Reference Coverage Analysis of OpenAlex compared to Web of Science and Scopus

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Abstract

OpenAlex is a promising open source of scholarly metadata, and competitor to the established proprietary sources, the Web of Science and Scopus. As OpenAlex provides its data freely and openly, it permits researchers to perform bibliometric studies that can be reproduced in the community without licensing barriers. However, as OpenAlex is a rapidly evolving source and the data contained within is expanding and also quickly changing, the question naturally arises as to the trustworthiness of its data. In this empirical paper, we will study the reference and metadata coverage within each database and compare them with each other to help address this open question in bibliometrics. In our large-scale study, we demonstrate that, when restricted to a cleaned dataset of 16,788,282 recent publications shared by all three databases, OpenAlex has average source reference numbers and internal coverage, respectively, comparable to both Web of Science and Scopus. We also demonstrate that the comparison of other core metadata covered by OpenAlex shows mixed results, with OpenAlex capturing more ORCID identifiers, fewer abstracts and a similar number of Open Access information per article when compared to both Web of Science and Scopus.

Keywords: Bibliometrics, Open Scholarly Metadata, Citation Analysis, Open Abstracts, ORCID

1 Introduction

OpenAlex (Priem et al., 2022) was released on January 1st 2022 by OurResearch as a replacement for the discontinued Microsoft Academic Graph (MAG) and is offered as a fully open source of scholarly metadata, with all data, API information and code released to the public. As observed in the comparative study by Scheidsteger and Haunschild (2022), not all aspects of the MAG were reproduced, as patents were not captured in OpenAlex. Aside from this exception, OpenAlex is effectively a continuation and expansion of the MAG.

OpenAlex is a promising alternative to proprietary bibliometric data sources as its permissible licensing creates the potential to support a transformation of research practice towards reproducible bibliometrics. This is being realised in open research policies in academia, for example in December 2023, Sorbonne University has switched from using the Web of Science (WoS) and Clarivate bibliometric tools to OpenAlex and open-source tools[1]. Reproducible bibliometric research is hardly possible with proprietary bibliometric data sources as their licensing terms rule out dissemination of data.

As a widely used open source repository of scholarly metadata, OpenAlex has previously been the subject of research, such as the review by Velez-Estevez et al. (2023), which comparatively analysed various APIs to bibliometric corpora, including API interoperability, characteristics and their use in research practice, and Akbaritabar et al. (2023) who released a working paper on the migration of scholars which included a comparative study between Scopus and OpenAlex, limited to the coverage of scholars in Western and non-Western countries. However, at this early stage of its development, OpenAlex is a highly dynamic data source whose characteristics are not well studied.

In this research report, we present the results of some investigations into the metadata coverage of OpenAlex, following previous quantitative comparisons of citation coverage of the MAG such as Martín-Martín et al. (2021), intersections of OpenAlex, WoS and Scopus, such as the study of the MAG against Scopus and other databases by Visser Visser et al. (2021), journal coverage analysis of WoS, Scopus and Dimensions, such as the study of Singh et al. (2021), and data completeness such as Delgado-Quirós and Ortega's smaller scale comparison of OpenAlex to other databases Delgado-Quirós and Ortega (2023) and Färber's tool for comparing author records between databases Färber et al. (2022), to provide insights into the suitability of OpenAlex for bibliometrics in its current state.

For this purpose, OpenAlex is compared in this paper with two major proprietary bibliometric data sources, WoS and Scopus. The motivation of this study is to analyse the extent to which OpenAlex can serve as an adequate (or even better) and free alternative to established, proprietary databases for bibliometric research and reporting. In this study, we concentrate on the analysis of the reference coverage and the coverage of some additional metadata fields, specifically abstracts, Open Researcher and Contributor IDs (ORCIDs), and Open Access status of items in all three data sources.

[1] https://www.sorbonne-universite.fr/en/news/sorbonne-university-unsubscribes-web-science

We are aware that these initial assessments are likely to change with further developments, so this report should be understood as reflecting the state as of late 2023.

