

Publication trends and co-citation mapping of translation studies between 2000 and 2015

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Abstract Literature regarding translation studies has increased rapidly in recent decades, yet there have been few empirical studies to investigate the research context of translation studies at the global level. A bibliometric analysis was carried out in this research to probe the current status and the research themes of translation studies papers published between 2000 and 2015 in all journals indexed by the Web of Science database. Bibliometric methods and knowledge visualization technologies were employed to thoroughly investigate publication activities, geographic distributions, core literature, and the distinctive research areas of translation research. The study distinguishes three research areas in translation studies, namely, theoretical translation studies, translation and interpreting training, and descriptive translation studies. The dissemination of knowledge in these areas is realized by publication sources specializing in language and linguistics, applied linguistics and pragmatics, phonetics and acoustics, and translation and interpreting. The core literature in translation studies has been focused to focus on linguistic theories, research methodology, theoretical models, interpreting, and new perspectives. This study provides researchers with several useful insights to better understand developments in translation studies.

Keywords Translation studies · Bibliometrics · Co-citation · Co-occurrence · Visualization

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Introduction

Recent translation studies has experienced rapid development. It has been estimated that more than 60,000 publications exist in translation studies alone, including books, journals, academic theses, etc. that have been issued in the past 20 years (Rovira-Esteva et al. 2015). The dramatic boom in translation studies knowledge has attracted the attention of scholars in this field to review the published literature in order to gain a better understanding of research activities and developmental trends (Bowker et al. 1998; Munday 2009; Rupke 2000; Toury 2012; Williams and Chesterman 2002). However, it is surprising that few studies have made use of the bibliographic data rapidly accumulating in the field. Bibliometric research in translation studies has only just emerged in recent years when the publication *Perspective*, a renowned journal in translation studies devoted an entire issue to studies using metabibliometric and bibliometric methods (Gile 2015; Li 2015; Martínez-Gómez 2015; Zanettin et al. 2015; Zhang et al. 2015). As pointed out by the editors of the special issue, the bibliometric approach provides a new perspective in translation studies that may assist in advancing the development of the discipline (Rovira-Esteva et al. 2015).

Although few in number, the above mentioned bibliometric studies in translation research serve to demonstrate various ways bibliographic information may be used in their respective studies. Zanettin et al. (2015) used author keywords and key noun phrases to probe the subfields of translation studies. The results of this particular study confirmed certain research trends already discovered by other translation scholars using non-bibliometric data. Li (2015) carried out a bibliometric study of citation and key words of published translation research in China. The study presented the nature of Chinese translation studies scholars' productivity, and it compared research themes found in international scholarship that would have raised difficult questions if bibliographic data were not in use. In other studies, bibliometric methods were employed to tackle ever more difficult questions such as to identify the boundary areas between translation studies and discourse studies (Zhang et al. 2015), as well as to describe non-professional interpreting as an emerging specialty located within translation and interpreting studies (Martínez-Gómez 2015).

These studies highlighted the reliability of bibliographic information as research data; however, except for Li (2015), the studies relied principally on counting publication types (Martínez-Gómez 2015), keywords (Martínez-Gómez 2015; Zanettin et al. 2015; Zhang et al. 2015), and authors and affiliations (Martínez-Gómez 2015; Zhang et al. 2015) in their analyses, leaving citation information (i.e. the references of a scientific paper) almost completely unexplored. The citation information of scientific papers has long been recognized by bibliometrics scholars as indicative of the theoretical and empirical foundations of the study (Glänzel and Schoepflin 1994, 1999; Leydesdorff 1995; Small 1973). References cited in articles have become a widely used measure in bibliometric studies relating to scientific publications that identify the structure of a scientific discipline, the trends that developed within, and the network of authors and papers that belong to the same school, paradigm, or theory therein (Borgman 1990; McCain 1990; White 1990; White and McCain 1997). If the citation were to be taken as the unit of analysis in the above mentioned studies, it would become possible for them to look at broader issues concerning translation studies such as with the thematic structure and the developmental trends in the field, the networks of authors and papers that belong to the same school, and a map of research paradigms and relationships between and within them.

From the above review of bibliometric studies related to translation research, it appears that bibliometric information, particularly citation information, has been under-investigated. In order to elevating the research scope in translation studies to a broader scientific and technological level, the current case study has been conducted to assess the current state of research on translation studies by profiling core literature, institutions, countries, as well as thematic hotpots through a detailed examination of bibliographic data. By presenting quantitative evidence focusing on the main themes inherent in translation studies, our case study provided a comprehensive perspective of the scientific landscape of this field. The results of this case study may serve as a reference useful to guide further study of translation and interpreting.

