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Aims and scope

Science Editing (Sci Ed) is the official journal of the Korean Council of Science Editors (<https://kcse.org>) and Council of Asian Science Editors (<https://asianeditor.org>). It aims to improve the culture and health of human being by promoting the quality of editing and publishing scientific, technical, and medical journals. Expected readers are editors, publishers, reviewers, and authors of the journals around the world; however, specially focused to those in Asia. Since scholarly journals in Asia are mostly published by the academic societies, universities, or non-profit organizations, Sci Ed is sought to play a role in journal development. The number of publications from Asia is increasing rapidly and overpass that of other continents; meanwhile, the number of international journals and highly appreciated journals is yet to be coming forward. It is task of Asian editors to pledge the journal quality and broaden the visibility and accessibility. Therefore, its scope includes the followings in the field of science, technology, and medicine.

- Policy of journal editing
- Data mining on the editing and publishing
- Systematic review on medical journal publishing and editing
- Research ethics and medical ethics including clinical registration, statement of human and animal health protection, and conflict of interest
- Publication ethics: fabrication, falsification, plagiarism, duplicate publication, and authorship
- CrossCheck
- Legal issue in journal publishing
- Peer review process
- Reporting guideline for medical journals
- Medical and scientific literature databases
- Advanced information technology applicable to journal editing and publishing including PubMed Central schema, journal article tag suite schema, Digital Object Identifier, CrossMark, FundRef, ORCID, datacite, QR code, and App
- International standard of journal editing and publishing including International Committee of Medical Journal Editors' Recommendations
- Reference styles including Vancouver (NLM) style, APA style, IEEE style, and ACS style
- Digital publishing in the web and App
- Education and training of editors, reviewers, and authors
- Manuscript editing
- Journal evaluation
- Bibliometrics and scientometrics in the context of journal editing and publishing
- Finance of journal publishing
- History of scholarly journal
- Copyright and Creative Commons License
- Open access and public access approaches

Its publication type includes original articles, reviews, case studies, essays, editorials, meeting reports, book reviews, announcement, correspondences, and video clips. Other types are also negotiable with the editorial board. All unsolicited articles are subject to peer review. Commissioned articles are reviewed by the Editorial Board.

About the journal

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Thoughts on the long-term digital preservation of scholarly journals

Kihong Kim

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Online publishing has become a dominant trend in the publishing of scientific, technical, and medical (STM) journals. Almost all STM journals already publish online, and the proportion of those that publish online-only is increasing rapidly. Online publishing obviously requires a completely different approach to preserving journal content. All storage devices are based on magnetic phenomena and are governed by the laws of physics. Stored digital information can spontaneously become erroneous or corrupted over time, and this problem can be worsened when the ambient magnetic field is stronger and the temperature is higher. Therefore, digital information needs to be carefully stored in an environment where the temperature and the ambient magnetic field are well-controlled and must be backed up periodically. Many difficult technical problems are also associated with managing complex file structures and formats as a database grows. These tasks require considerable effort and expenses. Thus, it seems natural to ask whether journal publishers or the institutions that keep their digital materials have sustainable plans and resources to preserve journals for a long period of time.

Scholars who have published research papers in journals would strongly hope that their papers will be read by and helpful for not only their contemporary researchers, but also future generations of researchers in decades to come. Ideally, digital information should be accurately stored and easily accessible for hundreds of years rather than just decades. This is not a simple task, however, and it requires careful consideration and research from various aspects of information technology (IT). Many small academic society publishers around the world, which are responsible for a significant portion of STM journal publications, do not have the capacity to tackle the task of reliable long-term storage of digital materials. These publishers often entrust the management of digital materials to small IT companies, which may have rather limited capabilities. We may also raise questions about whether some commercial publishers with a short history that publish a very large number of papers have a firm intention and reliable plans to keep their digital information stable for a long period of time.

In a related but wider context, the authors of the recently proposed Principles of Open Scholarly Infrastructure have articulated similar concerns and urged the establishment of a social consensus and norms to ensure the sustainability and the openness of academic digital archives [1]. These authors appear to be concerned about the possibility that digital information will be predominantly controlled by a small number of global conglomerates unless there are conscientious social efforts. I believe that academic research papers are of great value as part of

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the human cultural heritage and are not just the property of copyright holders. After the copyright period has passed, I think that it is natural and inevitable for papers to be made open-access and managed by public archives. These archives should be supported by society and managed by dedicated non-profit organizations. In the past, Korean dynasties used to publish four copies of official history books and kept them separately in four different places, so that these precious public records would be safely preserved in case of war or emergency. I feel that academic digital information also needs to be treated in a similar spirit—that is, as an important public property that has to be preserved for a very long time. Perhaps now is the time for society to start an active discussion on the long-term digital preservation of academic information.

Conflict of Interest

Kihong Kim has been the editor-in-chief of Science Editing since 2014.

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1. Bilder G, Lin J, Neylon C. The principles of open scholarly infrastructure [Internet]. openscholarlyinfrastructure.org; 2020 [cited 2022 Aug 9]. Available from: <https://doi.org/10.24343/C34W2H>

Status and factors associated with the adoption of data sharing policies in Asian journals

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Abstract

Purpose: This study investigated the current status and factors associated with adopting data sharing policies in Asian journals. Data sharing policies vary by country and region, and few studies have examined the trends and factors related to these policies in journals across the Asian region.

Methods: The 2020 Scimago Journal and Country Rank was used to download data about 1,143 Asian journals indexed in Web of Science. Excluding 40 journals inaccessible via the Internet or without English-language websites and author guidelines, 1,103 journals were analyzed through descriptive statistical analyses and the chi-square test.

Results: Of the 1,103 journals, 325 (29.5%) had data sharing policies, showing a moderate level of policy adoption among Asian journals. The results of the chi-square test suggested that the impact factor and publisher type (whether a publisher was commercial) were significantly associated with the presence of data sharing policies in journals, but subject categories were not identified as a significant factor. Regarding the strength of data sharing policies, most journals provided policies that only encouraged data sharing.

Conclusion: Policies only encouraging data sharing are unlikely to lead to actual data sharing; thus, considering varying levels of policy strength and effective ways to induce authors' compliance with the policies is important. Further research needs to examine other factors affecting the presence or strength of data sharing policies.

Keywords

Data sharing policies; Journals; Asia; Asian regions; Journal publishers

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Introduction

Background/rationale

The role of journals in data sharing is being increasingly emphasized. Journals are expected to foster a culture of open science by establishing and implementing data sharing policies. One study has suggested that journal data sharing requirements pressure authors to participate in

data sharing practices, thereby affecting data sharing norms and practices [1]. Several studies have investigated publisher or journal data sharing policies. A recent literature review conducted by Woods and Pinfield [2] stated that these studies have been done at three levels: the publisher level, the field- or discipline-specific level, or the individual journal level.

Research on journals' data sharing policies has also suggested several factors associated with the existence or strength of these policies. The identified factors significantly associated with policy presence or strength include the impact factor, discipline, type of journal publisher, and the geographic location of the publisher. The impact factor has been the most frequently mentioned factor, as journals with higher impact factors are more likely to have data sharing policies [3–5]. Regarding disciplines, it has been suggested that journals in the life sciences tend to adopt data sharing policies [4] or have stronger data sharing policies than those in other disciplines [6–8].

The publisher type—that is, whether a publisher is commercial—is also a relevant factor. A recent study has suggested that journals with commercial publishers are more likely to have data sharing policies than those with non-commercial publishers [7]. This finding, however, contrasts with those of previous studies conducted 10 years and more ago [5,9]. A possible interpretation for this difference involves changes in commercial publishers' attitudes toward data sharing, which have led to active support for journals having data sharing policies.

Moreover, the geographic location of the publisher would be an influential factor because the regulations that govern data sharing practices vary across countries and regions, leading to substantial differences in journals' data sharing policies [8,10]. Nevertheless, limited studies have examined the countries or regions of publishers as a factor related to the presence of data sharing policies in journals. Especially regarding Asian journals, only a few studies have investigated the data sharing policies of journals in individual Asian countries, such as Japan [11], South Korea [10,12], and China [8]. Little research, however, has been conducted on the data sharing policies of journals published across the Asian region.

Objectives

This study aimed to investigate the current status of data sharing policies and factors associated with them in terms of journals published in the Asian region. The analysis was based on data from 1,103 journals from 16 Asian countries. The research questions included the following: To what extent do Asian journals have data sharing policies? Which factors are associated with the presence or absence of data sharing policies in Asian journals? How enforceable are the data sharing policies of Asian journals?

Methods

Ethics statement

Neither approval by the institutional review board nor obtaining of the informed consent was required since this was a literature-based study.

Study design

This was a descriptive study based on journals' policies.

Data collection methods

Data about Asian journals were downloaded from the 2020 Scimago Journal and Country Rank (SJR). The SJR website contains several search parameters, such as region and material type, including journals, book series, and conference proceedings. We limited the search to the Asian region and set the material type to journals. Specifically, we only searched for Web of Science journals because Web of Science is one of the most respected databases that index leading scholarly articles in journals and elsewhere. Based on these parameters, 1,143 journals were identified. The data collected for each journal included the following: title, SJR quartile, country, publisher, and subject category (Dataset 1).

We each took half of the 1,143 journals and separately identified data sharing policies by visiting each journal's website and searching for the policies, which were mostly located in the guidelines for authors. In the current study, journals with data sharing policies refer to those journals that explicitly require or encourage data sharing or data availability statements. This definition does not include journals that only provide supplementary material policies without mentioning data sharing.

Out of 1,143 journals, 40 could not be examined because they had inaccessible websites, did not have English-language websites, or had no guidelines for authors (Fig. 1). The remaining 1,103 journals were subsequently analyzed. As a result, we identified 325 journals that had data sharing policies.

Variables

We primarily compared Asian journals with data sharing policies to those without such policies in relation to four aspects: subject area, country, SJR quartile, and publisher type. Thus, the units of study were journals published in the Asian region.

Data analysis

Descriptive statistical analyses were performed to compare the numbers of journals with and without data sharing policies by subject area, country, SJR quartile, and publisher type. The number and percentage of journals with data sharing policies in each subject area, country, SJR quartile, and pub-

lisher type were also examined. In addition, the chi-square test, as an inferential statistical analysis, was performed to determine whether there was a significant association between the presence of data journal policies in Asian journals and the following factors: subject area, SJR quartile, and publisher type. Stata SE ver. 17.0 (StataCorp LLC, College Station, TX, USA) was used to perform the analyses.

Results

Subject areas

The original dataset downloaded from the 2020 SJR provided multiple subject categories for each journal based on over 300

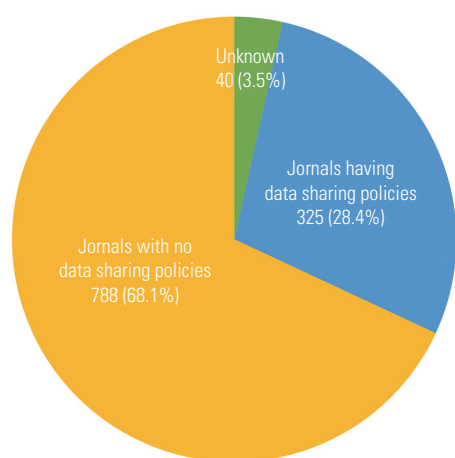


Fig. 1. Percentages of journals with vs. without data sharing policies.

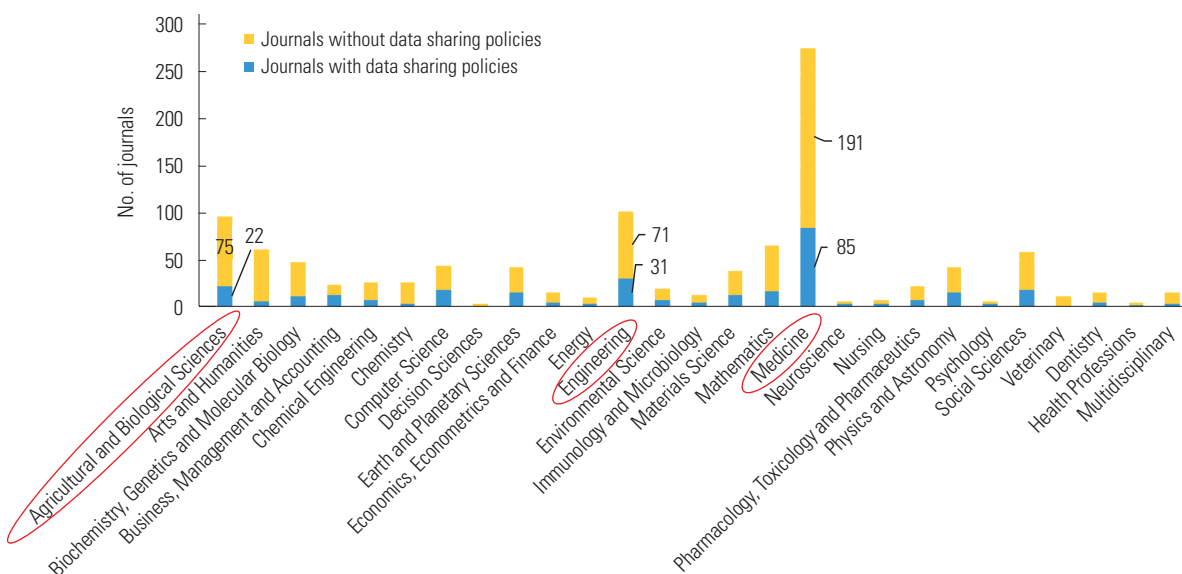


Fig. 2. The number of journals with vs. without data sharing policies by 27 Scopus subject areas. Three subject areas (medicine, engineering, and agricultural and biological sciences) were the most common in Asian journals.

sub-subject areas of Scopus. These minor subject areas can aggregate up to 27 Scopus subject areas. For a better presentation of subject categories, one of the 27 subject areas, corresponding to the first-listed sub-subject area of each journal, was assigned to each individual journal. Fig. 2 shows the number of journals with and without data sharing policies by 27 Scopus subject areas.

According to Fig. 2, three subject areas—medicine, engineering, and agricultural and biological sciences—were the most common in Asian journals. Specifically, the greatest number of journals were in medicine (25.0%, 276 out of 1,103). We also investigated the number and percentage of journals with data sharing policies in each subject area. The subject areas were sorted by the total number of journals in each subject (Table 1). The 18 bolded subject areas in Table 1 indicate those with higher percentages of journals with data sharing policies than the average (29.5%, 325 of 1,103). In particular, the subject areas where more than 40% to 50% of the journals had data sharing policies included computer science, business, management and accounting, nursing, neuroscience, psychology, and health professions.

The 27 Scopus subject areas, except for multidisciplinary journals, can also be grouped by the four largest subject categories: life, health, physical, and social sciences [13]. Excluding 15 multidisciplinary journals (three with data sharing policies), 1,088 journals were categorized into four subjects. Fig. 3 shows the distribution of the number of journals with versus without data sharing policies according to the four categories. The percentages of 322 journals with data sharing policies

Table 1. The number and percentage of journals with data sharing policies in each subject area

Rank	Subject area	Journal with data sharing policy (%)	Total no. of journals
1	Medicine	85 (30.8)	276
2	Engineering	31 (30.4)	102
3	Agricultural and biological sciences	22 (22.7)	97
4	Mathematics	17 (25.8)	66
5	Arts and humanities	6 (9.8)	61
6	Social sciences	19 (32.2)	59
7	Biochemistry, genetics and molecular biology	11 (22.9)	48
8	Computer science	19 (43.2)	44
9	Earth and planetary sciences	16 (38.1)	42
10	Physics and astronomy	15 (35.7)	42
11	Materials science	13 (33.3)	39
12	Chemistry	4 (14.8)	27
13	Chemical engineering	7 (26.9)	26
14	Business, management and accounting	13 (54.2)	24
15	Pharmacology, toxicology and pharmaceuticals	7 (30.4)	23
16	Environmental science	7 (35)	20
17	Dentistry	5 (31.3)	16
18	Economics, econometrics and finance	5 (33.3)	15
19	Multidisciplinary	3 (20)	15
20	Immunology and microbiology	5 (38.5)	13
21	Veterinary	1 (9.1)	11
22	Energy	3 (30)	10
23	Nursing	3 (42.9)	7
24	Neuroscience	3 (50)	6
25	Psychology	3 (50)	6
26	Health professions	2 (40)	5
27	Decision sciences	0 (0)	3
	Total	325 (29.5)	1,103

The 18 bolded subject areas indicate those with higher percentages of journals with data sharing policies than the average.

were 25.7% in life sciences, 30.5% in health sciences, 31.6% in physical sciences, and 27.4% in social sciences. Unlike the findings in a previous study [4], the extent of adopting data sharing policies by life science journals was lower than that of journals in other subject categories. The chi-square test was conducted to examine whether there was a significant associ-

Table 2. The number and percentage of journals with data sharing policies in each country

Rank	Country	Journal with data sharing policy	Total no. of journals
1	India	37 (17.1)	216
2	Japan	55 (26.4)	208
3	South Korea	52 (27.2)	191
4	China	77 (50.0)	154
5	Singapore	73 (56.6)	129
6	Malaysia	3 (5.4)	56
7	Taiwan	12 (24.5)	49
8	Indonesia	6 (22.2)	27
9	Pakistan	2 (9.5)	21
10	Thailand	0	18
11	Hong Kong	5 (50.0)	10
12	Philippines	1 (10.0)	10
13	Bangladesh	0	5
14	Kazakhstan	1 (25.0)	4
15	Sri Lanka	0	4
16	Nepal	1 (100)	1
	Total	325 (29.5)	1,103

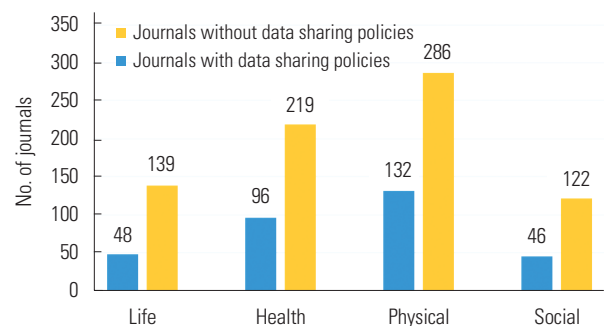


Fig. 3. The number of journals with vs. without data sharing policies by four Scopus subject categories.

ation between the presence of data sharing policies in journals and the subject categories. However, no significant association was identified between the two variables ($X^2(3) = 2.69$, $P = 0.44$).

Countries

The journals examined in the current study were distributed across 16 Asian countries. The highest number of journals were published in India, followed by Japan, South Korea, China, and Singapore. The numbers of journals from Malaysia and Taiwan were also higher than the others (Fig. 4).

In an analysis of the number and percentage of journals

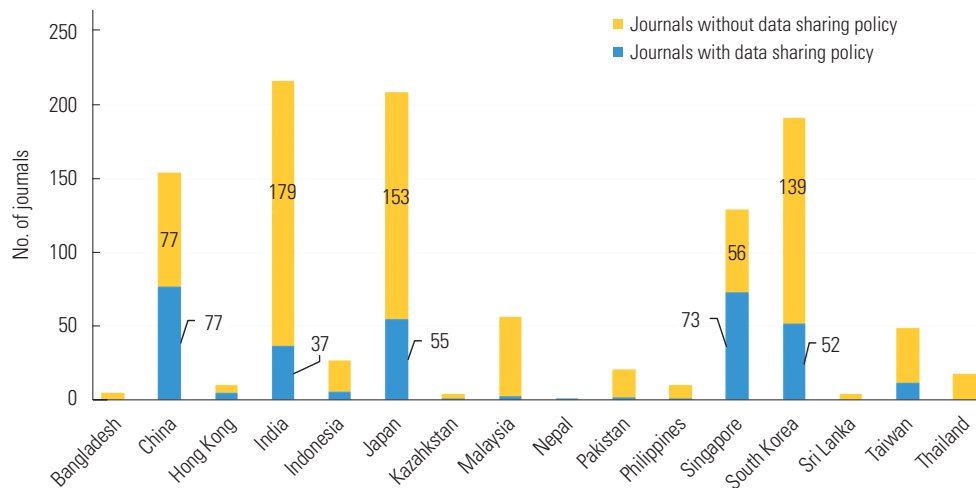


Fig. 4. The number of journals with vs. without data sharing policies by country.

with data sharing policies in each country (Table 2), although the total number of Indian journals was the highest at 216, only 37 of these journals (17.1%) had data sharing policies. The percentages of journals with data sharing policies from Japan and South Korea were between 26% and 27%, which were slightly below the average. However, the percentages of journals with data sharing policies from China, Singapore, and Hong Kong were approximately 50% or higher. This indicates that the journals in these countries or regions were more likely to have adopted data sharing policies than those in other countries.

SJR quartiles

We examined the number of journals with data sharing policies and those without based on SJR quartiles. As shown in Fig. 5, the number of Q1 journals with data sharing policies was similar to that of Q1 journals without the policies, but the proportions of the journals with data sharing policies in Q2, Q3, and Q4 (36.6%, 21.4%, and 13.0%, respectively) were much smaller than that of journals in Q1 (50.8%). The chi-square test showed that there was a significant association between the presence of data sharing policies in a journal and its SJR quartile ($X^2(3) = 84.47$, $P < 0.001$). This result and the pattern of the distribution in Fig. 5 indicate that journals with higher impact factors were more likely to have data sharing policies.

Publisher type

Table 3 presents the number and percentage of journals with data sharing policies from each commercial and non-commercial publisher. Of the 470 commercial publishers, Springer published the greatest number of journals was published (118,

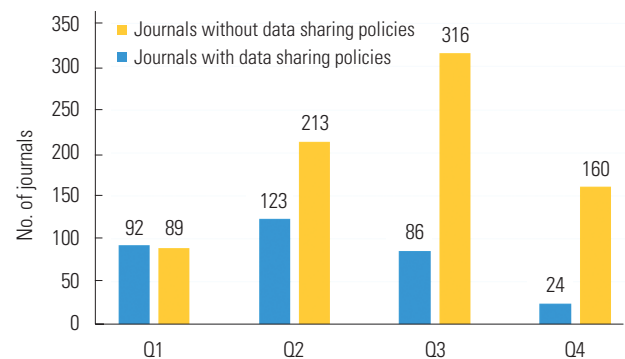


Fig. 5. The number of journals with vs. without data sharing policies by Sci-mago Journal and Country Rank quartile.

25.1%), but the proportion of their journals with data sharing policies was lower than average. Except for Techno Press and the “Other” category, most commercial publishers showed a much higher percentage of journals with data sharing policies than average (29.5%). Among the 633 non-commercial publishers, academic societies published the most journals (231, 36.5%), followed by universities (182, 28.8%). The journals published by academic societies showed an approximately average percentage of journals with data sharing policies. The percentages of journals with data sharing policies published by associations, academies, and the journals themselves were slightly higher than average.

A comparison between the number of journals with data sharing policies and that of journals without data sharing policies by publisher type (commercial vs. non-commercial) is presented in Fig. 6. The proportion of commercial publishers’ journals with data sharing policies (37.0%) was higher than that of non-commercial publishers’ journals (23.9%). The chi-

Table 3. The number and percentage of journals with data sharing policies in each commercial and non-commercial publisher

Rank	Publisher	Journal with data sharing policy (%)	Total no. of journals
Commercial			
1	Springer	29 (24.6)	118
2	World Scientific Publishing	53 (59.6)	89
3	Wolters Kluwer Medknow	10 (11.6)	86
4	Science Press	10 (43.5)	23
5	Elsevier	14 (70)	20
6	Sage	11 (68.8)	16
7	Techno press	0	15
8	AME Publishing Company	6 (66.7)	9
9	Higher Education Press	6 (66.7)	9
10	Science in China Press	7 (87.5)	8
11	KeAi Publishing Communications	7 (100)	7
12	Wiley	4 (100)	4
13	Taylor and Francis	2 (100)	2
	Others	15 (23.4)	64
	Sub-total	174 (37)	470
Non-commercial			
1	Society	66 (28.6)	231
2	University	31 (17)	182
3	Institute	15 (18.5)	81
4	Association	16 (32)	50
5	Academy	11 (35.5)	31
6	Journal	5 (38.5)	13
7	Center	1 (10)	10
	Others	6 (17.1)	35
	Sub-total	151 (23.9)	633

square test showed a significant association between the presence of data sharing policies in a journal and the type of publisher ($X^2(1) = 22.72, P < 0.001$). The findings suggest that journals with commercial publishers were more likely to have data sharing policies than those with non-commercial publishers.

Strength of data sharing policies

Commercial publishers such as Wiley or Springer provide various levels, or strengths, of data sharing policies. According to Wiley's categories of data sharing policies [14], for example, a level 1 policy only encourages data sharing, which means that data availability statements, actual data sharing, and data peer review are optional. Level 2 requires data availability statements only. Level 3 mandates data availability statements and actual data sharing. Level 4, which is the strongest policy, mandates data sharing with peer review of data. Based on the policy levels, the vast majority (74.2%) of the data sharing policies in the 325 Asian journals only encouraged data sharing. Fifty-two (16.0%) required data availability statements, and 32 (9.8%) mandated actual data sharing.

Table 4 shows examples of policy statements at different levels. An example of the level 1 policy mentions encouraging

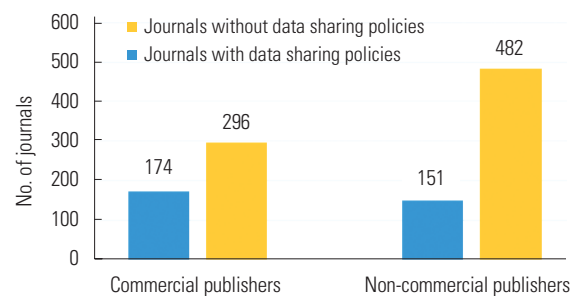


Fig. 6. The number of journals with vs. without data sharing policies by publisher type.

Table 4. Examples of data sharing policy statements

Policy level	Journal title	Publisher	Policy statement
Level 1	<i>Indian Heart Journal</i>	Cardiology Society of India	This journal encourages and enables you to share data that supports your research publication where appropriate, and enables you to interlink the data with your published articles. [...] you are encouraged to cite the data in your manuscript and reference list.
Level 2	<i>Protection and Control of Modern Power Systems</i>	Springer Open (Singapore)	All manuscripts must include an 'Availability of data and materials' statement. Data availability statements should include information on where data supporting the results reported in the article can be found including, where applicable, hyperlinks to publicly archived datasets analyzed or generated during the study.
Level 3	<i>Journal of Educational Evaluation for Health Professions</i>	Korea Health Personnel Licensing Examination Institute	For clarification on result accuracy and reproducibility of the results, raw data or analysis data will be deposited to a public repository, for example, Harvard Dataverse (https://dataverse.harvard.edu/dataverse/jeehp/) after acceptance of the manuscript. Therefore, submission of the raw data or analysis data is mandatory. If the data is already a public one, its URL site or sources should be disclosed.

data sharing and data citation. An example of a level 2 policy notes that all manuscripts submitted to the journal must include a data availability statement. An example of a level 3 policy shows that data deposition and data availability statements are mandatory.

Discussion

Key results

The current study suggested that the proportion of Asian journals with data sharing policies was less than one-third (29.5%), indicating that journals in the Asian region have gradually adopted these policies. However, the proportions differed by subject area, country of publication, impact factor, and publisher type, all of which might be considered factors related to the adoption of the policies. Based on the chi-square test, the current study identified the impact factor and publisher type as significant factors associated with the presence of data sharing policies in Asian journals. These findings are consistent with those of other studies [3–5,7]. However, a significant association was not found between the journals' adoption of the policies and the four subject categories of Scopus. In addition, most of the Asian journals examined in the present study only encouraged data sharing. A small portion of the journals required data availability statements.

Interpretation

Asian journals with higher impact factors were more likely to adopt data sharing policies. This may be the case because journals with higher impact factors would receive more interest from researchers and have more pressure to establish policies that address current issues in scholarly communication. They also tend to have more resources than other journals to build policies [4]. Asian journals with commercial publishers were also found to be more likely to have data sharing policies than those with non-commercial publishers. Commercial publishers' active promotion and support of data sharing would make journals adopt data sharing policies [7].

However, subject areas were not identified as a significant factor. The percentage of life science journals with data sharing policies was lower than that of journals in the health, physical, and even social sciences. This is inconsistent with the results from a previous study [4], which might be explained by the possibility that journals in disciplines other than life sciences have become more aware of data sharing recently and have adopted these policies as much as life science journals have. In terms of countries, higher percentages of journals from China, Hong Kong, and Singapore were found to adopt data sharing policies than those from other countries. Regulations and policies requiring data sharing recently

established by government bodies in China [8] and Singapore [15] may have facilitated the establishment of data sharing policies by journals in these countries.

The strength of data sharing policies in Asian journals was found to be generally low, with most journals only encouraging the submission of data availability statements and actual data sharing. Data availability statements were found to be required by around 26% of the 325 journals; however, another study has suggested that the requirement of data availability statements does not necessarily lead to actual data sharing [16]. This implies that policies that only encourage data sharing would not have much of an effect on the real action of sharing data. Thus, it is important to consider varying levels of policy strength and effective ways to induce authors' compliance with the policies.

Limitations

We performed the chi-square test, which only evaluated a single variable and, thus, did not take into account the interaction among subject category, SJR quartile, and type of publisher.

Conclusion

The Asian journals examined in the current study adopted data sharing policies to a moderate extent, and most journals' policies only encouraged data sharing. Considering a more effective policy approach to journal authors' participation in data sharing is necessary. The impact factor and publishing type of Asian journals were found to be significant factors associated with journals having data sharing policies. Future research needs to examine other factors that affect the presence and strength of data sharing policies.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

Data Availability

Dataset file is available from the Harvard Dataverse at: <https://doi.org/10.7910/DVN/XDVZSB>

Dataset 1. Raw data of Web of Science journals published in Asiatic area retrieved from the 2020 Scimago Journal and Country Rank, including data sharing policies, subject area, country, SJR quartile, and publisher type.

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Science beyond English: to what extent do Vietnamese scholars publish in non-English languages?

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Abstract

Purpose: Although English has become the *lingua franca* for scholarly communication, scholars worldwide publish in other languages. Nevertheless, few studies have answered the question, “To what extent do scholars publish in non-English languages?” This study addresses that question, limiting its scope to Vietnamese scholars.

Methods: We reviewed 833 non-English documents authored by at least one scholar from Vietnam between 1960 and 2021, exploring aspects such as the language of the publication, the year of publication, the document type, number of document citations, the most prolific and most cited authors, and the primary research themes.

Results: Among non-English languages, French, Russian, and Chinese were the three most often selected by Vietnamese scholars for their publications. The year 2015 was a pivotal year when non-English publications from Vietnam significantly increased. Journal articles were the most common type of document, and the most frequent subject areas were medicine, agricultural and biological sciences, engineering, energy, and environmental science.

Conclusion: Although English is the primary language of science, the number of non-English documents by Vietnamese researchers has been increasing. This suggests that collaborative work between Vietnamese researchers and foreign researchers has also increased.

Keywords

Non-English publishing; Scholarly communication; Vietnam; Bibliometrics

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Introduction

Background

English is currently regarded as the *lingua franca* for scholarly communication [1]. For non-English speaking scholars, mastering at least a minimum level of English is a must to facilitate communication with and recognition by international peers [2]. Vietnam is not immune from

this phenomenon. In Vietnam’s current academic landscape, when people say “international publishing,” they imply scientific documents written in English [3]. Nevertheless, anecdotal evidence shows that Vietnamese scholars publish in languages other than English, including Russian, French, and Chinese. Non-English publishing is also important in the social sciences, arts, and humanities [4]. Vietnam, in particular, has long historical, social, economic, and political relationships with several non-English speaking countries, including China, France, and Russia. Therefore, it is important to understand the role of non-English publishing among Vietnamese scholars.

Objectives

This study investigates the patterns and dynamics of non-English scientific documents (co)authored by Vietnamese scholars in terms of the language of publication, year of publication, type of document, number of document citations, number of author citations, and primary research themes.

Methods

Ethics statement

As a literature-based study, approval by the institutional review board and informed consent were not required.

Study design and setting

This is a bibliometric study based on the Scopus database. The search query was conducted at 10:00 AM on February 10, 2022.

Data source/measurement

The Scopus database was selected because it is one of the largest scientific indexed databases covering documents in English and other notable languages. Our search included all authors affiliated with “Vietnam” or “Viet Nam” who published documents in non-English languages. All documents published in 2022 were excluded. We obtained 833 non-English documents authored by at least one scholar from Vietnam between 1960 and 2021. The year 1960 marked the start of our study because this was the first year that a non-English document was found in our search [5]. The retrieved raw data are available from Dataset 1.

Variables and bias

The study variables were document language, yearly number of documents, document type, subject area, author, and research themes. No bias was present.

Statistical methods

The data, including bibliometric indicators, were downloaded in comma-separated values format, and subsequently analyzed with VOSviewer ver. 1.6.8 (<https://www.vosviewer.com>).

Results

Language of publication

The number of non-English documents (co)authored by Vietnamese scholars obtained from the Scopus database be-

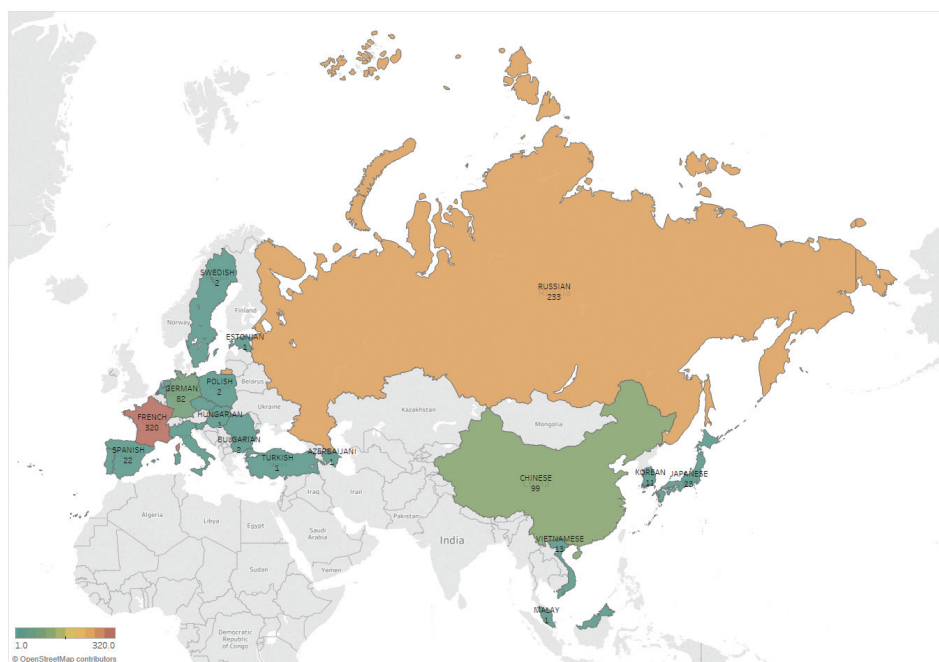


Fig. 1. Distribution of non-English documents (co)authored by Vietnamese scholars 1960–2021.

tween 1960 and 2021 is presented in Fig. 1. Notably, French led with 320 documents (38.42% of the total 833 documents) followed by Russian (233 documents, 27.97%), Chinese (99 documents, 11.88%), German (82 documents, 9.84%), and Japanese (23 documents, 2.76%) (Suppl. 1). A further investigation revealed that 13 Vietnamese-language documents were obtained from two sources: five documents from a Scopus-indexed conference (i.e., the International Society for Rock Mechanics and Rock Engineering, VietRock International Workshop, 2015) and eight documents from a no-longer-active journal (*Tap San Nhan Khoa*) (Suppl. 2).

