Google Scholar as a Data Source for Research Assessment in the Social Sciences

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Abstract

The Web of Science (WoS) was the dominant bibliographical source for a long time until the launch of Scopus and Google Scholar (GS) in 2004. GS is an academic search engine different from WoS and Scopus in approach and scope. The fact that GS covers the social sciences more broadly compared to WoS and Scopus led the academy to use GS as a bibliometric data source for research assessment studies. This chapter aims to review the studies on "Google Scholar" related to social sciences. In doing so, we reveal the usefulness of GS in assessment exercises. First, the literature on "Google Scholar" retrieved from GS, Scopus, and WoS is described using Flourish. We visualize the literature retrieved from these three data sources using VOSviewer to show the scatter of the studies and their emphasis on social sciences. Second, we focus on the studies related to social sciences. We discuss the terms extracted from the titles and abstracts of these studies related to "social sciences". This chapter concludes with the recommendation to use of GS in a careful way. GS is not a citation index but a search engine and various problems with data quality and its transparency are noted.

Keywords: Google Scholar, research assessment, social sciences, research evaluation, academic search engine, bibliometric data sources, data quality.

1. Introduction

The implementation of citation indexes initially with the Science Citation Index (SCI) by the Institute for Scientific Information (ISI) in 1964 (Garfield, 1964) brought a new dimension to research assessment. The Social Sciences Citation Index (SSCI) followed in 1973 and the Arts and Humanities Citation Index (AHCI) in 1978. For a long time, these citation indexes as brought together in the Web of Science (WoS) have been the sole data source for bibliometric assessment of research (publications, institutions, countries, journals, individuals, etc.). Even today, in many countries and many institutions worldwide it is not possible to get tenure or be promoted without publishing in a WoS indexed journal. Moreover, publishing in the first or second quartile journals of the Journal Citation Reports (JCR) is often expected. It is not always easy and fair for social scientists to fulfil such expectations because of the specificities of their publishing patterns. The second citation index, Scopus by Elsevier, became a competitor for WoS with broader journal coverage. With the expansion of WoS (Testa, 2011) with regionally relevant journals, WoS evolved in a similar direction as Scopus.

Although Scopus still outperforms WoS in terms of social sciences coverage (Rafols et al., 2020, p. 9), the social sciences are still underrepresented in both commercial databases. Jacsó (2005, p. 1540) found that 14% of WoS publications belong to the social sciences. A

recent study (Taşkın & Doğan, 2020, p. 4) revealed that the social sciences publications in WoS (1980-2018) accounted for only 9.4% of the total. Using the list of 16,997 journals indexed in SCI-Expanded, SSCI, and AHCI and 34,274 journals indexed in Scopus, Mongeon and Paul-Hus (2016, pp. 2218-2219) showed that the use of WoS and Scopus in research assessment results in unfavourable situation for the social sciences and arts & humanities compared to the assessment context for the natural sciences & engineering, and biomedical research. Mongeon and Paul-Hus showed that about 25% of academic social science journals in Ulrich were listed in Scopus and less than 12% in WoS. They also found that 21.3% of the journals indexed in WoS, and 27.8% of the journals indexed in Scopus were social sciences journals, whereas the share of social sciences journals in Ulrich amounts to 36.0%. As a national example, the coverage rate of peer-reviewed publications in the fields of social sciences and humanities in Norway between 2005-2009 and 2005-2012 was found to be the lowest in Wos and Scopus compared to other fields. About 20-22% of the social sciences publications were covered by WoS, and 38% by Scopus, while these rates were around 80% for natural sciences (Sivertsen, 2016, pp. 81-82; Sivertsen & Larsen, 2012, p. 571). Authored or edited books and book chapters submitted to the UK RAE (Research Assessment Exercises) 2008 was higher than 50% for 13 social science and humanities disciplines out of 67, and higher than 30% for 24 social science and humanities disciplines (Kousha & Thelwall, 2011, pp. 2160-2161).

Shortly after Elsevier launched Scopus, in 2004, GS was launched too. Today, WoS, Scopus, and GS are not the only sources of publications/citations. There are several others, which are called "new generation citation indexes," such as Microsoft Academic Graph (MAG), Dimensions, OpenCitations Index of Crossref open DOI-to-DOI citations (COCI), CiteSeerX, Lens.org, Semantic Scholar, and scite (Martín-Martín et al., 2021; Tay, 2020). However, Wos, Scopus, and GS, also sometimes called the "Big 3", are considered the three primary sources in evaluating research outputs and measuring research impact (Gingras, 2016, p. 63; Tay, 2020). Indeed, GS differs greatly from WoS and Scopus in that it is an automated academic search engine (Ortega, 2014) rather than a citation index where expert editors determine the content.GS indexes citations and crawls authoritative/scholarly web sources, the so-called "academic web". This makes GS a "milestone" academic search engine according to Ortega (2014, p. 7), who explains the reason for this as follows:

> *… it combined web crawling through powerful bots with the use of authoritative sources which, by agreement, allowed data extraction from their sites. Moreover, it also incorporated its own autonomous citation index that enriched the relevance of the results. In this way, Google Scholar included the main characteristics of an academic search engine – web crawling, authoritative sources, and citation indexing – but expanded them until it became the largest scientific information service with citation data.* (Ortega, 2014, p. 7)

GS, which was released around the same time as Scopus, drew attention with the coverage of different geographies, languages, publication types, and sources. From the studies on GS content in the early years of GS (Mayr & Walter, 2007; Neuhaus et al., 2006; Wilson, 2007), it becomes clear that the content of the social sciences was not very remarkable, but a significant improvement occurred over time. However, in the same years, Gardner and Eng (2005) compared GS content to three different commercial social science databases (PsycINFO, Social Science Citation Index, and ERIC) through sample searches and found GS better in terms of the number and relevance of results and types of sources. Many studies showed that social sciences are very well-covered in GS compared to WoS and Scopus (Ferrara et al., 2018; García-Pérez, 2010; Harzing & Alakangas, 2016; Jacsó, 2005;

Martín-Martín, Orduna-Malea, Thelwall, & López-Cózar, 2018; Meho & Yang, 2007; Prins et al., 2016). Considering that many countries and institutions struggle with the evaluation of social sciences and humanities (Martin et al., 2010; Sivertsen & Larsen, 2012), it is hence to be expected that GS has become so popular. The following description of a Social Sciences and Humanities (SSH) bibliometric database produced in the frame of the European Science Foundation's (ESF) Scoping Project entitled "Towards a Bibliometric Database for Social Sciences and Humanities" (Martin et al., 2010, pp. 12-13), makes this reasoning explicit:

> *A SSH bibliometric database must allow considerable flexibility in terms of coverage. While initially it may, for pragmatic reasons, focus on scholarly articles and books, over time it will need progressively to bring in more popular books, magazine or newspaper articles and other 'enlightenment literature', 'grey publications' such as policy reports, and (ideally) details of non-published outputs like artwork, exhibitions, excavation reports and photos for assessing SSH impact.* (Martin et al., 2010, p. 12)

While WoS and Scopus are subscription-based, GS is free despite its broad coverage of scholarly publications and citations (López-Cózar et al., 2019, pp. 102-105; Martín-Martín et al., 2019). GS also made it possible to measure the citation impact of dissertations (Kousha & Thelwall, 2019). All these features made GS the first stop for a comprehensive literature search and citation tracking. Furthermore, it has led scholars to study the potential of GS as a new and very comprehensive bibliometric data source for measuring scientific output and impact. Particularly for social sciences underrepresented in WoS and Scopus (Martín-Martín et al., 2019; Prins et al., 2016).