Materials and methods

Data and data retrieval strategy

All publications in this case study were collected from the online Web of Science (WoS) databases, namely, the Science Citation Index Expanded (SCI-E), the Social Sciences Citation Index (SSCI), and the Arts and Humanities Citation Index (A&HCI). As WoS databases are comprised of most important journals in the world (Boyack et al. 2005), they have therefore been identified as being most appropriate for the bibliometric analysis made in this case study.

The keywords used for retrieving records were:

(translation) OR (interpreting) OR (interpreter) OR (translating) OR (translator) NOT (interpretation)

The records were then refined by choosing Web of Science Categories of “Language Linguistics or Linguistics”, Document Types of “Article”, and Language of “English”. Research areas were further refined by excluding “Psychology” OR “Audiology Speech Language Pathology” OR “Philosophy” excluded. The publication period covered was from 2000 to 2015.

Bibliometric information analysis

Immediately after we retrieved the data from the WoS database, we carried out some general bibliometric analyses by simply using the online bibliometric analysis tools provided as part of the WoS website. These analyses presented statistical counting of the total number of publications, distribution by research areas, contribution by country, author productivity, annual output, etc.

We then carried out the following three network and cluster analyses using VOSviewer to produce network and visualization (Van Eck and Waltman 2009):

1. Co-citation analysis of the cited references to identify the core literatures as well as their linkage to other works;
2. Co-citation analysis of the publication sources to identify the most important publication sources and distinguish groups of publication sources that are strongly related;
3. Co-citation analysis of the noun phrases in the titles and the abstracts to identify the primary research areas in translation research.

The use of co-citation to analyze the relations between research articles has been proposed by many scholars of bibliometrics (Griffith et al. 1974; Small 1973). When two articles are cited by a third article, the two articles are referred to as being co-cited. The co-citation relationship between two articles is measured by the number of articles that cite the two articles (Small 1973). The co-citation analysis of publication sources has been widely used to identify the most important publications in a given research field. In this case study, we included references with a minimum of 33 citations in our 1st co-citation analysis. Of the 69,929 cited references, 30 references were found to meet the threshold and thus were used in the analysis.

The co-citation analysis of publication sources is often used to identify sub-disciplines through an examination of the interconnectedness of publication sources. The assumption of these co-citation analyses is that the more two publication sources are co-cited in succeeding publications, the stronger the co-citation relationship will be between them (McCain 1990). The 2nd analysis in this case study included publication sources with a minimum of 150 citations, and 26 publication sources met that threshold requirement.

Co-occurrence analysis of keywords extracted from the title and abstract of a publication has also been a popular method used to detect major themes in a given research field (Glänzel and Thijs 2011; Glenisson et al. 2005). The threshold for our 3rd analysis was set to a minimum of 30 occurrences of a noun phrase so that only the first 158 noun phrases, ranked as having the highest relevance, were included. Some noun phrases were excluded from the analysis, including publisher names and section headings that are commonly used in articles, for example *Elsevier*, *introduction*, or *conclusion*.

We used VOSviewer, an open source program, to carry out the above analyses as it is capable of processing output files of the WoS bibliographic database, and it is especially suitable for the visualization of bibliometric networks (Van Eck and Waltman 2009).

Results and discussion

Our results are presented in two parts. The first part presents the results of a general bibliometric analysis of translation studies conducted between 2000 and 2015, including the total number of the research articles published during the period, the countries/territories contributing to the given publication, the distribution of articles in publication sources, and the annual research output. The second part focuses on presenting the results of 3 co-citation analyses of the cited references, the publication sources (journals), and the noun phrases located in the titles and the abstracts.

General bibliographic information of dataset

The retrieved dataset consists of 2214 articles representing 2751 authors in 131 separate journals. The authors are affiliated with various institutions located in 80 countries. There are a total of 70,440 cited references, with 5130 unique words included in the titles and abstracts. The built-in bibliometric analysis tool of WoS provides some general information of our dataset. Table 1 lists country-of-origin information in order of the number of articles collected in WoS. Countries with less than 30 records are not listed. The first column provides the country/territory name; the second column gives the number of articles published; and, the third column offers the percentage of published articles in the data collection.

Authors in the United States of America were found to contribute the most articles (410) in translation studies over the set period. It should be noted that about 18.5 % of research