Growth trends

The growth trends of all non-English documents (co)authored by Vietnamese scholars are shown in Fig. 2. Fig. 2 shows the growth trends of documents in the three most dominant languages, including French (blue columns), Russian (orange columns), and Chinese (gray columns). As shown in Fig. 2, the growth trends between 1960 and 2014 were slow and unstable and the number of publications per year never exceeded 30. The year 2015 marked the first time the number of publications exceeded 30 (44 publications). Although there was a decrease in 2016 (27 publications), the trend continued to increase in subsequent years.

Document types

Regarding the types of documents, most non-English documents written by Vietnamese scholars were 754 journal articles (90.52%), followed by 36 reviews (4.32%), 26 conference

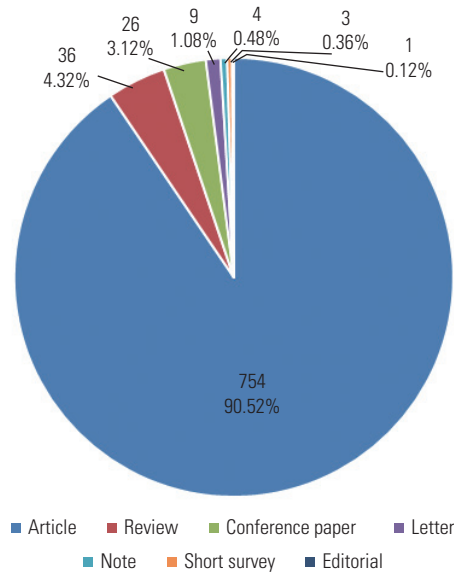


Fig. 3. Non-English documents (co)authored by Vietnamese scholars 1960–2021 according to the type of documents.

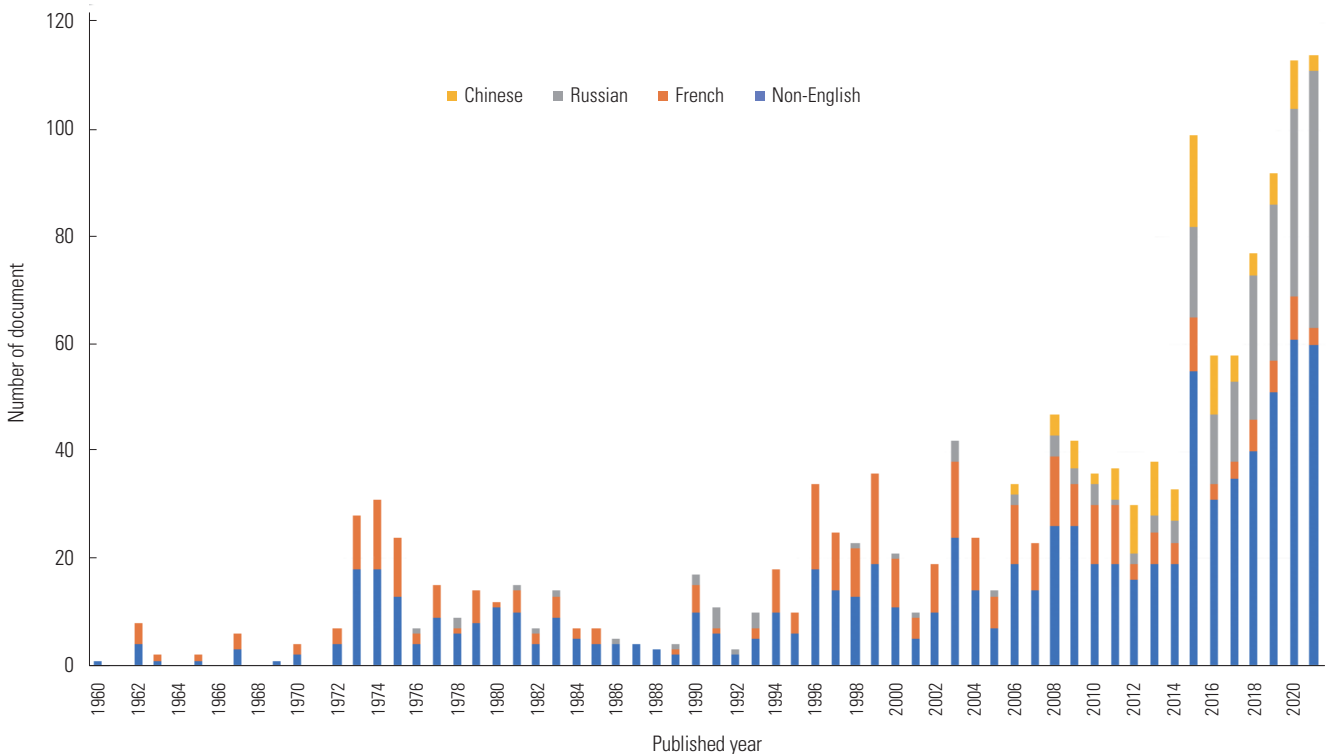


Fig. 2. The growth trends of non-English documents (co)authored by Vietnamese scholars 1960–2021.

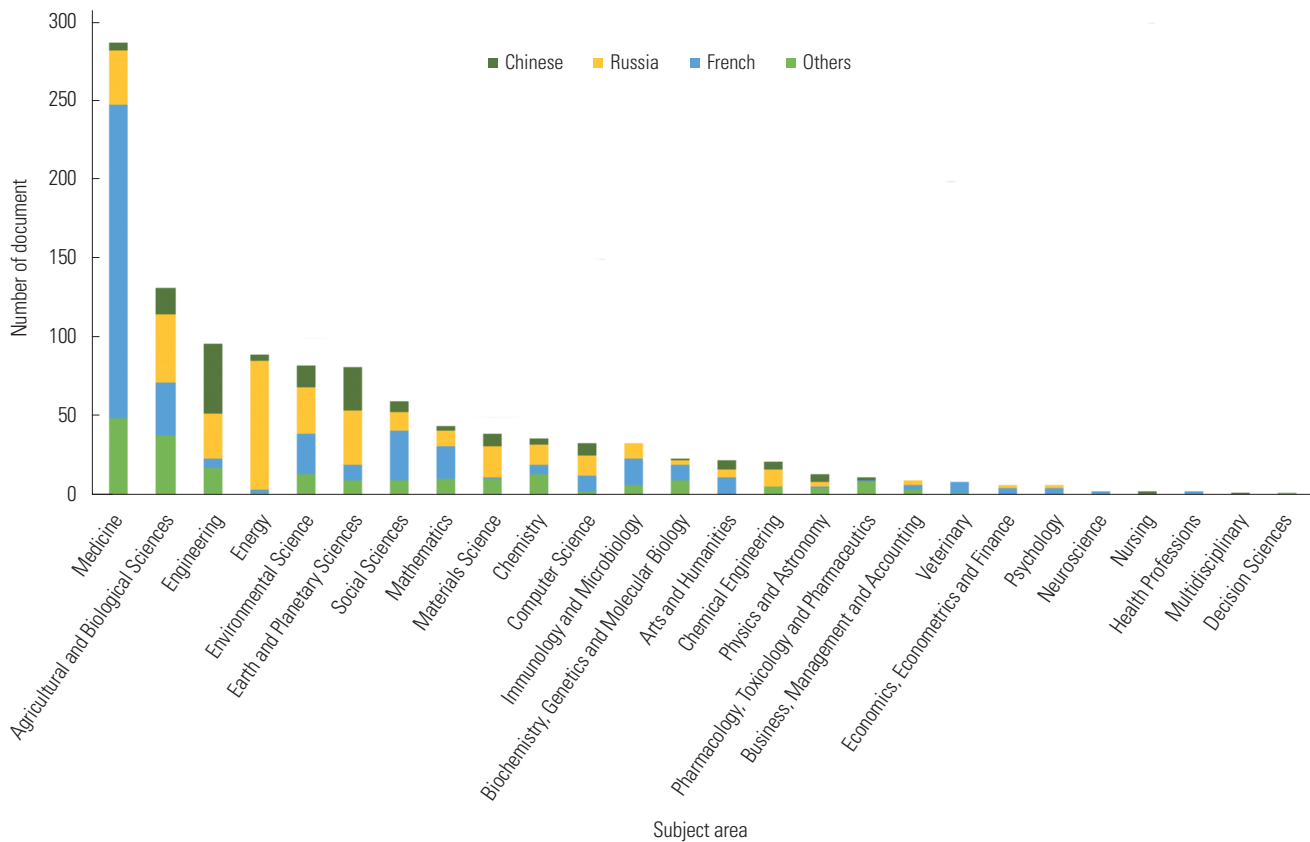


Fig. 4. Non-English documents (co)authored by Vietnamese scholars 1960–2021 according to the subject area.

papers (2.12%), and 9 letters (1.08%) (Fig. 3).

Subject areas and research themes

The number of non-English documents (co)authored by Vietnamese scholars according to subject area is presented in Fig. 4. The leading subject area was medicine, with 288 documents (34.57%). Other major subjects included 132 agriculture and biological sciences (15.85%), 96 engineering (11.52%), 90 energy (10.80%), 83 environmental science (9.96%), and 82 earth and planetary sciences (9.84%).

Fig. 5 presents the key topics and keywords found in the study documents. A single topic extracted from these documents corresponded to several keywords. Understandably, all keywords were from documents written in the major non-English languages (i.e., French, Russian, and Chinese). The topics were diverse and fragmented (Suppl. 3).

Top documents and authors

Suppl. 4 shows the top 10 non-English documents (co)authored by Vietnamese scholars according to the number of citations. The documents written in French received more citations than the documents written in other languages. Specifi-

cally, seven French documents were among the top cited documents (numbers 1–4, 7, 9, 10), followed by two documents written in Chinese (numbers 5 and 6) and one written in Russian (number 8).

Table 1 presents the top 10 authors based on two categories: number of documents and number of citations. Six authors appear in both categories, including Thanh NV, Tran MD, Nguyen TH, Tran L, Hieu PT, and Nguyen T, whereas four authors appear in only one category. In total, there were 14 authors appearing in at least one category. These authors all used the top three non-English languages identified in Fig. 2 (French, Russian, or Chinese) to publish their research. One scholar published in all three languages (Nguyen TH), and three scholars used two languages (Tran L, Nguyen T, and Bach TT).

Discussion

Key results

This study seeks to answer the question, “To what extent do Vietnamese scholars publish in non-English languages?” using 1960 to 2021 data from 833 non-English documents col-

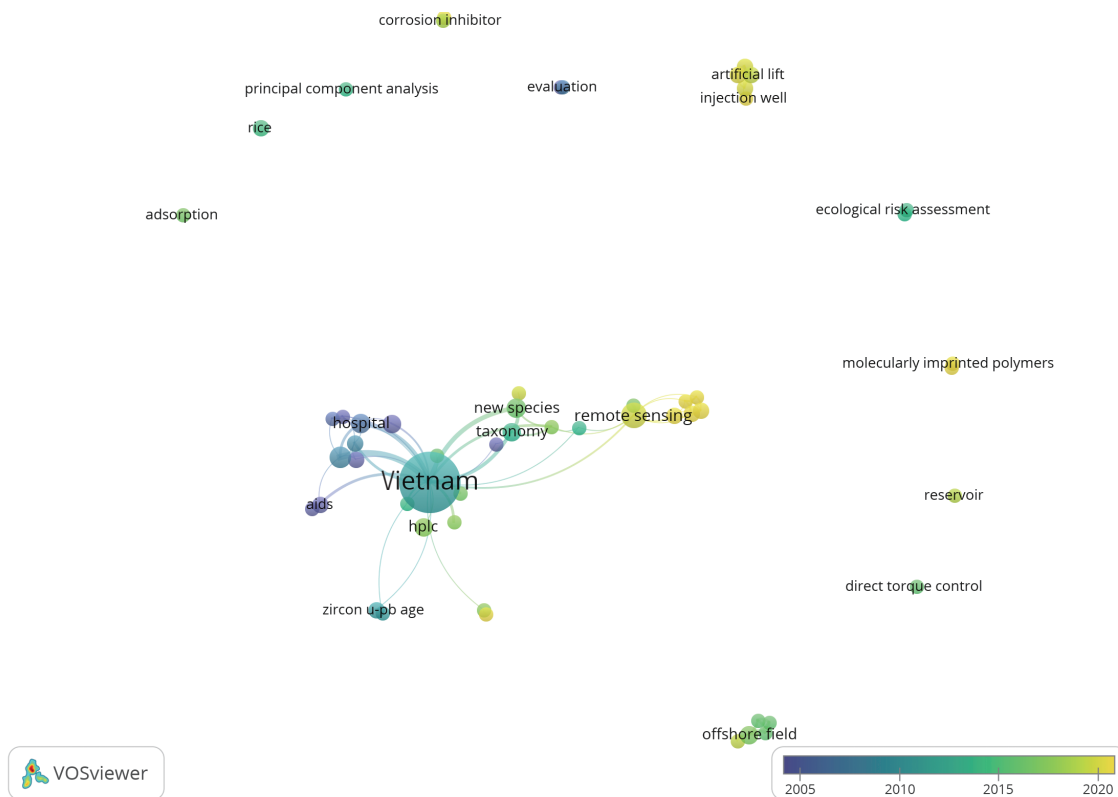


Fig. 5. Key topics and co-occurring keywords of non-English documents (co)authored by Vietnamese scholars 1960–2021. Total number of keywords, 55; the number of co-occurring keywords, at least 3.

Table 1. The top 10 authors published in non-English languages according to the number of documents and citations

Rank	Top 10 authors according to number of documents			Top 10 authors according to number of citations		
	Author (language)	Affiliation	Documents	Author (language)	Affiliation	Citations
1	Thanh NV (Russian)	Vietnamese Academy of Sciences and Technology	36	Tran MD (Chinese)	Hanoi University of Mining and Geology	93
2	Tran MD (Chinese)	Hanoi University of Mining and Geology	6	Tran L (Chinese, French)	Quang Binh University	71
3	Nguyen TH (Russian, Chinese, French, German)	Le Quy Don Technical University	6	Thanh NV	Vietnamese Academy of Sciences and Technology	47
4	Hung TL (Russian)	Le Quy Don Technical University	6	Bui M (Chinese)	Hanoi University of Mining and Geology	36
5	Tran L (Chinese, French)	Quang Binh University	5	Hieu PT (Chinese)	Vietnam National University, Ho Chi Minh City	30
6	Hieu PT (Chinese)	Vietnam National University-Ho Chi Minh City	5	Nguyen T (Chinese, French)	Ho Chi Minh City University of Industry	29
7	Nguyen T (Chinese, French)	Ho Chi Minh City University of Industry	5	Nguyen TH (Russian, Chinese, French, German)	Le Quy Don Technical University	22
8	Van Tien D (French)	Hanoi University	5	Bach TT (Korean, French)	Hospital Viet-Duc	20
9	Nguyen Duc Hanh (French)	Institute of Pasteur Viet Nam	5	Le HT (Chinese)	Hong Duc University	16
10	Nguyen Van Ai (French)	Institute of Pasteur Viet Nam	5	Quang DD (French)	Van Phuc Diplomatic Compound	15

lected from the Scopus database. The most frequent language was French (38.4%). In 2015, the number of non-English documents was 44. Medicine, agriculture and biological sciences, and engineering were the top-ranking fields of study.

Interpretation

Language

Vietnamese scholars published their documents in both English and non-English languages. The major non-English languages were 320 French (38.42%), 233 Russian (27.97%), 99 Chinese (11.88%), 82 German (9.84%), and 23 Japanese (2.76%). It is reasonable that these were the dominant languages as they are all languages of leading academic systems with long histories of collaboration with the Vietnamese academic system [6]. The French, Russian, and Chinese languages not only reflect established academic relationships with Vietnam but also historical political ties. Fig. 1 presents 13 documents written in Vietnamese.

Growth trends

Prior to 2014, the number of non-English documents (co)authored by Vietnamese authors was modest. Nevertheless, the trend appears to increase from 2015 onward with varied contributions in the three dominant languages. From the beginning years of this study, documents written in French have consistently contributed to the overall non-English documents (co)authored by Vietnamese scholars [7–10]. In contrast, the first document written in Russian was published in 1976, 14 years after the French, and there was a minimal contribution of Russian documents between 1976 and 2014. After 2015, the number of Russian documents increased significantly and contributed to the overall increase in non-English documents. Compared to documents written in French and Russian, the first documents written in Chinese appeared much later in 2006 [11,12].

Document types

Journal articles were the most common non-English documents by Vietnamese authors, with 754 published between 1960 and 2021 (90.52%). Other document types included reviews, conference papers, and letters. This finding implies that Vietnamese authors have not explored the full range of Scopus-indexed document types in non-English languages. This finding is similar to previous studies that explored the types of documents written in English by Vietnamese authors [13]. In the future, Vietnamese authors who want to publish their works in non-English languages should consider submitting their work to outlets other than journals (e.g., conferences).

Subject areas and research themes

When analyzing the top subject areas and research themes, this study did not find a significant number of non-English documents in the social sciences or the arts and humanities, contrary to our initial expectations. A similar study, using documents obtained from Web of Science between 2001 and 2015 that were written in English and (co)authored by Vietnamese scholars, identified engineering and technology, biomedical sciences, physics, and mathematics as the top subject areas [6]. Thus, the above mentioned gap in documents related to the social sciences and the arts and humanities reveals that there is still room for future Vietnamese scholars to publish in these non-English outlets.

Top authors and documents

The lists of top authors (according to the number of publications and citations) and top documents (according to the number of citations) are important references for future Vietnamese scholars who want to publish their works in non-English journals.

Limitations

This study had several limitations. First, due to the limited text available for each study, we did not utilize all aspects of bibliometric analysis, such as science mapping. Future studies could employ science mapping to further investigate the topic. Second, bibliometric analysis does not provide insight into the content of the studied documents. Future studies could avoid this limitation by adopting content analysis.

Conclusion

In recent years, Vietnam has implemented several initiatives aimed at boosting publications in international journals. In addition, academic scholars in Vietnam have studied various aspects of how to publish their works in international outlets. Nevertheless, these efforts have primarily emphasized documents written in English rather than non-English languages. Although our study confirms that English is not the only means of scholarly communication in Vietnam, there is still room for further investigation of this topic.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

Funding

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Data Availability

Dataset file is available from the Harvard Dataverse at: <https://doi.org/10.7910/DVN/C9VHWF>

Dataset 1. The retrieved raw data of 833 non-English documents collected from Scopus with search terms.

Supplementary Materials

Supplementary files are available from: <https://doi.org/10.7910/DVN/C9VHWF>

Suppl. 1. Top 10 non-English languages used by Vietnamese scholars according to the number of citations.

Suppl. 2. Thirteen documents written in Vietnamese.

Suppl. 3. Major topics and co-occurring keywords extracted from non-English documents (co)authored by Vietnamese scholars.

Suppl. 4. Top 10 non-English documents (co)authored by Vietnamese scholars according to the number of citations.

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Trends in research on clinical reasoning in nursing over the past 20 years: a bibliometric analysis

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Abstract

Purpose: Clinical reasoning is an essential component of nursing education. This study aimed to identify the trends in research on clinical reasoning in nursing over a 22-year period.

Methods: The Web of Science Core Collection was used as the target database, with the search terms “clinical reasoning,” “clinical judgement,” and “clinical decision.” The scope of the search included the subject, abstract, author’s keywords, and Keywords Plus for each article. Our literature search included journal articles from 2000 to 2021, with the subject area restricted to nursing. A total of 4,675 articles met the inclusion criteria after the removal of duplicates using digital object identifier. We used bibliometric analyses to conduct quantitative and statistical analyses of publication trends, the journals and countries with the most publications, the most productive authors, the most globally cited documents, and the most frequent keywords.

Results: In nursing, studies related to clinical reasoning have increased significantly since 2000. The most prolific country has been the United States. The journal with the most publications was the *Journal of Clinical Nursing*. The most productive author was Considine J, with 23 publications. The most widely cited author was Tanner CA, with 614 citations. The most frequent keywords in the literature related to clinical reasoning were “care,” “nurses,” and “decision-making,” in that order.

Conclusion: This study examined the quantitative analysis and statistics of publications related to clinical reasoning in nursing in the past 20 years using bibliographic information. This study can help guide future research on clinical reasoning for nurse educators.

Keywords

Clinical reasoning; Bibliometrics; Nursing; Education

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Introduction

Background

Competence in clinical reasoning is essential for nurses when they make judgements and decisions in their clinical practice. Nurses with competence in clinical reasoning better understand complicated clinical situations and solve problems more successfully [1,2]. Novice nurses may lack the ability to fully grasp patient cues [3], while experienced nurses with high clinical reasoning skills can more accurately analyze a patient's health status and provide appropriate care [4].

Clinical reasoning is important not only in clinical practice, but also in nursing education. Nursing students must acquire clinical reasoning skills before entering clinical practice as an RN to make safe and precise clinical judgements [5]. The Korea Accreditation Board of Nursing Education [6] identified clinical reasoning competence as an essential nursing program outcome for nursing students when they graduate.

Clinical reasoning is a dynamic thought process that enables one to identify, systematically analyze, interpret, and logically evaluate a patient's clinical status so that health care providers can form a conclusion [7]. "Clinical reasoning" has often been used interchangeably in the literature with concepts such as clinical judgement, critical thinking, and decision-making [8]. Many studies have analyzed the conceptual similarities and differences among these terms [3,4,9,10].

Clinical reasoning requires the ability to think deliberately about a clinical situation within a specific context [3]. Clinical reasoning evolves from a nurse's scientific and professional knowledge and includes ethical decisions and values [9]. Clinical reasoning also derives from critical thinking, which engages skills and attitudes based on existing information and context [9]. Clinical judgement is the ability to recognize cues in a clinical situation, generate and verify hypotheses, intervene and evaluate outcomes to achieve satisfactory clinical results [11]. The National Council of State Boards of Nursing [12] stated that clinical judgement is the observable outcome of embedded thought processes like critical thinking and decision-making. Clinical judgement refers to decision-making in a clinical situation. Although both clinical reasoning and clinical judgement are cognitive processes, clinical judgement differs in that it comprises a final decision or result [13]. Critical thinking is a concept applicable to all general situations, but clinical reasoning and clinical judgement are employed specifically in clinical situations [13]. In conclusion, critical thinking is a support tool for clinical reasoning, whereas clinical judgement is a result of the clinical reasoning process [7,14].

Bibliometric analysis is a research method for examining and analyzing large volumes of scientific data using quantitative methods [15]. Bibliometric studies explore publication

patterns, trends, new emerging areas of research, and gaps in research, and identify authors, institutions, and countries that have contributed the most to the development of a field [16].

Citation analysis is a commonly used bibliometric method using journal impact factors and individual author metrics such as the h-index [16]. Bibliometric analysis has been increasingly popular in nursing [15]. There were less than 10 total bibliometric nursing studies in the Web of Science before 2010, whereas more than 10 studies have been published every year since 2017, 144 studies so far. Studies have explored the following research topics: most prolific countries, number of articles by institutions and countries, number of citations, authors and their collaborations, impact factors, and popular topics within the research area of interest [17].

To date, no study has used bibliometric analysis to study clinical reasoning in nursing. However, several studies have used similar method such as bibliographic searches [9], systematic reviews [4], and scoping reviews [18]. Although similar, in that they analyzed studies on clinical reasoning, they were different from this study because they conducted in-depth reviews of a small number of studies [4,9] or included clinical reasoning in other health professions [18]. Since clinical reasoning is regarded as an important competence for nurses and nursing students, it is important to investigate the trends in research on clinical reasoning in the field of nursing using bibliometric analysis.

Objectives

This study presents a comprehensive picture of clinical reasoning research by analyzing papers published during a limited time span. Bibliometric analysis was employed to explore general bibliographic information, as well as publication growth, the countries with the most publication, the journals with the most publications and citations, leading authors, the most globally cited documents, and the most frequent author keywords, and a Keywords Plus analysis in clinical reasoning research.

Methods

Ethics statement

This study conducted bibliometric analysis of published documents. Ethical review was exempted for this study from institutional review board (IRB) committee of the university one of the authors belong to (IRB No: 2-7008132-A-N-01).

Study design

This was a retrospective descriptive study using bibliometric analysis.

Data source/measurement

This study followed a three-step process. The first step was retrieving data. The search was conducted in the Web of Science Core Collection database using the Science Citation Index-Expanded, Conference Proceedings Citation Index-Science, and Conference Proceedings Citation Index-Social Sci-

ence Humanities on October 9, 2021. In our search for studies related to clinical reasoning in nursing, the search terms “clinical reasoning” was conceptually related to “clinical decision” and “clinical judgement,” all of which were used in the search syntax. The search field included titles, abstracts, author keywords, and Keyword Plus in the category of nursing. The search included publications from 2000 to 2021 and generated 5,486 documents.

The second step was screening the retrieved data. Bibliographic information (i.e., publication title, source title, publication type, abstract, publication years, and references) from the 5,486 documents was exported into Excel file. After removing duplicates using digital object identifiers, 4,675 documents were obtained.

The last step was analyzing the data. Bibliometric analysis was conducted using the open-source Bibliometrix R package [19] to obtain information on annual scientific production, the most productive countries, the most relevant journals, the authors with the most publications, the documents with the most citations, the most relevant keywords, and Keywords Plus analysis from the bibliographic data.

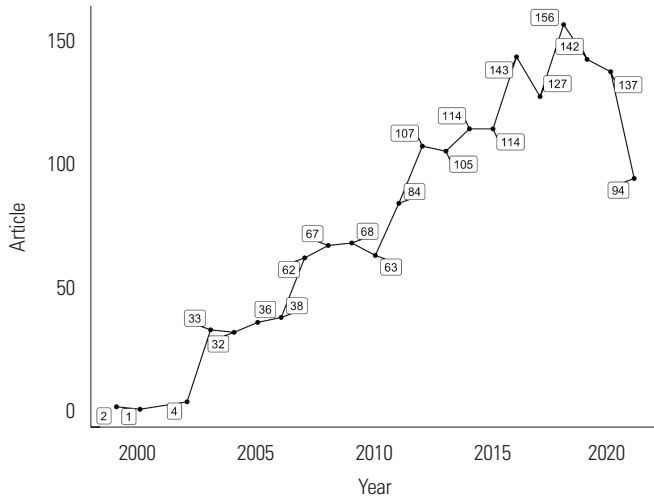


Fig. 1. Annual scientific production of articles on clinical reasoning.

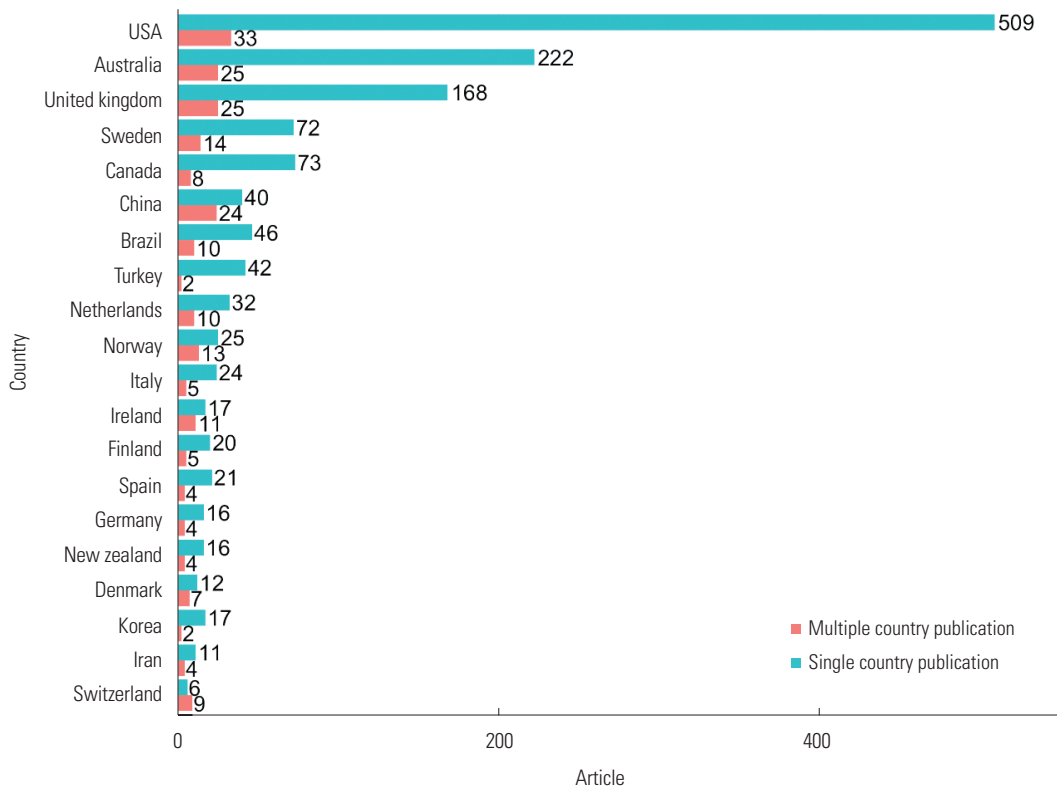


Fig. 2. Countries with the most publications related to clinical reasoning.

Results

General description of retrieved publications

Among a total of 4,675 studies, the document types were published 4,552 original articles (97.4%), 98 early-access original articles (2.1%), and 25 proceedings papers (0.5%). The average number of citations per document was 13.63 and the average number of citations per year per document was 1.57.

Growth of publications

The number of published studies related to clinical reasoning in nursing increased from 2000 to 2021 (increasing trend, $P=0.001$, Cox-Stuart test for trend analysis). Excluding 2021, the year with the most publications was 2018 ($n=390$) (Fig. 1). The yearly number of publications increased to more than 100 in 2006, more than 200 in 2010, and more than 300 in

2015. The year 2018 was the most productive (Fig. 1).

Top countries

Fig. 2 presents the 10 countries with the most publications related to clinical reasoning. Looking at single-country publications (SCPs) and multiple-country publications (MCPs), SCPs were relatively dominant compared to MCPs. The countries with the most SCPs were the United States, Australia, and the United Kingdom, in that order. The country with the most MCPs was the USA, with the UK and Australia tied in second place. As Asian countries, China ranked sixth and Korea ranked 18th.

Top journals

A total of 4,675 documents were produced in 130 sources including journals and books. Table 1 presents the top 10 journals with the most publications, which account for 53.45% of all

Table 1. Top 10 journals with the highest production of articles on clinical reasoning in nursing

Rank	Journal name	h-index	TC	No	PY
1	Journal of Clinical Nursing	48	12,879	816	2003
2	Journal of Advanced Nursing	47	7,007	259	2003
3	Nurse Education Today	33	3,919	231	2003
4	Journal of Nursing Education	26	2,851	142	2006
5	International Journal of Nursing Studies	33	2,678	126	2003
6	Nursing Ethics	19	1,154	114	2003
7	Computers, Informatics, Nursing	17	1,055	110	2002
8	Nurse Education in Practice	16	829	107	2013
9	Clinical simulation in Nursing	20	1,572	104	2011
10	Journal of Nursing Scholarship	24	1,760	98	2004

TC, total citations; No, number of publications; PY, year of first publication.

Table 2. Top 10 authors with the highest production of articles on clinical reasoning in nursing

Rank	Author	Affiliation	h-index	TC	No	PY
1	Considine J	Deakin University, Australia	10	309	23	2007
2	Bucknall T	Deakin University, Australia	10	540	22	2003
3	Lasater K	Edinburgh Napier University, UK	10	531	18	2007
4	Lopes MV	Universidade Federal do Ceara, Brazil	5	61	17	2009
5	Manias E	Deakin University, Australia	12	318	17	2003
6	Thompson C	University of Leeds, UK	11	433	17	2003
7	Chaboyer W	Griffith University, Australia	11	403	16	2010
8	Palese A	University of Udine, Italy	5	61	16	2007
9	Cooper S	Federation University, Australia	11	433	15	2006
10	Jackson D	University of Technology Sydney, Australia	8	205	15	2007

TC, total citation; No, number of publications; PY, year of first publication.

Table 3. Top 10 articles on clinical reasoning in nursing based on global citations

Rank	Article	TC
1	Tanner CA. Thinking like a nurse: a research-based model of clinical judgment in nursing. <i>J Nurs Educ</i> 2006;45:204–11. https://doi.org/10.3928/01484834-20060601-04	614
2	Rycroft-Malone J. What counts as evidence in evidence-based practice? <i>J Adv Nurs</i> 2004;47:81–90. https://doi.org/10.1111/j.1365-2648.2004.03068.x	494
3	Pravikoff DS. Readiness of U.S. nurses for evidence-based practice: many don't understand or value research and have had little or no training to help them find evidence on which to base their practice. <i>Am J Nurs</i> 2005;105:40–51. https://doi.org/10.1097/00000446-200509000-00025	374
4	Santos CM. The PICO strategy for the research question construction and evidence search. <i>Rev Lat Am Enfermagem</i> 2007;15:508–11. https://doi.org/10.1590/s0104-11692007000300023	349
5	Anderson RA. Nursing homes as complex adaptive systems: relationship between management practice and resident outcomes. <i>Nurs Res</i> 2003;52:12–21. https://doi.org/10.1097/00006199-200301000-00003	288
6	Melnyk BM. The state of evidence-based practice in US nurses: critical implications for nurse leaders and educators. <i>J Nurs Adm</i> 2012;42:410–7. https://doi.org/10.1097/NNA.0b013e3182664e0a	282
7	Lasater K. High-fidelity simulation and the development of clinical judgment: Students' experiences. <i>J Nurs Educ</i> 2007;46:269–76. https://doi.org/10.3928/01484834-20070601-06	236
8	Xyrichis A. Teamwork: a concept analysis. <i>J Adv Nurs</i> 2008;61:232–41. https://doi.org/10.1111/j.1365-2648.2007.04496.x	200
9	Harvey N. Nominal group technique: an effective method for obtaining group consensus. <i>Int J Nurs Pract</i> 2012;18:188–94. https://doi.org/10.1111/j.1440-172X.2012.02017.x	198
10	Levett-Jones T. Staff – student relationships and their impact on nursing students' belongingness and learning. <i>J Adv Nurs</i> 2009;65:316–24. https://doi.org/10.1111/j.1365-2648.2008.04865.x	187

TC, total citations.

publications. The *Journal of Clinical Nursing* recorded the most publications (816) and citations (12,879), followed by the *Journal of Advanced Nursing* (259 articles and 7,007 citations) and *Nurse Education Today* (231 articles and 3,919 citations).

