

Reference unification and reference linking: Concept, functionalities and inhibiting elements. A case study of Chinese Science Citation Database

Received Dec. 26, 2007

Revised Jan. 31, 2009

Accepted Feb. 9, 2009

ZENG Yan* & LIU Xiaomin

National Science Library, Chinese Academy of Sciences, Beijing 100190, China

Abstract In comparing reference unification to reference linking, the authors found that reference linking yield similar result as that of reference unification. An investigative study was conducted by these authors at Chinese Science Citation Database (CSCD) of National Science Library (NSL) of the Chinese Academy of Sciences (CAS), it was found that there were three inhibiting elements in invoking a reference unification solution and the same is true for a reference linking solution. Firstly, it was difficult to define a minimum set of data elements for matching. Secondly, it had a problem of data inaccuracy and/or data incompleteness. Thirdly, it was hard to determine an appropriate linking result that produced the desired document for the user. Thus these authors suggest that getting Digital Object Identifier (DOI) for each journal article is a good way to bring about reference unification and also to improve metadata quality simultaneously at the same time. Therefore, DOI has a pivotal role to play in terms of bringing about reference unification and/or a reference linking.

Keywords Reference linking, Reference unification, Inhibiting element, Implementation mechanism, Metadata

1 Introduction

The rapid development of web technology during the past 10 years has had a substantial impact on library and information services. Reference linking, a kind of web technology, can integrate information together dynamically. Its importance has been widely recognized by publishers, research groups and librarians since the end of the 1990s. Elsevier Corporate CEO Karen Hunter said that “one of the key roles a publisher should play in the future is creating links — adding value by integrating information and letting people manoeuvre through the space and get a full range of information”^[1]. And he believed that “the publisher with the best links wins”^[1]. Some link servers, such as those manufactured by CrossRef and SFX, have been embedded



CJLIS

Vol. 1 No. 3/4, 2008

pp 16–29

National Science Library,

Chinese Academy of

Sciences

* Correspondence should be addressed to Zeng Yan (E-mail: zengy@mail.las.ac.cn). The authors would like to express their sincere thanks to Prof. Charles C. Yen for the language revision.

in e-publishing and library services, facilitating the user to find resource greatly. But how about the quality of reference linking, is it perfect now? The answer is negative, “in reality, technical obstacles, as well as organizational concerns, blur the vision of perfect, seamless reference linking”^[2]. This is not an exaggeration. A case study was made by these authors at Chinese Science Citation Database (CSCD) to identify those barriers (or those inhabiting elements) in getting the desired result of reference unification whose implementation process is similar to that of reference linking. It was assumed that there was a commonality of inherent inhibiting elements in terms of generating either a reference unification or a reference linking.

In this paper, reference unification means to assign a unique identifier to the same reference record in a citation database which facilitates to recognize the same reference record/work and combine them together. The comparison between reference unification and reference linking indicates that they are similar in their process of implementation. A few suggestions about the improvement of the quality of reference linking as well as of reference unification will be discussed at the end of this paper.

2 Reference unification versus reference linking

2.1 Concept

Reference unification is a process for imposing standardization on various reference records and assigning a unique identifier on the same references. Reference unification is also a kind of data unification which is defined as a process for imposing standardization on various data. As we know, different disciplines, even different publishing organizations, have established their own bibliographic styles and practices over time, so the database producer who wants to offer high-quality data service to the user has to impose order on a widely diversified set of records.

Reference unification, which means a process for imposing standardization on various reference records, should be treated as the most complicated and in-depth data unification since more than one or two elements will be involved in it, which will be further explained in the next paragraph. Not only the standards of reference records should be established, but also some standard ways for data combination should be followed in the reference unification processing.

Usually, in a citation database, the records can be divided into two parts, one includes source title records, and the other includes reference/citation records. For the reference unification, in the first instance, the reference/citation records are to be integrated with one of the source titles, and then with the remaining references. For those reference/citation records which cannot have a match in the source title records will result some possible reference unifications within reference/citation records. Fig. 1 illustrates the two types of reference unifications as mentioned above.