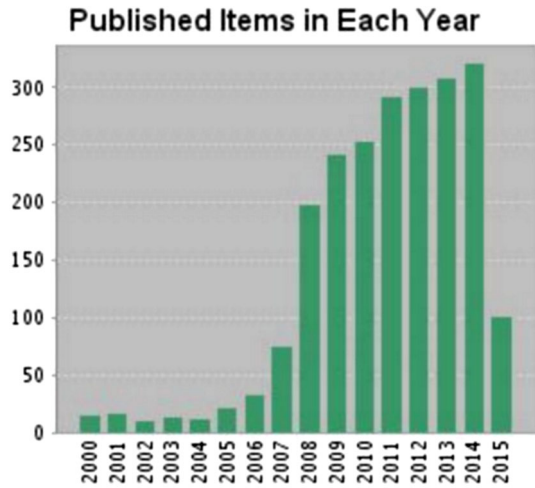
Table 1 Research output by country

County/territory	Rec.	% of 2214
USA	410	18.519
England	269	12.15
Spain	206	9.304
Peoples R China	149	6.73
Germany	109	4.923
Australia	101	4.562
South Africa	96	4.336
Belgium	94	4.246
Canada	84	3.794
Netherlands	70	3.162
Italy	68	3.071
France	57	2.575
Israel	53	2.394
Scotland	43	1.942
Denmark	42	1.897
Finland	39	1.762
Sweden	37	1.671
Taiwan	33	1.491
Switzerland	32	1.445
Poland	31	1.4

on translation studies was authored by at least one researcher from the US. England was the second most active nation, contributing 269 articles and accounting for 12.15 % of the world’s papers in this field. Other highly active countries included Spain (206), the People’s Republic of China (149), Germany (109), and Australia (101), contributing to 9.3, 6.7, 4.9 and 4.56 % of all published articles respectively. With well over half of the papers (56.2 %) contributed by the 6 top publishing countries/territories over the past 15 years, there is little doubt that researchers in these countries/territories are playing a leading role in translation studies. Except for the People’s Republic of China, South Africa, Israel, and Taiwan, the rest of the countries/territories represented in the table belong to what might be called “The Western World” (Wikipedia 2015). This indicates that translation studies from the Asia–Pacific region are dramatically under-represented in core journals indexed by WoS, and that there is huge potential for these countries to increase their research output in translation studies.

Between 2000 and 2007, no more than 100 translation and interpreting studies papers were collected annually by the WoS. However, the field of study started to flourish from 2008 onwards, and the number of published articles in WoS journals has increased year-on-year to more than 300 per annum, as shown in Fig. 1. The result indicates a continuous increase of research interest in translation studies. As the data for this study was collected through the middle of 2015, the number of papers published in the decade until 2015 does not provide sufficient information to reasonably project publication levels. Regular periodical examinations of future publication data in WoS are therefore necessary to gain a longitudinal picture of developments in translation studies.

The retrieved 2214 articles have been published in 138 journals. Table 2 shows the top 26 journals that published more than 20 articles on translation studies between 2000 and

Fig. 1 Annual research output**Table 2** Publication in journals

Publication title	Rec.	% of 2214
Translator	142	6.414
Translation Studies	132	5.962
Journal of Pragmatics	130	5.872
Interpreter and Translator Trainer	110	4.968
Target	101	4.562
Across Languages and Cultures	92	4.155
Translation and Interpreting Studies	77	3.478
Interpreting	76	3.433
Babel	69	3.117
Linguistica	61	2.755
Lingua	61	2.755
Southern African Linguistics and Applied Language Studies	58	2.62
Computational Linguistics	56	2.529
Linguistics	42	1.897
European Journal of English Studies	27	1.22
Text Talk	26	1.174
literary and Linguistic Computing	26	1.174
Journal of Phonetics	24	1.084
Natural Language Engineering	23	1.039
Language Sciences	23	1.039
Hispania	23	1.039
Lexikos	22	0.994
Language and Literature	22	0.994
Journal of Language and Politics	22	0.994
Intercultural Pragmatics	21	0.949
Journal of Multilingual and Multicultural Development	20	0.903

2015. The first column is the journal name, the second column, the number of articles that were published, and the third column, the percentage of published articles in our total collection. Of the top five journals publishing more than 100 articles, the *Journal of Pragmatics* was the only publication not specializing in translation studies, as suggested by its title. This circumstance probably results from the close tie between translation studies and pragmatics (Munday 2009).

The table also shows that academic articles in translation studies tend to be scattered in different journals rather than being concentrated in several core journals. For example, *Translator*, the top publication source shown in the table, had published 142 articles for the period in question, which only accounts for 6.414 % of the total articles published. This means that in addition to the 26 journals listed as part of in the table, a large number of articles in translation studies have been distributed to different journals. Therefore, to carry out a bibliometric study or a comprehensive literature review of the field, one should include as many relevant publication sources as possible. However, this appears not to be a common practice observed from some previous studies, where Martínez-Gómez (2015) chose only one journal to collect the data, and Zhang et al. (2015) included only 8 journals. The limited coverage of translation studies articles by any designated journals needs future studies.