The most productive authors

In total, 14,015 authors contributed to the retrieved documents. Among them, there were 566 single-author documents. The average number of articles per author was 0.33, and the average number of authors per document was 3.00. Table 2 shows the top 10 productive authors. The most productive author was Considine J, with 23 publications. Each of the top 10 authors produced 15 or more documents. Of the total 4,675 articles, 176 articles (3.7%) were written by the top 10 authors and 4,109 publications (87.9%) were multiauthored. The number of coauthors per document was 3.86 and the collaboration index was 3.28.

The most globally cited documents

Table 3 presents the documents with the most global citations. The most globally cited article was “Thinking like a nurse: a research-based model of clinical judgment in nursing” written by Tanner CA in 2006 published in the *Journal of Nursing Education* with 614 total citations. Tanner CA reviewed nearly 200

studies on clinical judgement in nursing and presented a clinical judgement model based on the reviewed studies. The second most cited document was written by Rycroft-Malone J in 2004 in the *Journal of Advanced Nursing*. The third was by Pravikoff DS in 2005 in the *American Journal of Nursing*.

The most frequent keywords

Keyword analysis was done with 8,646 keywords chosen by the authors. Among them, the most frequently encountered author keywords were “care” (n = 620 occurrences), “nurses” (n = 446), “decision-making” (n = 318), “education” (n = 278), “management” (n = 242), “experiences” (n = 241), “outcomes” (n = 238), “perception” (n = 234), “health” (n = 214), and “model” (n = 212), in that order (Fig. 3).

Keywords Plus analysis

Fig. 4 shows two clusters of Keywords Plus for clinical reasoning in nursing. In addition to the original keywords provided by the author, Keywords Plus are derived from the titles of the references of an article based on a special algorithm. Compared to keywords, Keywords Plus are more broadly descriptive but less comprehensive in describing the content of a particular article [20]. In Fig. 4, the word cluster on the left is centered on the word “care,” and the keywords surrounding it,

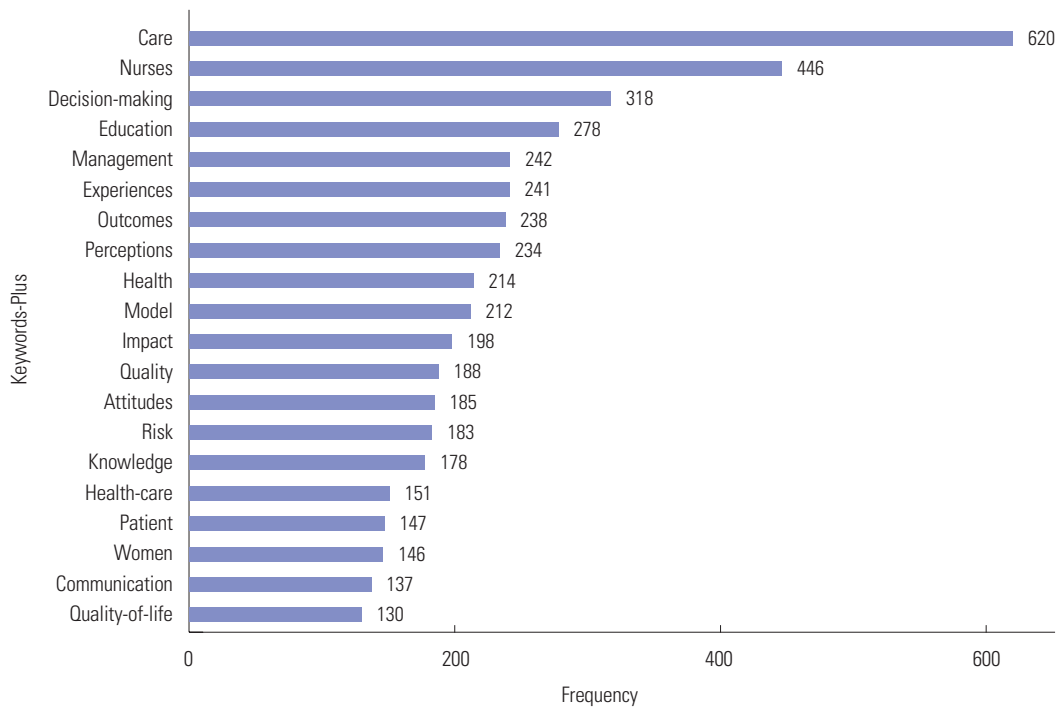


Fig. 3. Most relevant keywords for the topic of clinical reasoning in nursing.

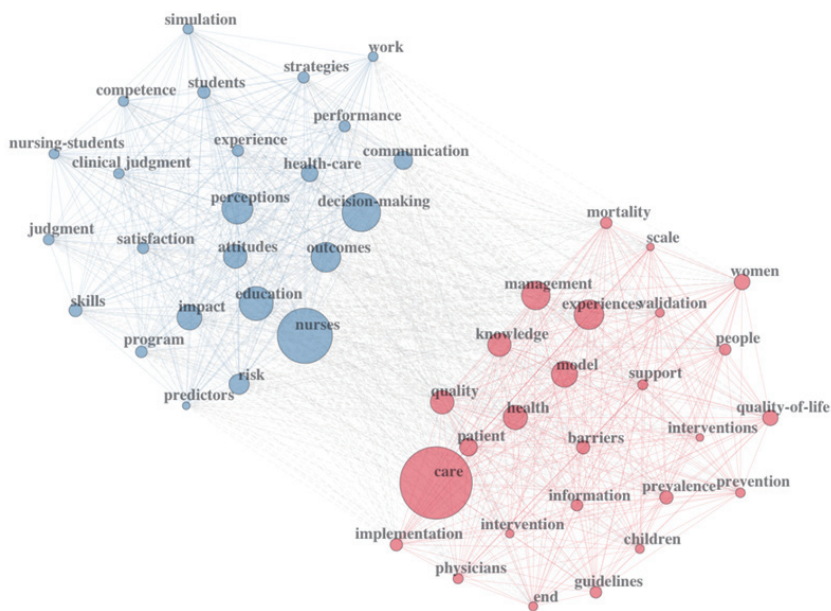


Fig. 4. Keywords Plus network analysis of clinical reasoning in nursing.

are in order from highest to lowest, “perception,” “management,” “experience,” “quality,” and “communication,” with the concept of “care” presented nearby. In the cluster on the right, the keywords “nurse,” “decision-making,” “education,” “outcomes,” “model,” “knowledge,” and “attitude” are also present

ed in order from highest to lowest. The concepts on the left reflect the experiences and interactions that are considered important in care, and the concepts on the right are related to the attributes and abilities that nurses should have.

Discussion

Interpretation

The most frequent keywords retrieved from the 4,675 published articles were “care,” “nurses,” “decision-making,” and “education,” in that order. The Keyword Plus network suggested “decision-making,” “education,” “outcomes,” “model,” “knowledge,” and “attitude” as keywords related to “nurse.” This aligns with the study by da Silva Bastos Cerullo and de Almeida Lopes Monteiro da Cruz [9], which stressed professional knowledge and ethical decision-making in the development of clinical reasoning by nurses. A systematic review by Cappelletti et al. [4] also supports the results of Keyword Plus network analysis by suggesting that clinical reasoning is an essential element in nurses’ decision-making process, and that education and experience significantly improve it.

Comparison with previous studies

There were three studies similar to ours. First, da Silva Bastos Cerullo and de Almeida Lopes Monteiro da Cruz [9] conducted a bibliographic search on clinical reasoning, and extracted 25 articles and analyzing them by reviewing the full texts. They reported that clinical reasoning originated from scientific and professional knowledge and reflected nurses’ ethics and values. The second was a systematic review by Cappelletti et al. [4]. A total of 2,353 research papers were identified in an electronic database by searching “clinical reasoning [and] nursing” and “clinical judgement [and] nursing.” After removing overlapping studies, 15 were reviewed. They reported that knowledge was the most effective strategy for promoting clinical reasoning and critical judgement, and that experience was also necessary in decision-making. The bibliographic search by da Silva Bastos Cerullo and de Almeida Lopes Monteiro da Cruz [9] and the systematic review by Cappelletti et al. [4] were similar to bibliometric analysis in regard to the extraction of related literatures from search engines. However, their goals were more similar to systematic reviews in terms of their in-depth analysis of clinical reasoning concepts. The third was a scoping review by Young et al. [18], which mapped the literature on clinical reasoning within health professions using seven databases. As a result, 110 different terms were derived to describe the concepts related to clinical reasoning in various health professions. They analyzed the concepts comprehensively, focusing on bibliometric characteristics and the use of varied terminology related to clinical reasoning. That study differed from our study in that it was not limited to nursing, but included studies from a variety of health professions, and analyzed various concept terminologies.

Suggestions for further studies

Clinical reasoning is required to solve the health problems of patients in clinical situations using evidence-based nursing interventions [10]. Nursing science deals with problems in clinical situations; therefore, related research on clinical reasoning should be conducted in the future. The terms “clinical reasoning” and “clinical judgement” were registered as Medical Subjective Headings in 2021, making this study timely and meaningful.

Limitations

Bibliometric analysis is a scientific and meaningful methodology that examines the trend of research using bibliographic information in the field. However, it has methodological limitations, such as database bias. Journal articles in data bases other than Web of Science and articles published after October 9, 2021 were not included in this analysis. Therefore, we acknowledge that the articles included in this study do not represent the complete literature available on clinical reasoning. Nonetheless, the results of this review provide a broad view of clinical reasoning in nursing.

Conclusion

The bibliographic analysis in this study provides nursing researchers with significant information on research trends related to clinical reasoning in the last 22 years. This study is meaningful because it is the first research to use bibliometric analysis to examine the research trends of clinical reasoning in nursing. Future active research on clinical reasoning could further integrate such knowledge into nursing practice.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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The authors received no financial support for this article.

Data Availability

Please contact the corresponding author for data availability, because Clarivate does not allow researchers to share the data retrieved from the Web of Science.

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Charting variety, scope, and impact of open access diamond journals in various disciplines and regions: a survey-based observational study

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Abstract

Purpose: The variety, scope, and impact of open access (OA) diamond journals across disciplines and regions from July 22 to September 11, 2020 were charted to characterize the current OA diamond landscape.

Methods: The total number of diamond journals was estimated, including those outside the Directory of Open Access Journals (DOAJ). The distribution across regions, disciplines, and publisher types was described. The scope of journals in terms of authorship and readership was investigated. Information was collected on linguistic diversity, journal dynamics and life cycle, and their visibility in scholarly databases.

Results: The number of OA diamond journals is estimated to be 29,000. OA diamond journals are estimated to publish 356,000 articles per year. The OA diamond sector is diverse in terms of regions (45% in Europe, 25% in Latin America, 16% in Asia, and 5% in the United States/Canada) and disciplines (60% humanities and social sciences, 22% sciences, and 17% medicine). More than 70% of OA diamond journals are published by university-owned publishers, including university presses. The majority of OA diamond journals are small, publishing fewer than 25 articles a year. English (1,210), Spanish (492), and French (342) are the most common languages of the main texts. Out of 1,619 journals, 1,025 (63.3%) are indexed in DOAJ, 492 (30.4%) in Scopus, and 321 (19.8%) in Web of Science.

Conclusion: The patterns and trends reported herein provide insights into the diversity and importance of the OA diamond journal landscape and the accompanying opportunities and challenges in supporting this publishing model.

Keywords

Access to information; Authorship; Data management; Diamond open access; Publishing

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This is an abridged form of a preprint entitled "Landscape: charting variety, scope and impact of OA diamond journals in various disciplines and regions" in the OA Diamond Journals Study available at: <https://doi.org/10.5281/zenodo.4558704>. The authors of the preprint are Jeroen Bosman (j.bosman@uu.nl) and Bianca Kramer (bianca@sesameopenscience.org), at the Utrecht University Library, Utrecht, The Netherlands, and a contributor is Jan Erik Frantsevåg (jan.e.frantsevag@uit.no) at the University Library, UiT The Arctic University of Norway, Norway. Bianca Kramer quit the Utrecht University Library in July 2022 and will work at Sesame Open Science starting in September 2022.

Introduction

Background/rationale

From June 2020 to February 2021, a consortium of 10 organizations undertook a large-scale study on open access (OA) journals across the world that are free for readers and authors, usually referred to as “OA diamond journals.” In other words, these journals have neither an author-side article processing charge (APC) nor a reader-side access fee. This study was commissioned by cOAlition S to gain a better understanding of the OA diamond landscape. In this article, only the landscape part of the results of OA diamond journal survey is presented.

Objectives

This study aimed to gain a better understanding of the OA diamond landscape within the scope of the survey of OA diamond journals. Specifically, we searched for information on the following parameters: the number of OA diamond journals and articles, distribution of OA diamond journals, journal size, scope, visibility of OA diamond journals in scholarly databases and indexes, and journal dynamics and life cycle.

Methods

Ethics statement

This study was based on a survey about journal publishing, the items of which included no sensitive personal information. No institutional review board approval was required. Participants agreed to voluntarily participate in the survey.

Study design and setting

This was a cross-sectional observational study based on a survey. From mid-June to mid-July 2020, we prepared an online survey listing 94 questions to collect data on various components of diamond journals, including their legal structure and governance, authorship, content and metadata, editorial quality assurance practices, technical framework, funding model, dissemination and readership, and challenges. The structure and questions of the survey are available in Suppl. 1.

SurveyMonkey was used to manage the dissemination of the survey and the collection of responses. The survey was disseminated to all diamond journals identified in the Directory of Open Access Journals (DOAJ), 30 mailing lists, nine hosting platforms and aggregators, 10 partners and community websites, and several personalities and social media accounts to be shared worldwide. A crowd-sourced list of OA diamond journals (particularly those not included in DOAJ) was also used to disseminate the survey to specific journals.

Open from July 22 to September 11, 2020, the survey pro-

duced 2,605 “raw” events, including approximately 1,900 identifiable answers (with the name and email address of the respondent). Eventually, after further cleaning (deduplication, removal of fake answers), we collected 1,619 valid responses. Of the 94 questions, 21 were not asked to journals that declared being indexed in DOAJ because the corresponding data were already available there. To the question: “Is the journal already registered in DOAJ?”, 1,136 journals answered “yes” (skipping questions 8 to 29), 431 answered “no,” and 52 answered “don’t know.” Data were then extracted from DOAJ for the 1,136 journals registered in DOAJ and added to the final dataset to be analyzed. The individual responses were identified by unique numerical identifiers generated by SurveyMonkey.

Participating journals

We undertook a statistical analysis of several bibliographic databases, surveyed 1,619 journals, collected 7,019 free-text submissions and other data from 94 questions, and organized three focus groups with 11 journals and 10 interviews with hosting platforms. Furthermore, we collected 163 references in the academic literature and inventoried 1,048 journals not listed in DOAJ (Suppl. 2).

Variables

All items of the survey questionnaire were variables.

Data sources/measurement

Analysis of the free-text submissions

The survey received 7,019 free-text submissions. Unlike the other inputs, these elements are not pre-structured: the respondents were free to develop their ideas or to include observations that were beyond the scope of the question. Some of the free-text submissions could be deemed irrelevant. On the other end of the spectrum, 50–100 free-text responses were very detailed and therefore became more highly represented when the corpus of submissions was analyzed at the sentence or the statement level rather than at the text level.

Exploration of the corpus

The corpus was too large to perform a simple qualitative analysis. However, the corpus was too small to be appropriate for standard text mining techniques, such as comparisons of vocabulary or topic modeling. For various questions, it was possible to retrieve the main arguments using a syntax analysis with Spacy (<https://spacy.io>).

Quantitative analysis with the Spacy natural language processing tree

The methods were not limited to a formal dataset of word oc-

currences, but relied on a “semantic space” of words and sentences. Bidirectional Encoder Representations from Transformers (BERT) is an important novel application in computational linguistics that uses deep learning models to recover the semantic and syntax relationships within a corpus. We generated a semantic map of the sentences from the peer review challenges. The interactive version of the map can be accessed here: http://numapresse.org/divers/peer_review_umap.html.

A systematic assessment based on clusters

While the exploratory tools give an approximative assessment of the arguments presented by the respondents, they do not make it possible to extract valid statistics. To give a more systematic assessment, a semi-automatic method was used. Small, very consistent clusters (HDBSCAN method) were used as a starting point.

Databases

To be able to quantify various dimensions of the diamond OA landscape, beyond derivatives from survey results, various databases were consulted. The most important were DOAJ, the ROAD Directory of Open Access Scholarly Resources, and Crawford’s Gold Open Access (GOA) databases.

Literature review

Through a literature search, 160 references were collected, focusing particularly on OA business models. The literature review was used primarily to design the survey, prepare the focus groups, and analyze the answers collected. The references were stored in a Zotero library, which has been made available online.

Interviews and focus groups

Three focus groups of journals were organized: two in English and one in Spanish. There were 10 interviews of representatives from hosting platforms and infrastructures. Each focus group lasted for 2 hours. The participants were selected based on their free-text submissions to provide a representative selection of the diversity of diamond models.

The experimental journal checker used for the focus groups

All the focus groups and the interviews were conducted remotely using an interview guide (with two different versions: one for the journals and one for the hosting platforms). The guide was not used as a constraining form but as a resource for potential questions and suggestions depending on the course of the discussion.

Complementary studies

In parallel, SPARC Europe conducted a study on Scoping Open Science Infrastructures in Europe that provided complementary information about the services and hosting platforms OA journals rely on.

Complementary study led by the Center for Sociology of Innovation

Finally, this study will be followed by a complementary study led by the Center for Sociology of Innovation to follow up recommendations with a complementary study to model operational funding scenarios. This will serve to transform the recommendations and action plan into possible concrete funding and support schemes and to test them against the actual capacity of the different stakeholders to implement them. More details on the setting and measurement methods can be found in the preprint available at: <https://doi.org/10.5281/zenodo.4558704>.

Bias

Different circumstances (the scope of the organization funding the study, the focus of the call for tender, and the composition of the consortium) influenced the collection of information, particularly in terms of geographic representativeness. Section 1 below gives details about the geographical biases of our dataset, compared to the geographical distribution that can be found in other databases. In addition to geographical bias, there may have been other biases in the responses due to journals’ motivation to participate in the survey or not. For instance, journals may have decided to participate to demonstrate their viability, or conversely, to highlight their needs for additional support.

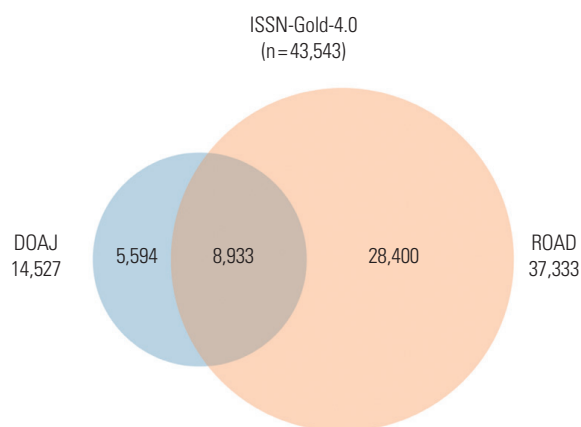


Fig. 1. Overlap of journals in Directory of Open Access Journals (DOAJ) and ROAD. Source: Bruns et al. [1].

Study size and statistical methods

Study size estimation was not done because this was not a randomized experimental study, but a survey with voluntary participation. Descriptive statistics were applied for the interpretation of the results.

Results

Number of OA diamond journals and articles

How many OA diamond journals have we identified in the world?

Table S1 shows various estimates, based on the different sources and criteria these databases use. According to the

ISSN Gold list from Bielefeld (ver. 4.0), there is a substantial overlap between DOAJ and ROAD journals (Fig. 1) [1]. If one assumes that the distribution of APC versus non-APC journals in the part of ROAD that does not overlap with DOAJ is the same as in DOAJ (at 73% OA diamond; Table S2), we could estimate the total number of OA diamond journals to be $0.73 \times 28,400$ (ROAD-only) + 10,194 (DOAJ) = 30,926. Out of 382 journals listed in ROAD but not in DOAJ, between 23.8% and 65% are OA diamond. The lower figure of 23.8% is journals that explicitly state that they do not levy APCs. The higher figure of 64.7% includes journals that do not provide data on whether they have APCs (Fig. 2).

In addition, 19% of journals are not active OA journals be-

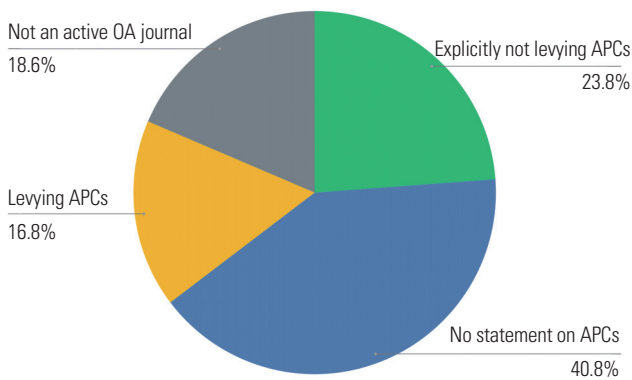


Fig. 2. Business models of a sample (n=382) of journals in ROAD but not in Directory of Open Access Journals (DOAJ). OA, open access; APC, article processing charge. Source: Manual check of websites of journals in the ROAD sample.

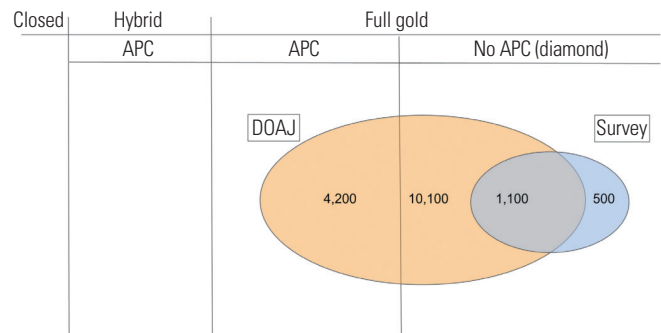


Fig. 3. The overlapping sets of Directory of Open Access Journals (DOAJ) and survey journals in the full journal landscape. Numbers rounded to the nearest hundred. APC, article processing charge. Sources: DOAJ and survey.

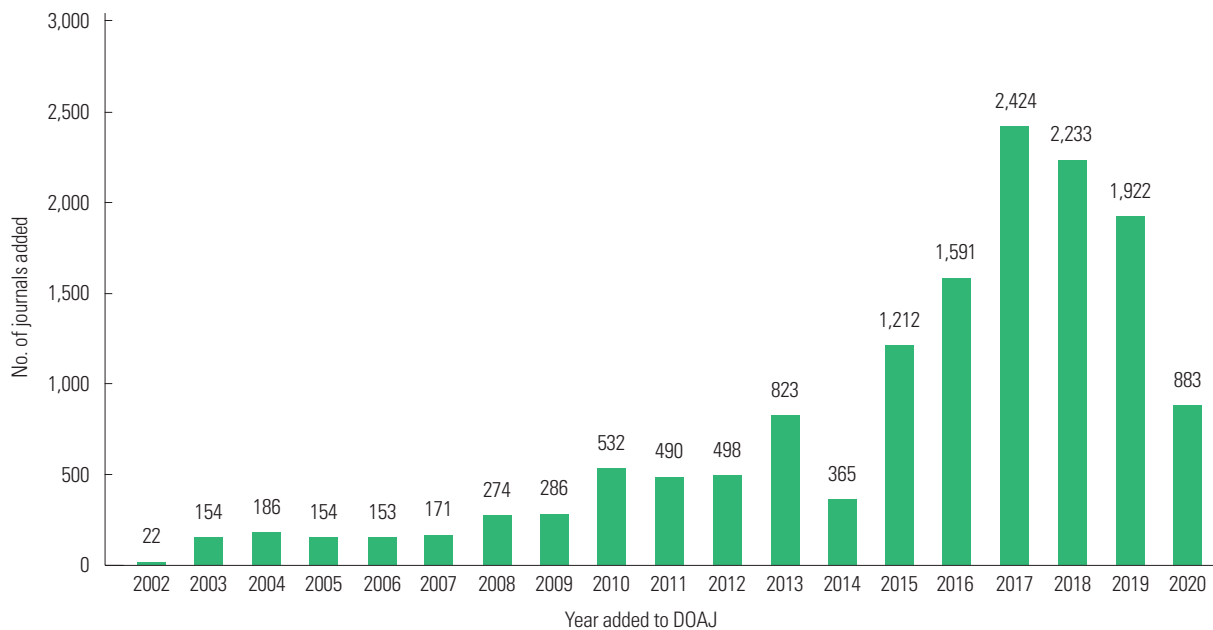


Fig. 4. Open access journals by year of addition to Directory of Open Access Journals (DOAJ). Source: DOAJ.

cause they have ceased publishing, are a closed/subscription journal, or are unfindable. The revised total estimate of OA diamond journals (with an ISSN) is, therefore, somewhere between $0.238 \times 28,400 + 10,194 = 16,953$ and $0.64 \times 28,400 + 10,194 = 28,569$. The overlapping sets of DOAJ and survey journals in the full journal landscape are presented in Fig. 3.

How has the number of OA diamond journals developed over time?

Fig. 4 shows the development of DOAJ journal numbers over time, using the year the journal was added to DOAJ. There is usually a time lag between a journal being established as OA or converted to OA, and being accepted by DOAJ, so many journals will be older than this graph suggests. This graph ex-

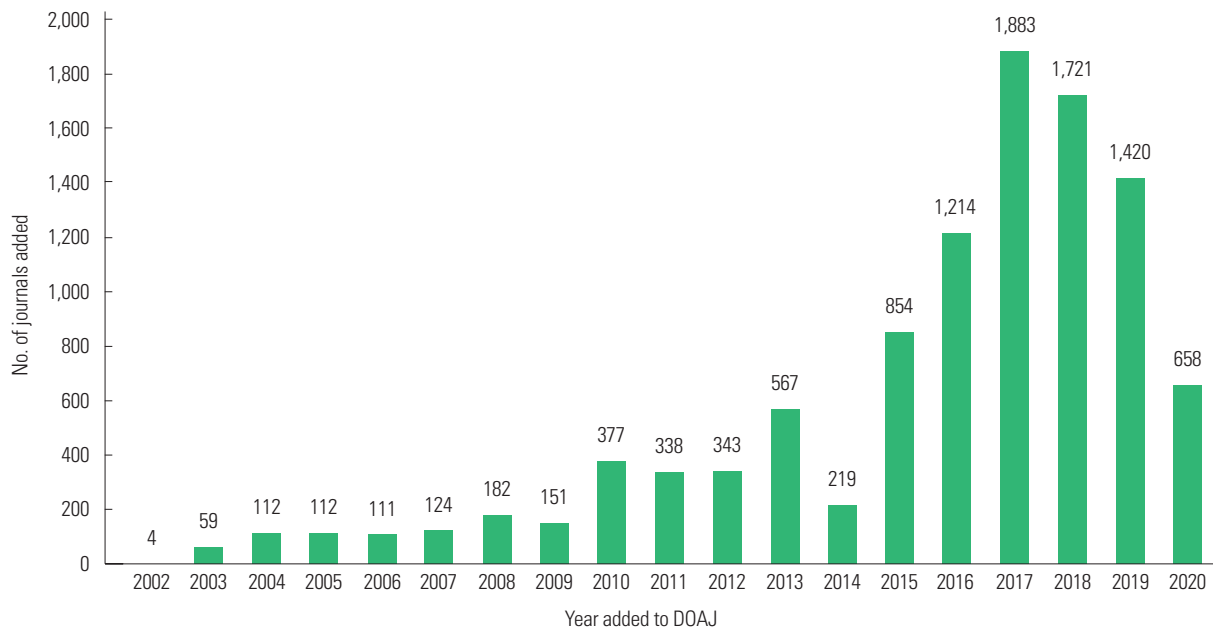


Fig. 5. Open access diamond journals by year of addition to Directory of Open Access Journals (DOAJ). Source: DOAJ.

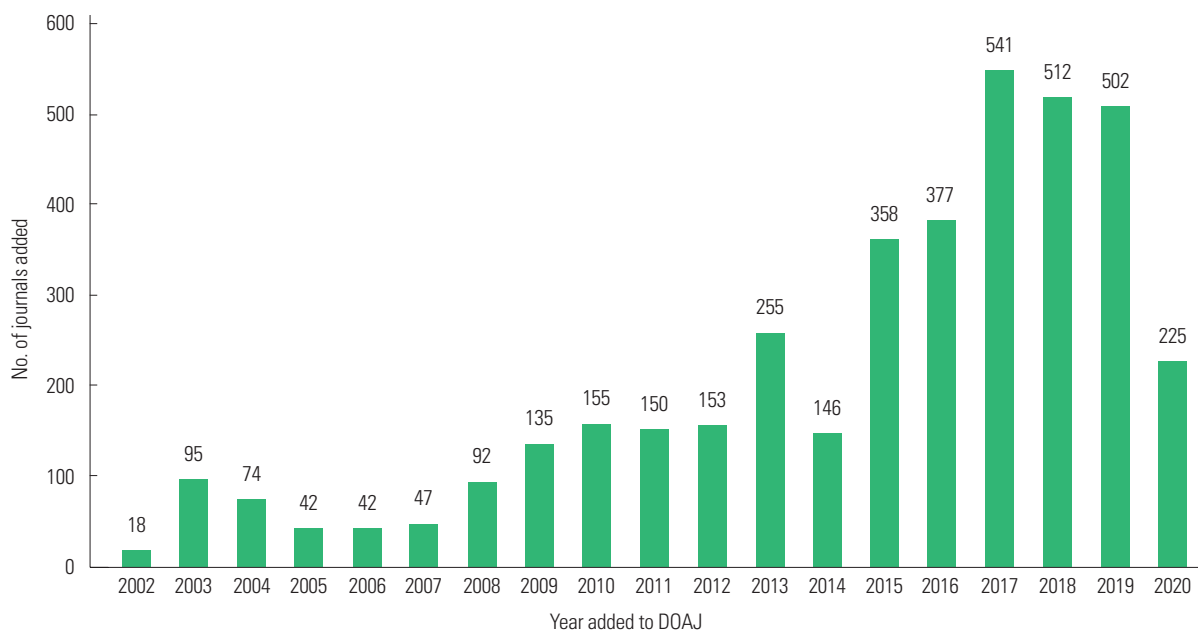


Fig. 6. Article processing charge-based open access journals by year of addition to Directory of Open Access Journals (DOAJ). Source: DOAJ.

cludes journals that have been removed by DOAJ. The 2020 data only contain information until early June 2020. When looking at just the OA diamond journals, we see a similar pattern (Fig. 5).

The development over time is strikingly similar for both OA diamond and APC-based journals (Fig. 6). There was strong growth until 2017, except in 2014, when the DOAJ re-application process started and many resources were spent on that. Both the number of journals admitted and the number of journals removed have grown over the last 3 years, resulting in an overall growth in DOAJ data (Fig. 7). Much content has been made available that dates from before the journal was added to DOAJ (Fig. 8). Obviously, some older journals

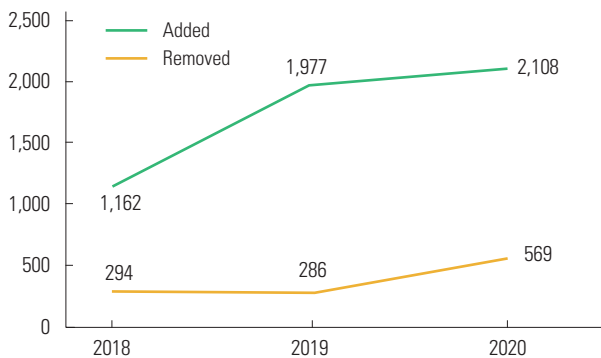


Fig. 7. Directory of Open Access Journals (DOAJ): trends in the number of journals added and journals removed in the last 3 years (numbers include all of 2020). Source: DOAJ public spreadsheet with added and removed journals.

have performed a retrospective digitization of content. Because of the inherent ambiguity in the question, DOAJ has removed this field from their current application form and metadata [2].

How many articles are published by OA diamond journals in total?

Based on the numbers for 14,368 DOAJ journals, partially from Crawford’s GOA (5) (<https://waltcrawford.name/>), and partially counted manually, and using the annual average number of articles per journal for the years 2017–2019, we estimate an annual production of 356,000 articles per year in 10,449 OA diamond journals and 453,000 articles per year in 3,919 APC-based journals. Almost half of the journals in our survey also contain book reviews, and substantial numbers also publish conference proceedings and opinion pieces (Fig. 9).

What is the number of articles in OA diamond journals over time?

It is also interesting to look at the change in article numbers over time. Crawford’s GOA (5) data set contains data for the years 2014–2019 for journals in DOAJ at the end of 2019 (Fig. 10). OA diamond journals show a continuous, but slowing, growth in article numbers between 2014 and 2018 and a decline in 2019. APC-based journals, in contrast, show a continuous and accelerating growth over the whole period. A slow de-

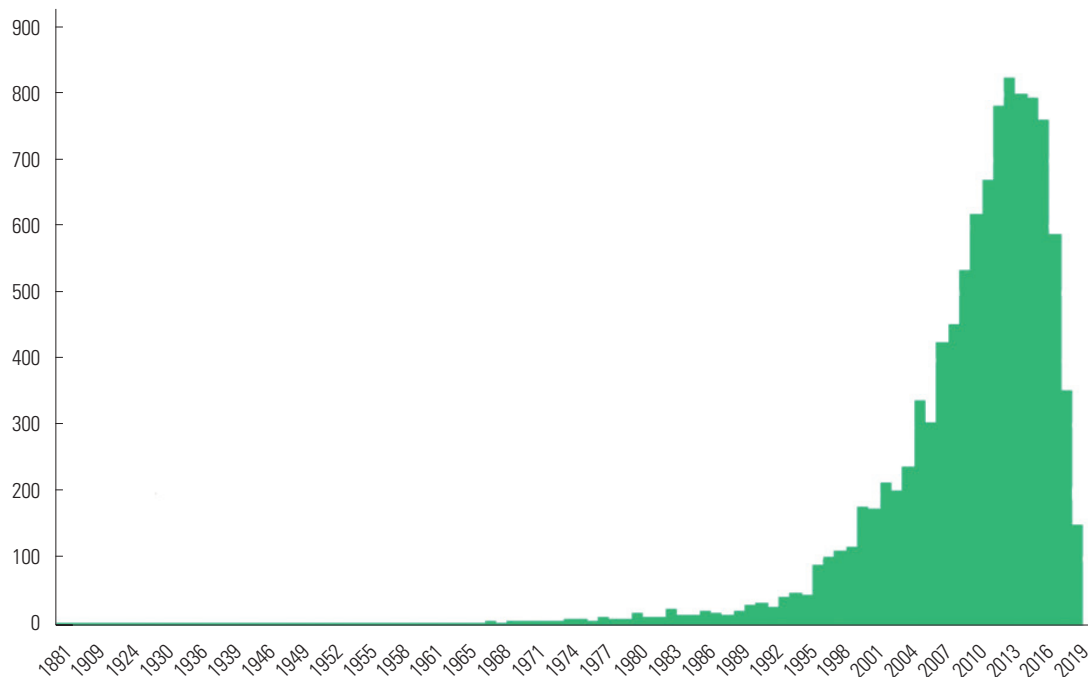


Fig. 8. Launch years of (current) open access (OA) journals. Source: DOAJ. Note that content for older years was probably made OA online retrospectively.