1.1 Reference Coverage

References are of central importance for bibliometric databases, as matching them to their target items forms the basis for the calculation of citation metrics. As a first step, we compare average reference counts between the three databases, whereby the basis of the comparison are the complete databases, then subsets of publications with the document type 'article', and a shared sub-corpus of publications covered by all three databases. Furthermore, references can also be used for an assessment of the coverage, i.e. the proportion of relevant research publications that are included in the database and accessible to users for analysis (Singh et al., 2021). An insufficient or biased coverage of the relevant literature should rule out the use of a database for a particular study.

There are different ways to determine the coverage of a database, for example, the comparison with external lists of relevant sources or publication lists of a sample of representative researchers of the studied fields. One relatively simple way to study literature coverage is calculating the internal reference coverage of a database as a whole or in relation to grouping characteristics, such as disciplines, the literature of particular countries or language communities.

The internal coverage is the proportion of those cited references of a publication set which are themselves covered as source items in the database, out of all cited references in the set. We refer to these as source references and in contrast, to references to items that are not themselves indexed in the database as non-source references (or references to non-source items). As an example, suppose a publication set of interest has 5000 references, including multiple references to the same works, of which 2000 are covered by the same database, then the internal coverage of this literature would be 40%.

A more comprehensive introduction to this concept and an analysis of the internal coverage of disciplines–as an estimator for disciplinary coverage–is available in (Moed, 2005, Chapter 7) and van Raan (2019). The great advantage of this type of analysis is that one does not need any external data which may be difficult and costly to collect. This reliance on only the assessed data source itself is also the major disadvantage, as one is limited to the reference data as present in the assessed data source with all its contingencies. Therefore one cannot simply extrapolate from the coverage of cited literature to the coverage of literature segments that were never cited in the source data, possibly as a direct consequence of the source database's selection criteria. These considerations show why internal reference coverage provides merely a partial and possibly source-biased measurement of coverage.

Nevertheless, when comparing citation index databases, the differences in internal reference collection can be a useful guide when choosing the most suitable data source for a planned bibliometric study. There are no established guidelines for numerical values of coverage proportions required to allow reliable studies to be carried out. But, for example, Moed (2005) analysed the combined ISI Citation Indexes (the predecessor of today's Web of Science) and found that the coverage rate, which is the proportion of references from the 2002 source year that refer to ISI source journals, was highest for Molecular Biology and Biochemistry, at around 90%, followed by human-focused Biological Sciences, Chemistry, Clinical Medicine and Physics and Astronomy. It was vastly lower in the Arts and Humanities and intermediary in the Social Sciences, Mathematics and Engineering.

When using this indicator to compare OpenAlex, WoS and Scopus, we are less interested in an evaluation in absolute values, but rather in assessing how OpenAlex performs in comparison to the two established bibliometric databases. Internal reference coverage depends on the size and possibly the disciplinary profile of a database as well as the accuracy of its reference matching procedure. As OpenAlex is actually much larger than Scopus and WoS (see Table 1) it could be expected that its internal reference coverage is at least not lower than in the latter databases.

1.2 Open Metadata

The increasing discussion surrounding the open availability of various types of scholarly metadata in bibliometrics is not limited to reference coverage, but expands to other metadata (van Eck and Waltman, 2023). For instance, the Initiative for Open Abstracts (I4OA[2]) advocates open abstracts of scholarly works and calls on scholarly publishers to submit them to Crossref, a Digital Object Identifier (DOI) registration agency. However, coverage analyses of Crossref suggest that not all publishers provide open scholarly metadata to Crossref (Mugabushaka et al., 2022; Kramer and de Jonge, 2022). Another example of essential metadata is the use of ORCIDs to persistently identify authors, helping bibliometricians not only to disambiguate author names, but also to interlink different data from different sources based on the ORCID (Haak et al., 2012). As open data sources are essential for OpenAlex, we will expand our analysis to compare abstracts and ORCID coverage at the journal level. Moreover, we will assess the coverage of open access status information between OpenAlex and the proprietary databases WoS and Scopus. In contrast to abstract and author information, all three databases use the same source, the open access discovery service Unpaywall, to retrieve open access status information (Else, 2018).