Co-citation analysis of cited references

The co-citation analysis of cited references enables us to identify the most cited and highly influential research documents found in translation studies, where the importance of a document is measured by the number of co-citations it may possess. We used the filtering function in VOSviewer to obtain a list of documents that were cited more than 33 times. The most cited 30 documents in the WoS database are shown in the left-hand column of Table 3, ranked in decreasing order of the number of citations made. The 30 documents listed attracted a total of 1429 citations. The table shows that apart from two journal articles, e.g. Grice et al. (1975) and Simeoni (1998), all of the documents are manuscripts containing underlying translation studies theories that are undoubtedly widely familiar to researchers in the field, whatever their particular research interests may be. For example, item 1 is a book (Toury 1995) which has been cited 151 times, so it is quite relevant to translation studies.

It is obvious that some documents with high citation numbers are not highly co-cited and would therefore rank much lower in the table if sorted by *Co-citation Links* (Column 3). For example, Chomsky (1995) ranks the 18th by the number of citations, but it is only co-cited once and would rank 30th according to its *co-citation links*.

The documents were then subjected to a co-citation analysis. Figure 2 is the co-citation network map of the 30 most cited references in translation studies literatures between 2000 and 2015. In Fig. 2, there are 30 nodes and 925 lines in the network. Each node represents one cited document and has been labeled with the representative author of the cited document and year of publication. The length of the labels has been truncated to 11 characters for better presentation effect, and Table 3 provides detailed information of the documents cited. The size of every circle is proportional to the amount of citations received by the document. Thus, a large-sized circle denotes a highly cited document. The circles are filled with different colors to distinguish them into five clusters.

Figure 2 shows that one cluster (denoted by the red color) is characterized by the common theme of linguistic theories such as Quirk et al.'s (1985) English grammar, Halliday's systemic functional grammar (Halliday and Matthiessen 1994, 2004), as well as

Table 3 Cited and co-cited references

Cited reference	Citations	Co-citation links
Toury (1995), descriptive translation	151	106
Venuti (1995), translators invisibility	91	66
Brown (1987), politeness some universals	64	26
Wadensjo (1998), interpreting interaction	64	45
Baker (2006), translation conflict	60	39
Venuti (1998), scandals translation	60	45
Goffman (1981), forms talk	52	35
Sperber (1986), relevance communication	48	26
Baker (1993), text technology in honor, p. 233	45	29
Hatim (1997), translator communicator	45	39
Newmark (1988), txb translation	43	28
Kiraly (2000), social constructivist	42	23
Nord (1997), translating purposeful Activity	42	31
Quirk (1985), comprehensive grammar	41	14
Gile (1995), basic concepts model	40	16
Grice (1975), syntax semantics, v3, p. 41,	40	19
Lefevere (1992), translation rewriting	40	30
Chomsky (1995), minimalist program	39	1
Hermans (1999), translation systems	39	32
Halliday (1976), cohesion English	38	22
Hatim (1990), discourse translator	38	31
Cronin (2003), translation globalization	36	28
Halliday (1994), intro functional grammar	35	24
House (1997), translation quality	35	29
Catford (1965), linguistic theory tran.	34	27
Halliday (2004), intro functional grammar	34	25
Simeoni (1998), target, v10,	34	25
Berk-Seligson (1990), bilingual courtroom	33	22
Bhabha (1994), location culture	33	18
Tymoczko (2007), enlarging translation	33	24
Total	1429	925

how to apply linguistic theories to translation practice such as Catford's (1965) linguistic translation theory, Newmark's (1988) translation textbook, Sperber and Wilson's (1986) relevance theory in translation, Hatim and Mason's (1990) discourse theory, and House's (1997) translation quality assessment. Brown and Levinson's (1987) politeness in language use and Grice et al.'s (1975) syntax and semantics theory also fall into this cluster: the former takes a pragmatic perspective of translation, and the latter, a semantic perspective. The frequent co-citation of these documents indicates that the linguistic approach to translation studies is still used of late by researchers even though some of the theories presented date back to the 1960s and 1970s (Catford 1965; Grice et al. 1975; Halliday and Hasan 1976). The importance of these "old" theories has been acknowledged by leading translation studies theorists (Baker 2006; Bassnett 1980).