The technique of reference linking appeared later than reference unification as it is an outcome of web technology. However, it spread widely and quickly as a useful tool for the integration of information. Caplan defines reference or citation linking as the ability to go directly from a citation to the work cited, or to additional information



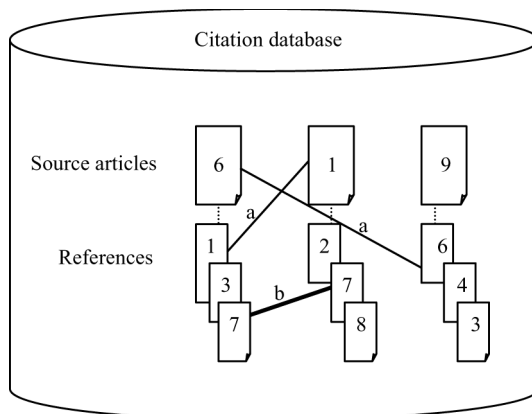


Fig.1 The two types of reference unifications. a, Unification between references and source articles; b, unification within references records.

about the cited work. Such additional information may include those from the following source originations such as from journal articles, web sites, conference proceedings, entries in abstracts and indexes (A&I) databases, or even a link sent via e-mail from one colleague to another. Generally, in the scholarly community, reference linking is the first and foremost thought of as a link among and between journal articles and bibliographic entries^[2].

Fig. 2 illustrates a typical reference linking model in a library. It establishes an ideal academic environment for users to easily transfer from one database to another

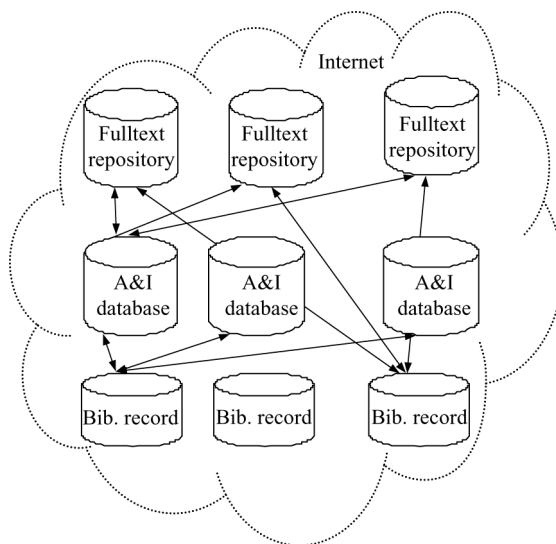


Fig. 2 The reference linking model in library.



database, and to gain access to resources and services requested. Reference linking shortens the length of time in retrieving resources and broadens ways of access to information.

2.2 Functions

As we know, the same references could be captured from different source titles and they were diverse in the citation database. The main function of reference unification is to facilitate and to maximize retrieval results. For some products, such as Highly Cited Papers, reference unification represents a significant aspect of its value to the user. Without reference unification, it is impossible to get an accurate result of accounting about how many times a document has been cited. Furthermore, reference unification provides a means of linking similar references to a matched article.

Reference linking plays several important roles in terms of facilitating users to discover resources and to connect them with their desired services^[3], specifically: 1) It assists resource discovery and access via the support of OpenURL (and probably other means, including proprietary, DOI, etc.); 2) it automates linking from a citation/metadata record to an appropriate digital object (e.g. linking a Psych Lit record to a Web of Science record and from there to the full-text of a referenced article); and 3) it invokes a request form in case there is no digital object available.

2.3 Operational mechanism

Though the concept and function of reference unification are not the same as those of reference linking, both of them are trying to establish the relationship between/among similar works and to cluster similar works together. They are similar in their operational mechanism.