The purpose of this chapter is to analyse the studies on "Google Scholar" and to review those studies that use GS to evaluate research in social sciences. Studies indexed in GS, WoS, and Scopus with "Google Scholar" in their title are included in this overview. We identified these studies through the searches in Appendix 1 and used the Publish or Perish Software (Harzing, 2016a) to retrieve the GS data. Data downloaded from GS, WoS and Scopus were first cleaned and standardized. Also, the information about the publications was verified by going to the relevant web addresses/DOI numbers, and necessary changes were made in the dataset (see Appendix 2-3). Some general findings regarding the publications about "Google Scholar" indexed in GS, Scopus, and WoS are presented under the second heading, using Flourish (https://flourish.studio/). Thus, an attempt was made to represent aspects in which GS differs from WoS and Scopus by means of a sample data set including studies on "Google Scholar". Also, a term-occurrence map/network of studies on "Google Scholar" was created using VOSviewer (https://www.vosviewer.com/publications), a bibliometric visualization tool. For this purpose, the English titles and abstracts of the studies were used as text data[1]. Both the subjects on which the studies on "Google Scholar" are concentrated and the place of social sciences in this sense have been determined. In the next part of the chapter, using the map and network files created by VOSviewer, terms that co-occur with social sciences in at least two documents were determined and visualized with Flourish. This information has been used to classify and review the studies on "Google Scholar" related to social sciences and to show how GS is used in social sciences.

While examining the studies on Google Scholar, we noted insufficient emphasis on data quality. Data quality is a very important issue, especially for studies that use Google Scholar as a data source for research evaluations. In Section 4, studies on Google Scholar's data quality are evaluated. That section also summarizes and illustrates with examples the

[1] Detailed information about the data can be found in Appendix 3.

problems encountered during the cleaning and standardization of the Google Scholar dataset used in this study. Google Scholar data is not available for download. However, the Publish or Perish software, which is also used in this study, is widely used for this purpose. Platforms that work with GS data such as Publish or Perish and the use of GS data for research evaluation purposes in different ways are presented in the following section.

2. Studies on "Google Scholar" in GS, WoS, and Scopus

Quite a few studies on "Goole Scholar" have been published since its launch in 2004. Figure 1 shows the number of publications on "Google Scholar" according to GS, WoS, and Scopus, respectively. GS contains about 1240[2] records with "Google Scholar" in the title as of August 23, 2020 (268 for WoS, and 369 for Scopus). After the data cleaning process, the number of publications decreased to 1033 for GS, a 14.5% decrease. There was no decrease for WoS and very little for Scopus. The electronic access link for the dataset is included in Appendix 2 and detailed information about the data collection, data cleaning, and conceptualization is available in Appendix 3.

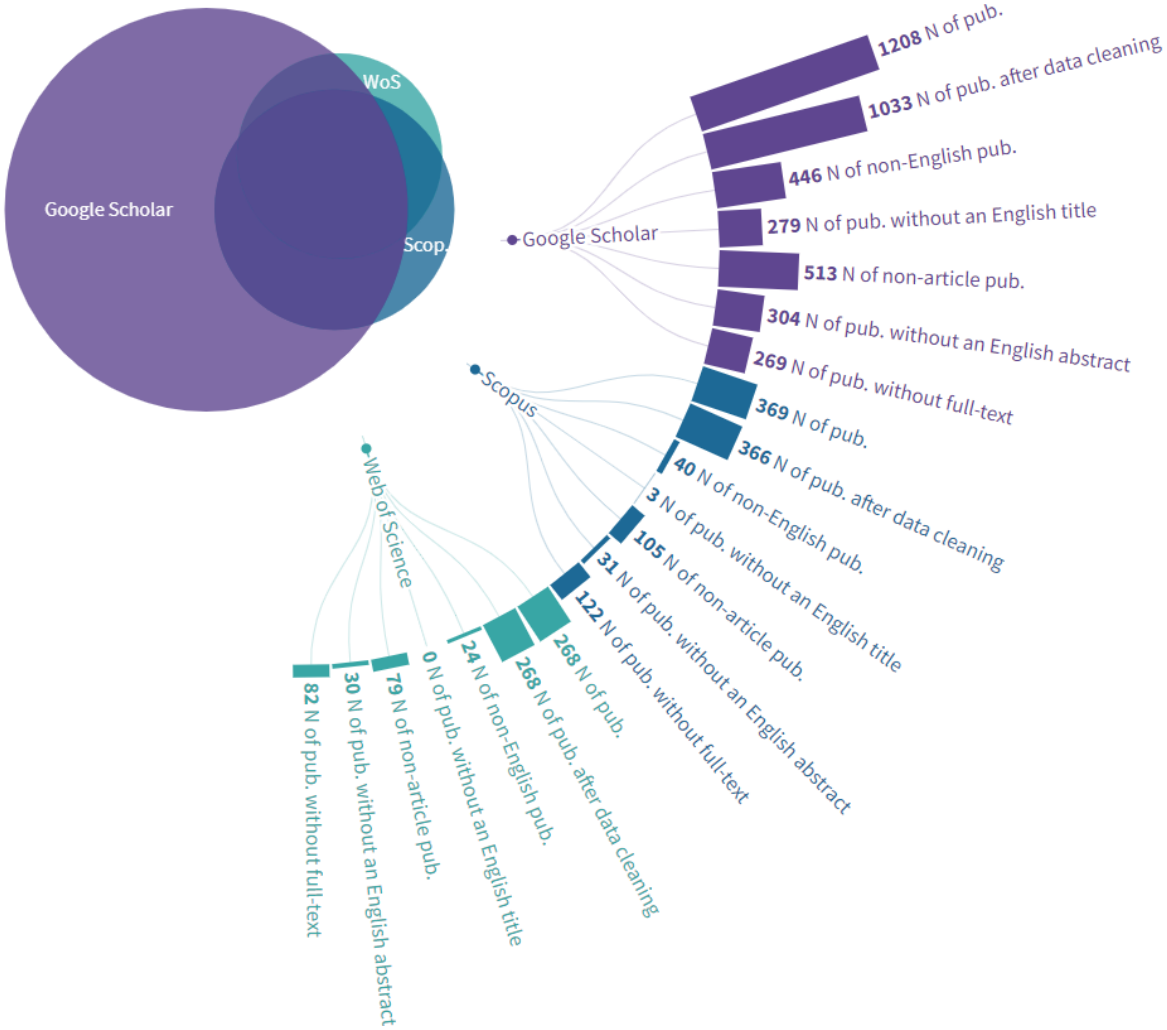

Figure 1. Data on publications with "Google Scholar" in their titles in GS, WoS, and Scopus.
*For Venn diagram: https://public.flourish.studio/visualisation/5602495/
*For radial tree: https://public.flourish.studio/visualisation/5560404)

[2] Result of the Google Scholar search performed on 23 August 2020 for 2004-2020. Note not this is not including patents and citations. This number changed as 1208 when the data downloaded via Publish or Perish on a yearly base (from 2004 to 2020).