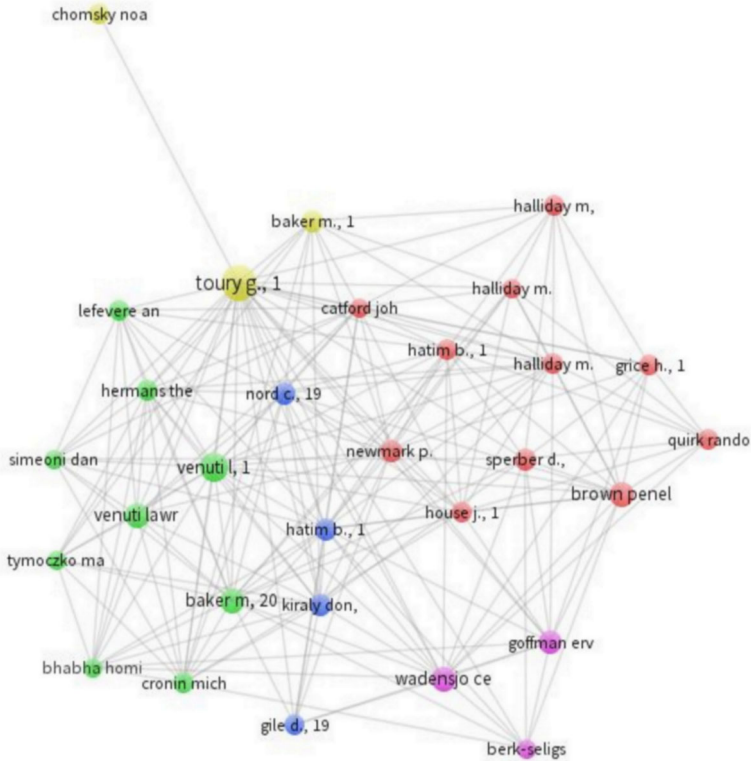


Fig. 2 Co-citation network of cited references

The second cluster, denoted by the yellow color, contains three documents relevant to translation studies: Toury’s (1995) *Descriptive Translation Studies and Beyond*, Baker et al.’s *Text and Technology* (Baker et al. 1993), and Chomsky’s (1995) *Minimalist Program*. Indeed, the most cited document in our dataset (Toury 1995) falls into this cluster. Being the standard reference for contemporary translation studies, Toury (1995) is often adopted as the theoretical and methodological foundation for most translation studies using descriptive methodology. Chomsky’s (1995) minimalist theory is a new line of research in language studies that deals with problems that cannot be solved with traditional generative grammar, and its theoretical implication has been widely recognized by translation studies. Baker *et al.* (1993) focus on the methodological bases of using three major modern linguistic approaches in translation studies: discourse analysis, corpus-driven analysis of language, and computational linguistics. As these three works cover major methodological issues in translation studies, the frequent co-citation of these works indicates that methodology is an active area of research in translation studies.

The blue-colored cluster includes four documents: Nord (1997), Hatim and Mason (1997), Kiraly (2000), and Gile (1995). These works propose various models to explain translation theories such as in the functional model (Nord 1997), the communication model (Hatim and Mason 1997), and the social model (Kiraly 2000). Gile (1995) offers some practical training models for interpreters and translators. It appears that works in this

“blue” cluster mainly concern research models in translation studies and pedagogy, and they have provided the theoretical frameworks on which translation studies are carried out.

The fourth cluster, denoted by the purple color, consists of three works: Wadensjö (1998), Berk-seligson (1990), and Goffman (1981). These works are frequently co-cited because they are all related to interpreting.

The fifth cluster, denoted by the green color, consists of 9 documents frequently co-cited in translation studies. These works conceptualize translation studies from various perspectives against the background of globalization, and bring new insight into translation studies from constructivism (Baker 2006), cultural studies (Bhabha 1994; Lefevere 1992), sociology (Cronin 2003; Simeoni 1998), systems theory (Hermans 1999), and history (Venuti 1995, 1998). This “green” cluster also includes a work that gives a review of translation studies (Tymoczko 2007).

The results of our co-citation analysis of cited references suggest that core literature in translation studies reviewed from 2000 and 2015 tends to fall into 5 major clusters that focus on linguistic theories, research methodology, theoretical models, interpreting, and new perspectives. This pattern continues if more highly-cited documents are to be included in the co-citation analysis. It becomes evident that these core documents in translation studies have often served as the underlying theory upon which contemporary translation studies are based and thus remain deservedly important. These core documents may be further utilized as a guide in translation and interpreting studies and pedagogy. These works can also lend support to in-service translators and interpreters in their everyday profession.

Co-citation analysis of publication sources

The co-citation analysis of publication sources aims to look into what contexts translation research acknowledged are cited. A question remains to be answered, “To what extent translation research is cited in translation studies journals of its own field and in its related fields?” We used the filtering function in VOSviewer to obtain a list of publication sources that were cited more than 150 times. The most cited 26 publication sources in our dataset are listed in Table 4, ranked in decreasing order of the number of citations, and their co-citation relationships further visualized, as shown in Fig. 3.

Each circle in the visualization presented in Fig. 3 is labeled by the title of the publication source. The size of a circle is proportional to the number of citations a journal has received. Publication sources that are located close to each other in Fig. 3 are more strongly related than those that are located far away from each other.

As shown in Fig. 3, our co-citation study distinguishes the 26 publication sources into 4 broad clusters that publish in the following subjects:

1. Translation and interpreting research (denoted by green color);
2. Applied linguistics and pragmatics research (denoted by blue color);
3. Language and linguistic studies (denoted by red color), and
4. Phonetics and acoustics research (denoted by yellow color).