2 Data and Methods

2.1 Data

In this section, we describe the data used in this study, and the reasoning for our choices of restrictions and subsets of this data. To enable a fair comparison between OpenAlex, and WoS and Scopus, we have created a 'Shared Corpus' containing records common to all three datasets based on an exact DOI match, which have been published between 2015 and 2022, where the DOI is unique to the record in all three databases, i.e. there are no multiple records with the same DOI. In the course of database ingestion, it is ensured that publications only ever have one DOI. In a further step, the references of the publications in the Shared Corpus are restricted to those published between 1996 to 2022.

[2] https://i4oa.org/

	WoS	Scopus	OpenAlex
Whole Corpus			
Number of Records	71,280,830	65,642,377	243,053,925
Number of References	1,765,281,799	2,033,522,623	1,845,379,285
Whole Corpus - Articles Only			
Number of Records	42,678,632	43,579,595	200,665,940
Number of References	1,400,958,343	1,422,650,789	1,636,497,394
Published 2015-2022			
Number of Records	22,609,069	27,620,472	76,836,191
Number of References	786,437,547	1,035,750,923	840,730,834
Shared Corpus (2015-2022)			
Number of Records	16,788,282	16,788,282	16,788,282
Number of References	725,008,043	727,056,725	585,616,069

Table 1 Sizes of databases and of the Shared Corpus dataset, with the number of references in each

The versions of the WoS, Scopus and OpenAlex databases used in this study are as follows. The WoS and Scopus data are snapshots from five indexes of the WoS Core Collection (Science Citation Index Expanded, Social Sciences Citation Index, Arts & Humanities Citation Index, Conference Proceedings Citation Index – Science and Conference Proceedings Citation Index – Social Sciences) and the Scopus database, both captured in April 2023. The OpenAlex database is the version released in August 2023, due in both cases to the versioning policy of our data host at FIZ Karlsruhe.

Due to this discrepancy in version dates, we have decided to restrict the items in the Shared Corpus to those published on or before the 31st December 2022 in order to mitigate any bias between the databases, and further refined this corpus to exclude records published before the 1st of January 2015, so the Shared Corpus covers items from publication years 2015 to 2022 inclusive.

As the Scopus database mainly contains items from 1996 onwards (although since 2015, pre-1996 cited references and backfiles of major publishers have been added[3]), and WoS and OpenAlex have had no such restriction, to avoid bias in the computation of source reference counts and internal coverage we further restrict references to those items published between 1996 and 2022.

We include in Table 1 a section on articles published 2015-2022 in all three databases, to illustrate the influence of the time restriction to the size of the Shared Corpus, and to give context to the DOI matching and deduplication work described in Section 2.2.

In the Scopus and WoS databases, pre-computed total 'reference counts', are delivered by the data providers Elsevier and Clarivate, whereas 'source reference counts' are computed for each record by our data provider FIZ Karlsruhe. Both databases are expected to contain all references of a given publication, regardless of whether they refer to items contained within or not contained within their databases, i.e. whether

[3]https://blog.scopus.com/posts/breaking-the-1996-barrier-scopus-adds-nearly-4-million-pre-1996-articles-and-more-than-83

they are source and non-source references respectively, and without a fixed time restriction. In contrast, in OpenAlex there only exist source references (see the OpenAlex documentation (Priem et al., 2022)[4]–apart from a smaller segment of references to supposedly deleted items) and a 'source reference count' has been calculated by FIZ Karlsruhe in our database. This fact explains the empty values for the average total reference counts in Table 3. We therefore have to relate this number to the source reference counts taken from WoS and Scopus.

In Table 1 we provide a summary of the records available in each data source and in Figure 1 we provide a diagram of the intersections between the three data sources, based on exact matching of unique DOIs, over the entire corpus, and restricted to records published between 2015 and 2022. Additionally in Table 1, we provide information for the size of each corpus when restricted to records classified as 'article' to demonstrate that this does not substantially decrease the relative scale of OpenAlex to WoS and Scopus.

It can be calculated from Table 1, that while the Shared Corpus, after DOI deduplication, contains 23.6% and 25.6% of all records in WoS and Scopus, and 6.9% of those in OpenAlex, it contains 41.1%, 35.8% and 31.7% of the references in the whole corpora of WoS, Scopus and OpenAlex respectively.

The Shared Corpus, after DOI deduplication, contains 74.3% of the records in WoS published between 2015 and 2022, and 60.8% of the records in Scopus published between 2015 and 2022 and 21.8% of OpenAlex published between 2015 and 2022.