Using the data retrieved from GS, WoS, and Scopus, we identified 1119 unique publications. The distribution of these 1119 publications in terms of the data sources is presented in Figure 1. GS as a data source is clearly dominant in covering the publications on “Google Scholar”. Almost 92.3% (N=1033) of the 1119 unique publications are accessible via GS, almost 63% (N=702) are solely covered by GS. However, publications only accessible via WoS (1.8%) or Scopus (2.9%) represent small shares.

Out of 1033 publications included in GS, 43% were not in English, more than one in four publications (27%) do not have an English title available. Non-English publications were 11% for Scopus and 9% for WoS. There was no publication in WoS without an English title and only three in Scopus. There are many different types of publications in GS (Martín-Martín, Orduna-Malea, Thelwall, & López-Cózar, 2018, p. 1167). Also for our dataset on “Google Scholar” we observe that almost half of the publications included in GS were non-article publications (49.6%). This share is lower for WoS and Scopus (29.5% and 28.7% respectively, almost one-third of both are conference papers). Due to the GS’s content in various languages and different types of sources, 29.4% of publications don’t have English abstracts, and 26% don’t have available full-texts. The shares of available full-texts are lower for WoS and Scopus than for GS. The full-texts of 33.3% of Scopus publications and 30.6% of WoS publications cannot be accessed. Indexing mostly the English articles, available English abstracts are higher for WoS (89%) and Scopus (91.5%).

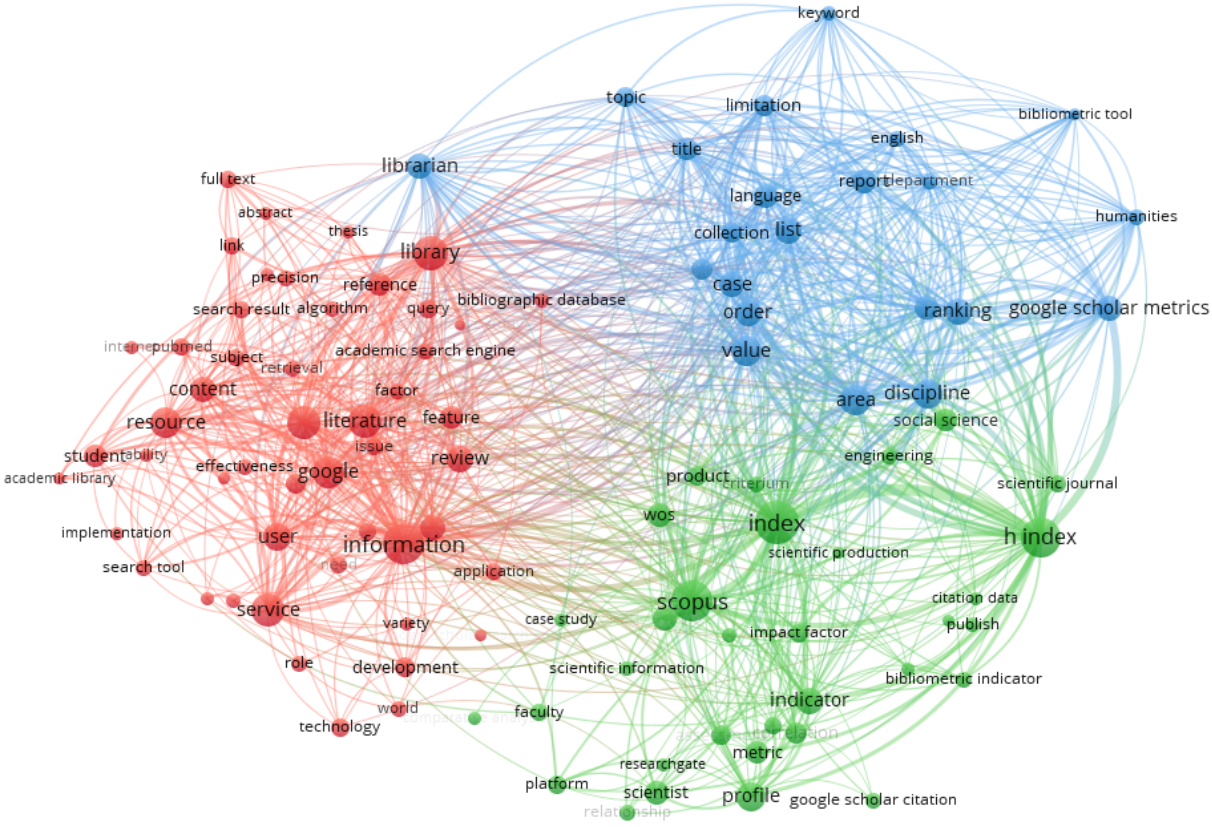

Figure 2. VOSviewer term co-occurrence map for terms extracted from titles and abstracts of the publications on “Google Scholar” (Binary counting used for term extraction, and terms with occurrences higher than 20 represented in the Figure)
*For interactive version: https://bit.ly/3ADY8n1

Figure 2 shows the co-occurrence map for the terms extracted from titles and abstracts of the 1119 unique publications retrieved from GS, WoS, and Scopus. Considering that almost

half (46%) of the publications are relevant to research evaluation, it is clear from Figure 2 that the green and blue clusters represent research evaluation studies. The red cluster focuses on the studies that evaluate GS as an academic search engine to retrieve scientific information/literature. The green cluster collects the studies comparing GS mainly with WoS and/or Scopus. Different fields (e.g. social sciences, engineering), scientific journals, faculties, and scientists are compared in these studies in terms of scientific production and different metrics/indicators such as h-index, citations, and impact factor. The blue cluster is positioned close to the green one, and focuses on ranking/listing of different areas, disciplines, faculties by Google Scholar Metrics. There are also studies represented in this cluster about the limitations/problems of GS or other bibliographic data sources that led researchers to use GS. An example that can be deduced from the map is that the language is mostly English.

3. "Social Sciences" in the Studies on Google Scholar

The visibility of "social science" in the green cluster in Figure 2, positioned very close to the blue cluster, indicates the use of GS data in metric-based studies related to social sciences. The term "social sciences" is mentioned in the title of 15 of the GS publications included in this study. In 85 cases "social sciences" is included in the title and/or abstract. Three-quarters (75.3%) of these publications are related to research assessment, 68.2% are in English, 46% is published after 2015, and almost half are articles (50.6%), 21% are reports or working papers.