In previous studies some journals dedicated to translation and interpreting studies were often considered to be the core publication sources in the field. For example, Zhang et al. (2015) only included eight journals in their study to retrieve bibliographic information. In the current study, a broader spectrum of publication sources has been analyzed as listed in Table 4. The results of our co-citation analysis reveal what publication sources the translation research is cited in.

Table 4 Cited and co-cited publication sources

No.	Source	Citations	Co-citation links
1	J Pragmatics	836	589.07
2	J Meta	689	585.22
3	J Linguist Inquiry	536	475.17
4	J Target	530	473.87
5	J Language	512	493.52
6	J Translator	497	409.31
7	J Interpreting	344	294.95
8	J Translation Studies	313	260.64
9	J Linguist Philosophy	306	289.54
10	J Lingua	286	308.25
11	J Cognition	273	250.54
12	J Memory and Language	266	254.08
13	J Phonetics	245	232.1
14	J Applied Linguistics	243	218.8
15	J Acoustical Society America	234	216.86
16	Benjamin Translation Library	226	209.19
17	Descriptive Translation	204	211.18
18	J Linguistics	203	220.84
19	Routledge Ency. Translation	181	159.23
20	J Natural Lang Linguistic Theory	177	196.41
21	J Language in Society	174	168.09
22	J Computational Linguistics	171	42.91
23	J Language Learning	165	143.27
24	J Natural Language Semantics	162	175.2
25	Thesis Mit	153	171.17
26	J Babel	150	148.59

It is clear that one of the most relevant clusters of sources is related to the translation and interpreting and that there is a strong relationship among the sources. These sources include the following six journals (*Meta*, *Target*, *Translator*, *Interpreting*, *Translation Studies*, *Babel*), one encyclopedia (*Routledge Encyclopedia of Translation Studies*), and two special series publication titles (*Descriptive Translation* and *Benjamin Translation Library*). Of the six journals only *Meta* is exceptional. The journal was a major publication in translation studies but was no longer indexed by WoS from 2012 for unknown or obscure reasons. This may explain why it is still frequently cited while not being included in the top ten publication sources in Table 2. The encyclopedia and two series titles have never been discovered as important publication sources before, and would have remained un-noticed if this co-citation analysis had not been carried out.

The results further indicate that translation studies documents are also cited in a great variety of publication sources; an abundance of documents is published in related fields other than translation and interpreting studies (e.g. linguistics, applied linguistics, pragmatics, phonetics and acoustics). Among the four clusters, the applied linguistics and pragmatics cluster (blue colored) is most related. In fact, the *Journal of Applied Linguistics* is the most frequently co-cited source as shown in Fig. 3. It appears that the cluster

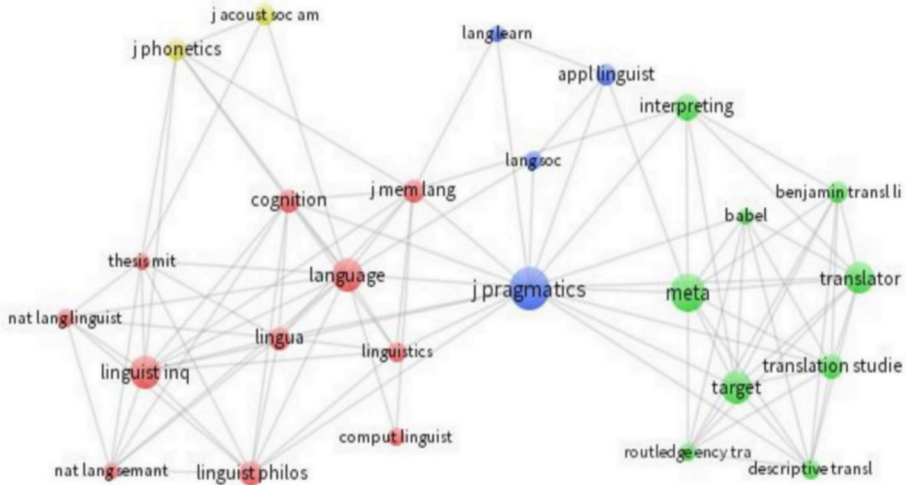


Fig. 3 Co-citation network of publication sources

functions as a link between the cluster of translation and interpreting research (green colored) and with the other clusters.

Many studies have highlighted the interdisciplinary and cross-disciplinary characteristics of translation research (Bowker et al. 1998; Tymoczko 2007). However few studies have described how translation research interacts with related disciplines given the empirical evidence. With a co-citation analysis of publication sources, our study suggests that translation and interpreting research interacts with other disciplines through some ‘intermediate’ research fields such as applied linguistics, pragmatics, and language learning. In order to adapt theories from broader disciplines such as language and linguistic studies, translation and interpreting research needs to first examine how theories are used in the ‘intermediate’ fields and pay particular attention to the ‘intermediate’ journals, namely, *Pragmatics*, *Applied Linguistics*, *Language Learning*, and *Language and Society*.