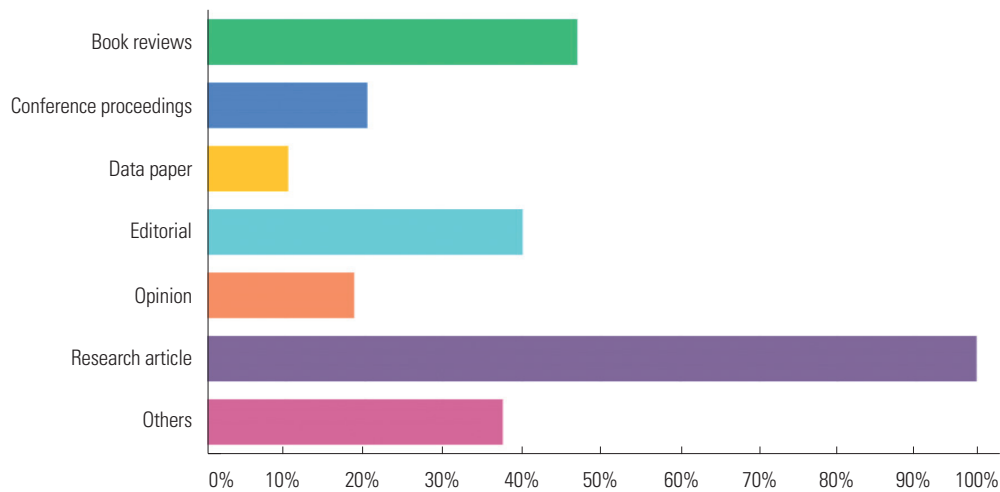


Fig. 9. Content types published. Source: Survey Q17 (n=439, non-DOAJ journals only).

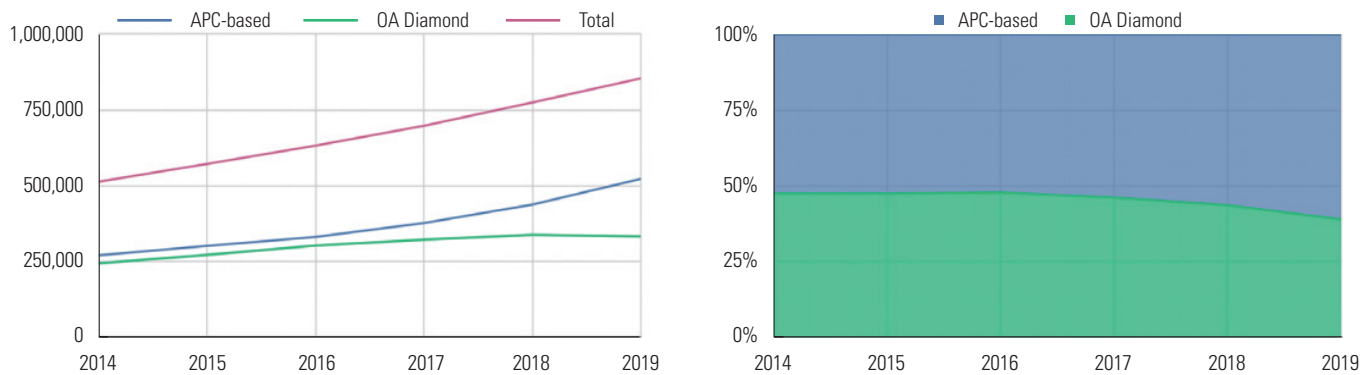


Fig. 10. Directory of Open Access Journals (DOAJ) article numbers from 2014–2019 by open access (OA) model, absolute (left) and as shares of DOAJ total (right). APC, article processing charge. Source: Crawford’s Gold Open Access (5).

cline in the share of OA diamond journals in DOAJ is observed between 2017 and 2018, with a more marked decrease in 2019.

Distribution of OA diamond journals

Distribution of OA diamond journals by region

It is by now common knowledge that the phenomenon of OA diamond journals is not equally strong in all parts of the world, with Latin America quoted regularly as having a strong OA diamond tradition [3]. In DOAJ, of the 11,000 OA diamond journals, about 45% are published in Europe and 25% in Latin America (Fig. 11, top left). The remaining quarter originates from other world regions, with Asia taking the largest share and a surprisingly small number of journals based in the US and Canada. Europe’s share of OA diamond journals in DOAJ, though large, is still relatively weaker than its share of APC-based OA journals (Fig. 11, top right), mainly due to the large number of those journals based in Western Europe. The journals from this survey that are not listed in DOAJ (Fig.

11, bottom right) are even more strongly characterized by a very large share of Western Europe, and smaller shares of Latin America and Eastern Europe, at least compared with DOAJ. Fig. 12 shows OA diamond and APC-based open access models in DOAJ by world region. Western Europe has the largest proportion of APC-based journals, together with Africa, at around 45%. The US and Canada follow with 37%, and then Asia with 29%. The global average is 27% APC-based and 73% OA diamond journals.

Distribution of OA diamond journals by discipline

Crawford’s subject classification from GOA (5) was applied to both DOAJ and survey data to group journals into three subject groups: humanities and social sciences (HSS), medicine, and sciences. Comparing the OA diamond journals in DOAJ (Fig. 13, top left) by discipline with the APC-based journals (Fig. 13, top right) showed a dominance of HSS journals among OA diamond DOAJ titles, whereas HSS is the smallest

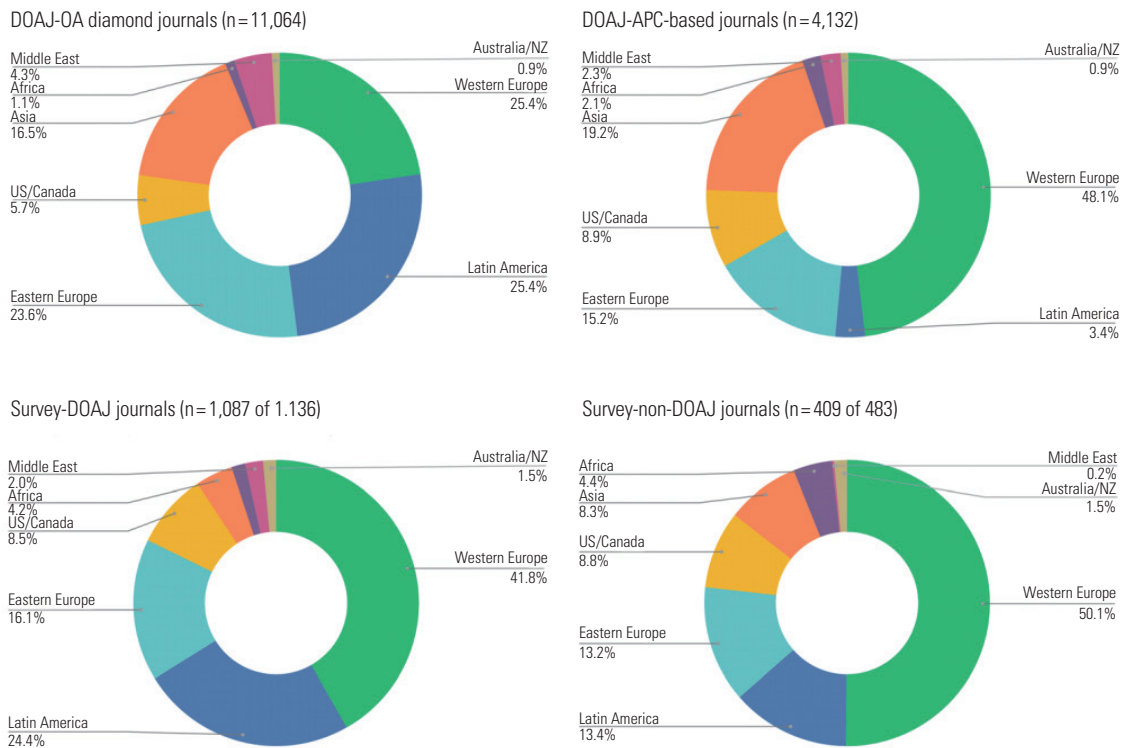


Fig. 11. Journals by location of publisher. Note: All regions are based on the assignment of Walt Crawford in Gold Open Access (5). DOAJ, Directory of Open Access Journals; OA, open access; APC, article processing charge. Source: DOAJ and Survey Q14.



Fig. 12. Shares of open access diamond and article processing charge (APC)-based open access models in Directory of Open Access Journals (DOAJ)-listed journals. Source: DOAJ.

group of disciplines among APC-levying journals. That same HSS-prevalence is found in the OA diamond journals of the

survey (Fig. 13, bottom left and right). The shares of APC and OA diamond models are markedly different in the three disciplinary groups (Fig. 14).

Distribution of OA diamond journals by publisher size and type

OA diamond journals show a strong skew towards the very small publisher size brackets (Fig. 15), with a large majority of journals issued by publishers with five or fewer journals, and often even just a single one. In certain ways, publisher size is related to publisher type. The publisher types in the OA diamond sector (Fig. 16) are characterized by a large (>70%) share of university-owned publishers, including university presses. Fewer than 20% of OA diamond journals are published by commercial and non-commercial OA publishers or traditional publishers, which together publish almost 60% of APC-based journals.

Journal size

OA diamond journal size, contrasted with APC-based journals

The annual average number of articles per journal in DOAJ for the period 2017–2019 is 34 for OA diamond journals and 55 for APC-based journals. The corresponding medians are

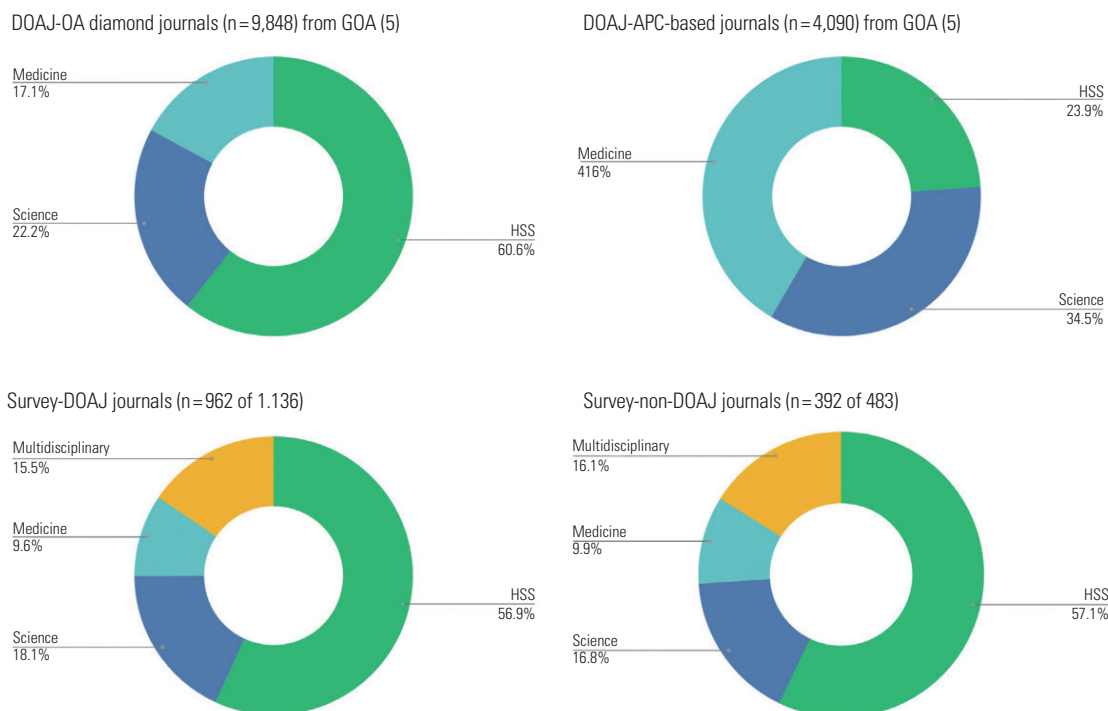


Fig. 13. Journals by discipline. DOAJ, Directory of Open Access Journals; OA, open access; APC, article processing charge; HSS, humanities and social sciences. Sources: DOAJ, Crawford’s Gold Open Access (GOA) 5, and Survey Q40.

23 and 25, respectively. In DOAJ, the majority of OA diamond journals (54.4%) publish 24 or fewer articles per year; only 33.4% of APC-based journals have a similar size (Fig. 17 and Table S3). On the other end of the scale, only 0.2% of OA diamond journals publish 500 or more articles per year, versus 3.4% of APC-based journals.

When analyzing the data on the number of articles by journal size brackets (Fig. 18), the number of articles appearing in very small journals (up to 10 articles per annum) is negligible for both APC-based and OA diamond journals. The data (Table S4) suggest the same kind of distribution, skewed toward the lower size brackets, and even somewhat more than the DOAJ data.

OA diamond journal size by region

Looking more closely at OA diamond journals’ annual number of articles published by geography and size (Table S5), we see that Asia, Australia/New Zealand, United States/Canada, and Western Europe have more journals in the smallest size group (0–24 articles) than the average. Eastern Europe, Latin America and the Middle East have more medium-sized journals than the average. The United States/Canada and Western Europe have more of the largest journals, with over 500 articles, than average, although the absolute numbers are small for this group.

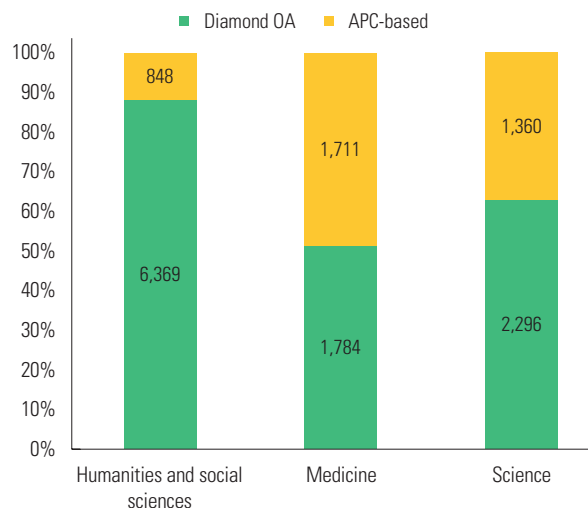


Fig. 14. Journals by funding models for the three disciplinary groups. APC, article processing charge; OA, open access. Source: Directory of Open Access Journals (DOAJ) and Crawford’s Gold Open Access (5).

OA diamond journal size per discipline

Applying Crawford’s subject classification from GOA (5) to the more recent DOAJ data used in this study, we can group journals into three subject groups: HSS, medicine, and sciences. The average HSS OA diamond journal publishes 27 articles per year (median, 20), science journals 43 (median, 23)

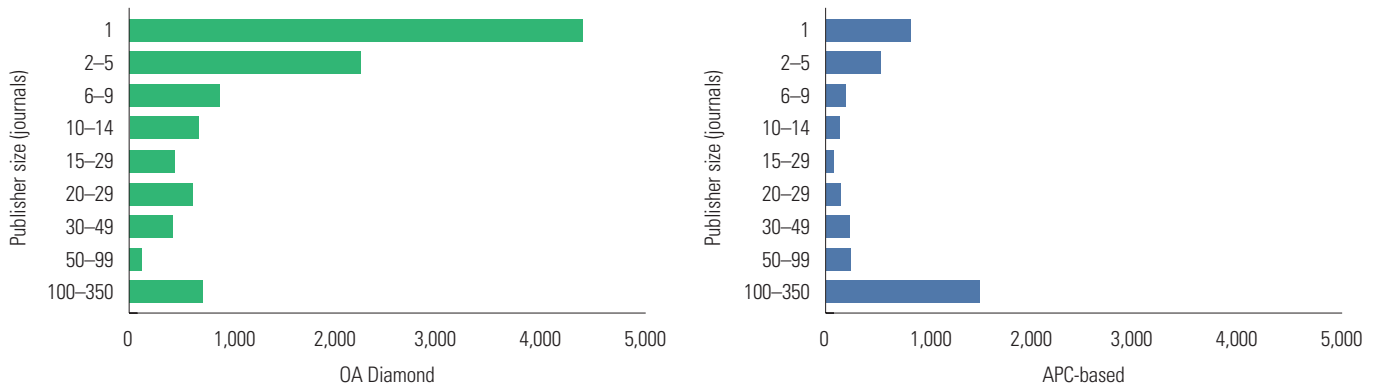


Fig. 15. Number of journals by publisher size in terms of journals published (size determined using the sum of open access [OA] diamond and article processing charge [APC]-based journals). Source: Directory of Open Access Journals (DOAJ).

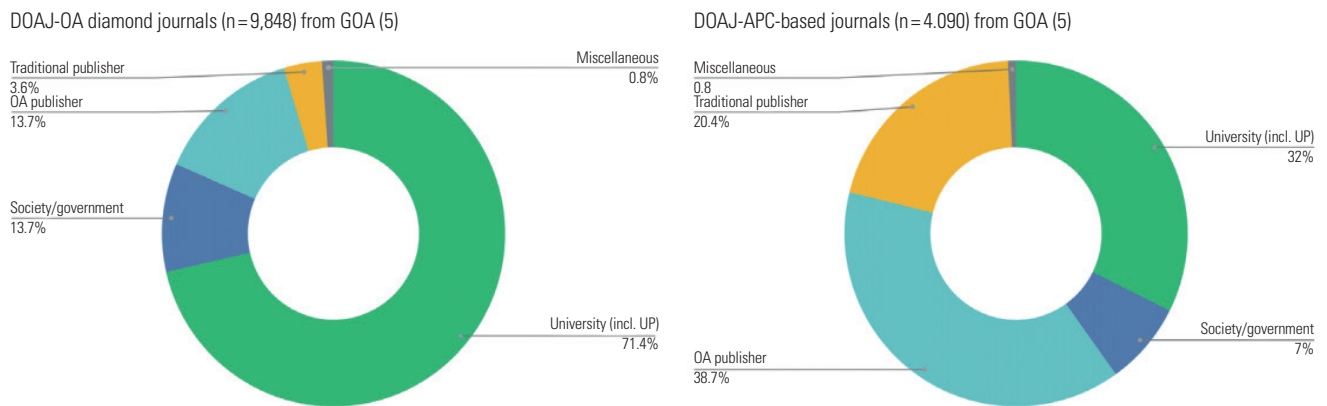


Fig. 16. Open access (OA) publishers by type for the OA diamond sector (left) and the article processing charge (APC)-based sector (right). DOAJ, Directory of Open Access Journals. Source: Crawford's Gold Open Access (5).

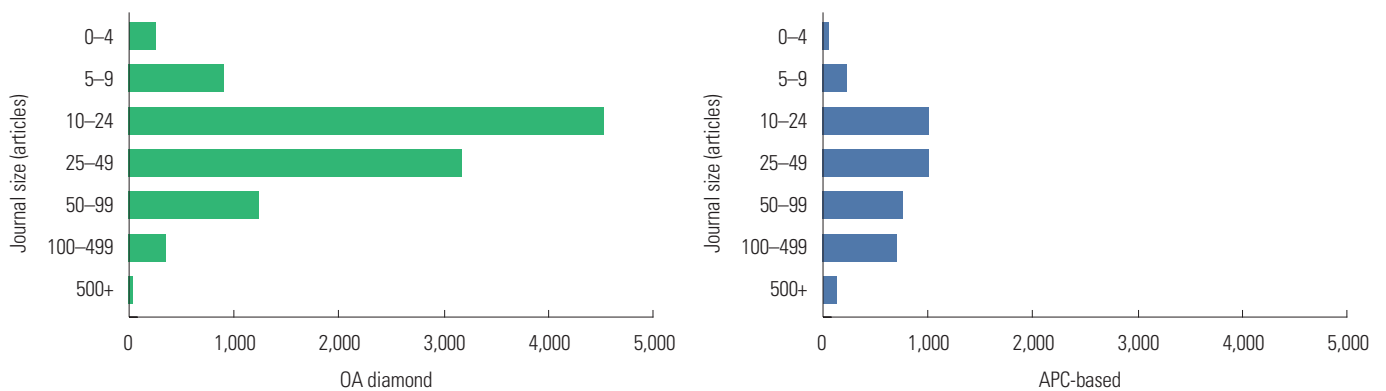


Fig. 17. Number of journals by journal size in terms of the number of articles per annum. APC, article processing charge. Source: Directory of Open Access Journals (DOAJ).

and medicine 47 (median, 33), for the period 2017–2019 (Table S6).

OA diamond journal size by publisher type

In his GOA (5) database, Crawford also classifies publishers

into four categories: OA publishers (publishing only OA), societies (including associations and government agencies), traditional publishers (publishing both OA and subscription journals), and universities (including colleges and educational and research institutes). Using the same classification for jour-

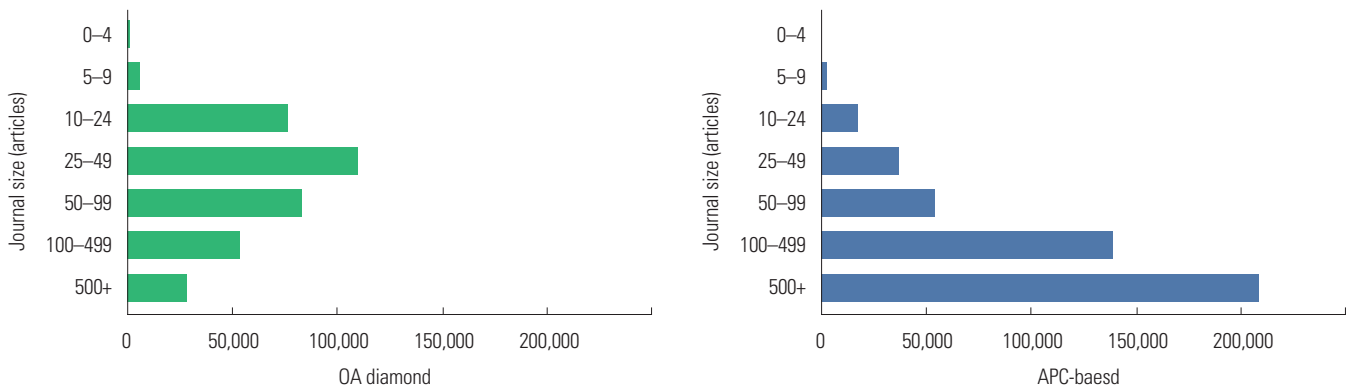


Fig. 18. Number of articles published by journal size in terms of the number of articles per annum. OA, open access; APC, article processing charge. Source: Directory of Open Access Journals (DOAJ).

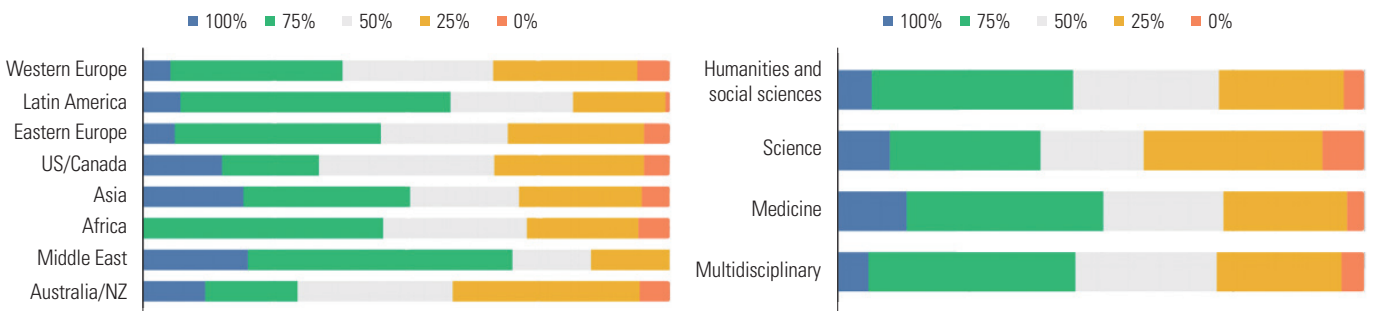


Fig. 19. Proportion of authors from the same country as the journal (by region and discipline of the journal). Source: Survey Q37 (1,365 regions, 1,269 disciplines).

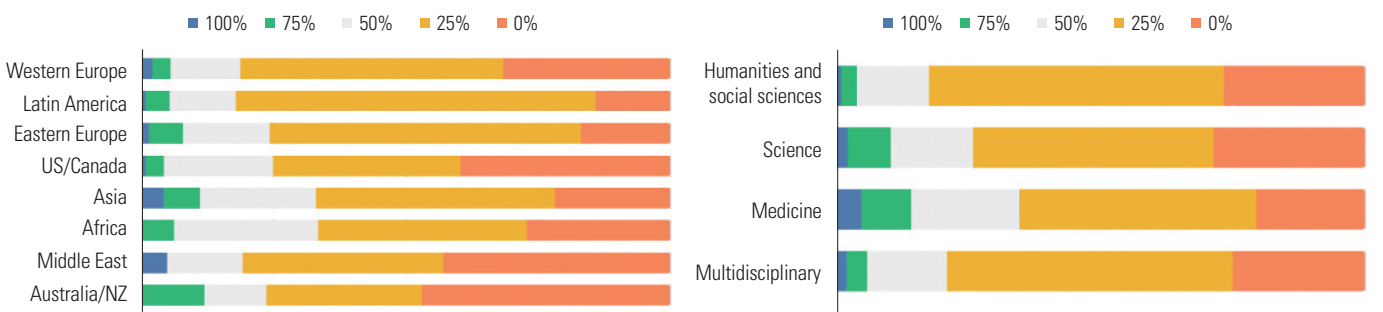


Fig. 20. Proportion of authors from inside the organization owning the journal (by region/discipline of the journal). Source: Survey Q36 (1,371 regions, 1,278 disciplines).

nals not in Crawford’s data, the OA diamond journals in DOAJ are classified in Table S7.

Scope

The institutional, national, and international authorship of OA diamond journals

This information was elicited by asking about the proportion of a journal’s authors who are from the same country as the journal. The results (Fig. 19) show the importance of local journals, especially in Latin America and the Middle East, where over three-quarters of journals report that at least half

of their authors are from the same country as the journal. Although many OA diamond journals have a national focus, the survey found that very few journals primarily serve authors at the institution the journal is associated with (Fig. 20).

National and international readership of OA diamond journals

The international orientation of many OA diamond journals is shown in Fig. 21. For HSS and medicine, approximately equal numbers of OA diamond journals report a more international orientation as do a more national orientation, and

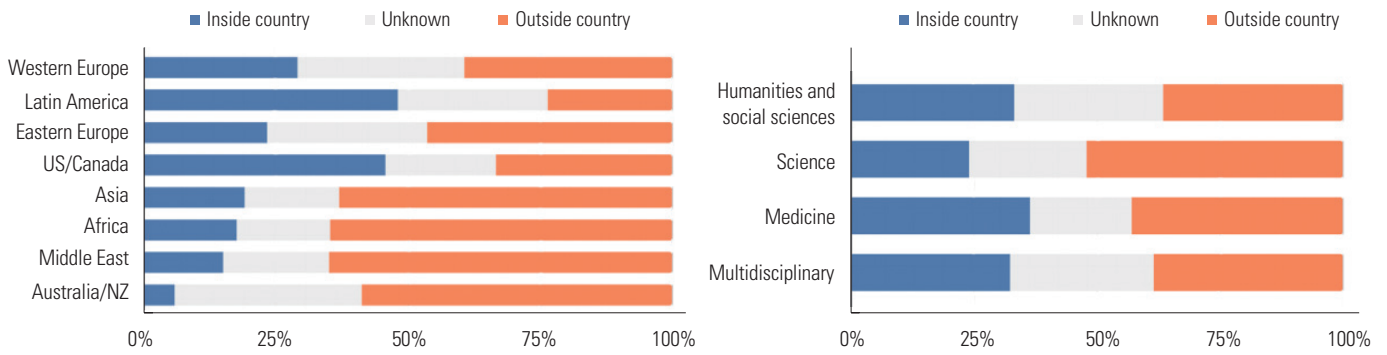


Fig. 21. Share of journals stating their readership is mainly inside or outside their country (by region and discipline of the journal). Source: Survey Q80 (1,274 regions, 1,202 disciplines).

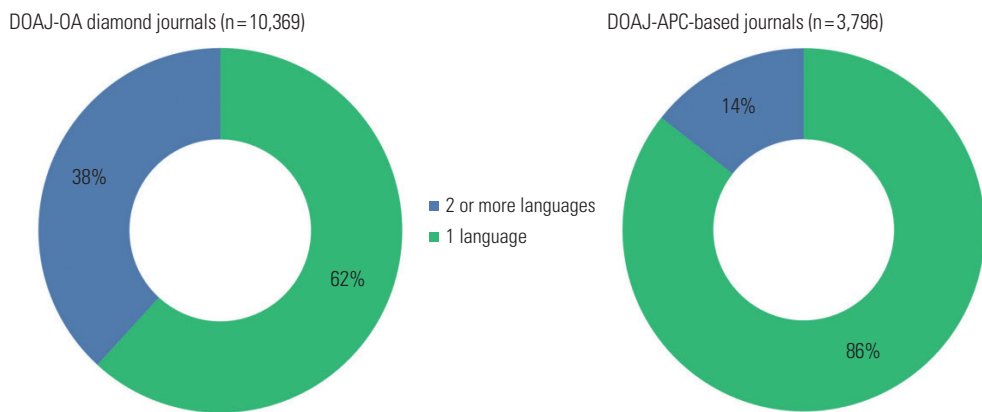


Fig. 22. Percentage of open access (OA) diamond and article processing charge (APC)-based journals using one language or two or more languages. Source: Directory of Open Access Journals (DOAJ).

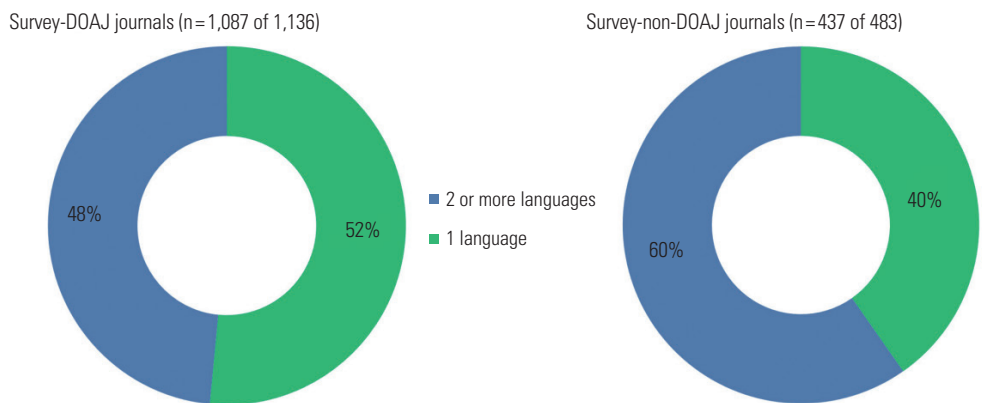


Fig. 23. Percentage of open access diamond journals that reported publishing in one language or two or more languages. DOAJ, Directory of Open Access Journals. Source: Survey Q18.

the same is true for multidisciplinary journals.

Publishing language diversity

Table S8 shows all languages mentioned by more than 100 journals after the harmonization of the data. English is the

most common language and is more important for APC-based journals than OA diamond ones. Spanish, Portuguese, and French play a much more important role in OA diamond journals than in APC-based ones. Generally, this holds for most languages other than English, with Ukrainian and Per-

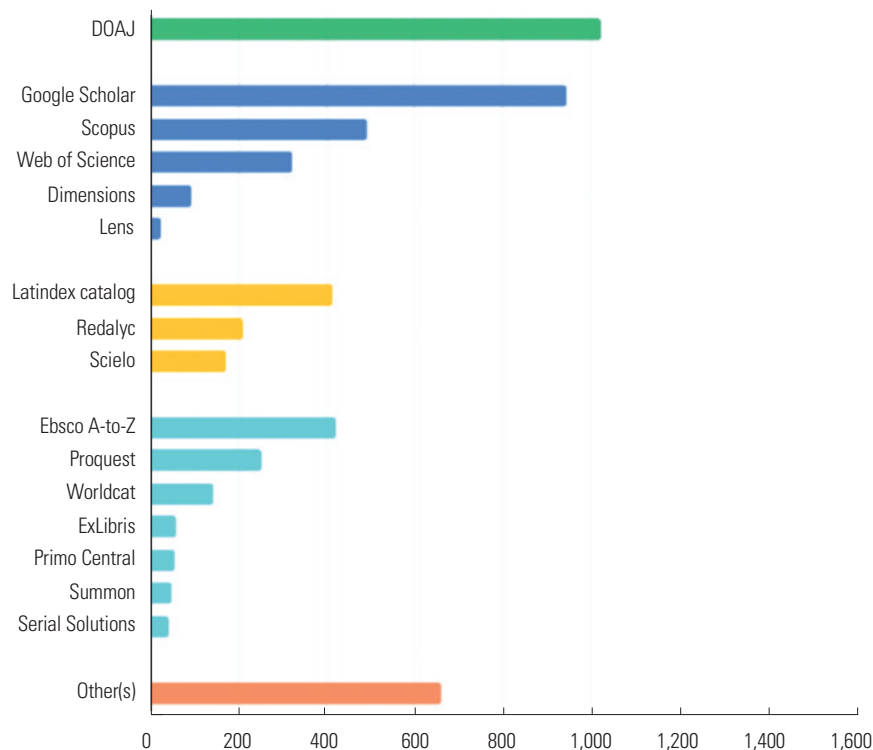


Fig. 24. Databases that index open access (OA) diamond journals, as reported by respondents: Directory of Open Access Journals (DOAJ; green), multidisciplinary bibliographic databases (blue), regional databases (yellow), library systems, including discovery systems (light blue), and others (orange). Source: Survey Q81 (n=1,359).

sian as the notable exceptions, which, unlike most other languages, play an equally significant role in both models. A somewhat different picture arises from the survey data on accepted languages (Table S9). Many journals use more than one language, though two-thirds appear to publish in just one language (Fig. 22 and Table S10). There is a clear difference between OA diamond journals and APC-based journals in DOAJ, with 14% of APC-based journals and 38% of OA diamond journals being multilingual. Among survey respondents, the proportion of multilingual journals is even higher than in DOAJ (Fig. 23 and Table S11). Of the DOAJ journals included in the survey, 48% are multilingual (versus 38% of all OA diamond journals in DOAJ). Of the survey's non-DOAJ journals, 60% are multilingual. Finally, from the survey data on the number of languages accepted, we find that among journals not in DOAJ, an impressive 14% accept manuscripts in four or more languages (Table S11).