2.2 DOI Match and Deduplication

When constructing the Shared Corpus as described in Section 2.1, we excluded records without a DOI and records where more than one publication item is attributed to the same DOI – as we are virtually not able to decide which item is the correct one for a given DOI in the latter case. These duplicate records account for the removal of 39,481 publications (counted as distinct DOI) in addition to those resulting from the restriction to 2015-2022. This accounts for the difference between the size of the Shared Corpus and the nominal intersection of the three databases between 2015 and 2022.

2.2.1 Error Margins of the DOI Match

	WoS	Scopus	OpenAlex
Published 2015-2022			
DOIs with multiple Records	7,177	76,891	11,074
Records with a shared DOI	14,376	282,893	22,158
Records without DOI	4,186,863	2,555,909	21,709,360

Table 2 A comparison of erroneous cases in the DOI match between databases

[4] https://docs.openalex.org/api-entities/works/work-object#referenced_works

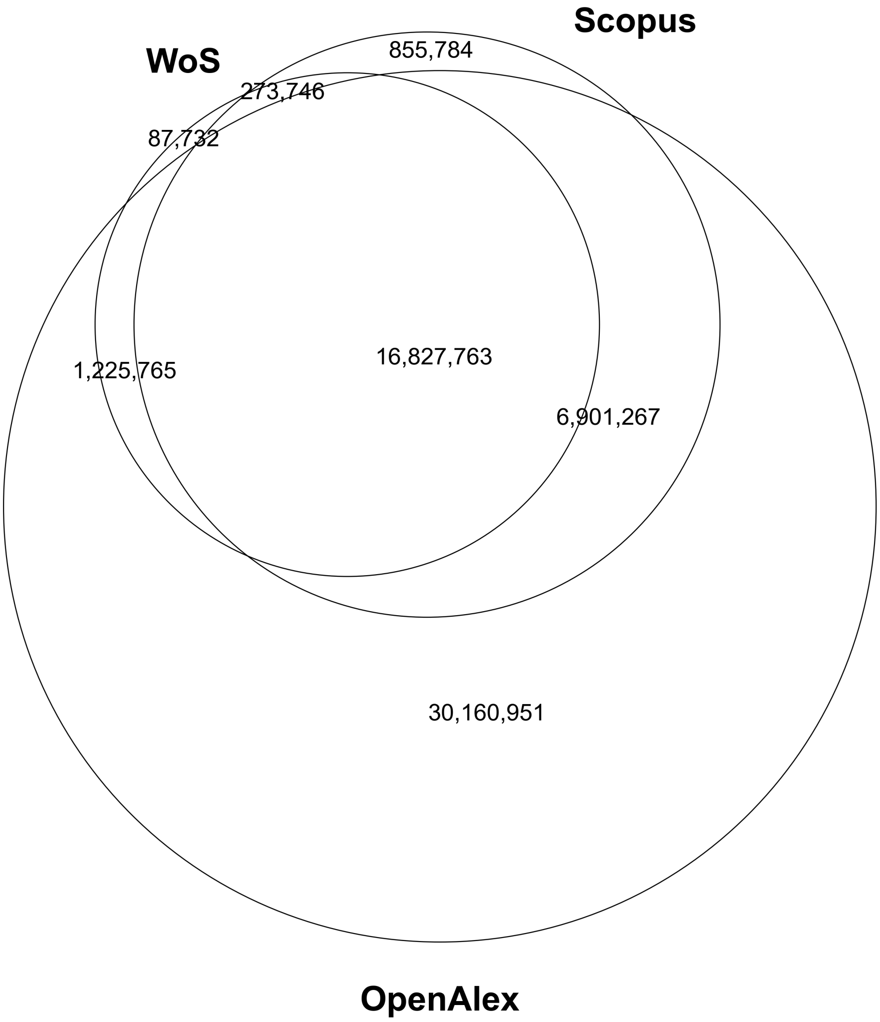

Fig. 1 Venn diagram of the intersection sizes of unique DOIs based in each database on exact DOI match, for records published between 2015 and 2022

Records with a shared DOI or those without a DOI were excluded from the DOI matching step in the construction of the Shared Corpus. In Table 2, which focuses on all publications in the three databases which are published between 2015 and 2022, it can be seen that Scopus has a significantly larger number of DOIs with multiple records associated with it. Altogether, OpenAlex has the greatest number of records without DOI, then WoS and Scopus.