Research areas in translation studies

A co-occurrence analysis of noun phrases in abstract and title fields was conducted to identify research areas in translation studies. We included noun phrases with a minimum of 30 occurrences in our analysis and mapped the co-occurrence network of the phrases using VOSviewer. Since VOSviewer uses fractional counting methodology, a noun phrase that occurs in the title or abstract of a publication is only counted once no matter how many times it occurs (Van Eck and Waltman 2009). With the threshold occurrence value of 30, we obtained 321 noun phrases from the total of 39,282 noun phrases in titles and abstracts. By default, VOSviewer only included 60 % of the noun phrases for analysis. This reduced the total number to 193. We further excluded the following 33 noun phrases: *Elsevier Ltd*, *property*, *right*, *scope*, *introduction*, *world*, *methodology*, *results*, *something*, *lack*, *interest*, *set*, *present study*, *finding*, *method*, *act*, *response*, *addition*, *name*, *usage*, *data*, *year*, *work*, *argument*, *success*, *researcher*, *version*, *overview*, *project*, *author*, *support*, and *frequency*.

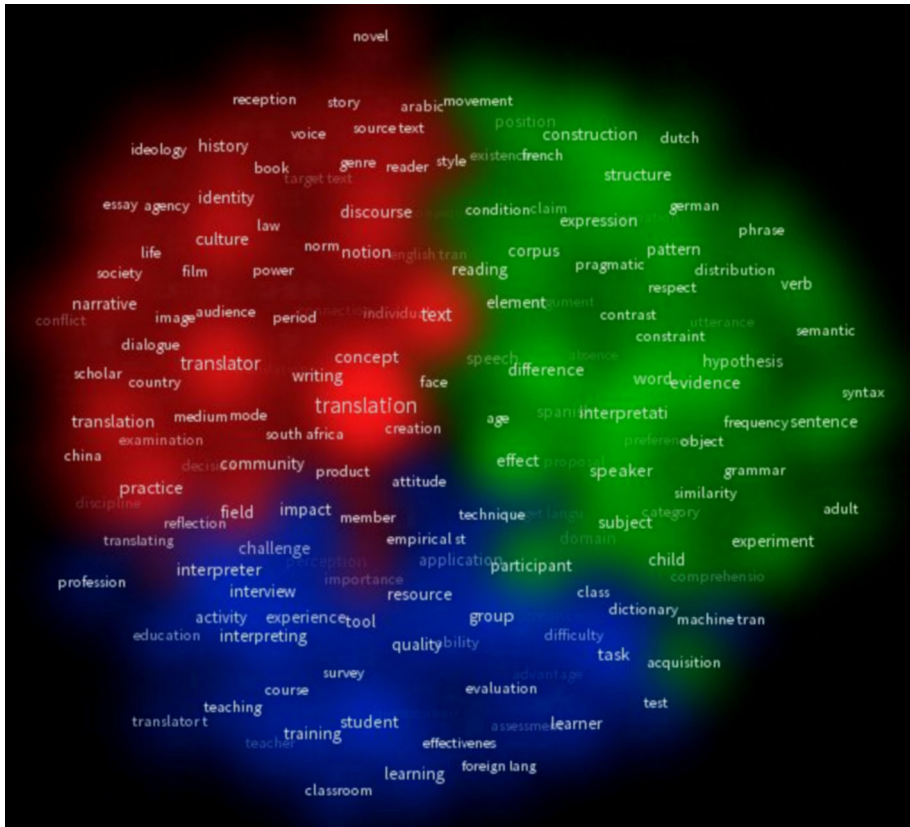


Fig. 5 Co-occurrence density map

educational settings (e.g. *class*, *teaching*, *course*, *training*, *activity*, *classroom*, *test*, *evaluation*, and *education*). Some phrases and terms indicate that the research in this cluster employs both qualitative and quantitative methods (e.g. *interview*, *participant* and *survey*). The major research themes are related with *impact*, *quality*, and *attitude*. Studies in this cluster are also concerned with resources and tools (e.g. *resource*, *machine translation*, and *tool*).

The green cluster appears to be related to linguistics and language studies. The dominant phrases/terms in this cluster are strongly related to areas of linguistics studies such as *structure*, *construction*, *expression*, *word*, *verb*, *syntax*, *sentence*, *grammar*, and *pragmatics*. In this cluster, we can also identify phrases/terms that refer to research methods of a quantitative nature (*corpus*, *hypothesis*, and *experiment*) and research subjects (*child*, *adult*, and *speaker*).