Figure 3 shows the terms that co-occur with "social science" in the titles or abstracts of these 85 publications. Although most of these terms refer to GS's use for research assessment, some studies mentioning "social science" in the title/abstract are not directly related to this issue. They are mostly focused on content, information retrieval, and the use of GS for the research information search/need. Most of these studies combine social sciences with humanities and arts, although not at the same level.

Social sciences cover local/regional issues, and so publishing in national journals in native languages is more predominant than in STEM fields (Hicks, 2004; Hicks et al., 2015). For example, half of the Norwegian social science publications (2005-2009) are in a domestic language (Sivertsen & Larsen, 2012, pp. 570-571). Note that this share is 18% for health sciences and only 3% for both engineering sciences and natural sciences. Moreover, 44% of social sciences publications were books/book chapters, also a much larger share than for health sciences (9.8%), natural sciences (11.4%), and engineering sciences (27.7%). However, commercial databases, mostly based on English articles published in international journals of developed countries, cannot respond to the diversity of social sciences and hence have limited coverage of the social sciences. A recent study (Taşkın & Doğan, 2020) analysed category-based WoS data (251 categories, 1980-2018) and showed that social sciences behave differently from other areas in terms of publications, citations, and collaborations. One of the current research assessment practices in social sciences is using all types of scholarly outputs and other sources than commercial databases such as WoS and Scopus (Giménez Toledo, 2018). The rise of GS has been promising in this regard, which is considered an inclusive data source for social sciences, and it is free. With the effect of this, studies comparing GS with other data sources (especially WoS and Scopus) are prominent in the GS literature. Halevi et al. (2017) determined the number of studies comparing GS with other citation databases as 91 for 2005-2016. According to López-Cózar et al. (2017), 66 studies in the period of 2005-2017 compare GS with WoS and/or Scopus.

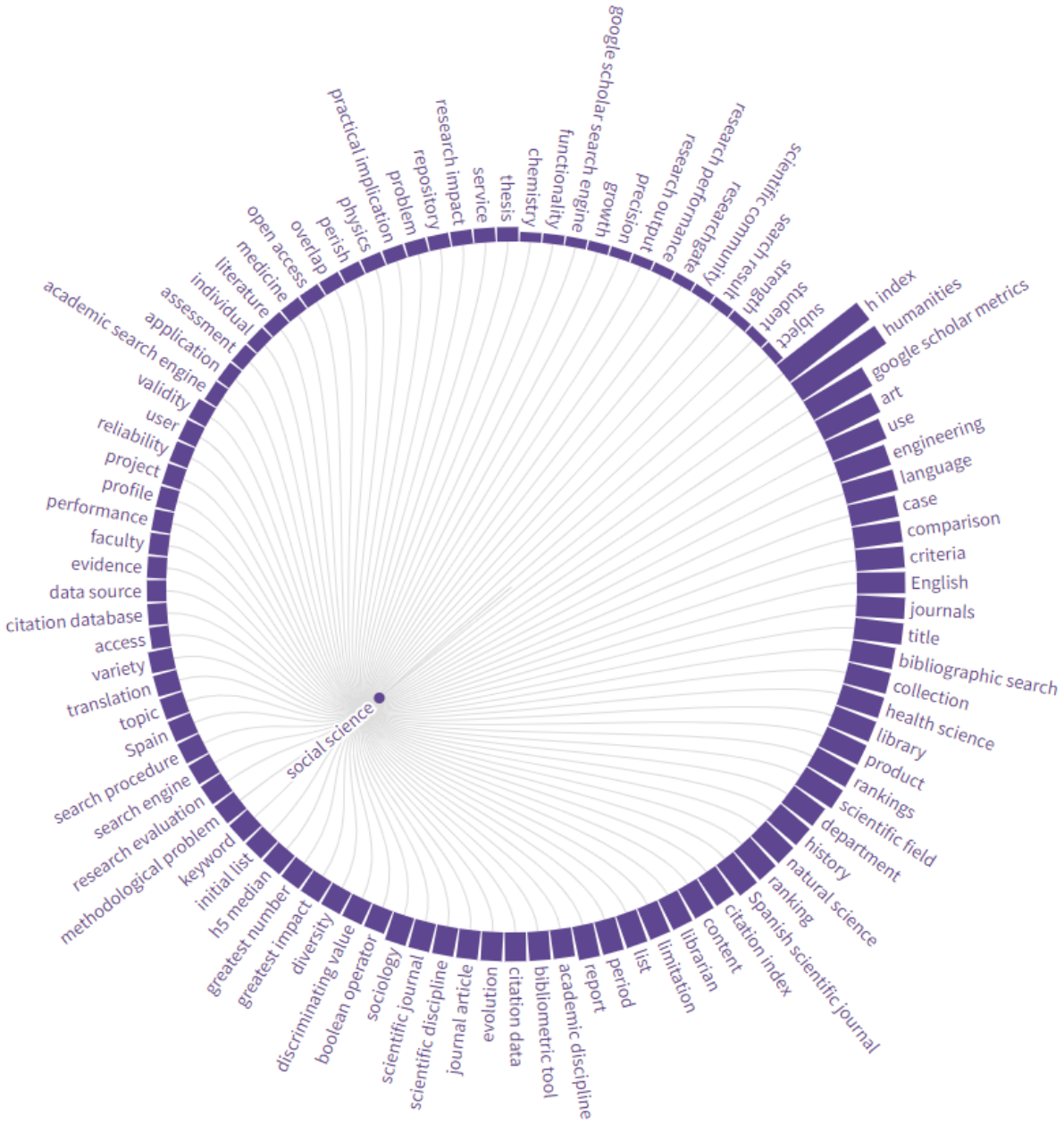

Figure 3. Term co-occurrence with "social science" in 85 publications (VOSviewer and binary counting used for term extraction. Term occurrences higher than 10, co-occurrences higher than 2 are represented in the Figure

*Interactive version: https://public.flourish.studio/visualisation/4273998/

3.1. Studies comparing "social sciences" with other fields using GS and other data sources

After discovering the potential of GS, several authors have explored the presence of main fields in GS compared to other bibliographic databases, WoS and Scopus in particular. One of the most comprehensive studies is by Martín-Martín, Orduña-Malea, Thelwall, and López-Cózar (2018, pp. 1165-1169), who compared overlap of citations in GS, Scopus, and WoS for main fields and 252 subject categories. They reported that GS contains 94% of all citations for social sciences (corresponding rates for WoS and Scopus were 35% and 43%, respectively). Besides, 93% of WoS citations and 89% of Scopus citations for social sciences were available in GS. It turned out that the social sciences citations, which can only be

accessed via GS, were over 50% (the same is the case for humanities, literature & arts, and business, economics & management, while it is between 20% and 34% for other fields). On the other hand, the citations accessible from all three of GS, WoS, and Scopus ranged from 21.4% to 30% for social sciences, humanities, literature & arts and business, economics & management, while it ranged from 50% to 70% for other fields. When the citing document types for the citations only available in GS are examined, the most common publication types for social sciences after journal publications (39%) are theses/dissertations (28%) and books/book chapters (14%). Books/book chapters represent the largest share for social sciences after humanities (19%). Another interesting finding of the study (Martín-Martín, Orduña-Malea, Thelwall, & López-Cózar, 2018, pp. 1169-1170) was the distribution of languages for citing documents. The languages of the unique citations in GS differed from the languages of overlapping citations for WoS, Scopus, and GS (almost all in English). The rate of non-English citations retrieved only from GS differed between 20%-38% for different fields.