Visibility of OA diamond journals in scholarly databases and indexes

The survey asked journals to indicate the databases and indexes where they are indexed, such as DOAJ, multidisciplinary bibliographic databases, regional databases (for Latin

America), and library discovery services. The results are presented in Fig. 24.

Journal dynamics and life cycle

Journal age and pathways to OA diamond

The survey collected information on the year of the journal's creation, the year the journal first became available online, the year it was made available as an OA journal, and the year it was made available as an OA journal without charging authors (Fig. 25). The results show that while older journals often started in print, almost all OA diamond journals have been OA diamond from the time they became available online.

Developments in article volume

The survey asked journals to indicate how the number of articles published per year has evolved over the last 5 years (Fig. 26). Specifically, it asked: has article volume been increasing, declining, remaining constant, or fluctuating? Overall, almost three-quarters of journals reported constant or increasing article volume, which can be taken as an indication of journal health and stability. It appears that smaller journals (fewer than 25 articles/year) are less stable than larger journals. Journals that currently have between 25-100 articles per year are

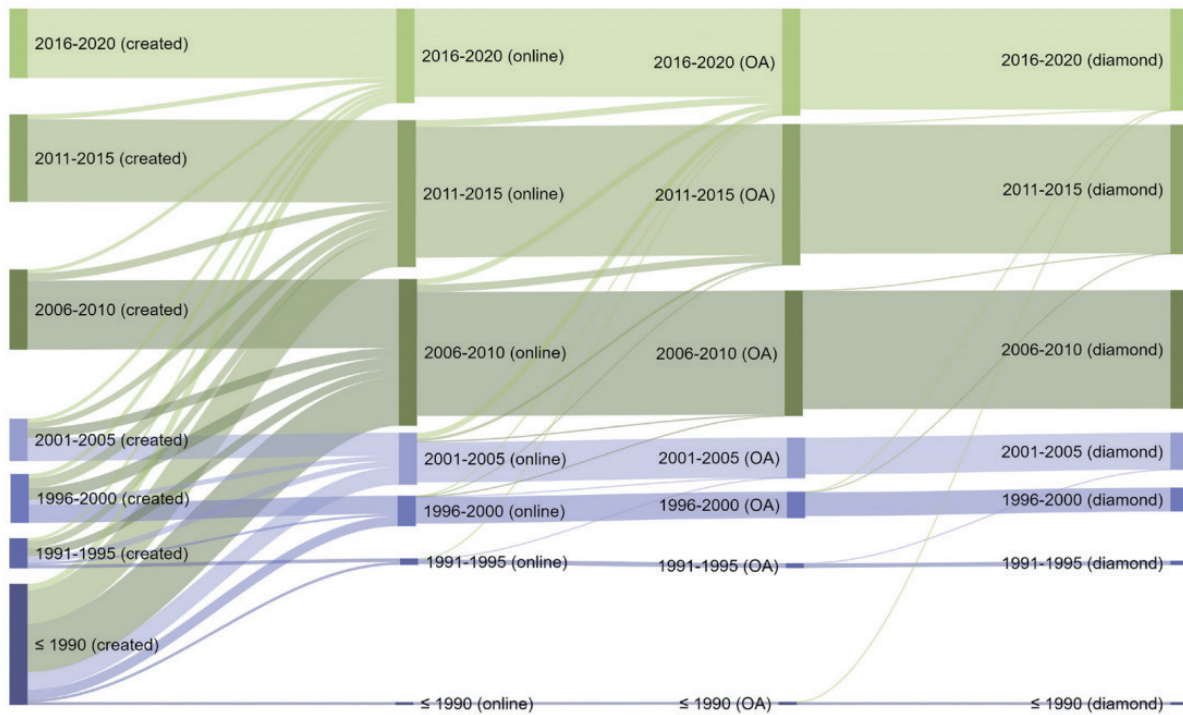


Fig. 25. Year's journals were created, made available online, made available as open access (OA) journals, and made available as OA diamond journals. Note that data points that appeared to go backward in time have been omitted (e.g., OA diamond date preceding OA date). Source: Survey (Q30, Q31, Q32, and Q33, n=1,550).

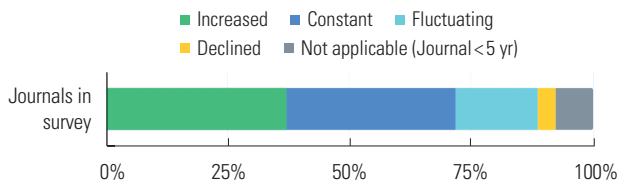


Fig. 26. Journals according to changes in the number of articles over the last 5 years. Source: Survey Q38 (n=1,463).

usually on a growing trajectory, with over 50% of these journals reporting an increase in the annual number of articles over the last 5 years (Fig. 27). No significant differences were reported in the stability of OA diamond journals across disciplines (Fig. 28) except in medical journals.

Discussion

Key results

A wide archipelago of relatively small journals serves diverse communities. The number of OA diamond journals is high (estimated at 29,000) but only a third are registered in DOAJ. OA diamond journals generally publish fewer articles than APC-based ones (356,000 per year compared to approximately 453,000). Since 2018, the share of diamond journal articles

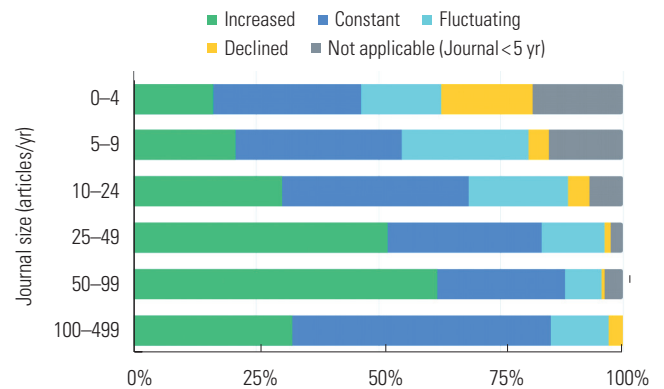


Fig. 27. Journals according to changes in the number of articles over the last 5 years and by journal size group. Source: Survey Q38 (n=1,463).

has been dwindling, which coincides with an increase in articles in APC-based journals. The OA diamond sector is diverse in regions (45% in Europe, 25% in Latin America, 16% in Asia, 5% in the US/Canada) and disciplines (60% HSS, 22% sciences, 17% medicine). In Europe, more than half of these journals are based in Eastern European countries. Most OA diamond journals are small, publishing fewer than 25 articles a year. OA diamond journals serve mainly a national authorship (in all disciplines, including sciences and medi-

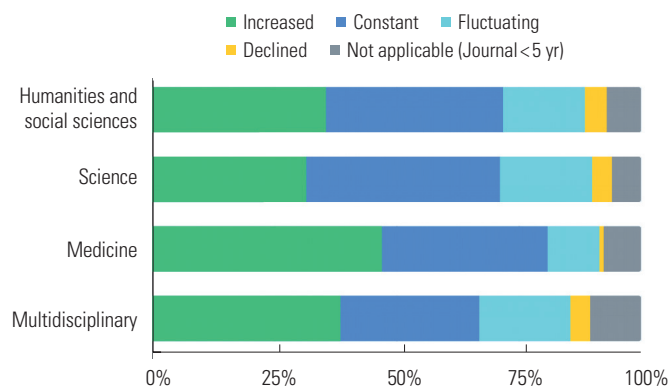


Fig. 28. Journals according to changes in the number of articles over the last 5 years and by discipline. Source: Survey Q38 (n=1,463).

ciné) but disseminate their output to a large international audience. OA diamond journals are much more multilingual (publishing in several languages) than APC-based ones (38% compared to 14%). Almost all OA diamond journals have been OA diamond since they became available online.

Interpretation

There are almost at least 17,000, but likely up to 29,000, OA diamond journals, including journals that have not considered or succeeded in registering with DOAJ. The present data provide more in-depth insights only for OA diamond journals in DOAJ. It is estimated that OA diamond journals publish around 8%-9% of the total number of scholarly articles, and APC-based OA journals around 10%-11%. The share of OA diamond articles in all OA journals has declined since 2017. Compared to APC-based journals, OA diamond is solid in Eastern Europe and Latin America, and weaker in Western Europe. Over half of OA diamond journals are found in HSS. Within those disciplines, a large majority of OA journals are OA diamond, while in medicine, about half of full OA journals are OA diamond.

Most OA diamond journals are relatively small, but not extremely small. This is markedly different from APC-based OA journals, where most articles are published in large or very large journals. Most OA diamond journals are the sole journal of their publisher or have a publisher with just a few journals. Most of these publishers are university-based. Though many OA diamond journals have a national focus in terms of authorship, their readership is often international. The survey found that the number of journals that primarily serve authors at the institution is very low.

While English is the most common language, this tendency is more notable for APC-based journals than for OA diamond ones. Unlike most APC-based journals, many OA diamond journals accept manuscripts in multiple languages. Almost all OA diamond journals have been OA diamond since they be-

came available online. Only a tiny proportion switched to an OA model after being available online as a subscription journal. Very few have switched from an APC-based OA model to OA diamond. Almost three-quarters of journals reported constant or increasing article volume, which can be taken as an indication of journal health and stability.

Limitations

This study was based on a survey of the editors or other corresponding persons of OA diamond journals. Attrition of participation is a major issue. This problem is not limited to the free-text; it affects all the fields of the survey that could not be recovered from the DOAJ since the respondents could skip a question for a variety of reasons, either because they were not interested or because they did not have time. Because only the status of journals and opinions of persons who voluntarily participated in the survey were analyzed, this was not a randomized experimental study. There may have been sampling bias due to the limitation of voluntary participation.

Generalizability

Although this was not a randomized study, the results of this large-scale survey may be able to provide information on the current landscape of OA diamond journals in the world.

Conclusion

OA diamond journals are very numerous, relatively small, often published by small university-based publishers, strong in HSS but important in other disciplines as well, and use the diamond model right from the moment of becoming accessible online. The above results indicate the importance of OA diamond journals. They also point to the main dimensions to reckon with when fostering OA diamond journals: their geographical and language diversity, large number and often smaller size, and their publishers' size.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Data Availability

Dataset files are available from: <https://doi.org/10.7910/DVN/HVGNGY>

Dataset 1. Raw response data from participants of the survey containing 94 questions on OA diamond journals' status from June 2020 to February 2021 without identifying information and without free-text answers (CSV). This includes, for some questions, data from DOAJ for journals present in that database.

Dataset 2. Readme text with the variable list for the survey data file (TXT)

Supplementary Materials

Supplementary files are available from: <https://doi.org/10.7910/DVN/HVGNGY>

Suppl. 1. Survey form of 94 questions in PDF format for open access (OA) diamond journals' status from June 2020 to February 2021.

Suppl. 2. List of journals and platforms consulted for the survey on open access (OA) diamond journals' status from June 2020 to February 2021.

Supplementary tables

Table S1. Global journal number estimates, checked in November 2020

Table S2. Open access models of DOAJ-listed journals covered in ROAD and not covered in ROAD

Table S3. OA journals by size and business model

Table S4. Open access diamond journals by size

Table S5. Journals by geography and size in terms of the number of articles published annually during the years 2017–2019

Table S6. Distribution of DOAJ OA diamond journals in terms of the number of articles published annually during the years 2017–2019 by field and journal size

Table S7. Distribution of DOAJ OA diamond journals and number of articles published annually during 2017–2019 by publisher type and journal size

Table S8. Languages in which OA diamond and APC-based journals publish

Table S9. Languages in which OA diamond journals publish

Table S10. Number of languages accepted by OA diamond and APC-based journals, from the 15 languages mentioned in Table S8

Table S11. Number of languages accepted by OA diamond journals in the survey, from the languages in Table S9

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Ukrainian scientific TV programs and YouTube channels as a distraction from war news on Russia's invasion of Ukraine: a survey-based observational study and a content analysis

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Abstract

Purpose: This study examined whether popular science journalism can be a distraction from war news, as the life of all citizens in Ukraine has changed significantly since the beginning of the full-scale Russian invasion of Ukraine on February 24, 2022.

Methods: This article presents an audience survey on whether they viewed science content as a distraction from war news. In addition, an analysis of 10 Ukrainian YouTube channels was conducted. All videos that were published after February 24, 2022, the start date of Russia's full-scale invasion of Ukraine, were processed.

Results: Out of 460 audience members of TV programs and YouTube channels, 64.8% of respondents considered watching popular science or entertainment programs as a distraction from the war. An analysis of the content of popular science YouTube channels during the first 2 months of the war showed that every active channel was reformatted according to the realities of wartime. In addition, the audience survey demonstrated that even during the war, this type of content has remained relevant.

Conclusion: The Ukrainian audience needed scientific content as a distraction from the war. The majority of respondents, regardless of gender, needed to divert their attention from military operations. Ukrainian science journalists also joined the information war against the foreign invasion.

Keywords

News; Journalism; War; YouTube; Ukraine

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Introduction

Background/rationale

February 24, 2022 was the beginning of a new reality for Ukrainians. They began to see rockets in the sky, respond to air alarms and look for the nearest bomb shelter, give shelter to other people, and avoid certain products. Destroyed houses, mass murders, and relocations affected not only the physical but also the psychological health of Ukrainians. According to the report of the International Organization for Migration, as of May 2022, more than 6 million Ukrainians were forced to leave for other countries. Another 8 million became internally displaced [1]. Some relatively safe people struggled with survivor guilt. Those who came under fire tried to reach safer places, and those who found themselves in occupied areas tried to simply survive. Some refused to leave their homes. Around the clock, people watched the news to understand where there were “green corridors” for evacuations in their area. Ukrainians, regardless of their location, constantly watched, listened, and read the news, fearing missing important information. Subsequently, psychologists advised those who were already safe to try to return to a relatively normal lifestyle—that is, to go to work and distract themselves from the news for a certain time [2].

On February 26, 2022, six Ukrainian TV channels united and launched a joint information television marathon, where they continuously talked about the situation in Ukraine throughout the day [3]. The importance of news for Ukrainians could be seen from the growth in the number of audience members. For example, before the war, the Telegram channel of the Public Broadcaster of Ukraine had almost 9,000 subscribers, while in the first months of hostilities, the audience grew to 290,000 (Table 1) [4].

When the inhabitants of occupied or partially destroyed cities left the dangerous zones, and some returned to their homes, the period of getting used to the war began. News remained the top priority among any other programs. It is worth noting that the news itself has become more dynamic and diversified, partially replacing “entertaining” content for Ukrainians due to the conditions in which they found them-

selves. The news began to give the “emotion” that the audience demanded, for example, the victories of the Ukrainian army or people’s grief. However, in addition to news, work continued on other projects, in particular, popular science projects on YouTube channels.

Objectives

The objective of this study was to expand knowledge about the value of science journalism in times of war. This study allows science journalists to understand the importance of their field by examining the extent to which people need scientific information during wartime.

Methods

Ethics statement

The authors requested feedback and questions from respondents in social media polls. No sensitive personal information was acquired; therefore, neither institutional review board approval nor informed consent was required.

Study design and setting

This is a survey-based observational study and content analysis. An audience survey was conducted on whether they viewed science content as a distraction from war news. The survey was conducted among Internet users using social networks (Facebook and Instagram) from May 18 to June 5, 2022. In total, 460 respondents took part in the survey. The total target number could not be estimated.

Data sources/measurement

The survey consisted of two questions: “Did you start watching scientific or entertainment content to distract yourself from the war” and “Which content did you choose for yourself.” The first question had two answer options (yes or no), and the second question contained three options (science content, entertainment content, or both). The analysis of answers focused on whether viewers started using popular science content to distract from news about combat operations and whether the need to use non-news programs as a distrac-

Table 1. The number of subscribers of the Public Broadcaster of Ukraine after the Russian invasion of Ukraine in February 2022 [4].

Date	Website: unique users (million)	Facebook: video views (million)	Telegram subscribers	Instagram followers
January 2022	4.0	4.2	8,830	16,090
February 2022	7.8	28	213,000	17,361
March 2022	9.5	48	283,000	30,927
April 2022	7.3	33	292,949	40,499
May 2022	5.2	12.3	294,184	40,572

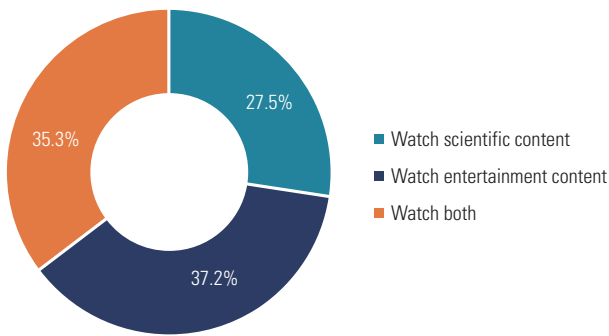


Fig. 1. Audience needs for information after the Russian invasion of Ukraine in February 2022.

tion was associated with gender.

Bias

There was no reportable source of bias in this survey.

Study size

The sample size could not be estimated since only the respondents' data were included.

Statistical methods

Response data from the survey were presented with descriptive statistics.

Content analysis of 10 Ukrainian YouTube channels

An analysis of 10 Ukrainian YouTube channels was also conducted. Ukrainian-language channels with at least 4,000 subscribers were selected. In general, the number of subscribers on the channels varied from 4,000 to 577,000. All videos that were published after February 24—that is, after the start of Russia's full-scale invasion of Ukraine—were processed. Content created before the war was also analyzed for comparison. The content analysis focused on answering the following questions: first, whether the number of releases decreased compared to before the war; and second, whether the new videos mentioned the war.

Results

The results of the audience survey showed that out of 460 respondents, 298 (64.8%) used popular science or entertainment content as a distraction from the war, while 162 (35.2%) did not do so. Of those who answered in the affirmative, 27.5% preferred popular science programs, 37.2% watched entertainment content, and 35.3% watched both (Fig. 1).

Among the 143 surveyed men, 87 (60.8%) needed distraction from news about the war, while 56 (39.2%) did not. Among the 317 surveyed women, 206 (65.0%) used popular

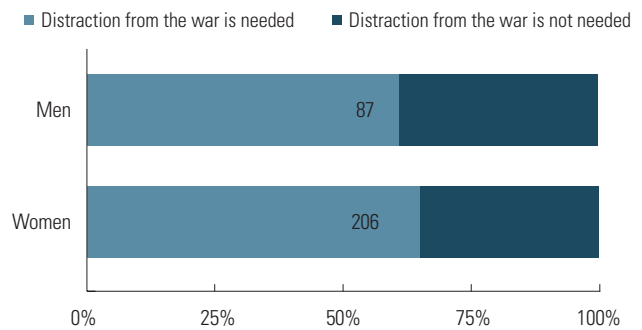


Fig. 2. Audience information needs depending on gender after the Russian invasion of Ukraine in February 2022.

science or entertainment programs as a distraction, while 111 (35.0%) did not (Fig. 2 and Dataset 1).

The analysis of popular science TV programs showed that the content on most YouTube channels had changed; specifically, they have reoriented themselves to the realities of the war. Some channels simply mentioned that Russia had invaded the territory of Ukraine and now active hostilities are taking place in the country, and some began to explain why it is necessary to hide in bomb shelters during alarms, how the weapons that the Ukrainian army has (e.g., Javelins, Stingers, or Bayraktars) work and what Russia's launch of missiles with nuclear warheads might lead to.

The analysis of the quantity and quality of the content identified the following findings:

Imeni T.H. Shevchenka (577,000 subscribers) is a popular science channel on the history of Ukraine. Before the start of the full-scale invasion, the channel also published videos about the difference between Ukrainians and Russians, discussed the topic of how Russia occupied Crimea, and debunked Russian fakes. After February 24, 2022, videos about nuclear ash, how to protect yourself from shelling, and how to destroy tanks began to appear. In addition, the channel analyzed the topics of the division of Ukraine and the history of land fortifications in Ukraine.

Kliatyi ratsionalist (206,000 subscribers) is a channel where the founder, Artem Albul, debunks myths, superstitions, and pseudo-experts in his videos. During the war, videos were not published on the channel.

Tsikava nauka (187,000 subscribers) is a channel for children that dubs popular science and educational videos from foreign YouTube channels from various fields of science. Over the past 2 months, the channel's content and quantitative diversity have not changed. However, at the beginning of each issue, the authors show a patriotic image with the inscription "Ukraine above all"

Tvoia pidpilna humanitarka (130,000 subscribers) is a channel where the author talks about whether the Ukrainian lan-

guage is really the second in the world in terms of melodiousness, whether there was *surzhyk* (a nonliterary linguistic variant characterized by a mixture of Ukrainian and Russian forms), and other topics. Since the beginning of the war, the channel has released two videos in which the author mentioned that Russia attacked Ukraine.

Tokar.ua (43,000 subscribers) is a channel that publishes information about space, technology and inventions. From the beginning of the war, the author of the channel, Nazar Tokar, began to make programs about the war in Ukraine.

Alpha Centauri Ukraine (33,900 subscribers) is a channel that publishes videos from foreign YouTube channels about space translated into Ukrainian. For the first month after the war, there were no videos on the channel, then videos about space novelties began to appear, but before the start of each episode, the authors mention Russia's full-scale invasion of Ukraine. They call to help the Ukrainian army.

Dovkolobotanika (14,900 subscribers) is a channel where author talks about the world of plants and animals. The content on the channel has not changed since the beginning of the war; however, at the beginning of the videos, the author mentions the war that Russia started against Ukraine.

Naukuimo (6,000 subscribers) is a channel where scientists talk about the importance of sleep, as well as ornithology, pain, artificial insemination, and other topics. During the war, one video appeared on the channel, where candidate of biological sciences Olga Maslova, sitting in the basement, talks about a dream during the war.

Lakuna (4,000 subscribers) is a channel where the author records short popular science videos about scientists from various fields and their inventions. Since the beginning of the war, the channel has released only two protest videos (one in Ukrainian, the other in English) about the fact that Patreon does not allow fundraising for the Armed Forces of Ukraine.

D6 nature (4,000 subscribers) is a channel that publishes videos united by the theme of nature. Since the beginning of Russia's invasion of Ukraine, the authors have recorded several videos about the war in Ukraine.

The changes in the quantity and quality of content on YouTube channels are summarized in Table 2.

Discussion

Key results

The results of the audience survey showed that 64.8% of respondents used popular science or entertainment content as a distraction from the war. Of those who answered in the affirmative, 27.5% preferred popular science programs, 37.2% watched entertainment content, and 35.3% watched both.

Regarding the distribution of answers according to gender,

Table 2. Changes in the quantity and quality of content on YouTube channels in Ukraine after the Russian invasion of Ukraine in February 2022

YouTube channel name	Has the number of releases decreased?	Did it mention the war?
<i>Imeni T.H. Shevchenka</i>	No	Yes, changed the content
<i>Kliaty ratsionalist</i>	Yes, decreased	There are no video releases
<i>Tsikava nauka</i>	No	No (very briefly)
<i>Tvoia pidpilna humanitarka</i>	Yes, decreased	Yes, mentioned
<i>Tokar.ua</i>	No	Yes, changed the content
<i>Alpha Centauri Ukraine</i>	No	Yes, mentioned
<i>Dovkolobotanika</i>	No	Yes, mentioned
<i>Naukuimo</i>	Yes, decreased	Yes, changed the content
<i>Lakuna</i>	Yes, decreased	Yes, mentioned
<i>D6 nature</i>	No	Yes, changed the content

among the surveyed men, 60.8% needed distraction from news about the war. Among the surveyed women, 65.0% used popular science or entertainment programs as a distraction.

Interpretation

The results of this survey show that in order to temporarily distract from the realities of combat operations, the majority of the audience used entertainment content. This is because in Ukraine during the war, the development of such content intensified. Stand-ups by comedians in bomb shelters became popular, and a humorous show about the war was periodically broadcast on the air of a nationwide television marathon. Psychologists have also advised Ukrainians to joke and laugh during the war [5]. Laughter should be used as a protective reaction to severe stress. However, one should not underestimate popular science programs, because more than a quarter of respondents preferred this type of content, and 35.3% watched both entertainment and popular science programs.

Out of 10 YouTube channels that were researched, three reduced the number of videos after the full-scale invasion, and one channel stopped publishing videos. This is explained by the fact that a large number of Ukrainian citizens became forced migrants, among whom there could be content producers in this field. It also takes time to organize the filming of programs in new conditions. Another factor was the bombing of residential areas, as among the destroyed buildings were also studios. One of the videos released after the full-scale invasion was recorded in a dilapidated building. Eight out of the YouTube channels that were researched mentioned Russia's invasion of Ukraine in their videos, and four of them changed their content to reflect the realities of the war. Another channel, which does not produce its own content, but

translates videos from foreign channels, began to add a patriotic image at the beginning of the videos. This shows that despite the remoteness of scientific journalism from the military sphere, the authors showed their civil position and gave a clear signal that no sphere of life can be outside of politics nowadays.

Comparison with previous studies

The question of the place of science journalism during the war has not been considered acute, since the most attention has been paid to journalism covering combat operations. War reporting, in short, demands that notions of what constitutes good journalistic practice be realigned on the basis of different criteria than would typically seem appropriate, criteria thrown into sharp relief—at times violently so—by challenging circumstances [6]. However, it cannot be claimed that science journalism completely ceased to exist during wars. Rather, it was pushed into the background by war news. For example, in 1919, after World War I, journalists, publishers, and scientists created the Science News Organization, which distributed scientific news. They were convinced of the importance of scientific knowledge for the American public. The result of this collaboration was the organization Science Service, established in 1921 for the popularization of science, with the support and participation of the leading science organizations. Reaching the public also meant navigating the contentious relationship between scientists and the press to create new ways of translating science information, and overcoming scientists' reticence about sharing their research interests with the lay public [7]. In Ukraine, periodicals during the First World War, especially in 1914–1916, mainly published informational messages about war events, but sometimes presented letters, memoirs, and artistic works that did not have a political or national coloration. This is due to the fact that during 1914–1916, the Ukrainian national press was actually banned by the Russian military authorities, with the exception of a few newspapers and magazines that continued to exist in Russian [8]. The main task for Ukrainian publishers was the revival of Ukrainian culture, which is why, therefore, due to political events, there was not enough space for scientific publications at that time in Ukrainian periodicals. The question of scientific journalism also attracted interest after World War II. As Martin W. Bauer and Jane Gregory write in their study, in the post-World War II period in the United Kingdom, there was a shift in science communication from a logic of journalism towards a logic of corporate communication, or in other words, from media-led activities towards a source-driven reportage of science [9]. Russia's war against Ukraine is still in the hot combat phase, so most Ukrainian journalists are focused on covering events, as well as debunking fakes pub-

lished by pro-Kremlin mass media. Nonetheless, there is still a certain stratum of journalists who continue to cover science news, especially since before the full-scale invasion of Russia in Ukraine, there was a social demand for science TV programs, as exemplified by a previous study finding that more than three-quarters of respondents were interested in scientific discoveries [10].

Limitations

The analytical results of this study reflect the assumption that Ukrainians who have encountered hostilities in Ukraine occasionally need a distraction from news about hostilities. However, the survey was conducted among social network users. If it were possible to survey respondents who do not use social networks, the results of the survey would probably show slightly different indicators.

Conclusion

This quantitative study and content analysis sought to broaden the understanding of whether it is necessary to produce popular science content during hostilities. As a result, it turned out that the audience needed scientific content as a distraction from the war. The majority of respondents, regardless of gender, needed to divert their attention from military operations. An analysis of 10 popular science Ukrainian YouTube channels showed that since the beginning of the war, most YouTube channels have continued their activities, but some have reduced the amount of content on the platform. Despite the remoteness of scientific journalism from the military sphere, the authors showed their civil position and gave a clear signal that no sphere of life can be outside of politics nowadays.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Data Availability

Dataset file is available from: the Harvard Dataverse at:

<https://doi.org/10.7910/DVN/ISNBTM>

Dataset 1. Raw response data of the survey on watching science content as a distraction from war news.

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Why consistent, clear, and uniform instructions for authors are required

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Introduction

More or less regularly, major science publishers circulate testimonials of authors' satisfaction with their group, a specific journal's editorial board, or editors/associate editors assigned to their manuscripts [1–4]. In contrast, quantitative surveys regarding author satisfaction are rather rare, but do exist [5–11].

Almost all testimonials are laudatory, and most surveys report very high rates of satisfaction with most questionnaire items [5,6,9,10]. This is not surprising, much less because of potential biases, but because authors do genuinely appreciate the complex and serious work performed by the editor handling each manuscript and the not less complex work of a whole journal's editorial team. Indeed, most editors are very frequently thanked in private correspondence with the authors, but seldom thanked publicly; may they find here a sincere expression of my and their esteem and gratitude.

One way of thanking editorial team members is to help them accelerate the processes of checking the correctness of a manuscript and the presentation of the manuscript itself. This requires abiding by the instructions contained in the several pages of the “guidelines for authors.” Although most authors may be convinced of the necessity and virtues of a minimum uniformity of all manuscripts submitted to a given journal, and though they are willing to follow all instructions, they still face a number of difficulties during formatting and submission tasks; this was the case for nearly 70% of authors in an international survey by D'Souza et al. [8] and 89% to 96% of dentists according to an Indian survey by Gadde et al. [11].

First, the formatting process may be too long—much longer than any author might imagine before full immersion in it. Examples of long formatting tasks include adapting the title and running title; shortening the abstract, if not the whole manuscript; creating specific sections (highlights, research in context, clinical significance, visual abstract, etc.), or writing cover letters with mandatory sections (suitability for the journal, interest for the readers, etc.). According to relatively recent works, the median formatting time of a manuscript was 14 hours, with a median cost of 477 USD [12]. The lower bound estimate of time wasted on reformatting rejected articles was 1.55 million hours per year [13] and could rocket up to 23.8 million hours

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[14], while the global annual economic burden was estimated at 550 million USD for the first authors and at over 1.1 billion USD for the entire teams [14].

Even supposing that the time and cost of formatting a manuscript does not represent serious barriers if authors target a very specific journal, they might still face a number of puzzling situations stemming from the formatting instructions, the submission system, or both.

The Problems

Problems at the formatting stage

To begin with, in 2018, 68.8% of authors found journal guidelines unclear and/or incomplete [8]. In practice, one problem any author might have faced at least once is inconsistency between the instructions of a given journal. Inconsistencies might concern the place of a particular section within a manuscript, such as the acknowledgments or various statements and declarations. Typically, whereas on page “n” of the instructions, that section (say, the “Title page”) is required *before* another one or *in a separate file*, on page “n+5” or “n+11,” the same section is required *after* it or *in the same file*! For example, consider the following pairs of contradictory instructions: (1) “[The] contributions should be [given in a] separate title page.” vs. “In the submission system, please upload as one file only the Title page.docx and the Full text.docx.”; (2) “You may [submit the] manuscript as a single file” vs. “A separate [page] should include the title, etc.”; (3) “The manuscript should be organized as follows: Abstract (...), Discussion, Acknowledgments, References (...)” vs. “Acknowledgments (...) should be placed in a separate section on the title page.” Note also the following self-recognition of the existence of contradictions: “(...) note that if any information in the Manuscript Preparation Guidelines is inconsistent with the Instructions for Authors, [the latter should prevail].”

Inconsistency might also concern the reference format: the description of a typical reference might be in one format, the example given just below in another format, and the printed material in a third format! For example, consider the following inconsistencies between examples given and published formats (only shown as examples of formats; the titles are concealed): (1) *VanDecar J.C., Russo R.M., James D.E., Ambeh W.B., Franke M. (2003) (...) Journal of Geophysical Research, <https://doi.org/10.1029/2001JB000884>* vs. *A. Thorburn, J. Thorburn, A.E. Frankel (...) Apoptosis, 9 (2004), pp. 19-25*; (2) *Smith JJ (...) Am J Sci. 1999;36:234-5* vs. *Blanc AK, Wardlaw T (...) Bull World Health Organ. 2005;83(3):178-85 S0042-96862005000300010*; (3) *Hamburger, C. (...) Ann. Mat. Pura Appl. 169, 321-354 (1995)* vs. *C. Weyer, C. Bogardus, D.M. Mott, R.E. Pratley, (...) J. Clin. Invest 104, 787-794 (1999)*.

A last but not least inconsistency might exist between those instructions and the requirements of the submission system. For example, the instructions might state that the abstract or the letter to the editor is required as a separate file, but the submission system might require it in a specific box or before the main text within the manuscript file.

Problems at the submission stage

Other difficulties unmentioned by the instruction pages are hidden in the submission system and suddenly discovered at the time of submission: queries for potential reviewers, specific descriptors of the article, peculiar presentation of the authors’ contributions, pieces of information on each author, and the like. Although these queries are often easy to handle, they are nevertheless likely to interrupt the submission session for hours or postpone it for days because of the need to search for reviewers’ addresses, check and order the authors’ contributions, or ask for the agreements of acknowledged collaborators.

One sudden major problem is a red warning that a given author’s affiliation does not match the (potentially erroneous) affiliation entered months ago by another submitting author of another manuscript. Meanwhile, no solution is immediately available to correct the error, make two different affiliations coexist, correct the erroneous affiliation at a later step or, even worse, unblock a stubborn submission system.

Problems after the submission stage

When all the above-cited difficulties have been successfully dealt with, a comforting acknowledgment of manuscript receipt and correct submission is issued. Unfortunately, this does not always happen. Instead, an email mentions one or several submission flaws. Here are a few true-life examples: the conversion of the abstract added extra spaces and made the word count exceed the prespecified limit; the file names were too long or not in line with the journal’s preferences; the title page (required first as a separate file) was not at the head of the main manuscript in the same file; and section “x” was not in the correct place relative to section “y” (especially, various declarations). Needless to say, each of these flaws required checks, amendments, the creation of new files, and, inevitably, a new submission.