As records without a DOI are not matched in our analyses there is a significant underestimation of the total size of the databases as portrayed in Figure 1, similarly records which have a shared DOIs are counted once. The error margin for the number of records compared to DOIs can be inferred from the data in Table 2.

Another reason for the exclusion of items in the DOI match, which at the same time restricts to publication years 2015-2022, is the fact that publication years are not always exactly the same between databases, possible due to differences in the handling of early access and print publication dates. We define the time restriction as applying to all three databases at the same time.

2.3 Methodology

To evaluate the reference and source reference coverage of WoS and Scopus against OpenAlex, we first used the reported reference counts and pre-calculated source reference counts as described in Section 2.1. The average total reference count and source reference count was computed for: each database, for records marked as 'article' (or comprising the document type 'article' alongside other type markings, in the case of Scopus and WoS) and for the Shared Corpus resulting from the DOI match (publication years 2015-2022). These numbers were replicated by counting the total number of references and records in each database and taking the ratio ('references per record'), as reported in Table 4. Then for the final results, queries were created to calculate and average the number of references with reference publication year 1996 to 2022, and the number of references that are linked to source items and publication years 1996 to 2022.

To determine metadata coverage (as detailed in Section 3.3), we also used the Shared Corpus as described in Section 2.1. Here, we restrict to publication items published in journals. For this purpose, the publication type categorisations of Web of Science and Scopus were used and the OpenAlex publications were assigned to these via the DOI comparison of the Shared Corpus, so that OpenAlex could be compared bilaterally with the other two databases. We then specifically compared the coverage of abstracts, ORCIDs and Open Access (OA) status information by assessing whether items have (at least one) of these and aggregated by journal, that is, for each journal, a publication record was counted if the desired metadata property was available. In the case of OA, we counted the item if the OA status was not marked as *closed*. We have normalised the journal title to lowercase to aggregate the items.

3 Results and Discussion

3.1 Total and Source Reference Coverage

Table 3, in a naïve averaging of the source reference count, leaves OpenAlex looking comparatively poor at 7.6 references per record to the 16.9 or 18.7 of WoS and Scopus (and well behind the other databases' average total reference count). However, when restricting to the 2015-2022 corpus shared by the three databases, OpenAlex proves competitive with a higher average source reference count than both WoS and

Scopus. The fact that results vary greatly depending on the underlying corpus definition could be explained by the fact that OpenAlex comprises of many–possibly less scientific–publications with comparatively short reference lists. When focusing on the comparison of the average total reference counts between WoS and Scopus, it initially appears that Scopus outperforms WoS, however when considering records marked as articles they perform more comparably. This trend continues when observing the Shared Corpus and the Shared Corpus with references from 1996 to 2022. Notably here the difference between the source reference count and total reference count decreases as the restrictions are added. The results suggest that Scopus still has a small disadvantage due to its initial indexing start in 1996. Consequently, the slight advantage for OpenAlex is reversed when references are restricted to reference publication years 1996-2022, with Scopus outperforming OpenAlex, and WoS performing worst – however, differences are very small.

	WoS	Scopus	OpenAlex
Whole Corpus			
Reported Average Reference Count	24.765	31.254	–
Pre-calculated Average Source Reference Count	16.867	18.692	7.572
Internal Coverage	68.1%	59.8%	–
Whole Corpus - Articles Only			
Reported Average Reference Count	32.826	32.805	–
Pre-calculated Average Source Reference Count	22.442	20.230	8.134
Internal Coverage	68.4%	61.7%	–
Shared Corpus (2015-2022)			
All References			
Reported Average Reference Count	43.185	43.320	–
Pre-calculated Average Source Reference Count	33.416	33.363	34.863
Internal Coverage	77.4%	77.0%	–
References 1996-2022			
Calculated Average Reference Count	38.226	38.062	–
Calculated Average Source Reference Count	31.207	33.359	31.823
Internal Coverage	81.6%	87.6%	–

Table 3 Comparison of the reference coverage available in each database, including the reference counts from the database providers, and our computed counts

The internal coverage of OpenAlex cannot be computed for Table 3 as it does not contain all references, respectively a total reference count. However, we can infer OpenAlex' internal coverage in the Shared Corpus by assuming either Scopus or WoS contain a definitive reference count. In this case, the internal coverage for the last segment (comprising the 1996-2022 restriction to reference publication years) for OpenAlex would be 83.2% when related to WoS' total reference count, or 83.6% when related to Scopus' reference count, notably these values lie between those of WoS and Scopus. We cannot perform the same analysis on all comparisons given the differing database sizes.