The GS, Scopus, and WoS publication and citation numbers of 146 academics from five main fields (humanities, social sciences, engineering, sciences, and life sciences) were compared by Harzing and Alakangas's study (2016, pp. 795-796). They showed that the numbers of Scopus and WoS publications are close to each other in five main fields, and that the areas where the coverage of these two databases differs most from GS are the humanities and social sciences. For social sciences, the average number of publications in GS is 3.8 times more than in WoS, and 3.4 times more than in Scopus. The average number of citations in GS amounts to almost four times that in WoS and almost three times that in Scopus. Martín-Martín, Orduña-Malea, and López-Cózar (2018) also compared highly cited publications in GS (N=2515) with those in WoS and Scopus. The highest fraction of highly-cited publications that could not be accessed through WoS and Scopus were those belonging to the fields of humanities and social sciences. The citation numbers of the highly-cited publications in WoS and Scopus were compared with the corresponding GS citation numbers. Although strong correlations were found for all fields, one of the areas with the lowest correlation coefficients was social sciences (WoS-GS: 0.86, Scopus-GS: 0.91). The highest number of highly-cited publications for each field were in GS, and GS diverged from WoS and Scopus in particular in the humanities, literature & arts, social sciences, and business, economics & management (pp. 2180-2182).

A recent study (Martín-Martín et al., 2021) also compared GS with other databases than WoS and Scopus. Martín-Martín et al. (2021) compared citations indexed in six different platforms (Dimensions, Microsoft Academic, and Open Citations' COCI in addition to WoS, Scopus, and GS). According to this recent study, 94% of COCI citations, 93% of Dimensions citations, and 89% of the Microsoft Academic citations were available in GS. These three data sources contain respectively 28%, 54%, and 50% of all citations, and 30%, 57%, and 61% of GS citations. GS does not even lose its first place in terms of citation finding compared to the "new generation citation indexes" (p. 882). In another study (Kousha & Thelwall, 2019) GS citations of dissertations for different fields including the social sciences are compared with Mendeley's reader count. The authors conclude that GS citations can be used to assess the impact of social science dissertations older than two years. García-Pérez (2010, pp. 2080-2081) compared the GS, WoS, and PsycINFO h-index values of four Spanish psychologists and found that h-index values were highest in GS for all four scholars.

3.2. Studies comparing/listing disciplines, schools, journals, or researchers in "social sciences" using GS and/or other data sources

Besides studies comparing the main research fields using data retrieved from different data sources including GS, schools, faculties, disciplines and journals are also compared. GS is also used for comparing, ranking, listing researchers working in a certain country, discipline, or university.

Mingers and Lipitakis (2010) compared three business schools in the UK by findability of about 4,600 publications using WoS and GS. GS found 2,146 citations for the 167 publications indexed under the social sciences field, whereas the number of citations for WoS was 771 (p. 6222). This study suggested not to use WoS for evaluating research in the field of management, given WoS' poor coverage of the field (Mingers & Lipitakis, 2010). Meho and Yang (2007) examined the WoS, Scopus, and GS citations of 25 researchers from Indiana University (Bloomington) School of Library and Information Science in the first years of GS. At the time, they observed no significant difference in the citation rankings of the researchers based on GS, Scopus or WoS (p. 2118). However, significant differences were observed between the number of citations, types of citations, and their languages (pp. 2114-2116). WoS and Scopus together found 2,733 citations, while GS alone found 4,181 citations. Almost half of the citations were only accessible by GS. 40% of the GS citations were journal articles (34% conference papers), and 7% were from non-English publications. While the rate of journal articles was 72% in citations accessed via WoS and Scopus, the authors reported that the language of almost all of them was English (p. 2122).

When WoS and GS citations are compared for different disciplines (biology, chemistry, physics, computing, sociology, economics, psychology, and education) based on 1,650 articles from 108 open access journals published in 2001, GS appears to be more comprehensive for social sciences. For education, economics, sociology, and psychology disciplines, the average citations found in GS were 2-4 times higher than WoS. For other disciplines excluding computing, the average number of citations in WoS was higher (Kousha & Thelwall, 2007, p. 1060). Analysing the citations in GS to 774 publications from 13 programs of education and pedagogical sciences (Ed/Ped), 328 publications from five programs of anthropology in six universities in the Netherlands (2004-2012), Prins et al. (2016) found that almost 57% of Ed/Ped citations and almost 63% of anthropology citations were from academic sources. They also found that 57.4% of citations were from books/book chapters for anthropology, only 21% from journals. These percentages were 44% (books/book chapters) and 30.6% (journals) for Ed/Ped (p. 266). GS found 8,092 citations for Anthropology publications (4,573 of which were from academic sources). The number of citations available in WoS for the same discipline was 1,097. The differences were not that much for Ed/Ped (Out of 22,887 citations in GS 13,370 from academic sources, 8,870 citations in WoS). Note that, the median percentage for coverage of publications by WoS in different programs of anthropology was lower than 30%, while it was about 80% for educational programs and higher than 90% for pedagogical sciences programs (p. 267).

There are studies ranking researchers/departments in specific social sciences disciplines according to their GS citations. An example study is the ranking of 1,572 German researchers in business administration based on the citation counts, who were members of the German Academic Association for Business Research (VHB) in 2007 (Dilger & Müller, 2013). The results compared with the Handelsblatt-BWL-Ranking list which is specifically for German-speaking Business Administration researchers. Two lists' top-ten differed greatly (pp. 147). Another study compared 3,354 researchers from 93 Greek university departments,

including social sciences (psychology, education, philosophy, philology) according to their GS publications per researcher, citations per researcher, and median h-index values (Altanopoulou et al., 2012). One of the interesting findings of the study was that the availability of publications on the web page for psychology and some education sub-fields in social sciences created a difference in the h-index value (p. 134). There are also studies in which GS rankings are compared to other databases, such as a ranking of Turkish international relations academics and departments in terms of GS and SSCI citations (Balci et al., 2019). In the study, where there was no significant difference between the rankings, the low rate of women in the list was noted (30%). A case study of 21,342 Italian researchers from six disciplines named as "non-bibliometric" by the authors –civil engineering and architecture; historical artistic sciences; history, philosophy, education, and psychology; law; economics and statistics; political sciences– showed that intersection of GS with Scopus and WoS were lowest in disciplines more focused on social sciences and/or humanities. Only 0.15% of GS publications from the discipline of law were available in both Scopus and WoS (Ferrara et al., 2018, p. 287). The correlation between the number of citations in GS and in Scopus was also lowest (0.57) for the law discipline (p. 290).

