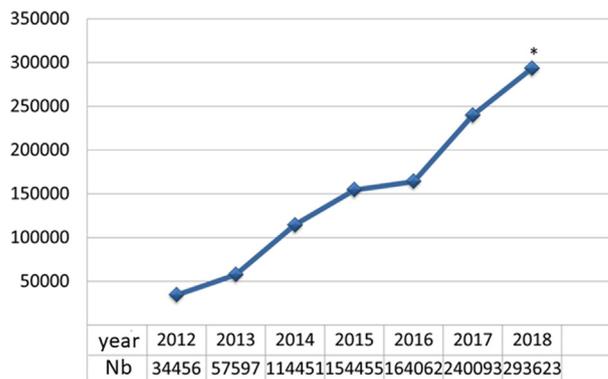


Fig. 1. 2012–2018 progression in number of Science Direct downloads of articles from the French ENT Society journal (data kindly provided by the publisher, Elsevier - * data calculated on September 1, 2018).

means submitting to journals with an impact factor, and therefore tend to publish less in French the more productive they are, as highlighted in a study conducted by the Rouen University Hospital [33].

Recent developments in the European Annals of Otorhinolaryngology Head Neck Diseases, journal of the French ENT society SFORL, however, show that bilingualism may be a promising path for French scientific medical journals to follow. Up until 2011, this was a French-language journal with no impact factor; bilingualism, however, got it included in Journal Citation Reports within 2 years, with an IF of 1.34 for 2018 (<https://www.researchgate.net>). At the same time, the number of downloads of articles from the journal on Science Direct kept increasing, by more than 800% (Fig. 1). Comparing the monthly averages of Science Direct downloads between the French and English versions of the articles shows that it is the English-language version of the journal that is causing the increase, which had still not plateaued in 2018 (Fig. 2). The policy of the journal's publisher, Elsevier, is for downloads to be archived 2 years after publication, with access free of charge, and this was the second reason for the increase in downloads, 70% of which in 2018 were free.

This idea of double language publication is not restricted to French ENT. In Europe, since the early 2000s, the Italian and Spanish ENT societies have been publishing in English alongside their native languages. And in France in the early 2000s, the *Revue du Rhumatisme*, organ of the French Rheumatology Society, paved the way with its English-language Joint Bone Spine, with an impact factor greater than 3 for 2018, and the impact factor of the on-line English-language Journal of Visceral Surgery, partner of the French Association of Surgery and the French Association of Digestive Surgery, reached 2.4 in 2017 (<https://www.researchgate.net>). Similarly, in 2009, with Orthopedics, Traumatology, Surgery & Research, the previously French-language journal of the French Society of Orthopedics and Traumatology followed the path while, more recently, the French general practitioners' scientific journal, *La Presse Médicale*, initiated its own transformation toward a French/eEnglish journal.

In our opinion, bilingualism is the future for French scientific medical journals, if long-term funding is available to provide for on-line submission, publishers' secretariats and translation of articles accepted after peer-review, but also and above all if the scientific societies and their members get actively involved by submitting to these journals. Unfortunately, all too often scientific societies appear to be rather passive and a certain conservatism on the part of their scientific and political leaders stands in the way of the development of these journals. A study in the journal of the Spanish ENT society reported that the move to bilingualism had not met with the expected success for the journal because Spanish authors

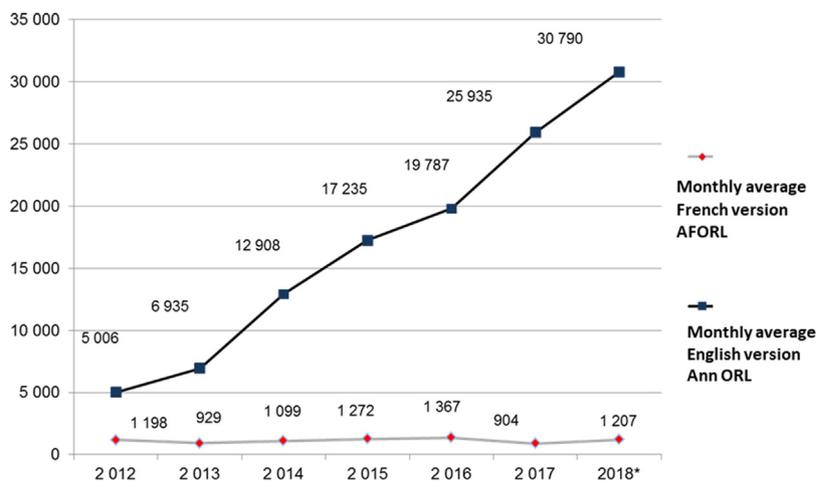


Fig. 2. Comparative 2012–2018 progression in mean monthly Science Direct downloads of articles from the French ENT Society journal's French-language (AFORL) and English-language (ANORL) versions (data kindly provided by the publisher, Elsevier - * data calculated on September 1, 2018).

were reluctant to turn to their own mouthpiece and continued to prefer to publish in America [34] – another adverse effect of the impact factor. . . -, but also a failure of Spanish authors to appreciate the importance of making their work known at home as well as abroad, combined with a kind of intellectual submission to the lingua franca of the day.

The bilingual perspective may also be blocked off if the trend toward open access based on the APC business model is not handled properly. The spread of pre-prints and institutional platforms such as Gates Open Research and Wellcome Open Research is also liable to threaten the present delicate balance that French-language journals are trying to strike [35]. And finally, well-intentioned initiatives in favor of open science and researchers who would quite simply like to abolish publishing and editors as a profession, without regard for the interest of scientific societies, constitute a real threat – although medicine seems less at risk in this regard than other scientific fields –.

Conclusion

French-language scientific journals are at a crossroads. Will they turn into training aids, popularization magazines, liaison sheets for medical society members, information vehicles for public health decision-making? Or will they survive as actual scientific journals? French/English bilingualism seems to us to be a way for these journals, bestriding as they do two cultural worlds, to occupy an indisputable place in 21st century science. This requires the active support of French scientific medical societies, but would also contribute to maintaining high-level medical teaching in French and the promotion of French as a global language. On October 7, 2018, the 2006 Renaudot prize-winner Alain Manbanckou wrote in the French national weekly Journal du *Dimanche*: “Translation of texts written in French broadens the scope of the French-language imaginary”.

Disclosure of interest

The authors declare that they have no competing interest.

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