3.2 Discrepancies between Reference Counts and Reference Data

When comparing the reported and pre-calculated average total and source reference counts to an alternatively self-calculated ratio of all references to all publications, we came across discrepancies in Scopus and OpenAlex. In case of Scopus, reference counts reported by the provider do not always correspond to the actual references in the database, a phenomenon confirmed by Elsevier in informal communication as being caused by inconsistent supplier ingestions. In case of OpenAlex, some references refer to items that do not exist in OpenAlex, i.e. are deleted. The latter references are not included in the pre-calculated values. The discrepancies between both types of calculation can be seen in Table 4.

For further verification, we selected the publications in Scopus and OpenAlex where either the pre-calculated total 'reference count' in Scopus and 'source reference count' in OpenAlex were not equal to the respective number of entries in the databases' reference table. We then computed the averages of the reported/pre-calculated counts, and compared this to the ratio of references to publications while excluding in both cases the identified publications where reference count (in Scopus) or source reference count (in OpenAlex) do not correspond to the actual number of references. Once this has been done, the resulting averages then only differ at the 12th to 14th decimal place. We therefore conclude that for both databases discrepancies between reference counts and actual reference numbers are due to erroneous data. While in OpenAlex both our pre- and self-calculated source reference counts are consistent to our concept as we only count as source references those whose target items are actually in the database, the situation is more complicated in the case of Scopus: In our averages, we first use the reference counts supplied by the provider, which do not always match (but are probably more correct than) the references actually supplied, while in the last segment, where we calculate the count ourselves with references restricted to the 1996-2022 time window, we can only do this on the basis of the references actually supplied.

The detected discrepancies raise issues with both proprietary and open source bibliometric databases and should be considered when working with the references, and likely merits a deeper analysis.

	WoS	Scopus	OpenAlex
Whole Corpus			
Ratio of References per Record	24.765	30.979	7.592
Reported Average Total Reference Count	24.765	31.254	–
Reported Average Source Reference Count	16.867	18.692	7.572
Whole Corpus - Articles Only			
Ratio of References per Record	32.826	32.645	8.155
Reported Average Reference Count	32.826	32.805	–
Reported Average Source Reference Count	22.442	20.230	8.134

Table 4 Discrepancies between Scopus and OpenAlex reported / pre-calculated reference counts and the ratio of references to records

3.3 Metadata Coverage

Figure 2 highlights the metadata coverage analysis results between OpenAlex and the two proprietary databases, WoS and Scopus, within the Shared Corpus. The x-axis represents OpenAlex, while the y-axis corresponds to WoS (left) and Scopus (right). The points represent the percentage coverage of the relevant indicator per journal.

The results indicate that OpenAlex depicts a different pattern compared to WoS and Scopus in terms of abstracts (Figure 2a), with the two proprietary databases having a higher overall availability of abstracts. In total, over 92% of the articles in WoS and Scopus have abstract information, compared to a 87% coverage of abstracts in OpenAlex. In contrast, the ORCID coverage is more comprehensive in OpenAlex (Figure 2b). The proportion of articles in OpenAlex with at least one ORCID present is 92%, and the proportion of articles with at least one ORCID in WoS is 16% and in Scopus 32%. However, upon inspection we discovered that OpenAlex performs a generous disambiguation of authors, resulting in a high ORCID coverage, which may explain this large difference. In particular, some authors with Chinese names were linked to more than 10,000 publications. The distribution of open access information is more linear (Figure 2c), with a tendency slightly in favour of OpenAlex, suggesting an indexing lag of Unpaywall's open access status information in the WoS and Scopus data. The proportion of open access information in all three databases is around 49%.