2.3.1 Reference unification solutions

As mentioned above, reference unification is a process for imposing standardization on various reference records. Centring on reference unification, a lot of things should have been done in the preparation stage, which lays the foundation for reference unification. It requires certain software support so that similar reference records can be combined together automatically in a citation database. The following steps need to be observed particularly:

- Establishing a data access process and a policy for bibliographic standardization. As different publishers have different policies regarding to bibliographic standard, it is vital to establish one's own data access process and policy in a citation database.
- Formulating rules for bibliographic control. Different authors may cite the same work in different ways. For example, the paging citation may appear in different formats. Some people add a 'p' in front of the pagination number whereas others may only give the pagination number only. There should be some definite rules to standardize such practice.



- Defining the core bibliographic elements for each kind of resource entries. In the process of combination, we should consider which data elements are the core bibliographic elements. When citing a journal article in a bibliographic database, for example, some writers offer two numerical numbers in their pagination notation. One is for the beginning page of the article, the other is the ending page number of the article. However, for the reference unification, the ending page number is not needed. Therefore, it is not a core bibliographic element. In ISI product Web of Science, it defines the following elements as the vital elements for citing a journal articles^[4]: 1) Cited author (first listed author's surname); 2) cited work (title of work); 3) cited year (year of publication); 4) volume (volume number); and 5) pagination (pagination number).
- Combing similar bibliographic records together by matching up among different records. Certain softwares are needed in facilitating the combination of the similar bibliographic records. By matching the values of those vital bibliographic elements among different records, we can compare one record with another. There are a few different matching strategies such as exact matching, ambiguous matching, and artificial intelligence matching etc. that need to be taken into consideration in combining bibliographic records.
- Finding out the "appropriate copy" from the matching results. Usually, when one reference record matches with one of the source article records, it is considered that the source article record as the "appropriate copy", because they have more accurate bibliographic information than reference records. And if the match-up is between two different reference records, it is really hard to say which one is the better one. In such a case, one of them is selected as the "appropriate copy" randomly.

2.3.2 Reference linking solution

There are several reference linking solutions, such as DOI-based CrossRef linking and OpenURL-based reference linking. Take the famous SFX solution for example, it is a reference linking tool based on the OpenURL standard which provides the syntax for transporting bibliographic metadata and identifiers of objects between information services. Fig. 3 illustrates the implementation mechanism of SFX solution^[5].

The following shows a detailed operational procedure of SFX solution:

- It creates a unique OpenURL hook for each citation or bibliography reference. This is displayed as a link or "SFX Button" to authorized users of a given source system.
- It assembles a metadata string (possibly including an identifier) "on-the-fly" based on rules for that particular source, when the user clicks on the link.
- It sends the metadata string via the OpenURL to the SFX server and compares the metadata elements to existing rules and thresholds in the rules database.
- It returns a menu of "appropriate" links, including a link to the full-text if the rules have been met, or to the user. For example, a full-text link can be presented



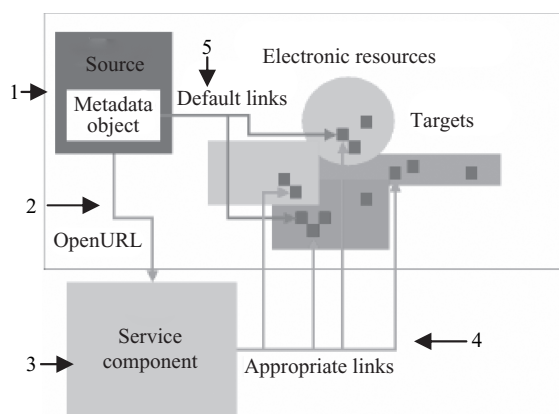


Fig. 3 SFX solution.

if the source metadata contains an ISSN that exists in the rules database and the volume and date are within the threshold information for that ISSN.

- Ultimately it enables the user to click on a link in the menu and access the target via the URL that was constructed via the “link-to” syntax information in the rules database using the descriptive metadata from the source.