Breaches of blind review

This is probably the most astonishing, the most concerning, and the most irreparable rift in the relationship between authors and editors. Indeed, the authors cannot explain, cannot complain, and cannot repair seeing their names at the start of a review report, whereas they were expecting a strict double-blind examination of their manuscript: “This work of Pr

Smith is certainly interesting...” or “I have read with interest the article by Jones, Brown, and Taylor.” What went wrong and when? One personal experience was seeing a separately loaded title page added to the main manuscript in a single PDF document given to the reviewers. Another was a journal’s request to place the authors’ contributions (with the full names) before the references! Furthermore, while some journals recommend anonymizing the manuscript, others forget to do so, and still others even announce breaches of anonymity: (1) “*On manuscript page (...), type the abstract (...) headed by the title of the article and name(s) of the author(s).*”; (2) “*Authors’ contributions (mandatory) (...) Full name and surname should be [given].*”

The Solutions

All the above-mentioned problems have known sources: a steep increase in the number of journals [15,16] (e.g., 30,000 medical journals worldwide [17]), fully electronic (potentially unsupervised) manuscript processing (85% of life science journals) [18], and, above all, the intrusion of for-profit publishing into science. Regarding the latter fact, staff reductions resulted not only in transfer of formatting tasks to the authors, but also in a lack of regular meticulous guideline revisions [19] intended to avoid instruction stacking and duplication, remove inconsistencies, and ensure a perfect match between journal website and submission-site requirements. Whereas it seems nearly impossible or undesirable to step back to fewer journals, less digital processing, and complimentary publishing, other sources of problems may be easily dealt with. Among the solutions, one would like to see the following:

- Regular and accurate revisions of journals’ instructions to ensure consistency, conciseness, and specificity (first vs. last submission) [19].
- Comprehensive revisions and simplifications of submission systems’ too rigid requirements, especially regarding first submissions [12]. This is essential to save research time and perfectly feasible because some submissions require minutes while others require hours!
- Matching essential instructions from journals with simple requirements from submission systems.
- Adopting, anew, clear and uniform requirements (e.g., those of the International Committee of Medical Journal Editors [ICMJE] that prevailed for decades). The idea of uniform guidelines for manuscript preparation and submission was supported by 89.5% of authors and that of a standardized template by 86.7% [11]. According to the latter authors, harmonization would save time (92%) and help focus on content (89.3%). If the idea of a template seems sound and viable, ideally, at least a universal concise

checklist limited to 20 or 30 essential items would be very welcome [20].

Conclusion

Given the ever-increasing number of journals, snubbing such improvements and refusing to build up a reasonable, more or less uniform, and single-page checklist will make authors continue to waste precious time and spend too much money on form rather than on substance [13,14]. Given the current trends in science publishing, seeing a uniform checklist might be a dream, that of 91% of authors [14]; however, if the major journals or publishers move, the others will hopefully follow.

I believe that rigorous and English-fluent authors do read and abide by most instructions, but that a non-negligible number of authors still suppose that “anything goes” after they have drafted a manuscript of any quality or format and imagine they can rely on the reviewers and editors to create a clean and correct version. Obviously, the latter authors should not be encouraged to ignore the instructions but, ideally, they should be given a reasonable and coherent amount of instructions.

Inconsistent guidelines are undoubtedly harmful to science and finances. Most of the sources of inconsistency can be easily identified and removed. Otherwise, the quasi-final and hopefully rewarding steps of knowledge production (drafting, formatting, and submitting) will look like a thick jungle to cross before facing severe comments from reviewers and the difficult task of manuscript revision.

Lastly, the authors “who are both creators and consumers of the scientific literature” and “form the core of the publishing system” need to be heard and offered “an author-friendly system” [8]. They deserve journal guidelines that are as concise and clear as their manuscripts are expected to be.

Conflict of Interest

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Why do journals publish research protocols?

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Introduction

A protocol is defined as “the detailed plan of the study.” Every research study should have a protocol, and the protocol should be written explicitly [1]. The increasing emphasis on transparency in research has been accompanied by a growing recognition of the importance of research protocols. Furthermore, it is well known that various biases, including publication bias and selective outcome reporting bias, can be reduced through protocol registration. In recent years, there has been a shift from registering research protocols to publishing them. This article describes the reasons for publishing research protocols and the foreseeable impacts of this trend.

Registration of Research Protocols

According to the Declaration of Helsinki, “Every research study involving human subjects must be registered in a publicly accessible database before recruitment of the first subject” [2]. The most important reason for pre-registration of study protocols is that human subjects research carries risks to patients. However, a significant number of human studies have not been published. For instance, it was reported that 31% of studies conducted for Food and Drug Administration approval were unpublished, and the results of unpublished studies were mostly negative [3]. Selective outcome reporting is another problem with the non-publication of research. According to the same study, 62% (51/82) of 102 protocols for clinical trials approved for antidepressants showed that the actually reported outcome variables were different from those of the original protocols [4]. Furthermore, the International Committee of Medical Journal Editors mandated the registration of all clinical trial protocols [5].

Publication bias

The first reason why protocols should be registered is to prevent publication bias. Publication bias means that reviewing only published research results leads to an overestimation of the research results. Publication bias occurs because more positive results lead to more submissions, more publications, and a more rapid turnaround time for publication. For example, 13 studies were conducted on the effect of reboxetine, a drug for major depression, but only four of them

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were published. If the overall results were analyzed instead of only published data, the effect of this drug on depression would be greatly reduced, and the possibility of dropping out due to side effects would be twice as high [6]. Registering all protocols significantly reduces the risk of publication bias.

Selective outcome reporting bias

The second reason why protocols should be registered is to reduce the risk of selective outcome reporting bias, which refers to the reporting of only positive outcomes related to the effect of a specific intervention. There are two types of bias in selective outcome reporting. The first involves reporting only some of the measured specific intervention outcomes (i.e., selective reporting of specific intervention outcome measurements), and the second involves reporting only part of the analyzed content (i.e., selective reporting in the analysis).

Advantages of protocol registration

Registering a protocol has several advantages, the most important of which is avoiding publication bias and bias due to selective reporting of intervention results. Registration also avoids unnecessary duplication of research, improves the clarity of conduct and analysis of research, informs ongoing clinical trials, and protects authors' rights in research.

Protocol Registration versus Protocol Publishing

For some time, protocols were subject to registration, not publication. However, this trend has recently been changing. A search for "protocol [ti]" in PubMed (<https://pubmed.ncbi.nlm.nih.gov/>) shows a sharp increase from 469 results in 2000 to 9,815 in 2021. The purpose of protocol publication may differ slightly according to the researcher's point of view, the point of view of academia, and the point of view of society as a whole (Table 1).

Issues Related to Protocol Publishing

Several issues are related to protocol publication. The first is the emergence of protocol-only journals. Several international journals are launching journals that only publish protocols, like spin-offs. For example, *Nature* publishes a journal called *Nature Protocols*, and *JMIR Research* publishes a protocol-only journal called *JMIR Research Protocols*.

The second issue is whether protocol registration or publication will predominate. Although this is not easy to predict, from the author's point of view, there is a possibility that there will be a push toward publication, since authors receive credit for publications. Furthermore, since protocol publication is easy to manage and promote in the academic world, publica-

Table 1. Purpose of protocol publication

Group	Perspective
Individual researcher	<ol style="list-style-type: none"> 1. Protocol publication is favorable for future publication. 2. Some journals require publication. 3. Some journals offer automatic registration. 4. Authors can receive additional credit. 5. Methods can be improved through initial feedback. 6. Some journals cover the publication cost. 7. Some journals discount the publication cost.
Academia	<ol style="list-style-type: none"> 1. Protocol publication provides the institutional review board with data on the current study. 2. The publication time is reduced. 3. Methodological errors and similar issues can be detected at an early stage and can be corrected.
Society	<ol style="list-style-type: none"> 1. Research transparency is increased. 2. Publication bias is prevented. 3. Selective outcome reporting bias is prevented. 4. Duplication of research is avoided.

tion may be advantageous.

The third issue is the possibility of publishing protocols in domestic journals in various countries. At the moment, no Korean academic journals publish protocols. However, publication of a protocol guarantees at least one citation, so it can be a breakthrough strategy for journals that want to increase their citations or suffer from a shortage of manuscripts.

Conclusion

Registration of research protocols has been essential for clinical studies to reduce or minimize the risk of publication bias and selective outcome reporting bias. The advantages of protocol registration include preventing duplicate research, enabling more explicit research conduct and analysis, informing ongoing clinical trials, and protecting authors' rights in a clinical study. There has also been a recent trend for protocol publication, and journals that only publish protocols have appeared. It is time for local clinical journal editors to consider whether they should publish research protocols more actively. Academic society publishers in the medical field should also consider publishing protocol-only journals.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Plan S: estimating future developments

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Introduction

In this brief paper, I will present Plan S and cOAlition S (<https://www.coalition-s.org/>). cOAlition S is a consortium of 27 organizations worldwide. It includes national funders in Europe—from Austria to the United Kingdom—but also the European Commission, as well as several charitable foundations from the United States and the United Kingdom, such as the Bill & Melinda Gates Foundation and the Wellcome Trust. cOAlition S also has a global dimension, with support from the World Health Organization, the Jordanian Higher Council for Science and Technology, the National Science and Technology Council from Zambia, and the South African Medical Research Council. Jointly, these research funding agencies invest about 40 billion dollars in research funds annually, with an output of about 150,000 published articles a year based on that research support. I would like to explain the goals of Plan S, its implementation process, the routes to compliance to open access (OA), and some of our tools, services, and projects.

Why Was Plan S Devised?

cOAlition S funders want all research articles that are the result of their research funding to be fully accessible and reusable on publication with a CC-BY license. In this way, they hope to accelerate the transition to full and immediate OA. This single goal is articulated in the 10 principles that we ask cOAlition S members to implement in their policies.

Many cOAlition S funders have supported hybrid OA in the past. Hybrid OA refers to journals that use a mixed model of publication, in which some of the papers are only accessible via subscription and other papers are published in OA. This model has been around for more than 15 or 20 years, but it is very clear that it has stagnated and failed to provide the rapid transition to OA publishing that is needed. Most hybrid journals have plateaued at around 20% of articles in OA. Even more tellingly, as Table 1 shows, very few journals have completely transitioned to full OA at the major publishers.

Many other problems are also associated with hybrid OA, which we have detailed in the form of six arguments below [1]:

1. Hybrid has not facilitated a transition to OA.
2. The research community pays twice (double dipping).
3. Hybrid journals are more expensive than fully OA journals.

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Table 1. Number of subscription and open access journals at three large publishers

Publisher	Current no. of subscription journals (title)	No. of subscription titles converted to open access
Elsevier	Approximately 2,400	69
Wiley	Approximately 1,600	23
Springer Nature	Approximately 1,900	19

4. Hybrid journals provide a poor quality of service.
5. Hybrid journals crowd out new, full OA publishing models.
6. Reader access: a hybrid journal is a “random OA” journal.

This is why the cOAlition S funders have decided that their funds can no longer be used to publish in hybrid journals, unless these journals are under a transformative arrangement that accelerates the transition to full and immediate OA. In addition, there are still too many subscription-based journals, and the transition to OA means we have to get rid of the subscription system. We want all research articles to be fully accessible and reusable with a CC-BY license. About two million articles are published each year. More researchers, using more different technologies, must be able to have immediate access to these articles to discover new knowledge. We have seen how important it was during the first years of the COVID-19 pandemic that all articles were accessible. Similarly, we need full and immediate OA to face other societal challenges, such as climate change. This is an urgent issue that we need to address as quickly as possible, and our demand for full and immediate OA is based on strong principles.

Plan S: Strong Principles

First, we want OA to articles to be immediate and without embargo periods as soon as an article is published.

Second, all publications must carry a CC-BY license so that researchers retain their intellectual rights.

Third, the funders do not endorse nor will they pay for a hybrid model of publication except as a transitional arrangement with a defined endpoint. Therefore, it is not that we prohibit hybrid journals outright, but we want to provide incentives for hybrid journals to become fully OA journals.

Fourth, we also want the pricing contract and publication fees to be transparent and in line with the services that are provided.

Fifth, we also ask that funders commit to contributing to the payment of OA publication fees if they are fair and transparent. More precisely, we do not want individual researchers to pay for article processing charges (APCs). This means that cOAlition S grants can be used to pay for (non-hybrid jour-

nal) APCs, but these fees should not be paid out of pocket by researchers.

Sixth, to create a more level playing field between journals, we have committed to assessing research outputs based on their intrinsic value rather than on the prestige attached to the venue of publication or the prestige of quantitative metrics. This is something that will gather momentum in the next few years since the European Commission [2] has launched a large-scale project to reform research assessment. cOAlition S is also reevaluating the assessment procedures for awarding grants along the lines of the Declaration on Research Assessment (DORA; <https://sfedora.org/>). As a result of such efforts, funders will give less weight to publishing in high-prestige journals than it is now, and metrics will also play a lesser role.

Implementation Process of Plan S

We do not believe in a single silver bullet that will magically provide OA to research publications overnight. We have developed a pragmatic approach involving integrated policies at all levels of OA. Therefore, we basically support all colors and minerals of OA—diamond, gold, and green OA. We also seek alignment and coordination with other organizations, such as university libraries, university associations, and organizations like the Confederation of Open Access Repositories, with whom we collaborate productively to achieve that goal. We are, of course, also in contact with publishers and publisher organizations about our policy, which impacts them considerably. It is very important to monitor the effects of Plan S on early-career researchers because they are concerned about how cOAlition S policies will affect their future career opportunities. We find that young career researchers are extremely positive toward Plan S.

Three Routes to Compliance

Researchers who have received funding from cOAlition S research agencies are allowed to publish in any journal of their choice. However, certain conditions apply that are in line with the Plan S principles and implementation. We have developed three routes that our funded researchers can use to publish in a way that is compliant with the OA mandate that is a condition of their grant agreement.

Route 1. OA journals and platforms

cOAlition S-funded authors can publish in OA journals or platforms that are indexed by the Directory of Open Access Journals (DOAJ; <https://doaj.org/>). cOAlition S funders are committed to financially contribute to the publication fees of funded authors in these journals, for example, by allowing

their grants to be used for that purpose.

Route 2. The repository route and the rights retention strategy

The second route is more complex. cOAlition S wants to enable researchers to publish in subscription journals, while at the same time making sure that they are compliant with the immediate OA mandate of their grant agreement. Under Plan S, authors are allowed to publish in a subscription journal if they make the author-accepted manuscript (AAM) of their paper available in a repository immediately on publication. Our rights retention strategy assists authors in doing that. Authors who wish to publish in a subscription journal have to inform the publisher at submission that they have applied a CC-BY license to the AAM arising from their submission. That prior CC-BY license then allows the author to share the AAM in a repository when the paper is published in a pay-walled journal.

Publishers do not like this and want to apply a 6- to 12-month embargo to those articles. However, cOAlition S has informed 150 publishers that our funded authors will apply a prior CC-BY license to the AAM arising from their submissions in the future. This was to make them aware that cOAlition S-funded researchers are subject to this policy. Publishers are, of course, free to desk-reject submissions that apply a CC-BY license to the AAM. Still, no publishers have actively informed us that they will do so. Publication in a subscription journal is of course not financially supported by cOAlition S because subscription journals are paid for by subscriptions from university libraries.

For authors, the effort involved in the rights retention strategy is minimal. We only ask them to add a brief CC-BY license statement as a note to their article or to the letter accompanying their submission. The advantages of this statement, by contrast, are immense: once the CC-BY license is applied to that article, it is inviolable, as it is inherent in that paper. This strategy therefore allows authors to deposit the CC-BY-licensed AAM in an OA repository. It also allows the publishers to still have rights to the version of record.

For authors, there are many other advantages to applying a CC-BY license. It means that they can freely reuse all the material in their CC-BY-licensed article without asking for copyright permission from the publisher. Since the CC-BY license is applied to the AAM arising from the submission before any publication agreement is signed with the publisher, that CC-BY license takes legal precedence over any conflicting language in the later publication agreement with the publisher. This is how the rights retention strategy circumvents any embargo the publisher might wish to impose via their publication agreement.

Route 3. Journals under a transformative arrangement

The third route is what we call the transformative arrangement route. This route recognizes journals that are progressively changing from subscription to OA via transformative deals. cOAlition S authors can publish in these journals if their institution participates in such a transformative arrangement.

Transformative arrangements refer to publishing models where the publisher is committed to transitioning subscrip-

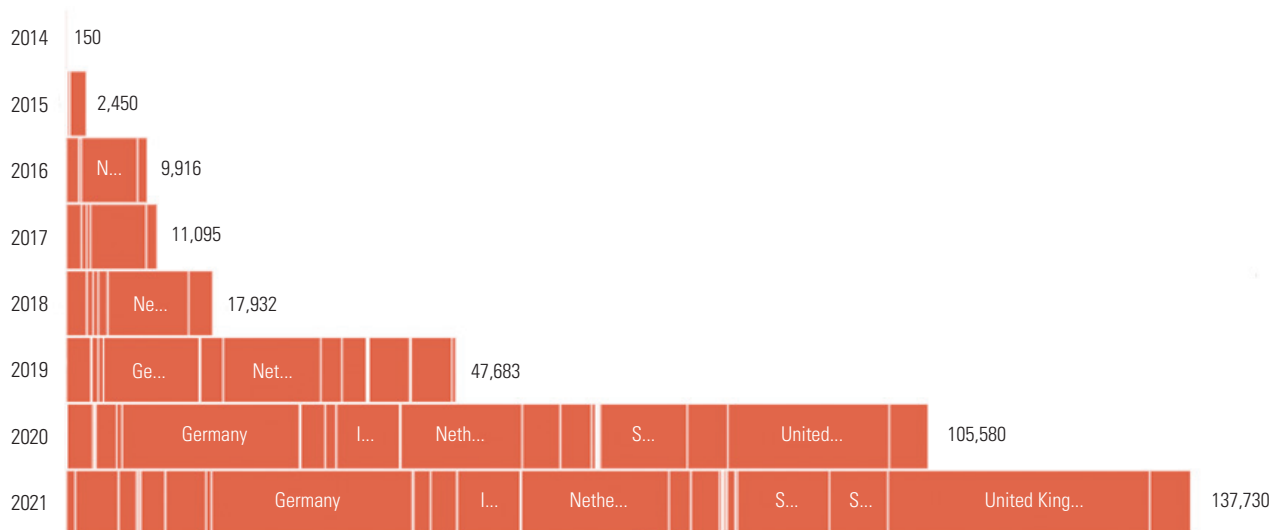


Fig. 1. The increase in open access articles made available by transformative agreements (source: ESAC Transformative Agreement Registry [cited 2021 Jun 18]. <https://esac-initiative.org/about/transformative-agreements/agreement-registry>).

tion and hybrid journals to OA, and library consortia pay not just for reading rights, but also for publishing rights of their researchers in those journals. Fig. 1 shows that transformative agreements are making an enormous contribution to providing OA content. Many publishers are currently taking advantage of transformative agreements to transition their journals to OA. Such agreements are typically negotiated by library consortia, but in some countries, the cOAlition S funder can either contribute to them or be involved in the negotiations leading to them. Journals thus become gradually more OA as more library consortia join in these deals. cOAlition S [3] also supports new publishing models, such as its transformative journals model, which requires publishers to transition their journals in a determined time frame of about 3 to 4 years, while demanding key performance indicators that must be met every year. Fourteen publishers and 2,240 journals have enrolled in this program.

Making It Easy: The Journal Checker Tool

Researchers may find it hard to know exactly how their preferred journals are compliant with cOAlition S policies. It is difficult for researchers to know whether a journal is a gold OA journal, whether it is under a transformative agreement in their region, or whether it is still a subscription journal. For this reason, we decided to help researchers navigate the complexity of OA routes to compliance by developing a Journal Checker Tool (JCT; <https://journalcheckertool.org>). The JCT is a simple search engine that allows a cOAlition S-funded researcher to choose a journal that is compliant with cOAlition S policies. Typing in the triple combination of journal, funder, and institution will allow authors to see how they can publish in the journal of choice as a researcher (Fig. 2). The results allow researchers to see whether the journal in question is compliant with the conditions of the cOAlition S funder’s grant agreement.



Fig. 2. Combination search in the Journal Checker Tool. Author’s screenshot based on <https://journalcheckertool.org/>.

Transparency of Prices and Services

Plan S Principle 5 requires that the structure of publication fees in OA publishing must be made transparent. This is why we have adopted two transparency frameworks. We have selected a provider to build that service. cOAlition S has adopted a phased approach to invite publishers to participate in the Journal Comparison Service (JCS); first, we ask them to sign the JCS Publisher/European Social Fund (ESF) Agreement, and then they can supply their 2021 price and service data by October 31, 2022. If publishers do not participate, the JCT will signal that the journal is not transparent regarding pricing. cOAlition S will actively engage with library consortia to adopt price transparency as a contractual condition in transformative agreements. Publishers who do not provide price transparency may eventually not be eligible for payment by cOAlition S funders.

The JCS is a secure service that enables libraries, library consortia, and funders to better understand whether prices are commensurate with the publication services delivered. Publishers provide information in a standard format, including information about the publication frequency, the peer review process, times from submission to acceptance, the range of list prices for APCs and subscriptions, and more. For reasons of competition law, publishers should not be able to see each other’s price information, and the service will therefore be only accessible to selected users (libraries, consortia, and funders). However, at least these stakeholders will be able to gain insights into the nature and structure of those prices, which are often not tied to the quality of services but to the reputation of the journal. Reputation is not something that cOAlition S funders are willing to pay for. We hope that this price comparison will exert downward pressure on prices and create a more open market.

Diamond Publishing

Diamond OA is perhaps the ideal way of disseminating research. It is free for authors and for readers. There are rarely per unit payments. It is often seen in non-commercial, community-owned, academic-owned, or scholar-led journal publishing. In 2020, cOAlition S and Science Europe commissioned a study on diamond OA publishing that provided a number of findings, recommendations, and a data set [4]. The study produced survey findings from 1,629 journals, and estimated that there are between 17,000 and 29,000 diamond OA journals in the world, 11,500 of which are in DOAJ. Mostly these are small journals: 60.6% in the social sciences and humanities, 17.1% in medicine, but also 22.2% in the sciences. They publish 44% of OA journal articles and comprise 8% to

9% of the total publishing volume. These journals represent an archipelago of small to mid-size journals in the world that are very important to their communities. They may be somewhat isolated and not as visible as the journals of large commercial publishers. Often these are national journals or journals with a smaller audience, and they are frequently strong in multilingualism.

The study formulated recommendations to support these journals, stating that these should be more efficiently organized, coordinated, and funded to realize their potential. Spurred by this study, ANR (French National Research Agency), cOAlition S, OPERAS (European Research Infrastructure for the development of open scholarly communication in the social sciences and humanities), and Science Europe developed a Diamond Action Plan that was presented on March 2, 2022 at Open Science European Conference (OSEC) in Paris, and made public on March 2 for endorsement by organizations and individuals [5]. This is a plan to align and develop common resources for the entire diamond OA ecosystem, including journals and platforms, while respecting their cultural, multilingual, and disciplinary diversity. Over 100 organizations have signed up for the Diamond Action Plan to work together in a community.

The Diamond Action Plan will initially be taken forward by the €3-million HORIZON-WIDERA-2021-ERA-01-43 grant (Capacity-building for institutional open-access publishing across Europe) awarded to the DIAMAS (Developing Institutional open Access publishing Models to Advance Scholarly communication) consortium that grew out of the OA diamond study. The purpose of this project is to comprehensively map diamond OA publishing across Europe, inventorying service mechanisms, funding processes, and gaps. Activities will be developed to improve the coordination, quality, and services of diamond OA publishing. Shared standards and good practices, high-quality journal policies and procedures, and sustainable funding models will be explored. Finally, actionable recommendations will be formulated for strategies and policies to be adopted by research institutions to support their diamond OA publishing activities in a coordinated way across Europe.

What is the Road Ahead for Scholarly Publishing?

Although scholarly publishing is increasingly consolidated around the big five academic publishers, this consolidation is matched by an increasing realization by its users—libraries, researchers, readers, and funders—that it is unaffordable, inequitable, and unsustainable. APCs are sky-high and they are also very unfair toward researchers from developing countries, who simply cannot afford them. There is a risk that the

unsustainable subscription model will be replaced by an equally unsustainable OA publishing model: instead of paying unaffordable subscriptions for journals, we might end up paying for unaffordable APCs. However, I believe the response to this situation is exactly what cOAlition S is trying to do. cOAlition S wants to make sure that prices and services are made transparent, that transformative agreements are open contracts, and that consortia collaborate much more to drive down the prices publishers charge. We also have to look for APC-free solutions, such as the PLoS community action publishing model (<https://plos.org/publish/community-action-publishing-for-authors/>) or diamond OA journals, as a solution to the problem of inequitable access. Researchers in the Southern Hemisphere, for instance, have difficulties paying for high APCs (between \$2,000 and \$3,000 on average) for journals that are mostly published in the Northern Hemisphere. We also see that funders are increasingly setting up their own publication platforms: Wellcome Open Research (<https://wellcomeopenresearch.org/>), Gates Open Research (<https://gatesopenresearch.org/>), and Open Research Europe (<https://open-research-europe.ec.europa.eu>).

I believe that these platforms will gain importance in the next few years, especially as the prestige of journals will no longer be recognized in research assessment. Researchers will be taking control of the publication process through preprint services and journal-independent peer review services, such as Peer Community (<https://peercommunityin.org/>). I think we should aim for a rapid transition to full OA publishing, with a mix of healthily competing commercial and institutional publishing service providers.

Conclusion

The academic community must achieve more control over academic publishing, with sharply delineated roles and responsibilities for academic journal communities on the one hand, and publishing services providers on the other. I think we will see more fragmentation of publishing services, with journal-independent preprint services, independent peer review, and independent preservation services. We will also hopefully be moving towards a more equitable publishing system with more transparent and equitable payments. We should strive towards a globally equitable payment system that is differentiated as a function of the size and income of institutions' leadership, the proportion between the readership and authorship, and regional purchasing power parity.

Conflict of Interest

Johan Rooryck is an executive director of cOAlition S. Other-

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Life as an editor of the *Journal of Stroke*, my third and most vulnerable child

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How the *Journal of Stroke* Was Born

The *Journal of Stroke* (JOS), previously called the *Korean Journal of Stroke* (KJS), was established as the Korean Stroke Society's official scientific journal in 1999. At that time, the Korean Stroke Society requested me to become the first chair of the publishing committee. KJS was an ordinary, domestic Korean journal, and I do not have any particularly interesting or impressive memories of the journal covering the 3-year period from then until I resigned. My position was then filled by the next chair, Dr. Ji-Hoe Heo. However, my relationship with KJS did not end after my resignation. Instead, as I now recall, it was much stronger than I initially expected. In 2012, about 10 years after I resigned from my initial position, the Korean Stroke Society again offered me the editor job.

In those days, there was growing enthusiasm among Korean scientific societies to publish their own journals as international journals written in English and to achieve a reasonably high journal impact factor (JIF) from Thomson Reuters (now Clarivate). The Korean Stroke Society was no exception to this trend and decided to transform KJS into a high-standard, international journal. I think that the society decided to recruit me again partly because after leaving my job as an editor of KJS, I served as the chief editor of the official English-language journal of the Korean Neurological Society. At that time, I, together with other associate editors (AEs), successfully developed a domestic society journal into an international journal—the *Journal of Clinical Neurology* (JCN)—with a reasonable JIF. Currently, the 2021 JIF of JCN is 2.566.

While the members of the Korean Stroke Society may have recognized my ability to develop scientific journals, I do not have a “golden touch” and found it extremely challenging to develop both JCN and JOS. Fortunately, I had excellent colleagues who joined me in the team as AEs in developing JOS: Dong-Wha Kang from Asan Medical Center and Oh-Young Bang from Samsung Medical Center. Our first task was to give the journal a new name. Although the society members had given many good suggestions for journal names, we eventually settled on *Journal of Stroke*. We did not include “Korean” in the journal name, partly due to my experiences with JCN. Although I had also named the JCN, some senior members of the Korean Neurological Association were against dropping the word “Korean,” deeming it unacceptable for Korean journals. However, the other AEs and I thought otherwise. Considering the international image of the name “Korea,” it would be difficult to compete with journals with

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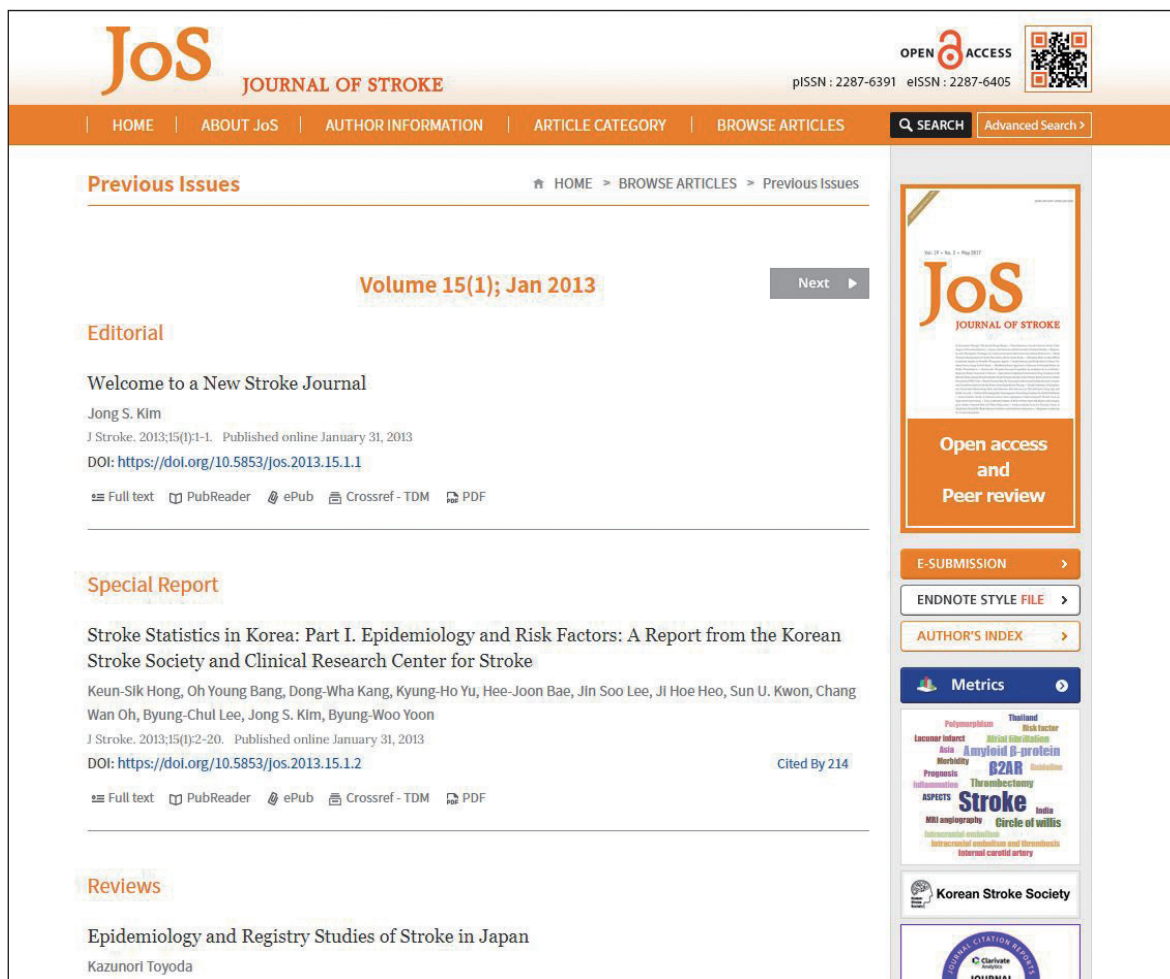


Fig. 1. Screenshot of the journal homepage with article titles of the first issue in 2013, including statistical and epidemiology articles.

names that included geographical terms like “American” or “British” if its name contained the word “Korean.” An English editor who worked at a famous journal production company also advised me to omit the word “Korean,” saying that German scientists would probably hesitate to submit their work to a Korean journal. Some argued that *Journal of Stroke* would be a rather simple and indistinguishable name from that of other journals; however, we thought otherwise. While it is true that the name is very similar to those of existing journals, such as *Stroke*, *International Journal of Stroke*, or *Journal of Stroke and Cerebrovascular Disease*, having a name similar to well-known scientific journals would help convince authors to publish with us when they try to search for appropriate journals for their work. We thought that science and art should be innovative, yet believed that scientists are more conservative than artists. This is how JOS was born, and the first issue was released in early 2013 (Fig. 1) [1].

The Process of Being Indexed in International Databases

JOS was quickly registered in PubMed Central, and we hoped to have it registered in the Science Citation Index (SCI) as soon as possible. Instead of passively waiting to be registered, we chose a more aggressive strategy; we wrote to Thomson Reuters explaining why our journal should be SCI-registered. In the letter, we emphasized the importance of a scientific journal that deals with Asian issues. For instance, while extracranial atherosclerosis (e.g., carotid artery disease) is the main cause of ischemic stroke in the Western hemisphere, intracranial atherosclerosis (e.g., middle cerebral artery disease) is the most common atherosclerotic disease associated with ischemic stroke in Asians and Africans. Nevertheless, scientific papers and textbooks have exclusively described stroke symptoms, mechanisms, diagnoses, and treatments based on carotid artery disease, whereas descriptions of intracranial athero-

sclerosis are very rare. We explained that this unbalanced information in the literature is a major deficiency, since Asians and Africans account for more than 70% of the world's population. Intracranial atherosclerosis, therefore, deserves more attention than extracranial atherosclerosis, and JOS—a journal developed in Asia—needed to be registered to improve the balance of scientific information in this world. We sent the letter in August 2014, and received a response 2 months later from Thomson Reuters saying, “Yes, your journal deserves it.” Thus, just 20 months after the release of the first issue, our journal was already included in the Web of Science Core Collection (Science Citation Index Expanded, SCIE). The decision was quickly made in our favor, probably because we chose to send a letter that reasonably explained the necessity of JOS. My own career as an editor may have also contributed to this success. At that time, I was an AE of the *International Stroke Journal*, *Cerebrovascular Disease*, and the *Journal of Stroke and Cerebrovascular Diseases*. I was also an editorial board member of *Stroke*, and a founding editor of JCN. My track record may have convinced the editors or assessors for Thomson Reuters.

How to Increase the JIF

Before launching JOS, we discussed possible ways to increase the JIF. All scientists wish to submit their work to high-IF journals, but JOS had no impact factor at the time of launch. Therefore, we had to submit our own papers or invited articles as initial publications. We thought that if we wished to make JOS a high-JIF journal, an early and rapid increase in the JIF would be an essential strategy. More qualified manuscripts would be submitted to a journal with a high JIF. The more excellent-quality papers published, the more they would be cited. Through this positive cycle, the JIF would eventually increase. This process is like how life works—rich people become richer because they have money to invest, whereas the poor get poorer without such money. For this strategy, we believed that review papers on exciting and important topics were necessary for the early issues. Therefore, we invited Korean and international colleagues to write about stroke epidemiology. In this way, papers on stroke epidemiology from Korea, USA, Japan, China, and India were consecutively published. We also published a series of reviews on Asian issues, such as intracranial atherosclerosis, moyamoya disease, and hemorrhagic strokes. As expected, these papers were well cited, and the first JIF released in 2016 was surprisingly high, at 4.795. This value was the second highest among all Korean scientific journals and the highest among international journals devoted to stroke research, excluding only *Stroke*. Since then, many papers from various parts of the world have been

submitted to JOS. The following year, the JIF increased to 5.576, which was the highest among Korean journals. The JIF has continuously increased since then, reaching 8.632 in 2021. Now, JOS has become a truly international journal. Aside from Korea, the countries that have most frequently contributed to JOS include—in order of frequency—USA, Germany, Spain, Switzerland, China, France, the Netherlands, Canada, and England.