GS is thought of as a useful source for journals, especially national social science journals. The EC3 research group used GS widely to rank/list Spanish journals annually in terms of Google Scholar Metrics, especially the h-indexes and citations (Cabezas-Clavijo & Lopez-Cozar, 2012; López-Cózar et al., 2013). The majority of the studies on journal rankings come from these report series of EC3. However, case studies have also been conducted to determine the position of a single social science journal in GS compared to WoS and Scopus with respect to citations (Chapman & Ellinger, 2019; Roales-Nieto & O'Neill, 2012). Chapman and Ellinger (2019, pp. 1043-1044) examined the citations to the *Journal of Operations Management* (JOM), which is ranked in JCR. GS found 94% of citations to 37 articles published in JOM (vol. 28, 2010). The rate of citations available from WoS was 34.3% and 54.5% from Scopus. The citations retrieved from only one of these databases differed dramatically. While 45% of the citations were available only in GS, 5% of citations were only in Scopus and 0.02% only in WoS. In another study (Roales-Nieto & O'Neill, 2012, pp. 464-465), the rate of cited articles for the *International Journal of Psychology & Psychological Therapy* (IJP&PT) proved highest in GS compared to WoS and Scopus for each year between 2001 and 2010.

3.3. "Book" emphasis in GS studies on "social sciences"

Books and book chapters are very common types of publications and information sources for the social sciences (Martin et al., 2010, pp. i-ii). Social scientists write and cite books intensively. As mentioned earlier in this chapter, 44% of Norwegian publications (2005-2009) in social sciences are books/book chapters (Sivertsen & Larsen, 2012, p. 571). WoS and Scopus are used in most of the research assessment exercises, but they still lack meaningful coverage of books/book chapters. GS has the advantage of accessing both books and book citations because of indexing full-texts (Kousha & Thelwall, 2011, p. 2153; Martin et al., 2010, pp. 6-7). A known example is White's (2006, pp. 17-18) study, in which he searched for Gabriel Plattes –the 17th century utopian and scientific author– in several platforms in addition to GS. He found one hit in Historical Abstracts, and two hits in WoS, which contrasts to the 51 hits in JSTOR and 55 hits in GS because both index full-texts. Google also has a Google Books platform, but unfortunately, there is still no integration between GS and Google Books.

Some studies focused on GS's potential to index social science book citations. Citations to 1,357 Malaysian arts, humanities, and social sciences books published by five university publishers (1961-2005) were investigated in Abrizah and Thelwall's (2014) study. GS found more citations than Google Books for all disciplines of arts, humanities and social sciences (p. 2502). Comparing GS, Scopus, and WoS citations, Martín-Martín, Orduña-Malea, Thelwall, and López-Cózar (2018, p. 1170) found that citing document types that are only available in GS were journal publications (39%), theses/dissertations (28%) and books/book chapters (14%) for social sciences. Prins et al. (2016, p. 266) found that 57.4% of GS citations were from books/book chapters for anthropology, and 44% for education and pedagogy. Kousha et al. (2011) analysed the citations to a sample of 1,000 books submitted to the 2008 UK RAE (N=5420). They compared seven book-based disciplines –archaeology, law, politics and international studies, philosophy, sociology, history, and communication, cultural and media studies– using Scopus, GS, and Google Books. Google Books citations almost tripled Scopus citations for law and history disciplines. Google Scholar, on the other hand, doubled the number of citations for history, almost quadrupled them for law and communication, cultural and media studies, and almost tripled the number of citations for the other disciplines (p. 2154). Unique GS citations were more than 81% for all disciplines and highest for law (90%) and communication, cultural and media studies (87%) (p. 2156).

4. Data quality for GS

The general idea emerging from the studies reviewed for this chapter is that GS should be used, instead of WoS and/or Scopus, for multidisciplinary comparisons, including the social sciences. This point has also been made by Harzing (2013). The superior coverage of GS for social sciences over other databases explain its use in research evaluation and bibliometric analysis. However, GS is widely criticized because of the errors that it contains. Despite the superior coverage, a significant amount of bibliometric studies using GS data converged on the "data quality/reliability" problem, most notably due to lacking quality control. The data quality problems of GS -such as the problem of being unsystematic and lacking rigor-caused questions of its suitability in research evaluation and bibliometric analyses (Martin et al., 2010, p. 18; Mongeon & Paul-Hus, 2016, p. 214). GS turned out to be substantially problematic in providing quality data and hence some authors strictly do not recommend it for bibliometric analysis (Bornmann et al., 2014, p. 204; Jacsó, 2010). Some other studies suggested the informed use of GS (Halevi et al., 2017). One recent paper (Martín-Martín et al., 2019) that compares the size of GS, WoS and Scopus underlines the requirement to understand these data sources, and the indicators they offer and suggest to use them well-informed for research assessment purposes. Although it is clear that a significant number of studies using GS as a data source sacrifice data accuracy if they do not implement any data cleaning process, for a significant number of the studies reviewed for this chapter, there wasn't any reported data cleaning process.

The process of data cleaning was explained very detailed in Chapman and Ellinger (2019, p. 1043) which is an exemplary study in this sense. Dilger and Müller (2013, p. 146) and Meho and Yang (2007, p. 2111) are other example studies focused on data quality and have run a process with this aim. Comparing 25 LIS researchers over WoS, Scopus, and GS, Meho and Yang (2007) also compared the time spent on data for each platform. It is stated that the time spent on GS data was 30 times more than WoS and 15 times more than Scopus. Prins et al. (2016) also draw attention to the data reliability problem of GS and make data-based suggestions for ensuring reliability. Similarly, as explained in detail by Ferrara et al. (2018), the EVA project focused on the quality of records retrieved from GS.

49 studies (16 of which are by [Péter] Jacsó) focus on GS errors directly or indirectly up until 2017. These studies are reviewed and listed in Orduña-Malea, Ayllón et al. (2017, pp. 25-33) study. They identified only two studies (Doğan et al., 2016; Orduña-Malea, Martín-Martín, & López-Cózar, 2017) that have been conducted to directly detect GS errors and show their effects (p. 19) mainly due to the time needed for data cleaning and limitations of data collection from GS. The 49 studies are classified into four groups in terms of the GS errors addressed as coverage, parsing, matching, and searching & browsing (Orduña-Malea, Ayllón et al., 2017, p. 7). Content errors were mistaken document types, indexing all files from ".edu" academic sites. Parsing errors were one of the most important types, mainly related to confused metadata/bibliographic information, such as author names confused with other fields, generating non-existent author names or new co-authors (see Jacsó (2010) for examples), or parsing four digit page numbers as the publication date. Duplicate versions of records and the inflation of the citation numbers were an example of matching errors(Orduña-Malea, Martín-Martín, and López-Cózar (2017, pp. 9-10, 12-13). Comparing the h-index values for four Spanish psychologists using three different bibliometric data sources, García-Pérez (2010) found an incorrect citation rate of 16.5% for GS, which is high compared to PsycINFO (1.1%) and WoS (0.3%). The weird number of returned results for different but related searches, the inability to return proper results for a specific author or journal, and erroneous full-text linking are the most common searching & browsing errors (Orduña-Malea, Martín-Martín, & López-Cózar, 2017, pp. 15-16).