2.3.3 Three key steps for the implementation of reference unification & reference linking

When comparing reference unification solution with reference linking solution, one can easily find that both of them comprise the following three key steps: 1) To define a minimum set of data elements; 2) to match up among records; and 3) to find out the “appropriate copy”.

In fact, in the web environment, reference unification can be looked as a static inter-content linking. Reference unification resembles to a mirror that reflects reference linking. The inhibiting elements that we found in reference unification could also be found in reference linking, and *vice versa*. What they are in common is some of their ways for solution.

3 Inhibiting elements to reference unification : A case study of CSCD

3.1 Background

The history of Chinese Science Citation Database dates back to 1989 and with a period of rapid development in the 1990s, during which period, the amount of source journal titles that entered into the database increased from 300 to 1,000 plus. All these journals were selected from a pool of scholarly journals that had been published in People’s Republic of China. As it stands today, there are about 3 million source



journal article records and 17 million reference records in the CSCD. In the early 2000s, with the financial support of Chinese Science Digital Library Funding, a new data processing platform has been developed not only for the online edition of CSCD but also for Science China, a new product which integrated CSCD with Chinese Current Contents (CCC) and Chinese Science Document Database (CSDD).

The new data processing platform includes the following modules:

- Data inputting, checking, and auditing.
- Data unification, including reference unification. Some authority files have been set up and maintained in CSCD, specific software should be run regularly for reference matching.
- Data statistics. And
- Data retrieval. There are two main search options in CSCD. One is the general search, and the other is the cited reference search. The cited times of works that appeared in the search results are computed at the basis of reference unification.

CSCD has a by-product of CSCI (Chinese Science Citation Indicators) which began from 1998 and then issued as an annual just as SCI has a by-product ESI (Essential Science Indicators). The CSCI contains a series of indicators to enable researchers to conduct ongoing, quantitative analysis of research performance and also track trends in the scientific field. As its quality heavily relied on the quality of data unification in CSCD, it has no doubt that data unification represents a significant value to its users.

It has no doubt that reference unification is essential to the value of both of CSCD and CSCI for the simple fact that approximately 20,000 citations are processed annually for inclusion in CSCD and each of them will be involved in the processing of reference unification. Just as Janet Robertson, JCR Project Coordinator of Institute for Scientific Information, pointed out that correlating tens of millions of cited titles with a set of standard abbreviations (one aspect of unification), a mountain of efforts is but an important aspect of database quality^[6]. But what is more, we should take into consideration the fact that some of the inhibiting elements that are not really easy to overcome during the operational process of reference unification.

3.2 Inhibiting elements to reference unification of CSCD

As mentioned above, reference unification should be done after data inputting, checking and auditing. In the past, reference unification was done manually and only partially. In the new data processing platform, we expected that it would be done wholly and automatically. Unfortunately, it seemed that reference unification was somehow in a dilemma between efficiency and accuracy. At first, we hoped to have the problem resolved with the assistance of matching algorithms, which had been adjusted for several times, but the results were not satisfied. Finally, we found that the real reason for the difficulty in getting successful reference unification might lie beyond the technology as explained below.



3.2.1 Difficulty in defining a minimum set of data elements

There are lot of issues which should be considered before defining the minimum set of data.