3.4 Discussion

This study demonstrates the source reference coverage in OpenAlex to be comparable to that in WoS and Scopus for comparatively newer records which lie in the intersection of all three databases, both in general and when restricting to references from 1996 onwards. On the one hand, this could be seen as an indicator of good quality bibliometric core data. On the other hand, OpenAlex does not have the highest internal coverage, although it is by far the largest database, so it would actually be plausible that higher proportions of the referenced publications are themselves part of the database. In this respect, the Scopus coverage policy seems to be a bit more effective. However, one possible factor could also be that a comparatively poorer reference-matching algorithm misses a noticeable amount of actual source references. From table 3 it can be inferred that within the Shared Corpus, there are on average 6.4 to 6.2 references captured in the total reference count by WoS and Scopus (respectively) that OpenAlex does not capture in its source reference count. The fact that OpenAlex does not systematically include non-source references, as well as complete reference strings, limits the flexibility of using and exploring the data source: It does not allow researchers or bibliometric centers to apply their own reference matching algorithms or to analyse non-source references as such.

The study also revealed data errors in Scopus and OpenAlex. The reported figures for reference counts in Scopus do not correspond to the actual numbers of references in the database, and OpenAlex is inconsistent in its handling of references as it does not systematically comprise all non-source references, but references to deleted source items. Similarly, we note that all databases, to a different degree, comprise cases where