During the data cleaning process for the dataset used for this chapter that includes GS publications on "Google Scholar" (see Appendix 2), many data quality problems pointed out in the study of Orduña-Malea, Martín-Martín, and López-Cózar (2017) were encountered. The most prominent problem was duplication because of retrieving data from several different sources which were classified as matching errors. This situation was encountered very often, especially in studies that were not in English but also had English titles. Parsing errors mainly for titles of the retrieved documents were also common. Some of the examples are presented in Figure 4. In addition to the publications that were excluded for these and similar reasons (detailed in Appendix 3), 137 out of 1033 unique GS publications were revised (Scopus: 23, WoS: 4).

Besides those in Figure 4, the following example was retrieved as a title. The link of another record was redirecting to a full-text journal issue mentioning inside that the journal is indexed in GS. Since it contains GS metrics, there were also CVs retrieved in the dataset.

> Ulaga, Wolfgang and Werner Reinartz (2011), "Hybrid Offerings: How Manufacturing Firms Combine Goods and Services Successfully", Journal of Marketing, 75 (6), 5-23. lead article]. [ISI Impact Factor 2011: 5472; citations in peer reviewed journals, including Google Scholar: 102]

Although not too many, there were also linking errors. The full-text link for one of the records in the dataset was redirecting to the VOSviewer web page.

Retrieved title: delen met anderen pubmed google scholar

Retrieved title: Google Scholar. 1600

Figure 4. Two examples of erroneous retrieved titles from the dataset of this study

5. Platforms using GS data

There are platforms generated by using the GS data (Martín-Martín, 2019). The best known one is the Publish or Perish (PoP) software released in 2006 for general use, shortly after the launch of GS. Announced in September 2019, PoP 7 allows downloading GS data in different formats and presents metrics such as average citations per paper/author/year, author count per paper, g-index, different variations of h-index (Harzing, 2016a). Today, it is not only used for GS but also “new generation citation indexes” such as Crossref and Microsoft Academic.

A recent addition is a bibliometric tool developed by the EC3 research group for arts, humanities, and social sciences to overcome the limitations of Google Scholar Metrics (GSM), named as Journal Scholar Metrics (EC3 Research Group, n.d.; Martín-Martín et al., 2017). There are currently 8,910 social sciences journals under 13 categories and 3,310 arts and humanities journals under nine categories. Journal Scholar Metrics aims to measure the performances of social sciences and humanities journals by collecting GS citation data. Next

to the h5-index and h5-median presented by GSM, JSM presents additional indicators, namely the journal self-citation rate, h-citations with and without self-citations, h5-index, and h5-median without self-citation and quartiles of journals in terms of h5-index. The EVA (Extraction, Validation, and Analysis) project/approach is another study that explicitly targets the use of GS data for social sciences and humanities after a cleaning and deduplication process (Ferrara et al., 2018, p. 291).

The Ranking Web of Universities (https://www.webometrics.info/en) platform also uses Google Scholar as a data source for the Webometrics University Ranking. One of the three indicators used is “transparency”, gathering the citation numbers of the top 210 (excluding the top 20) researchers from their Google Scholar Profiles (Ranking Web of Universities, 2021a). The platform also ranks researchers according to their Google Scholar citations and h-index (Ranking Web of Researchers). A recent global ranking of researchers was published in March 2021 (Ranking Web of Universities, 2021b). Also URAP (University Ranking by Academic Performance), in its first years of ranking, used GS data for the number of publication indicators (https://www.urapcenter.org/).

Google Scholar Metric is also widely used by national journals’ web pages. Two examples are presented in Figure 5 below.

Figure 5. Two examples for journals’ usage of Google Scholar Metrics
*For first example: http://www.ccsenet.org/journal/index.php/mas/article/view/37570
*For second example: http://www.revistalatinacs.org/069/paper/1030_USC/33en.html

Recently, platforms for visualizing literature using open citation data are common. Examples include scite (https://scite.ai/), connected papers (https://www.connectedpapers.com/), and Litmaps (https://www.litmaps.co/). In this sense, there is an individual study to visualize the literature using GS citation data called who.cites (Tidey, 2016).

6. Conclusion

GS launched in 2004 as an academic search engine. By indexing a broad coverage of publications in different types and languages and citations to these publications, GS became an essential bibliometric data source. Almost half of the literature on GS covers research assessment studies in different disciplines, with a special emphasis on social sciences, which is underrepresented in other bibliometric data sources. GS is thought of as a data source to make fairer multidisciplinary comparisons, including for the social sciences. Beyond assessment purposes, GS also has potential for comprehensive literature searches and individual citation tracking. As reported by Prins et al. (2016), GS is used for formal assessments of social sciences in the Netherlands.

This chapter reviewed the social science research assessment studies using GS as a data source. To achieve this goal, we created a dataset of all studies on “Google Scholar”. Three groups of studies were determined, two of which represented research evaluation studies using GS. “Social sciences” as an evident node in research evaluation implied the use of GS for assessing research in social sciences. We identified, analysed and reviewed these studies. Results of studies that compared “social sciences” with other main fields in terms of GS, Scopus, and WoS, frequently by citations, showed the advantage of GS for the social sciences. The more a discipline focuses on social science, the more obvious the advantage of using GS has become. GS is also used for comparing researchers, journals, departments, and institutions.

It is clear from the reviewed studies that GS is not an ideal tool for research assessment mainly because of the lack of transparency and data quality problems. However, GS can be useful for quantitative analysis, in particular because of the serious limitations of alternatives in terms of coverage of the social sciences. While many studies show the advantage of GS over other bibliometric data sources in terms of coverage, the number of studies dealing with data quality is insufficient to get this topic on the agenda.

7. Implications of Research Assessment

Transparency and data quality of GS confront decision-/policy-makers, researchers, and scholars with a complicated situation, which is clearly defined as a trade-off “between more comprehensive, but disorderly systems and orderly but limited systems” (Martín-Martín et al., 2019). Harzing (2016b) argues that it is worth sacrificing “a little” data accuracy for more comprehensive coverage while better options become available. Similarly, Kousha and Thelwall (2014, p. 295) proclaim to consider GS for small-scale impact assessments, particularly for social sciences and humanities that are not well covered in WoS and Scopus, but to use GS cautiously for large-scale assessments. Ferrara et al. (2018, pp. 290-291) also found GS empirically more realistic for individuals and small groups. In contrast, GS differs at the individual level and for small groups, “especially for humanities, law, and some fields of political sciences.” As a result, informed use of GS is critical. GS is not a citation index but a search engine, with crucial transparency issues. The metrics it provides are open to manipulation (López□Cózar et al., 2014) and may be positively affected by dirty data in GS content.

As recommended in Martin et al. (2010, p. 25), if improvements are achieved with GS’s transparency, and data quality, it has a strong potential for being a unique data source for social sciences.