- The level of reference unification. According to Functional Requirements of Bibliographic Records (FRBR) conceptual model^[7], there are four levels of a work: work, representation, manifestation, items. Most of the references are in representation levels, but sometimes it is very difficult to distinguish which level they represent. Furthermore, it is hard to say about which level of references should be unified. Take the following references for example, we may find that there are several editions of the monograph *Molecular Cloning: A Laboratory Manual*. Should we treat them as one and the same work or as different works? Different reference unification policy may have different unification results which represent different meaning to the users.
 1. Maniatis T, Fritsch E F, Sambrook J. *Molecular cloning: a laboratory manual*. New York: Cold spring harbor laboratory, 1982
 2. Sambrook J, Fritsch E F, Maniatis T. *Molecular cloning: A laboratory manual*. 2nd ed. New York: Cold Spring Harbor Laboratory Press, 1989
 3. Sambrook J, Ressel D W. *Molecular cloning: a laboratory manual*. 3rd ed. Cold Spring Harbor Laboratory Press, 2001
 4. Sambrook K J, Maniatis T, Fritsch E F. *Molecular cloning: A laboratory Manual*. (3rd ed.). Beijing: Science Press, 2002 (in Chinese)
 5. Sambrook K J, Maniatis T. Fritsch E F. *Molecular cloning: A laboratory Manual* (2nd ed.). Beijing: Science Press, 1992 (in Chinese).
- The theory of defining a minimum set of data elements. It seems that FRBR has given us a framework to define a core set of data elements, but there is a gulf between theory and reality. Some standards, like SICI^[8], BICI^[9], DOI^[10] etc. can be used to identify a journal article, a book (or one chapter of a book) uniquely, which could be looked as theory to define a minimum set of data elements, but they are not used as reference bibliography standards and they are not applicable to other kinds of resources like reports and dissertations etc.
- The reliable framework for journal article identification. Usually, the minimum set of data elements include cited first author's name, source title (serial title or monographs title), cited year, volume, issue number and the starting page when taking the journal article records as an example. But to the experience of the CSCD staff, many records in the database lack either the volume information or the information of an issue number. Therefore, it is better to adjust the data from six to five elements as detailed in the following: 1) The first author's name, 2) source title, 3) cited year, 4) volume or issue number and 5) start page.

Table 1 shows the variation of the results of reference unification by different minimum data elements in CSCD. It is obvious that more reference unification results can be found by using 5 data elements than by using 6 data elements, since there is



Research Papers

a great amount of reference records in the database and it is impossible to check them one by one. Although there is no result of errors that have been detected so far by random sample testings, it is still an issue of concern for its result reliability.

Table 1 The variation of the results of reference unification by different minimum data elements

Year	References unification with journal articles ^a	References unification with journal articles ^b	Loss
1989	23,890	14,217	9,673
1990	25,724	15,757	9,967
1991	26,636	16,405	10,231
1992	27,628	17,333	10,295
1993	29,241	18,592	10,649
1994	30,156	21,080	9,076
1995	31,649	22,731	8,918
1996	51,619	35,656	15,963
1997	51,997	35,860	16,137
1998	51,732	3,549	16,241
1999	52,670	29,837	22,833
2000	38,296	18,186	20,110
2001	14,815	3,258	11,557
Sum	456,053	284,403	171,650

Note: a, Reference unification with journal articles by using 5 data elements; b, reference unification with journal articles by using 6 data elements.

3.2.2 Data quality on the results of reference unification

Reference unification relied heavily on the quality of the records. The quality of the records may be divided into four levels:

- Standard records, which refer to the accurate data in a standard form.
- Correct but non-standard records. In CSCD, it contains both Chinese journals and English journals. Some of these references are cited in English no matter whether the original ones are in English or in Chinese. Sometimes they are cited in Pinyin name, in other occasions, they are cited in an abbreviated form while there are still others that are cited in their full name form.
- Insufficient data. As mentioned above, we selected the first author's name, source title, year, volume, issue number, start page as the minimum data elements for journal articles. If one of them is absent, it is insufficient for reference unification.
- Citation errors or typo errors during the data processing period.

For example, the following reference records are exactly one and the same, but they look significantly different in appearance. Identifying them as one work is not a trivial task. In the next section, we will explain how the clustering technique is used to support the identification of similar works. Only those standard, accurate data can be easily integrated together. To the insufficient data and error data, it would



be impossible to consult cited authors and journal editors about their accuracy and completeness. To those correct, but non-standard data, some authority files may be helpful, but it is a labour-consuming task. When records in the authority file were checked out, the data quality assurance would be in jeopardy for reference unification implementations.