Support from Colleague Editors

This remarkable achievement was not solely due to my own efforts. At present, I am supported by six AEs: three Koreans (Ji-Hoe Heo from Yonsei University, Keun-Sik Hong from Ilan-Paik Hospital, and Dong Eog Kim from Dongkook University Hospital) and three international AEs (Edip Guro from Harvard University, David Liebeskind from UCLA, and Bijoy Menon from Calgary University). We also have an assistant editor, Jin Soo Lee from Ajou University, a manuscript editor, Joonsang Yoo from Yongin Severance Hospital, and a devoted managing editor, Juhee Jin. I am greatly indebted to these excellent, diligent, and cooperative colleagues. Due to the large number of submissions, about two-thirds receive a “rapid rejection” after the initial screening. While we make it a rule to inform authors if their papers are rapidly rejected within a week of the initial submission, AEs are often busy. In particular, unlike Korean AEs, international AEs occasionally have long vacations, during which they may be difficult to contact. In such cases, I handle the papers by myself after informing the relevant AEs. Other papers are reviewed by two or three reviewers, and we try to make a final decision as quickly as possible. Currently, the acceptance rate of submitted papers is about 5%.

Challenging Environment

Although JOS has received much praise, it still faces challenges. There are strong, competing journals that also enjoy increasing JIFs. Because these journals represent areas with large populations, such as the USA, China, or Europe, it is becoming more and more difficult to improve our JIF. The same seems to be the case for other Korean journals. All editors of Korean journals should try their best to improve their journals through their own effective strategies. In addition, I think that high-quality papers can only be produced in societies with high social standards backed by stable budgetary support. Thus, the country's economy and social standards have an important bearing on the future of Korean journals.

Conclusion

I have been connected to JOS for more than 30 years, from 1999 until now. I have spent a lot of my time and energy on this journal. I am now very proud to see that JOS has grown into an international, high-JIF journal. However, I do know that in this competitive world, we still need more painstaking work to improve or even maintain the quality and increase the position of JOS in the global ranking of academic journals. For me, JOS is like a family member. I have tried my best to take care of my children (one son and one daughter) when they were young, but they are now grown up. I feel that JOS is my third and the most vulnerable child who still needs my constant care.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Reference

1. Kim JS. Welcome to a new stroke journal. J Stroke 2013; 15:1. <https://doi.org/10.5853/jos.2013.15.1.1>

Meeting report on the 16th EASE General Assembly and Conference

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Meeting: 16th EASE General Assembly and Conference

Date: 24-26 June 2022

Venue: Valencia, Spain and online

Organizer: European Association of Science Editors

The conference was held in Valencia, Spain and online simultaneously from June 24 (Friday) to June 26 (Sunday) local time. I participated online, so the time difference was a relevant factor. Due to the time difference, the conference began at 10 PM on Friday and at 4 PM on Saturday and Sunday here in Korea. On the first day, at 10 PM Korea time, the conference started with an overall report of the European Association of Science Editors (EASE), including a financial report and a description of the membership according to nationality. Turkey had the most members, while Croatia had the most regional chapters, followed by Turkey. In an editing-related course provided to the members of the EASE, there were 104 participants from Turkey, 23 from Croatia, eight from Ukraine, and five from Romania. Another remarkable aspect of the conference was that the GatherTown virtual meeting platform was used as a place where questions that had not been asked during lectures could be asked, and the participants could have conversations with each other (Figs. 1, 2).

It was easier to focus on the lectures on the 2nd day (Saturday) as they began at 4 PM Korea time. In the “Landscape of scholarly publishing in Spain” session, the distribution of universities (50 public and 33 private universities) and the growth and composition of academic publications in Spain were introduced. Moreover, the speaker presented the types of copyright (e.g., Creative Commons BY-SA) and the percentage of each type. An interesting aspect of this presentation was that each slide contained pictures related to Valencia and Spain to provide further context about Spain. A detailed explanation of preprints was then given, and their advantages and disadvantages were mentioned. MDPI, one of the main sponsors, gave an explanation of open access and a presentation about MDPI. The speaker explained the three types of open access (green, gold, and hybrid) and the benefits that open access brings to researchers, research funding organizations, and the general public. MDPI’s history, the number of articles published, and the time required for publication were introduced as well. The session ended with an introduction of its initiatives, membership, and partnerships. Within my understanding, many people from MDPI participated in the conference and were actively involved in an-

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swering questions. In addition, the MDPI representative talked about the efforts they make to find reviewers and how they try to avoid delays by handling publication through their in-house office.

Professor Ana Marušić from Croatia, co-editor-in-chief of the *Journal of Global Health*, described in detail how she overcame the obstacles she faced as the editor-in-chief of a small journal. She had a lot of challenges, including a small number of researchers/institutions, difficulties in receiving financial support, and linguistic limitations. She described holding workshops with authors, including prospective authors. She also advised authors to “make haste slowly” and talked about the responsibility for research, how to plan and design studies, and even technical areas such as statistical analysis. An analysis of the workshops was presented. From 2003 to 2011, 17

workshops were held, and the authors who participated in the workshops were cited more frequently in scientific journals and had a higher h-index. Professor Marušić reported that she held workshops with students as well. Although small journals can be expected to experience difficulties, her efforts to overcome them wisely and enthusiastically were impressive.

Thomas Lang gave a presentation on submission guidelines for authors. He proposed preparing manuscript files for submission according to the type of the study. He explained different reporting guidelines that exist for different types of studies: CONSORT (randomized trials), STROBE (observational studies), and SRQR (qualitative research). He emphasized the importance of checklists and mentioned items that could be included in them (e.g., clinical trial registration, patient privacy, data sharing, sample repository and authorship, duplicate publication, divided publication, plagiarism, and copyright transfer). There was also a detailed explanation of references. He pointed out that it can be inappropriate to limit the word count of subheadings of an abstract (e.g., 20 words for Purpose and 140 words for Methods). Finally, he proposed instructions for authors that would be easy to understand and follow.

Session 3, “Innovations from editors to help authors with manuscript submission,” helped me develop a wider viewpoint of the peer review of a journal paper. In general, the process involves an article being submitted to a journal and then reviewed. However, I also had the opportunity to think about journal-independent peer review. One speaker said that deciding whether an article fits a journal is the task of the editor-in-chief, not reviewers. Through journal-independent

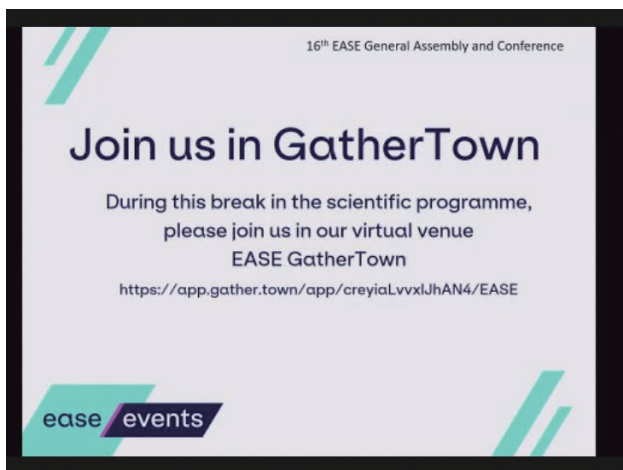


Fig. 1. Announcement regarding GatherTown virtual meeting platform.

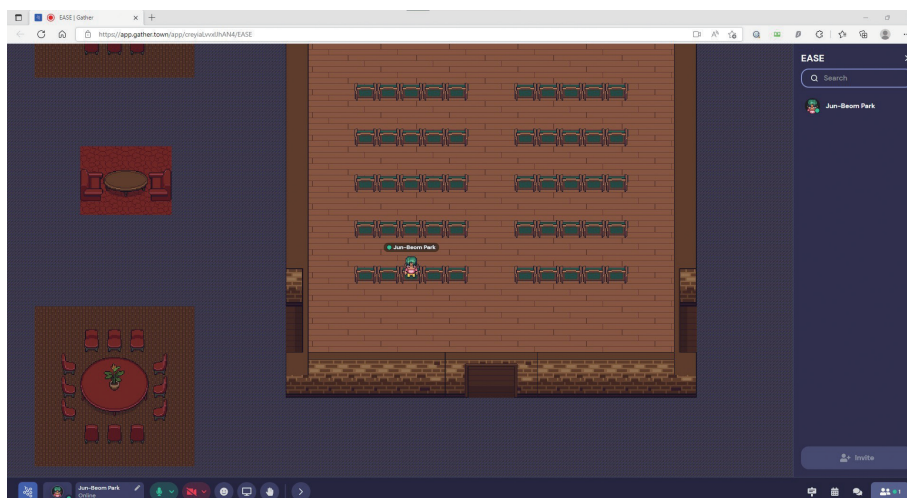


Fig. 2. Attendance of GatherTown through online (There was personal information of the participants, so the content of the attendance by the present author is presented).

peer review, multiple review processes can be reduced, and the time it takes for articles to be published can also be shortened. There was also a presentation about journal-agnostic peer review. Dr. Bernd Pulverer introduced eLife, a journal that only publishes articles that go through a preprint review system, even though they have not been published elsewhere, implementing a publish then review model of publishing. In the Cell Press Community Review process, authors select journals that they are interested in, and the editor-in-chief provides initial feedback.

The next lecture was on the publication process of an article. The speaker argued that it would be desirable for assistant editors to check the articles to be published to confirm whether the articles have been prepared well in all areas according to the journal's instructions and scope. He also said that it was possible to check redundancy, authorship, and data accessibility, and that a senior editor should be selected. He proposed using iThenticate (Turnitin, LLC) to check for duplication and plagiarism and to comply with the Committee on Publication Ethics (COPE) guidelines. A detailed explanation of copyright, data accessibility, and ghost/gift authorship was provided as well. In addition, a presentation was given on helicopter (parachute and neo-colonial) science. The speaker said that the responsibilities of a senior editor included an assessment of the scope and novelty of a study, redundancy with existing publications, and whether a study fits the journal's standards regarding the publication, such as excluding case studies, and study design. For this, several methods were introduced, such as an inside-out approach method where the results of a journal article can be evaluated first to determine whether the article is suitable for the journal, whether desk rejection is appropriate, or whether an associate editor should

be selected. For the journal the speaker operated, 58% of those manuscripts were desk-rejected, of which 70% were offered transfer to sister journals. The speaker also shared the difficulties he had as an editor-in-chief.

There was an opportunity to think about paper mill submissions and image manipulation and to learn about a random face generator. Manipulated images can be detected using forensically and Photoshop/Gym. Clues can be found by examining cover letters closely. The speaker added that not all issues can be resolved by just one tool, and many efforts will be needed since paper mills will learn about the solutions quickly. The editorial structure of PLOS ONE was also introduced. They described their reviewers', authors', and editors' experiences. The presenter emphasized the scope of PLOS ONE and stated that PLOS ONE covers various fields of research and evaluates whether articles have methodological rigor and high ethical standards, regardless of their perceived novelty.

On the last day of the conference, I joined in a discussion of participants on GatherTown and attended the lectures. I would like to thank everyone involved for giving me an opportunity to participate in this excellent conference.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Open-source code to convert Journal Article Tag Suite Extensible Markup Language (JATS XML) to various viewers and other XML types for scholarly journal publishing

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Abstract

There are many ways to use open source code to implement digital standards for scholarly journal publishing. However, providing digital services using open-source code can be a challenge, especially for small and local academic society journals. This paper provides some critical examples of using some of the many open-source code resources available to the public. Journal Article Tag Suite (JATS) Extensible Markup Language (XML) has been established as an essential tool, and is now used by most journals for digital publication. JATS XML can be converted to other viewer formats, including Extensible Hypertext Markup Language, PubReader, and EPUB 3.0. It can also be used to create dynamic interactive PDFs. It can be converted to other XMLs, including Crossref XML, PubMed XML, and DOAJ XML. Open-source code published on GitHub, National Information Standards Organization, and the US National Library of Medicine can be used for Crossref XML deposition for digital object identifier and Crossmark stamp registration. These examples of open-source code need to be implemented on journal websites to provide local academic journal publishers with various critical functions. This paper provides instructions on the best ways to realize these digital standards so that journal content can be provided to readers in a more friendly and effective way.

Keywords

Crossref; Digital publishing; GitHub; JATS XML; Open-source code

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Introduction

Background

Open-source code is widely used in scholarly journal publishing in all fields, including in scientific society journals. The biggest changes in scholarly journal publishing over the past decade have been the change from analog publishing to digital and the expansion of open access [1]. As part of the evolution of open access in the digital era, journal publishing services using open-source code have improved considerably. While it would be ideal for local academic society journal publishers to develop their own technology with abundant funding, the way international commercial publishing companies do, the lack of available experts and technical limitations generally make open-source code solutions more practical. Just as with the open-science movement, the open-source movement is actively underway. The movement of constructing a global public indexing database is suggested, which would include more scholarly journals than those in the commercial databases. If many academic society journal publishers can produce the full-text Journal Article Tag Suite (JATS) Extensible Markup Language (XML) files and deposit those files to the suggested database, this movement can be realized quickly [2].

Objectives

This paper shows how to implement digital standards in journal publishing with several examples of open-source code applications. Specifically, examples of JATS XML conversion to various viewers such as Extensible Hypertext Markup Language (XHTML), PubReader (National Library of Medicine, Bethesda, MD, USA; <https://www.ncbi.nlm.nih.gov/pmc/about/pubreader/>), EPUB 3.0 (International Digital Publishing Forum; <https://idpf.org/epub/30/>), and interactive PDFs are described, as well as conversion from JATS XML to Cross-

ref XML, PubMed XML, and Directory of Open Access Journals (DOAJ) XML, with automatic deposition of Crossref XML and insertion of Crossmark stamp.

JATS XML as a Key Format in Scholarly Journal Publishing

JATS provides a common XML format in which publishers and archives can exchange journal content. It provides a set of XML elements and attributes for describing the textual and graphical content of journal articles as well as some non-article material such as letters, editorials, and book and product reviews [3]. The conversion of JATS XML for various viewers is required to provide access to the content to readers of the journal. Conversions to XHTML, PubReader, EPUB 3.0, and PDF are basic utilities for journal publishing. JATS XML is a standard document in scholarly journal publishing adopted by American National Standards Institute and National Information Standards Organization and its code is open for anyone to use.

JATS XML to XHTML for Viewing in Browsers

Since JATS XML has only elements and attributes of XML, it must be converted to XHTML to display on a website. Fig. 1 describes the relationship between Cascading Style Sheet (CSS) and Extensible Stylesheet Language (XSL) and how they specify the overall layout of web documents when they are displayed in XHTML converted from JATS XML-written articles.

The open-source preview XSL Transformation (XSLT) stylesheets required to convert JATS XML to XHTML are available from NCBI GitHub (<https://github.com/ncbi/JATSPreviewStylesheets>). The “jats-html.xsl” document converts to html, which, when combined with a CSS file that specifies the layout of the web document, can be displayed as

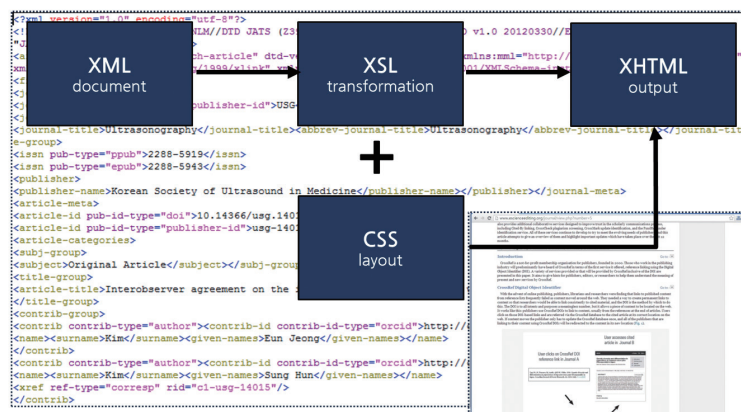


Fig. 1. Relationship between XSL and CSS files. XML, Extensible Markup Language; XSL, Extensible Stylesheet Language; XHTML, Extensible Hypertext Markup Language; CSS, Cascading Style Sheet.

a dynamic web document. It can be declared as shown below.

Example process of converting kcse-205.xml to XHTML (Suppl. 1)

Step 1.

```
<?xml version="1.0" encoding="UTF-8"?>
// At the declaration of "kcse-205.xml", add and call the
"jats-html.xml" as below. CSS styles defined in "jats-pre-
view.css" is included in jats-html.xml.
<?xml-stylesheet type="text/xsl" href="jats-html.xml"? >
<!DOCTYPE article PUBLIC "-//NLM//DTD JATS
(Z39.96) Journal Publishing DTD v1.0 20120330//EN"
"http://jats.nlm.nih.gov/publishing/1.0/JATS-journal-
publishing1.dtd" >
<article article-type="research-article" dtd-version="1.0"
xml:lang="en" xmlns:mml="http://www.w3.org/1998/
Math/MathML" xmlns:xlink="http://www.w3.org/1999/
xlink" xmlns:xsi="http://www.w3.org/2001/XMLSche-
ma-instance" >
```

Step 2.

Fig. 2 is the result of browsing "kcse-205.xml" with Firefox Browser ver. 102.0.1. Fig. 3 presents a screen view of "kcse-205.xml" that includes font size, font style, font color, line breaks, and other elements in the CSS file.

The resulting output becomes visible on the website as XHTML.

JATS XML to PubReader

PubReader is another, more reader-friendly web presentation option for literature in Pubmed Central (PMC) and Bookshelf. Designed especially for enhanced readability on tablets and other small screen devices, PubReader can also be used

on desktops and laptops and with multiple web browsers [4]. The open-source code and process for converting JATS XML documents to PubReader are available from NCBI GitHub (<https://github.com/ncbi/PubReader>). This conversion method generates HTML files for PubReader from JATS XML. Alternatively, for smoother continuous maintenance of published articles, XSLT is also available using the PubReader open-source code. XSLT is a language for converting XML documents into other formats, such as other XML documents or HTML for web pages. The following is an example of code that converts the JATS XML document to PubReader format using an XSLT processor, which must be installed on the application server.

Two ways to produce PubReader files:

The first method is to compile XML file to produce HTML using "saxon9he.jar" as below:

```
> > java -jar saxon9he.jar -xsl:/xsl/test-page.xsl -s: /xml/
kcse-205.xml > kcse-205.html
```

The second method is to use XSLTProcessor. XSLTProcessor applies an XSLT stylesheet transformation to an XML document to produce a new XML document as an output. After installing XSLTProcessor, the xml file is converted to PubReader with the following function. There was no creation of HTML file:

```
$xsl_file = /xsl/ test-page.xml";
$xml = new DomDocument();
$xml->load($xsl_file);
$processor = new xsltprocessor();
$processor->importStyleSheet($xml);
$html = $processor->transformToXML(/xml/kcse-205.
xml);
```

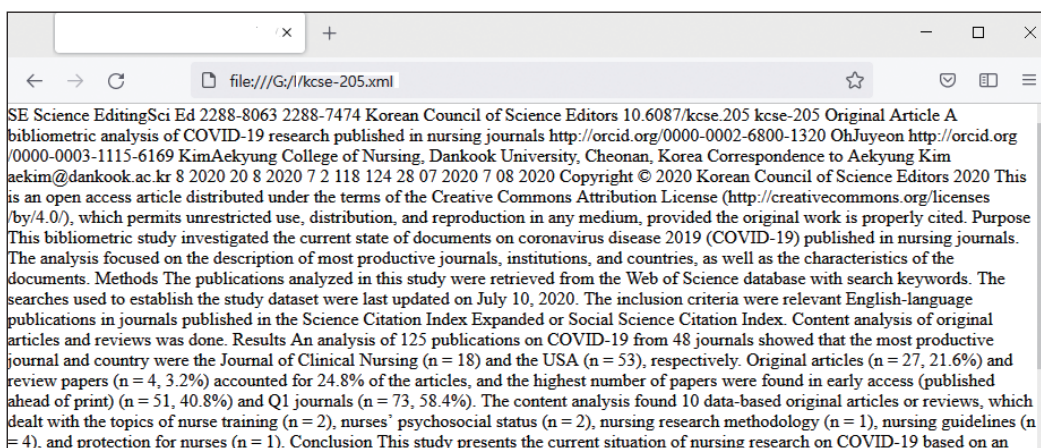





Fig. 2. Screen view of combining kcse-205.xml and jats-html.xml.

Original Article
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<https://doi.org/10.6087/kcse.205>

A bibliometric analysis of COVID-19 research published in nursing journals


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Abstract Go to: 

Purpose
 This bibliometric study investigated the current state of documents on coronavirus disease 2019 (COVID-19) published in nursing journals. The analysis focused on the description of most productive journals, institutions, and countries, as well as the characteristics of the documents.

Methods
 The publications analyzed in this study were retrieved from the Web of Science database with search keywords. The searches used to establish the study dataset were last updated on July 10, 2020. The inclusion criteria were relevant English-language publications in journals published in the Science Citation Index Expanded or Social Science Citation Index. Content analysis of original articles and reviews was done.

Fig. 3. Screen view of combining kcse-205.xml, jats-html.xsl, and kcse.css.

JATS XML to EPUB 3.0

EPUB is an open, free electronic book viewer format established by the International Digital Publishing Forum as a standard for eBooks worldwide. EPUB files have automatic space adjustments that allow them to deliver content optimized for various device characteristics, and can be read through eBook viewers that support the EPUB format [5]. The file has a “.epub” extension and can be considered as a single compressed file. Fig. 4 explains the components of EPUB 3.0 after decompression, which renames the extension of the file to a “.zip” file. The open-source code for converting JATS XML to EPUB is available from the GitHub account of the World Wide Web Consortium (W3C; <https://github.com/w3c/epub-specs>).

There are three essential files in the “kcse-205-epub” folder in the Supplement, “/OPS/epub.ncx,” “/OPS/epub.opf,” and “se-205.xml.” The conversion process should be guided by appropriately trained computer engineers.

JATS XML to PDF

To convert JATS XML to PDF, an Extensible Stylesheet Language Formatting Objects (XSL-FO) document should first be created. XSL-FO is an XML-based markup language for output to various media including paper screens. The process

for producing an FO document is explained in Fig. 5. An FO document is generated by combining an XML file and an FO-XSLT file. The JATS XML can be converted to the final PDF by the generated XSL-FO document, using various easily available formatters. Open-source code that can generate XSL-FO documents from JATS XML is also available on the NCBI GitHub site (<https://github.com/ncbi/JATSPreviewStylesheets/blob/master/xslt/main/jats-xslfo.xsl> or <https://github.com/ncbi/JATSPreviewStylesheets/tree/master/shells/saxon/>). The conversion method is similar to the conversion of JATS XML to XHTML. Note that if the FO document was generated using the above method, it the PDF will be generated in A4 size, as shown below.

```
<?xml version="1.0" encoding="UTF-8"?>
<fo:root xmlns:fo="http://www.w3.org/1999/XSL/Format">
<fo:layout-master-set>
<fo:simple-page-master margin-right="0.5in" margin-left="0.5in" margin-bottom="0.5in" margin-top="0.5in"
page-width="8.267717in" page-height="11.023622in"
master-name="cover">
<fo:region-body margin-right="0in" margin-left="0in"
margin-bottom="0.5in" margin-top="24pt" region-name="body"/>
</fo:simple-page-master>
```

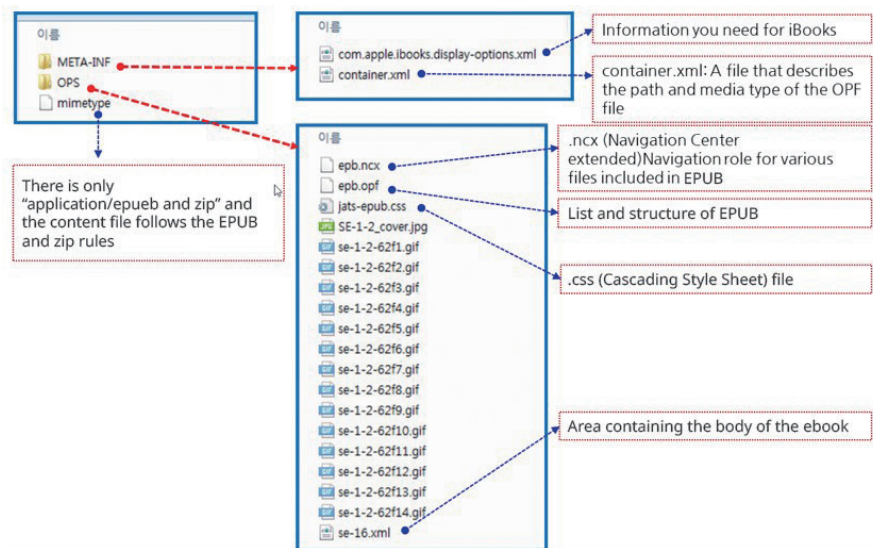


Fig. 4. Components of EPUB 3.0.

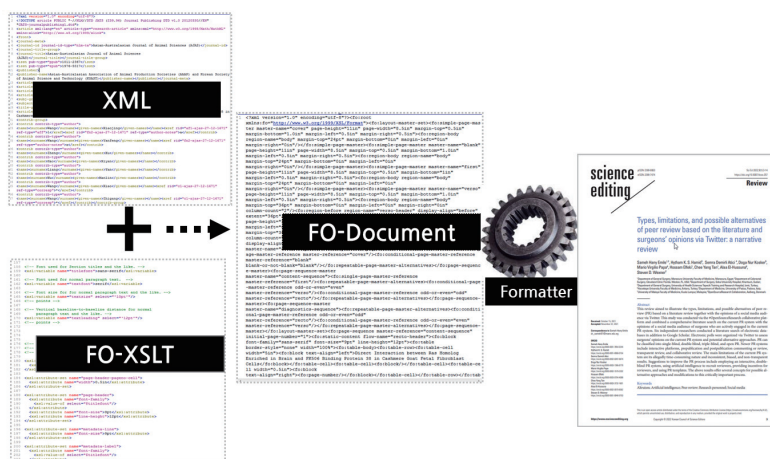


Fig. 5. JATS to PDF conversion process (XML, XSLT, and XSL-FO). JATS, Journal Article Tag Suite; XML, Extensible Markup Language; FO-XSLT, Formatting Objects Extensible Stylesheet Transformations; XSL-FO, Extensible Stylesheet Language Formatting Objects.

The generated FO document can be easily converted to a PDF using a publicly available formatter. One of these is the Apache FOP Project (<https://xmlgraphics.apache.org/fop/fo.html>). PDFs can also be generated using paid programs.

An example of converting an XML file to PDF is presented below.

```
Step 2. Format "kcse-205.fo" with "Antenna House AH Formatter" to produce "kcse-205.pdf"
>> sh /Formatter/AHFormatterV62_64/run.sh -d /xml2pdf/fo/kcse-205.fo -o /xml2pdf/pdf/kcse-205.pdf -x 4 -i /xml2pdf/config.xml
```

Example of generating "kcse-205.pdf" from "kcse-205.xml"

```
Step 1. Compile "kcse-205.xml" using saxon9.jar to produce "kcse-205.fo" under the JAVA environment
>> java -jar /saxon/saxon9.jar -o:/pdf/kcse-2005.fo' -s:/xml/kcse-205.xml, ' -xsl:/ shells/saxon/ jats-PMCcit-print-fo.xsl
```

JATS XML to Crossref XML, PubMed XML, and DOAJ XML

Open-source options are available for sending article metadata to several indexing databases. JATS XML can be converted to other XML formats to deposit metadata XML files to Crossref, PubMed, and DOAJ using open-source code. Receiving and sending metadata in XML is currently the most

efficient and convenient way to send article metadata to the indexing databases. Crossref XML, PubMed XML, and JATS XML are the best formats to deposit into Crossref, PubMed, and DOAJ, respectively. The open-source for converting JATS XML into Crossref XML and PubMed XML is available at the NCBI GitHub account (<https://github.com/ncbi/PMCXML-Converters>). Since JATS XML is an extension of PMC XML, it can be easily converted using two open sources, “pmc2pubmed.xml” and “pmc2crossref.xml.” DOAJ provides schema and sample xml files for DOAJ XML (<https://doaj.org/docs/xml/#the-doajarticlesxsd-schema-file>), allowing JATS XML to be converted DOAJ XML using the schema. Below is the example of converting JATS XML to Crossref XML, PubMed XML, and DOAJ XML.

Declaration of DTD of “kcse-205.xml” is required as below:

```
<?xml version="1.0" encoding="utf-8"?>
<!DOCTYPE article PUBLIC "-//NLM//DTD JATS (Z39.96) Journal Publishing DTD v1.0 20120330//EN"
"http://jats.nlm.nih.gov/publishing/1.0/JATS-journal-publishing1.dtd">
<article article-type="research-article" dtd-version="1.0"
xml:lang="en" xmlns:mml="http://www.w3.org/1998/Math/MathML" xmlns:xlink="http://www.w3.org/1999/xlink"
xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
```

.....

1. Conversion of JATS XML to Crossref XML
 Compile “kcse-205.xml” using saxon9.jar to produce “crossref-kcse-205.xml” under the JAVA environment

```
>> java -jar saxon9he.jar -xsl:/xsl/pmc2crossref.xml -s:/xml/kcse-205.xml > /crossref/crossref-kcse-205.xml
```
2. Conversion of JATS XML to PubMed XML

```
>> java -jar saxon9he.jar -xsl:/xsl/pmc2pubmed.xml -s:/xml/kcse-205.xml > /pubmed/pubmed-kcse-205.xml
```
3. Conversion of JATS XML to DOAJ XML
 Example DOAJ XML file and DOAJ XML schema file are provided at the DOAJ website, <https://doaj.org/docs/xml/>.
 A JATS XML file can be converted to DOAJ XML using an XPath query as below:

```
$publisher-name = $xml->xpath("/article/front/journal-meta/publisher/publisher-name");
$journal_title = $xml->xpath("/article/front/journal-meta/journal-title-group/journal-title");
$issn = $xml->xpath("/article/front/journal-meta/issn[@pub-type='epub']");
$seissn = $xml->xpath("/article/front/journal-meta/
```

```
issn[@pub-type='epub']");
```

The converted DOAJ XML is as follows:

```
< records >
  < record >
    < language > eng < /language >
    < publisher > Korean Council of Science Editors
  < /publisher >
  < journalTitle > Science Editing < /journalTitle >
  < issn > 2288-8063 < /issn >
  < eissn > 2288-7474 < /eissn >
  .....,
  < /record >
< /records >
```

Automatic Deposition of Crossref XML and Crossmark Stamp

Since the Crossref service is now essential in scholarly journal publishing, most journals grant digital object identifiers (DOIs). To facilitate Crossref XML deposition for DOI and quickly put Crossmark images into PDFs, a Crossref PDF stamp can be downloaded from the GitHub Crossref account (<https://github.com/CrossRef/pdfstamp>). Using pdfstamp.jar, the Crossmark stamp can be inserted in a PDF using the following commands.

In the command line, DPI is set as 250; Crossmark logo file is “CROSSMARK_Color_square_108.png”; and, XY axes are set as Position X: 520, Position Y: 75.

Below is the example JAVA compile:

```
>> java -jar./pdfstamp.jar -d 250 -I /img/CROSSMARK_Color_square_108.png -l 520,756 -o /pdfstamp/ -u https://crossmark.crossref.org/dialog/?doi=10.6087/kcse.205&domain=pdf -p 1 /pdf/kcse-205.pdf
```

Fig. 6 is a simple example of how to load a PDF file from a website, specify the X and Y coordinates, load the Crossmark logo file, and insert the Crossmark logo using the above command.

There are various ways to deposit Crossref XML, including web deposit and logging in to <https://doi.crossref.org> with a Crossref account. As it can be cumbersome to log in and deposit every time, however, Crossref provides a tool to automatically deposit from the user’s server (<https://www.crossref.org/documentation/content-registration/direct-deposit-xml/https-post-using-java-program/>). The “crossref-upload-tool.jar” file can be downloaded from the above URL and installed on the user’s server to easily deposit Crossref XML. The following example commands can be used for deposition.

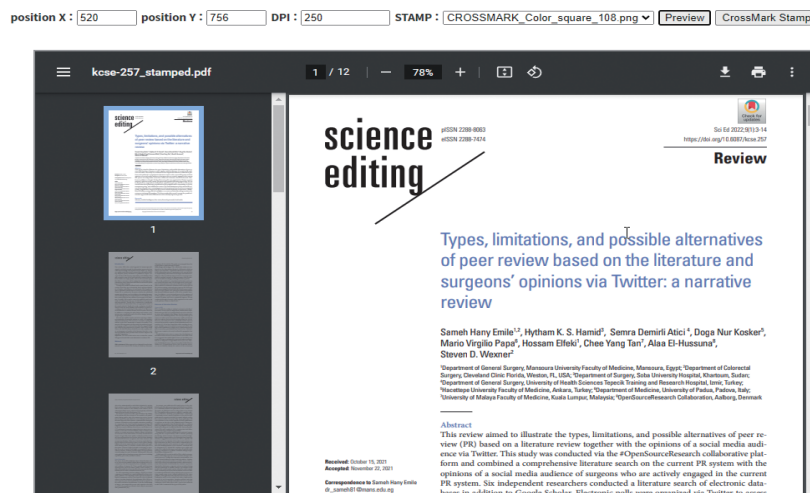


Fig. 6. Method of applying a Crossmark stamp.

Direct deposit of a Crossref XML file is possible with the following command.

```
> > java -jar doUpload.jar -u {Crossref_username} -p {Crossref_password} -f /xml/crossref-kcse-205.xml
```

The files used for converting the JATS XML to various viewers and other XML types for scholarly publishing were available from Suppl. 1.

Conclusion

By creating JATS XML documents for articles, the digital publication of academic journals can be improved using the various examples of open-source code discussed above. JATS XML files are, therefore, a core element of online journal publication, and JATS XML creation is a necessary step toward building more digital services for the publication of academic journals. Using the open-source methods discussed above will aid the publishing of scholarly journals online by creating a simple publishing process and various digital services. In the future, new open-source applications based on the presently available code will likely be used more frequently by volunteers and other interested parties.

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No potential conflict of interest relevant to this article was reported.

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Supplementary Material

Supplementary file is available from: <https://doi.org/10.7910/DVN/S1BHP0>

Suppl. 1. Examples of XML, CSS, FO, and other necessary files to convert the JATS XML to various viewers and other XML types for scholarly publishing.

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Improving Journal Article Tag Suite for multilingual articles

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Abstract

The scenarios for journal articles that contain more than one language are no longer (and never really were) limited to having an article's title, abstract, and keywords translated to additional languages. Journal Article Tag Suite (JATS) currently has a variety of structures for tagging articles that are in multiple languages or have substantial amounts of content in more than one language. However, these structures are not all coherent and are not up to the tasks of handling some common use cases. A subcommittee of the National Information Standards Organization (NISO) JATS Standing Committee (with participation from members of the Standards Tag Suite (STS) and Book Interchange Tag Suite (BITS) committees and some other invited experts) was formed, in 2021, with the goal of recommending changes to JATS to enable it to usefully encode multilingual articles. The subcommittee has recommended a set of changes that introduce new structures that can be available to JATS users who need them while minimizing the burden JATS users who rarely deal with multilingual content. Most of these changes are backward compatible with earlier versions of JATS. These changes are currently a work in progress and may become available in a future version of JATS. This paper presents a proposal for improving JATS to better support tagging multilingual articles with the hope of garnering feedback and suggestions from the JATS community.