Our co-occurrence analysis finds that translation studies may be seen to consist of three broad areas: theoretical translation research, translation and interpreting training, and linguistics-oriented translation research. This finding is different from the categorization of translation studies previously proposed by non-bibliometric investigations. For example, Bowker et al. (1998), juxtaposed 12 titular areas of translation research including the following: *Text Analysis*, *Translation Quality Assessment*, *Genre Translation*, *Multimedia Translation*, *Translation and Technology*, *Translation History*, *Translation Ethics*,

Terminology and Glossaries, Interpreting, Translation Process, Translator Training, and Translation Profession. It could easily be misunderstood that these areas were considered to be of similar size and importance. However, in our opinion, translation and interpreting training (blue cluster) is a much better developed research area rather than some research themes such as *Terminology and Glossaries* or *Translation Profession* because research in the former has been found to be strongly related in terms of research subjects, research methodology, and research themes. In addition, some of the so called research areas, such as *Multimedia Translation* and *Translation Technology*, are not considered to be as significant as *Text Analysis, Genre Analysis, and etc.*, so we argue that there is no need to frame them as research areas at the present stage of discussion.

Another finding of this study is, unlike the other two clusters (blue- and green-colored), few co-occurring terms or phrases related to research methods have been identified in the cluster of theoretical translation studies (red cluster). Translation studies is claimed to be an emerging academic field accompanied by diverse forms of research (Venuti 1995), and the frequently co-occurring terms/phrases such as *culture, history, identity, power, ideology* in our analysis well confirm these developments. There is no doubt that these terms or phrases represent various theoretical and methodological perspectives that can be directly traced to political theory, literary theory, communication theory, as well as academic studies of sociology, history, and philosophy. As Tymoczko (2000) points out, in addition to the traditional linguistics approaches, cultural studies approaches, including the descriptive translation studies approach (Toury 1995), are increasingly being adopted in contemporary translation studies. Nevertheless, research taking either type of approach still needs to begin with and be based upon a hypothesis, and it should to be conducted within a sound theoretical framework (Tymoczko 2000). Therefore, the lack of co-occurrence of certain popular terms/phrases in this cluster such as descriptive approach, framework, qualitative, quantitative, participants, etc. is unusual, and it may suggest that studies in this cluster tend to be more elaborative and theoretical rather than empirical.

Holmes (1975) distinguished two broad fields of translation studies: ‘pure’ translation studies including Descriptive Translation Studies (DTS) and Theoretical Translation Studies (ThTS), and applied translation studies including translation training, aid, policy, and criticism. Under the title of ‘pure’ translation studies, subfields were further defined as discourse studies, textual linguistics, contrastive linguistics, psycholinguistics and sociolinguistics, machine-aided translation, cultural studies, literature, and psychology and sociology. This binary classification assignment was subsequently modified by Williams and Chesterman (2002), who divided research into a qualitative category and a quantitative category. Our study tends to support Holmes’s (1975) classification taxonomy. Furthermore, we argue that the theoretical translation studies and descriptive translation studies under Holmes’s ‘pure’ category are two distinctive fields: the former being represented by the red cluster, and the latter, by the green cluster. In addition, we propose that translation and interpreting training (the blue cluster) is the third field of translation studies. This field was considered under Holmes’s applied translation studies category but our co-occurrence analysis finds itself in a self-contained research field.

Conclusion

In addition to giving an overview on translation studies between 2000 and 2015, this study has employed co-citation and co-occurrence analysis methods to further investigate three important aspects of the field, the core literature, the key publication sources, and major

research areas. As bibliometric methods are a relatively new area of translation studies, this study has shed some new light on the current development of the field. The identification and the subsequent categorization of the core literature into five major themes have provided a clearer guide for researchers to locate the right literature whenever carrying out translation studies. Another important finding of this study is to pinpoint the important role played by the ‘intermediate’ journals in linking language and linguistic studies with translation study. This is seen to help researchers to find the appropriate theories related to the research theme of their interest. The co-occurrence analysis of title and abstract terms has distinguished theoretical translation studies, translation and interpreting training, and descriptive translation studies to be three major areas of research. The identification of these three major research areas has provided an alternative perspective of the translation studies landscape that is different from the previous one. It is expected that these newly defined research areas can better accommodate the increasingly diverse research topics faced by translation and interpreting specialists.

The present study has faced some limitations, which should be approached carefully in future bibliometric studies of this type. Our inclusion of 30 documents and 26 publication sources for co-citation analyses was based on our subjective judgment; if a greater number of documents or publication sources were included in the two analyses, the outcome may become improved to a certain extent. The co-occurrence analysis only took into account of 160 titles and abstract terms. The research areas could be better visualized if author keywords were also included in the analytical process. Our data retrieval strategy which decided to include only English articles in the WoS-indexed journals produced a bias against research articles published in non-WoS journals and non-English journals. It is hoped that with the advance of computer technology, the compatibility of current software packages will improve enough to handle different reference formats and characters of different languages. Furthermore, it is acknowledged that co-citation analysis and visualization are all subject to technological limitations.

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