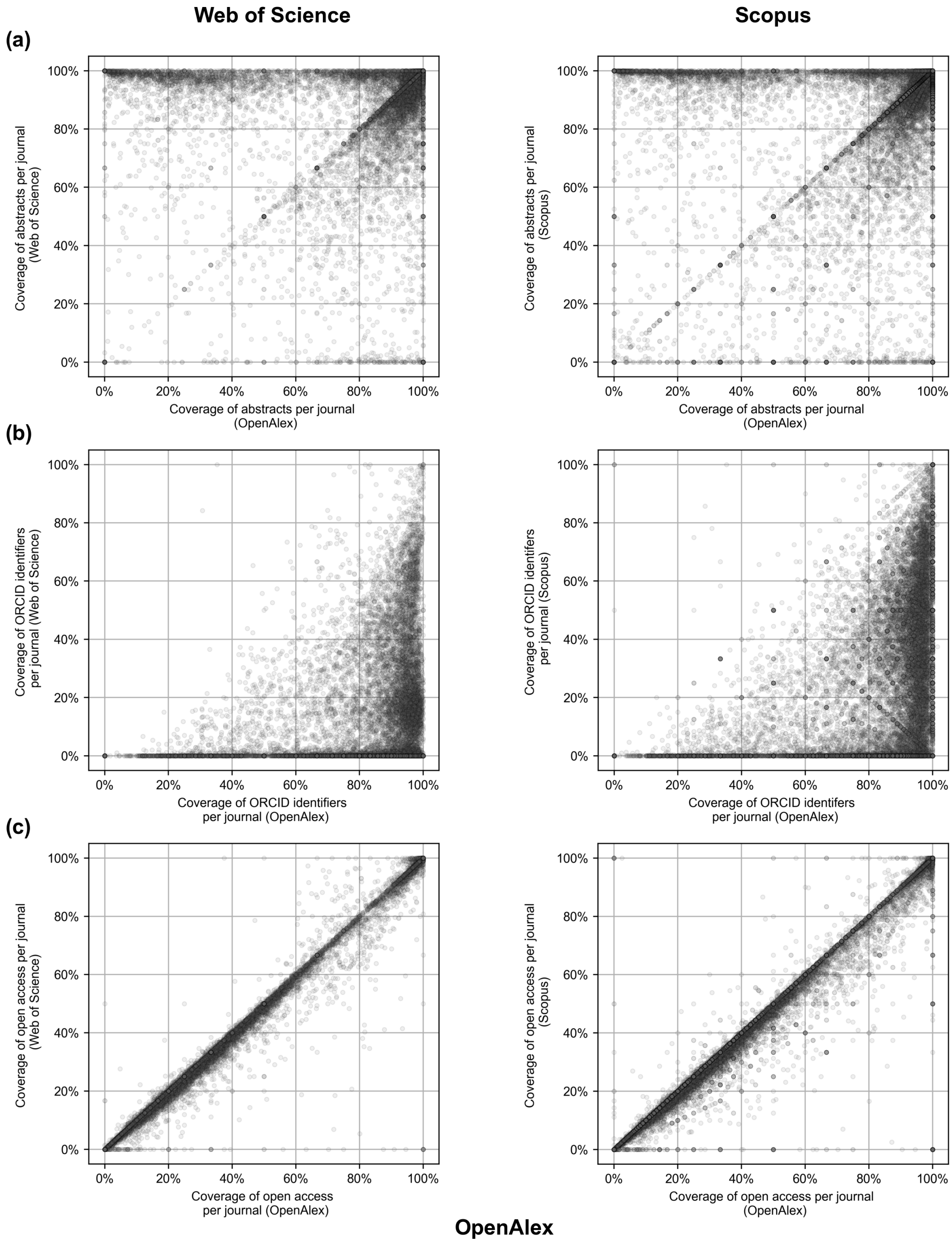

Fig. 2 Plots of the coverage of metadata between OpenAlex and Web of Science and Scopus

DOIs refer to multiple records–cf. Franceschini et al. (2015). We believe it merits further study and caution when replicating these computations.

Although metadata coverage relating to abstract information is lower than in WoS and Scopus, the share of records with abstracts in OpenAlex is nevertheless higher than in Crossref as stated in Kramer (2024). Kramer also notes that, at the time of writing, the large publishers Elsevier, Taylor & Francis and IEEE did not openly share abstracts via Crossref. But OpenAlex also acknowledged legal issues, which resulted in the representation of abstracts as inverted index as well as in the removal of some abstracts.[5]

Our analysis reveals that OpenAlex demonstrates a particularly high level of coverage for ORCID in comparison to WoS and Scopus. Over 90% of articles in OpenAlex had been assigned at least one ORCID. However, we have observed that this percentage is somewhat excessive. Upon inspection, we discovered that in some case ORCIDs were assigned to more than 10,000 records in our corpus, suggesting issues with OpenAlex's author disambiguation method. Notably, Chinese author names were among those most affected.

4 Limitations and Outlook

A fundamental limitation of our study setting is the lack of ground truth–we do not analyse whether the reference counts provided by WoS and Scopus correspond exactly to the respective reference lists in the publications. However, we have checked in all three cases whether delivered and pre-calculated reference counts and delivered references correspond.

We also do not check the accuracy with which the databases match references to publications, which can be seen as the prerequisite for the internal coverage indicator we use. Some studies analyse the accuracy of the database matching algorithms either on the basis of manual sample evaluations and/or in comparison with their own algorithms for example, in Olensky et al. (2016).

In a more extensive setting, an in-depth comparison of source and non-source references of each publication in a sample between the databases could provide indications of the extent to which the detected smaller differences can be explained by different coverage profiles or strengths and weaknesses of the matching algorithms. A possible extension of our main methodological setting could analyse the internal coverage with respect to the disciplinary level and address the question to what extent OpenAlex has a better (or worse) coverage of non-English, regionally-oriented journals which might be relevant to some Arts & Humanities and Social Sciences subjects, for example, and do not easily fulfill WoS curation criteria.

When studying ORCID availability, it must be noted that we did not check for the availability for all co-authors, but just if there was at least one ORCID present per article. It is important to conduct further analysis to confirm whether the author names and ORCIDs are accurately matched, given the observed phenomenon of a single ORCID being erroneously attributed to tens of thousands of articles. If this

[5] https://groups.google.com/g/openalex-users/c/ptFDD7qWvYw/m/kXWDG3o5BAAJ

is not the case then this may demonstrate the ongoing challenge of author name disambiguation, in particular in the case of Chinese names.

As discussed in Section 2.2, some DOIs were found to have duplicate records assigned to them in each of the three databases, requiring us to deselect the 39,481 records from 2015-2022 which lay in the intersection of the three databases and had more than one record associated with the DOI in one of the databases from our Shared Corpus. A more detailed examination of duplicate DOIs may be merited, in particular with respect to Scopus (as demonstrated by Table 2.) Similarly investigations into the distribution of duplicated DOI by record type between each database may be recommended for future research.

Declarations

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