Keywords

Journal Article Tag Suite; Language; Multilingualism

Introduction

The scholarly publishing community is becoming increasingly aware of the need for supporting multilingualism in journal publishing to enable inclusion and to reach global audiences. The National Information Standards Organization (NISO) Journal Article Tag Suite (JATS) Standing Committee and a subcommittee on multilingual content started a project, in 2021, to recommend changes that could be made in a future version of JATS to offer better ways of tagging journal articles that are in multiple languages or have substantial amounts of the content

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in more than one language. The team that undertook this project, which included members of the NISO JATS Standing Committee and other invited experts, gathered and examined examples of journal articles that contain more than one language. The project team began with a “fresh eyes” perspective and tried to produce a way for people who have documents in multiple languages to encode information about the languages used, the relationships among the multiple versions of a portion of the document, and the expected use of these documents or document portions, without imposing a substantial burden on JATS users who do not have multilingual documents. The resulting proposal is being presented in this paper with the hope of sparking discussion and feedback from JATS users who work with multilingual content.

This paper begins by providing a review of the language support that is currently available in JATS (version 1.3 and earlier versions). Next, the proposal is presented in which new attributes are added to existing elements to identify alternative language versions of text, and the concept of language groups is introduced. The proposal also describes a new metadata element and changes to a few existing elements to better support journal articles that contain metadata in more than one language. This paper then provides examples to show how the language attributes could be useful in common scenarios. In its conclusion, this paper requests feedback from the JATS community and describes where to send feedback (to the JATS-List listserv or the author). Suppl. 1 provides an alphabetical list of JATS elements that are currently in scope for the proposed changes.

Existing Language Support in JATS

To begin, it is worth giving attention to the mechanisms that are currently available in JATS (including version 1.3 and earlier versions) to support journal articles that contain more than one language.

- Identify the language of text
 - The `@xml:lang` attribute can be placed on an element to identify the language of content contained within the element. The `@xml:lang` attribute is available on many elements, but not on all elements.
 - The `@hreflang` attribute can be placed on linking elements to identify the language of the document that is being linked.
 - `@xml:lang` and `@hreflang` hold BCP 47/ISO 639 language codes which can include tags for script, region, variation.
- Contain alternative language versions of text
 - Many elements are allowed to repeat to hold alternate language versions of content with the language identi-

fied using the `@xml:lang` attribute.

- There are five elements that exist to hold translated versions of certain information: `<trans-title-group>`, `<trans-title>`, `<trans-subtitle>`, `<trans-source>`, `<trans-abstract>`. These elements are documented as being limited to holding translated versions of text for their specific items (although we understand that community usage has been broader than that).
- Characters of any script can be represented
 - Unicode character set supports scripts for most languages.
 - `<private-char>` and `<inline-graphic>` with image files can be used for glyphs that are not available in Unicode.

The `@xml:lang` attribute is defined in the W3C Recommendation *Extensible Markup Language (XML) 1.0 (Fifth Edition)* [1], which is the standard that defines XML itself, to “identify the natural or formal language in which the content is written.” The `@xml:lang` attribute is defined to hold a language identifier that conforms to the standard IETF BCP 47 *Tags for the Identification of Languages* [2], which is based on several standards including ISO 639 *Language Codes*. The `@xml:lang` attribute is scoped to apply to the elements’ textual content, the elements’ attribute content, and all the elements’ descendants until another `xml:lang` attribute is encountered. The W3C has published an informative document *Language tags in HTML and XML* [3] that explains how the `@xml:lang` attribute can be used to identify language, script, region, and variations. The JATS Tag Library also contains informative documentation about the `@xml:lang` attribute [4].

The scripts for most writing systems in the world can be used in JATS documents thanks to the Unicode Character Set (ISO/IEC 10646) [5]. Unicode allows the scripts for most languages, both modern and ancient, to be represented in JATS documents. Glyphs that are not available in Unicode can be represented in JATS documents using the `<private-char>` and `<inline-graphic>` elements along with an image file.

Proposal

This proposal recommends creating a new set of attributes for marking up multilingual content. These new attributes, which are referred to collectively as the `lang-*` attributes, should be added as a group to block-level elements, text-containing metadata elements, and most elements that currently have the `xml:lang` attribute. That is, an element that allows any of the `lang-*` attributes should allow all of them so that all the `lang-*` attributes will be available on elements where users might want them. All the `lang-*` attributes will be:

- optional, as we expect most documents will not use any of them.

- provided in the DTD modules as a parameter entity, so users who do not want them can easily remove them in their local subsets.

A key concept is that of a language group. A language group consists of all the alternate language versions of some content. This may include versions that are considered parallel, or an original and translation(s) or other nonoriginal versions. In some documents it is expected/required that all of the language versions of content be displayed, in other documents it is expected that a display system will select appropriate version(s) to display. The members of a language group are not wrapped in a structural element but they are associated with each other. The lang-* attributes provide the mechanism for associating the members of a language group.

The use of attributes, rather than elements, to hold language information builds on the existing @xml:lang and @hreflang attribute mechanism for marking up the language of content, and has the advantages that it:

- avoids cluttering the tag set with body elements that most users will not need.
- puts structures that are provided in multiple languages in the same place in the document as the same structure would be if there were only one version of it.

The language attributes will contain metadata to:

- Identify language using existing attributes @xml:lang and @hreflang with standard 2-letter or 3-letter language codes, and optionally include identifiers for region, dialect, and ancient languages.
- Associate alternative language versions of the same passage using a @lang-group attribute.
- Label each alternative language version (original, translation, etc.) using a @lang-variant attribute.
- Indicate the source of an alternative language version of a passage (author, editor, translator, machine, etc.) using a @lang-source attribute.
- Mark text that should not be translated (for example by automated services like Google Translate) using a @lang-translate attribute.
- Indicate intent for how alternative language versions of a passage should be displayed (primary, secondary, etc.) using a @lang-focus attribute.

Example:

```
<p> <italic id="phrase001" lang-group="phrase001" xml:lang="la" lang-variant="original" lang-translate="no"> carpe diem </italic> (<styled-content lang-group="phrase001" xml:lang="en" lang-variant="translation"> seize the day </styled-content>) </p>
```

The lang-* attributes are described in more detail in the following sections.

There is a distinction between article metadata that is pres-

ent in multiple languages and article content that is present in multiple languages. Article metadata typically consists of an article's title, authors, keywords, and other information that can be contained within the <front> element. Article content typically consists of an article's text, figures, tables, and other content that can be contained within the <body> and <back> elements. The nature of article metadata allows alternative language versions of metadata items to appear next to each other, while the nature of article content is such that alternative language versions of content items may need to occur in separate locations throughout a document.

- In situations where article metadata is present in more than one language the element that holds the metadata item can repeat with a different @xml:lang attribute value for each alternative language version. For example, the kwd-group element can repeat to hold alternative language versions of keywords thus forming a language group for keywords.
- In situations where article content is present in more than one language the element that holds the content item can repeat with a different @xml:lang attribute value for each alternative language version. The alternative language versions of content items may be in separate locations throughout a document. The @lang-group attribute provides a mechanism to associate alternative language versions of a content item.

This proposal also recommends changes to bring more consistency to tagging article metadata that is present in two or more languages. Most structures within article metadata are able to repeat with different @xml:lang attribute values to hold alternate language versions. This proposal recommends making this consistent for all article metadata elements that could have alternative language versions. There are a few metadata elements that are not allowed to repeat in the current version of JATS but which may have alternative language versions so these elements should be allowed to repeat. In the current version of JATS there is a set of five elements that can hold a translated title, subtitle, abstract, and source; these elements are inconsistent with the way that JATS handles alternative language versions of other metadata so this proposal recommends deprecating these elements in favor of better consistency. Also, since community use of these translation elements is not limited to translations, we recommend using elements that meet both the needs of current users and of producers of multilingual articles.

Language Group attribute @lang-group

The @lang-group (Language Group) attribute is used to associate all members of a language group that present alternate language versions of the same content. The members of a lan-

guage group may appear next to each other, in different places within a document, or in different documents.

The value of the `@lang-group` attribute should be the same for all the members of a language group to support processing. For example, the members of a language group may be processed using `<xsl:for-each-group select="//*" group-by="@lang-group">` to produce a display of the language group.

`@lang-group` is defined as IDREF, which enables the DTD to assist users in creating links using ID/IDREF. The group name must be a valid `@id` attribute value in the same document. For example, the `@id` attribute could be on one member of the language group or on a relevant parent element.

Language Variant attributes `@lang-variant` and `@lang-variant-custom`

The `@lang-variant` (Language Variant) attribute indicates how language of the text is acting on the content, for example, “transliteration,” “phonetic,” or “spoken.” The `@lang-variant` attribute describes the relationship between alternative language versions of the content. The `@lang-variant` attribute labels an alternative language version of a passage; a passage can be any piece of content, as small as a word or as big as an entire journal article. The list of values for the `@lang-variant` attribute should include:

- original – a passage in its original language
- translation – a translation of a passage into another language
- interpretation – a rewording of a passage into another language
- transcription – a representation of spoken language in a written form
- transliteration – a mapping from one system of writing into another
- phonetic – a representation of speech sounds using phonetic symbols
- spoken – a passage spoken aloud
- unknown – the language relationship is unknown. This is not the same as omitting the attribute; this is truly “we do not know”.
- custom – any other label or any combination of the above labels, to be used in conjunction with the `@lang-variant-custom` attribute.

The `@lang-variant-custom` (Language Variant Custom) attribute holds a text string to describe the language variant, which may be a combination of the values above or any text string, when the value of `@lang-variant` is “custom.” This attribute works in the same way as the `@*-custom` mechanism works for other fixed lists.

The list of values for the `@lang-variant` attribute may grow over time. If usage shows that some combinations of values

are popular/common those combinations can be added as hyphenated values of the base values (e.g., “transcription-translation”).

By design, this value list does not include “equivalent.” The members of a language group will be considered to be equivalent if no `@lang-variant` attribute is present to differentiate by naming one, for example, a “translation.” For example, a title and a parallel title (where neither is a translation) are merely two titles with different language attribute values, so they are equal or equivalent titles.

Language Focus Suggestion attributes `@lang-focus` and `@lang-focus-custom`

The `@lang-focus` (Language Focus Suggestion) attribute indicates how members of a language group are related to each other, which may be used as a hint for how multiple language variants might be displayed. The manner in which the members of a language group are displayed is application specific, perhaps driven by reader preference. However, the `@lang-focus` attribute can be used to provide hints in markup about the authors’ intention for how a language group should be displayed. The list of values for the `@lang-focus` attribute should include:

- primary – The text has a more central focus than other language variants in the group. In display, such text is typically made more prominent or be the only focus displayed.
- secondary – The text is not the primary textual focus in the language group. In display, such text is typically less prominent.
- undefined – No recommendation is made concerning the relative focus of the language variants, thus all variants are intended to be displayed the same way. In display, all language variants are typically displayed in document order.
- custom – The language relationship is not any of the specific listed values. The `@lang-focus-custom` attribute should be used to specify the relationship.

The `@lang-focus-custom` (Language Focus Suggestion Custom) attribute holds a text string to indicate how members of a language group are related when the value of `@lang-focus` is “custom.” This attribute works in the same way as the `@*-custom` mechanism works for other fixed lists.

Language Source attributes `@lang-source` and `@lang-source-custom`

The `@lang-source` (Language Source) attribute indicates the source of an alternative language version. The list of values for the `@lang-source` attribute should include:

- author – provided by an author of the article
- editor – provided by an editor of the article

- translator – provided by a human translator
- machine – provided by a machine (for example, automated translation software)
- custom – The source is not any of the specific listed values. The @lang-source-custom attribute should be used to specify the source.

The @lang-source-custom (Language Source Custom) attribute holds a text string to indicate the source when the value of @lang-source is “custom”. This attribute works in the same way as the @*-custom mechanism works for other fixed lists.

Language Translate attribute @lang-translate

The @lang-translate (Language Translate) attribute is used to specify whether an element’s content is to be translated when the content is localized or whether to leave the content unchanged. Text that should not be translated, for example automatically by Google translate, can be tagged with attribute lang-translate=“no” to indicate that the text should not be translated. The @lang-translate attribute can hold a value of either “no” or “yes”.

If a passage of text that should not be translated that is tagged with lang-translate=“no” contains text that can be translated, the setting can be toggled by adding attribute lang-translate=“yes” to the text that can be translated.

The @lang-translate attribute is based on the HTML5 @translate attribute, which is defined in the HTML5 standard [6] and described in “Using HTML’s translate attribute” [7].

Add @xml:lang and lang-* attributes to face markup elements

It is very common for text that is in a different language than the surrounding text to be set apart stylistically, for example in italicized font using the <italic> element. However, the <italic> element does not allow the @xml:lang attribute in JATS 1.3 and earlier versions of JATS. The @xml:lang and lang-* attributes should be available on all face markup elements.

- italic
- roman
- sans-serif
- sc
- strike
- bold
- monospace
- overline
- underline
- rb
- rt
- styled-content

The lang-* attributes will also be added to structural ele-

ments. Suppl. 1 to this paper contains a list of all elements that are proposed to receive lang-* attributes.

New <content-language> element

In current versions of JATS (version 1.3 and earlier) there is no way to identify the languages of an article in cases where the main content of the article is provided in two or more languages.

For the majority of journal articles, which have the content of the article in one language and perhaps have metadata and some text passages in other languages, the @xml:lang attribute on the <article> element can identify the primary language of the article. However, for journal articles in which the text of the article is provided in more than one language, the @xml:lang attribute cannot hold multiple values. The @xml:lang attribute can hold a value “mul”, which is defined by ISO 639 to indicate “multiple languages”, but this does not identify what the multiple languages are.

Book Interchange Tag Suite (BITS) [8] and NISO STS [9], which are part of the family of tag sets that are based on JATS, have a <content-language> element that can hold metadata to identify each primary language when a document contains more than one primary language.

The BTIS Tag Library says of <content-language> :

- Part of the metadata of a document used to identify the primary language(s) used in the document. This element should appear once for each primary language. For Best Practice, the content of <content-language> should be the two-letter ISO 639 code for the language that are typically used as values for @xml:lang., for example, “en” for English, “de” for German, or “es” for Spanish.
- The tag set is agnostic on how “primary” is defined, leaving that decision to each producer. However, the intent of this element is to record the principle languages used in a multi-lingual document, not to state that three Latin quotations are intermixed with primarily German content. An abstract in Spanish in an otherwise Portuguese paper would be a single primary language.

The <content-language> element is only useful in situations where the <article> element has attribute @xml:lang=“mul” to identify what the multiple languages are. The <content-language> element should appear once for each primary language used in the text of a multi-lingual document. There is no value in using the <content-language> element in a monolingual document (one where the @xml:lang attribute on <article> element has a value other than “mul”).

The <content-language> element should be added to JATS, and allowed to appear as a repeatable optional element within <article-meta>. Within the content model of the <article-meta> element, the <content-language> element should be

placed after `<author-notes>` element. This placement is based on the content model of the `<book-meta>` element in BITS.

For articles that have the main content of the article presented in more than one language it will be recommended to:

1. Use `@xml:lang="mul"` on the `<article>` root element.
2. Include a `<content-language>` element with a language code for each primary language in the main `<article-meta>` in `<front>`.
3. Tag a `<sub-article>` element with attributes `@xml:lang` and `@lang-group` for each alternative language version of the main content. The `@lang-variant`, `@lang-focus`, and `@lang-source` attributes could also be usefully applied to the `<sub-article>` elements if desired.

Changes to `<article-meta>` and `<front-stub>` for metadata in more than one language

The content model of the `<article-meta>` and `<front-stub>` elements should be updated to:

1. Add `<content-language>` element as optional and repeatable after `<author-notes>`.
2. Allow `<author-notes>` to repeat in order to allow alternative language versions of author notes.
3. Allow `<supplement>` to repeat and clarify its use in the documentation of this element.
4. Allow `<title-group>` to repeat in order for article title to be provided in more than one language.

All other article metadata elements are already able to repeat for multiple languages. Article metadata elements are either able to repeat directly within `<article-meta>` (and `<front-stub>`) or they can be placed in a grouping element where it is allowed to repeat.

Examples of metadata elements that repeat within a grouping element are:

1. `<article-version>` can repeat within `<article-version-alternatives>`.
2. `<article-categories>` can contain repeatable `<subject-group>`, `<series-title>`, and `<series-text>` elements.
3. `<volume-series>` can repeat within `<volume-issue-group>`.
4. `<issue-part>` can repeat within `<volume-issue-group>`.
5. `<pub-history>` can contain repeatable `<event>` elements.
6. `<history>` can contain repeatable `<date>` elements.
7. `<permissions>` can contain repeatable `<copyright-statement>`, `<copyright-holder>`, `<license>` elements.
8. `<name>` for a contributor can repeat within `<name-alternatives>`.
9. `<aff>` can repeat within `<aff-alternatives>`.
10. `<institution>` in a funding source or in an affiliation can repeat within `<institution-wrap>`.

There are a few article metadata elements that are not allowed to repeat and are not likely to have alternative language versions, as is the case with the page range and `<elocation-id>` elements.

Article title, issue title, and journal title

The metadata elements that hold article title, issue title, and journal title should all handle alternate language versions in a consistent manner. Each title group element (`<title-group>` for article title, `<issue-title-group>` for issue title, and `<journal-title-group>` for journal title) should be able to repeat to hold alternative language versions. This approach keeps the corresponding title elements for each language version together (for example, a title group with the French article title with the French article subtitle, and a title group with the English article title with the English article subtitle).

The `@xml:lang` attribute should be placed on the group element, unless the article has a very rare exception in which a title and corresponding subtitle are in different languages. The `lang-*` attribute group should be added to the `<title-group>` element.

Within the group element, the title element should be required once (`<article-title>` in `<title-group>`, `<issue-title>` in `<issue-title-group>`, and `<journal-title>` in `<journal-title-group>`).

The current version of JATS contains inconsistencies in how the metadata elements for article title, issue title, and journal title are modeled.

This proposal recommends bringing consistency with these changes:

- For article title, the `<title-group>` element should be allowed to repeat within `<article-meta>` so that the article title, subtitle, and alternate titles can be provided in more than one language. The `@xml:lang` and `@lang-*` attributes should be added to `<title-group>`.
- For issue title, the `<issue-title-group>` element can repeat to hold alternative language versions of an issue title and issue subtitle. The `lang-*` attributes should be added to the `<issue-title-group>` element.
- For journal title, the `<journal-title-group>` element can repeat to hold journal title and subtitle in more than one language. The `<journal-title>` element, which is optional in current version JATS, should be required once in `<journal-title-group>`. The `lang-*` attributes and the `@xml:lang` attribute should be added to the `<journal-title-group>` element.

Retire translation elements

The current version of JATS (version 1.3) and all previous versions, including JATS' predecessor NLM DTD, have five

elements that are designated to hold translations of certain metadata information. These elements are: `<trans-abstract>`, `<trans-title-group>`, `<trans-title>`, `<trans-subtitle>`, and `<trans-source>`. Each of these elements has a corresponding main element that can take an `@xml:lang` attribute and repeat for alternative language versions. Providing designated translation elements for a few metadata items is inconsistent, potentially misleading, and not as capable of handling the complexities of real multi-lingual documents.

This proposal recommends documenting the translation elements as deprecated to discourage their use, and then removing the translation elements in a future non-backwards compatible version of JATS.

The five translation elements and their preferred replacement elements are:

1. `<trans-abstract>` - instead use `<abstract>`
2. `<trans-title-group>` - instead:
 - o In `<title-group>` repeat the `<title-group>`
 - o In `<journal-title-group>` repeat the `<journal-title-group>`
 - o In `<issue-title-group>` repeat the `<issue-title-group>`
3. `<trans-title>` - instead:
 - o In citation contexts use `<article-title>` or `<part-title>`
 - o In `<title-group>` use `<article-title>`
 - o In `<journal-title-group>` use `<journal-title>`
 - o In `<issue-title-group>` use `<issue-title>`
4. `<trans-subtitle>` - instead:
 - o In `<title-group>` use `<subtitle>`
 - o In `<journal-title-group>` use `<journal-subtitle>`
 - o In `<issue-title-group>` use `<issue-subtitle>`
5. `<trans-source>` - instead use `<source>`

Processing metadata

A new optional attribute `@lang-grouping` (Language Grouping Use) should be added to the `<processing-meta>` element. The `@lang-grouping` attribute flags to users that language grouping features are used in the document and may need to be processed. The values that are allowed in the `@lang-grouping` attribute are “yes” and “no.”

The `@lang-grouping` attribute is only used on the `<processing-meta>` element, so `@lang-grouping` is the only language attribute that is not part of the `lang-*` attribute group.

Maintaining full text semantics

The modifications that we propose making to the JATS tag set do not alter the way in which the contents of a journal article may be semantically tagged in JATS. The `lang-*` attributes provide ways to group together alternative language versions in text that is tagged with the usual semantics of the JATS syntax. The use of two or more languages may often suggest rep-

etition of parts of the text. Most elements (such as paragraphs and face-markup) may naturally repeat when there are alternative language versions of text present. Some elements may be grouped with elements of another kind and in another location to express their language relation (such as display quotes or verses and their translation). Some components might be more challenging. For example, while tables can contain translated content, the fundamental table structure must not be broken; supplying additional cell entries in a row would collide with how tables work and should not be done. The handling of multilingual content may in some cases demand some design insight from the user.

Examples

The following examples show some of the ways in which the language attributes could be useful in common scenarios:

- article metadata (article title, keywords, abstract, etc.) in two or more languages
- substantial portions of content in two or more languages
- the entire document in two or more languages

Metadata items in two or more languages

Article title

```
<title-group xml:lang="en" lang-variant="original" lang-source="author">
<article-title>Exposure to COVID-19 risk representations
and state depressive symptoms in a United Kingdom sam-
ple: a preliminary experimental study</article-title>
</title-group>
<title-group xml:lang="es" lang-variant="translation" lang-
source="translator">
<article-title>Representaciones de riesgos referentes a la ex-
posición al COVID-19 y síntomas depresivos actuales en
una muestra del Reino Unido: un estudio experimental
preliminar</article-title>
</title-group>
```

Issue title

```
<issue-title-group xml:lang="en">
<issue-title>SPECIAL ISSUE: COVID 19: THE PSYCHO-
LOGICAL CONSEQUENCES OF LOCKDOWN</issue-
title>
</issue-title-group>
<issue-title-group xml:lang="es">
<issue-title>NÚMERO ESPECIAL: COVID 19: CONSE-
CUENCIAS PSICOLÓGICAS DEL CONFINAMIENTO</issue-title>
</issue-title-group>
```

Journal title

```
< journal-title-group xml:lang = "en" >
< journal-title > Studies in Psychology < /journal-title >
< /journal-title-group >
< journal-title-group xml:lang = "es" >
< journal-title > Estudios de Psicología < /journal-title >
< /journal-title-group >
```

Article abstract

```
< abstract xml:lang = "en" lang-variant = "original" lang-
source = "author" >
< title > ABSTRACT < /title >
< p > This study examined the impact of being in lock-
down... < /p >
< /abstract >
< abstract xml:lang = "es" lang-variant = "translation" lang-
source = "translator" >
< title > RESUMEN < /title >
< p > Este estudio analizó el impacto del confinamiento... < /p >
< /abstract >
```

Article keywords

```
< kwd-group kwd-group-type = "author" xml:lang = "en" lang-
variant = "original" lang-source = "author" >
< title > KEYWORDS < /title >
< kwd > COVID-19 < /kwd >
< kwd > risk < /kwd >
< kwd > lockdown < /kwd >
< kwd > social representations < /kwd >
< kwd > depression < /kwd >
< kwd > anxiety < /kwd >
< kwd > stress < /kwd >
< /kwd-group >
< kwd-group kwd-group-type = "author" xml:lang = "es" lang-
variant = "translation" lang-source = "translator" >
< title > PALABRAS CLAVE < /title >
< kwd > COVID-19 < /kwd >
< kwd > riesgo < /kwd >
< kwd > confinamiento < /kwd >
< kwd > representaciones sociales < /kwd >
< kwd > depresión < /kwd >
< kwd > ansiedad < /kwd >
< kwd > estrés < /kwd >
< /kwd-group >
```

Funding source

```
< funding-group >
< award-group >
< funding-source >
< institution-wrap >
```

```
< institution xml:lang = "es" lang-focus = "primary" > Consejo
Nacional de Investigaciones Científicas y Técnicas < /insti-
tution >
< institution xml:lang = "en" lang-focus = "secondary" > National
Scientific and Technical Research Council < /institution >
< institution xml:lang = "es" lang-focus = "secondary" > < abbr
ev > CONICET < /abbrev > < /institution >
< institution-id institution-id-type = "open-funder-registry"
> 10.13039/501100002923 < /institution-id >
< /institution-wrap >
< /funding-source >
< award-id > PIP 112201 501000 80CO < /award-id >
< /award-group >
< /funding-group >
```

Content items in two or more languages

Figure

```
< fig id = "f0001" lang-group = "f0001" xml:lang = "en" >
< label > Figure 1. < /label >
< caption > < p > Number of people who use each source of
information about COVID-19 in the early phase of the CO-
VID-19 outbreak in the UK < /p > < /caption >
< graphic xlink:href = "REDP_A_1950461_F0001_B.jpg" / >
< /fig >
< fig id = "f0003" lang-group = "f0001" xml:lang = "es" >
< label > Figura 1. < /label >
< caption > < p > Número de personas que utilizan cada una
de las fuentes de información sobre el COVID-19 en la fase
temprana de la crisis del COVID-19 en el Reino Unido < /
p > < /caption >
< graphic xlink:href = "REDP_A_1950461_F0003_B.jpg" / >
< /fig >
```

Table

```
< table-wrap id = "t0001" lang-group = "t0001" xml:lang =
"en" >
< label > Table 1. < /label >
< caption > < p > Socio-demographic characteristics of the
sample < /p > < /caption >
... < /table-wrap >
< table-wrap id = "t0004" lang-group = "t0001" xml:lang = "es" >
< label > Tabla 1. < /label >
< caption > < p > Características demográficas de la mues-
tra < /p > < /caption >
... < /table-wrap >
```

Section

```
< sec id = "s0004" lang-group = "s0004" xml:lang = "en" >
< title > Social representations of risk < /title >
... < /sec >
```



```
<sec id="s0012" lang-group="s0004" xml:lang="es">
<title>Representaciones sociales de riesgo</title>
...</sec>
```

Phrase

```
<p><italic id="phrase001" lang-group="phrase001"
xml:lang="la" lang-variant="original" lang-translate="
no">carpe diem</italic> (<styled-content lang-group
="phrase001" xml:lang="en" lang-variant="translation"
>seize the day</styled-content>)</p>
```

Full text in two or more languages

There are two general approaches that publishers follow when publishing journal articles where the full text of the article is provided in two or more languages. The JATS tag set can support either of these approaches.

- Full text in two or more languages published as one article.
- Full text in two or more languages published as separate articles.

The decision of which of these approaches to use can be influenced by a variety of factors that may include timing (for example, whether a translation or alternate language version is ready before or after publication), publishing agreements, and content management needs.

Full text in two or more languages in one article

A journal article that contains the full text of the article in more than one language can be tagged as follows.

- The `<article>` root element should have attribute `xml:lang="mul"` (multiple languages).
- Each language should be identified by a `<content-language>` element containing a 2-letter language code within `<article-meta>` in `<front>`.
- Each alternative language version should be tagged in a `<sub-article>` element with an `@xml:lang` attribute to identify the language and a `@lang-group` attribute to connect the alternative language versions.

This approach allows a wide variety of options to choose from in regard to how much of the article's content is presented with alternate language versions or with only one language. For example: figures and tables might be present with alternative language versions or only once, a reference list might be present only once. Any content item that is presented with alternate language versions can be tagged using the language attributes to identify each one as part of a language group.

Full text in two or more languages in separate articles

When a journal article has alternative language versions published as separate articles, each separate article may be linked

together using the `<related-article>` element.

The `<related-article>` element uses the `@xlink:href` attribute to point to another article. The `@hreflang` attribute can identify the language of the article that is pointed to by the `@xlink:href` link. The `@related-article-type` attribute identifies the type of relationship that the related article has to the current article.

The `@related-article-type` attribute value "alt-language" indicates that the linked article is an alternative language version of the current article.

```
<related-article related-article-type="alt-language" hreflang
="de" xlink:href="10.5414/ALP33164" ext-link-type="
doi"/>
```

The `@related-article-type` attribute value "translated-article" indicates that the linked article is an earlier, possibly original, language version of the current article.

```
<related-article related-article-type="translated-article"
hreflang="en" xlink:href="10.5555/lvh.2016.5.3" ext-link-
type="doi"/>
```

Conclusion

As greater numbers of researchers and publishers become interested in publishing journal articles that contain multilingual content, and as the technical challenges of doing so are increasingly solved, there may be new opportunities. Language metadata in journal articles could be used in a variety of ways such as: improving accessibility and discovery by providing metadata that identifies the language to screen readers and search engines; linking and navigation within an article; repackaging multi-language content in new forms; and researchers using text mining or distant reading tools may find creative and useful ways to use language metadata to analyze and visualize text.

The members of the NISO JATS Standing Committee and the JATS Multi-lingual Article Subcommittee have made an effort to suggest new structures within the JATS tag set that can usefully be employed by JATS users who have multilingual content. The world of academic publishing is large, as is the world of publishing in general, and it is likely that there are use cases for multilingual content in existence that have not come to the attention of the project team. Therefore, this paper concludes with a call to the JATS community to provide additional use cases, suggestions, feedback, and discussion regarding the proposal set forth in this paper. Comments can be sent to the JATS-List listserv or to the author of this paper. The details about how to subscribe to the JATS-List listserv are available at <https://www.mulberrytech.com/JATS/JATS-List/>.

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Supplementary Material

Supplementary file is available from: <https://doi.org/10.7910/>

DVN/DDYNQO

Suppl. 1. An alphabetical list of JATS elements

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Dissertations:

12. Kim K. Quantum critical phenomena in superfluids and superconductors [dissertation]. Pasadena, CA: California Institute of Technology; 1991.

- **Tables:** Tables are to be numbered in the order in which they are cited in the text. A table title should concisely describe the content of the table so that a reader can understand the table without referring to the text. Each table must be simple and typed on a separate page with its heading above it. Explanatory matter is placed in foot-

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Reviews are invited by the editor and should be comprehensive analyses of specific topics. They are to be organized as follows: title page, abstract and keywords, main text (introduction, text, and conclusion), acknowledgments, references, tables, figure legends, and figures. There should be an unstructured abstract of no more than 200 words. The length of the text excluding references, tables, and figures should not exceed 5,000 words. The number of references is limited to 100.

4. Case studies

Case studies are intended to report practical cases that can be encountered during editing and publishing. Examples include interesting cases of research misconduct and publication ethics violations; experience of new and creative initiatives in publishing; and the history of a specific journal development. They are to be organized as follows: title page, abstract and keywords, main text (introduction, text, and conclusion), acknowledgments, references, tables, figure legends, and figures. There should be an unstructured abstract of 200 words maximum. The length of the text excluding references, tables, and figures should not exceed 2,500 words. The number of references is limited to 20.

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Essays are for the dissemination of the experience and ideas of editors for colleague editors. There is no limitation on the topics if they are related to editing or publishing. They are to be organized as follows: title page, abstract and keywords, main text (introduction, text, and conclusion), acknowledgments, references, tables, figure legends, and figures. There should be an unstructured abstract equal to or less than 200 words. The length of the text excluding references, tables, and

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Editorials are invited by the editor and should be commentaries on articles published recently in the journal. Editorial topics could include active areas of research, fresh insights, and debates in all fields of journal publication. Editorials should not exceed 1,000 words, excluding references, tables, and figures. References should not exceed 10. A maximum of 3 figures including tables is allowed.

7. Book reviews

Book reviews are solicited by the editor. These will cover recently published books in the field of journal publication. The format is same as that of Editorials.

8. Correspondence

Correspondence (letters to the editor) may be in response to a published article, or a short, free-standing piece expressing an opinion. Correspondence should be no longer than 1,000 words of text and 10 references.

In reply: If the Correspondence is in response to a published article, the Editor-in-Chief may choose to invite the article's authors to write a Correspondence Reply. Replies by authors should not exceed 500 words of text and 5 references.

9. Video Clips

Video clips can be submitted for placement on the journal website. All videos are subject to peer review and must be sent directly to the editor by e-mail. A video file submitted for consideration for publication should be in complete and final format and at as high a resolution as possible. Any editing of the video will be the responsibility of the author. *Science Editing* accepts all kinds of video files not exceeding 30 MB and of less than 5 minutes duration, but Quicktime, AVI, MPEG, MP4, and RealMedia file formats are recommended. A legend to accompany the video should be double-spaced in a separate file. All copyrights for video files after acceptance of the main article are automatically transferred to *Science Editing*.

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Unsolicited manuscript with publication types of original articles, case studies, essays, and correspondence can be submitted. Other publication types are all commissioned or invited by the Editorial Board.

Table 1 shows the recommended maximums of manuscripts according to publication type; however, these requirements are negotiable with the editor.

Table 1. Recommended maximums for articles submitted to *Science Editing*

Type of article	Abstract (word)	Text (word) ^{a)}	References	Tables & figures
Original article	250	2,500	20	10
Review	200	5,000	100	No limits
Case study	200	2,500	20	10
Essay	No	2,500	20	10
Editorial	No	1,000	10	3
Book review	No	1,000	10	3
Correspondence	No			
Letter to the editor	-	1,000	10	3
In reply	-	500	5	3
Video clip	No	30 MB, 5 min	-	-

^{a)}Maximum number of words is exclusive of the abstract, references, tables, and figure legends.

7. FINAL PREPARATION FOR PUBLICATION

1. Final Version

After the paper has been accepted for publication, the author(s) should submit the final version of the manuscript. The names and affiliations of the authors should be double-checked, and if the originally submitted image files were of poor resolution, higher resolution image files should be submitted at this time. Color images must be created as CMYK files. The electronic original should be sent with appropriate labeling and arrows. The EPS, TIFF, Adobe Photoshop (PSD), JPEG, and PPT formats are preferred for submission of digital files of photographic images. Symbols (e.g., circles, triangles, squares), letters (e.g., words, abbreviations), and numbers should be large enough to be legible on reduction to the journal's column widths. All of the symbols must be defined in the figure caption. If the symbols are too complex to appear in the caption, they should appear on the illustration itself, within the area of the graph or diagram, not to the side. If references, tables, or figures are moved, added, or deleted during the revision process, they should be renumbered to reflect such changes so that all tables, references, and figures are cited in numeric order.

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- Abstract up to 250 words for original articles and up to 200 words for reviews, essays, and features. Up to 5 keywords.
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