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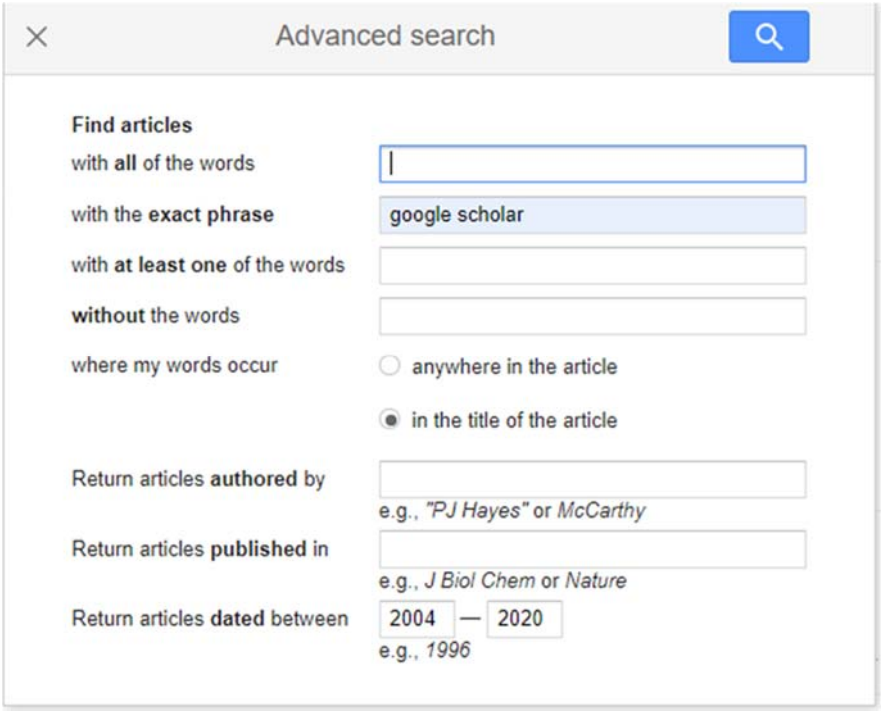
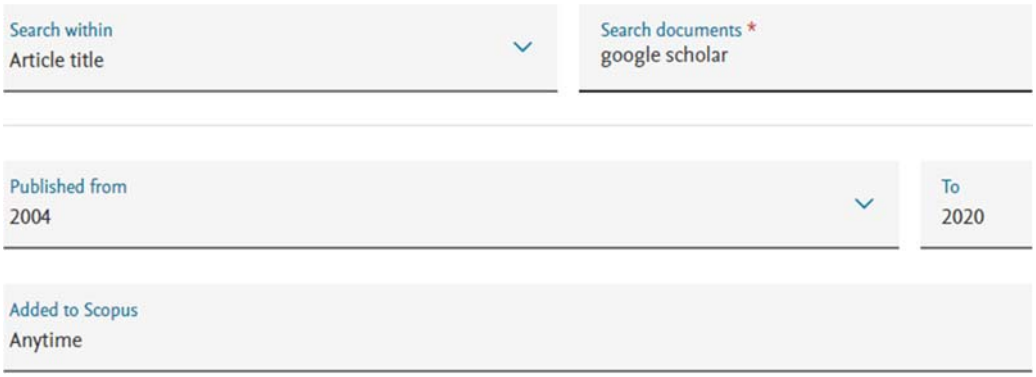
9. Appendix

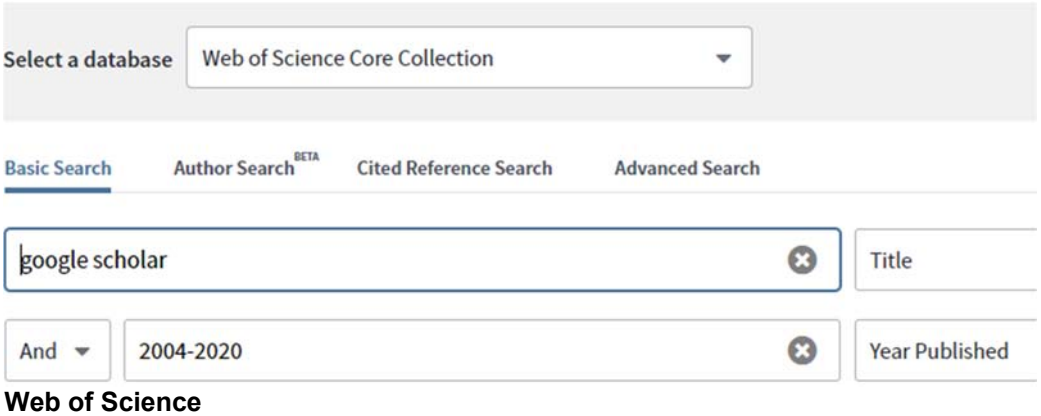
Appendix 1. Details of searches on GS, Scopus, and WoS



Google Scholar



Scopus



Web of Science

Appendix 2. Dataset

The dataset used for this study can be accessed from https://zenodo.org/record/5079007#.YOWgbegzaUk

Appendix 3. Information about dataset
(also available on Zenodo: https://zenodo.org/record/5079007#.YOWgbegzaUk)

Column	Column name	Information about values and content of the column
Column 1	Source	Data sources that the publications retrieved. Values for this column are “Google Scholar”, “Scopus”, and “Web of Science”.
Column 2	Authors	The authors of the publications. This column is kept as additional information for verification of data. Not used in the analysis, it has not been standardized.
Column 3	Title	Titles of the publications. For non-English publications, English titles, if available, are kept in this column. Otherwise, the original titles have been entered. The headings were checked and errors and omissions were corrected. Corrected titles are marked in red.
Column 4	Title translated with Google Translate	In this Column, the English translated titles of the publications that do not have English titles are kept. Google Translate is used for detecting the language and translation. For publications with an English title, the expression [Title in English] has been entered. The translations of the original titles kept in this field were used in the analysis made through VOSviewer. It is marked in red as it is newly added data.
Column 5	Language	Language of the publications. The languages of all publications were checked, missing data were completed and errors were corrected. If the language of the publication could not be determined, the value is [Not found]. The cells with addition or correction are marked in red.
Column 6	Document type	Types of the documents. For all publications, publication type information was checked, missing ones were completed and corrections were made. All intervened cells are marked in red. Article and Review types are referred to as “Article” in the text.
Column 7	Full-text available	Values for this column are “Yes” and “No”. The values for this column are Yes and No. If there is access to the full text of the publication via the web, "Yes", otherwise the "No" value has been entered.
Column 8	On research evaluation	Values for this column are “Yes” and “No”. Using the title and/or abstract information, it was tried to determine whether the publications were related to the research evaluation. “Yes”, if found relevant, and “No” if not. It is marked in red as it is newly added data.
Column 9	Publication year	The publication years of the documents. If the publication years are missing, they have been completed. The current publication years have been checked and corrected if necessary. If the year of publication could not be found, it is indicated as [Not found].
Column 10	English abstract	Abstracts of the publications. If there is an accessible/available English abstract for the publication, it is kept in this column. [Not found/Not available] for missing values. Abstracts that were added, changed, corrected, or completed are marked in red.