1. Wang Cunxin (in Chinese). Journal of Physical Chemistry (in Chinese). 1991, 7(5):586
2. Wang C X. J Phys Chem. 1991, 7(5):586
3. Wang C X. Wuli Huaxue Xuebao. 1991, 7(5):586
4. Wang Cunxin. Journal of Physical Chemistry. 1991, 7(5):586

It is impossible for us to check thoroughly all records in CSCD, only the records of top 10 cited articles in 2001 have been evaluated for their quality. Table 2 shows that only about 57% citations are of high quality. The remaining 43% citations for reference unification had to be examined or judged manually. How could we improve the quality of CSCD as its goal is to offer excellent service to the users? Some authority files have been set up to support the reference unification, but they fell short to the desired task due to the existence of some ambiguity data in an authority file.

Table 2 Proportion of quality level of reference records from CSCD in 2001

First author of top 10 cited articles	Error citation (%)	Insufficient citation (%)	Non-standard citation (%)	Standard citation (%)	Total (%)
Wu Zhenyi	9.62	88.46	–	1.92	100.00
Wang Aiguo	2.27	77.27	–	20.45	100.00
Lin Zhifang	–	21.87	–	78.13	100.00
Zhang Xinshi	3.45	58.62	3.45	34.48	100.00
Li Guangwei	–	50.00	5.00	45.00	100.00
Zhang Peng	15.79	31.58	5.26	47.37	100.00
Shen Weiren	–	16.67	5.56	77.78	100.00
Wang Cunxin	–	–	16.67	83.33	100.00
Hou Xun	5.88	–	–	94.12	100.00
An Zhisheng	5.88	5.88	–	88.24	100.00
Average percentage	4.29	35.04	3.59	57.08	100.00

Note: If a reference record was counted as an error citation, it will not be counted as an insufficient citation or a non-standard citation any longer no matter whether it actually was or not. The sequence for counting was on the top row from left to right in the table.

For CSCD reference unification, we used an artificial intelligent software to invoke its happening. It was hoped that some error or non-standard data in a record would be eliminated and it could also be unified with a standard record. But as to what kind of error or non-standard data could be eliminated, it is still a question to be answered. Coincidentally, Helen Atkins^[11] mentioned some time ago that a fuzzy matching mechanism was needed for reference linking. In the system of DOI-X that they designed, if 75% of the submitted metadata fields were matched, and 25% were not matched, it would return a DOI for generating a reference linking. She emphasized



a possible reason for the mismatch might be a misspelled author name or an incorrect page number.

3.3.3 Haphazardness in ascertaining the best copy as the result of reference unification

When a group of records can be integrated together as one reference unification result, it is time for us to judge which one has the best quality that should be shown to users. We believe that the quality of source article records would be better than the quality of reference records. However, if the comparison were to be made among reference records, it would be difficult to decide which one is the appropriate one. We can only select one of them randomly which may not yield to the best copy as originally desired.

4 Reference unification performed by getting DOIs from CrossRef service

CrossRef is one of the major DOI Registration Agencies to assist and to facilitate the use of DOI for reference linking. As we know, DOI was first created by the American Publishing Association in 1997. Its business objective was to develop a permanent and reliable document identifier system for users to find their desired documentary contents in the Internet. That system was also subsequently used in reference linking system successfully. As of October 2007, CrossRef has had over 28 million DOI names registered which were taken from 15,000 journals and 40,000 books. This enormous database strength has made CrossRef by far the largest DOI Registration Agency in the world today^[12].

Just as DOI successfully supports CrossRef reference unification, we may be inclined to assume that DOI could also be used for reference linking. It was assumed at first that the Reference Resolver, which was embedded in CrossRef system, could help the retrieving party get journal references' DOIs^[13]. The returned DOIs can not only help identify the same reference by the same DOIs, but also help link the reference to its relevant full text article which has been registered in the CrossRef System. The main service that CrossRef provides is not to register DOI names but rather to affect a networked reference linking of the published contents of 470 member publishers.

Then, what is the probability of getting references' DOIs via CrossRef system? Firstly, it was due to the limited scope of journals in Chinese registered in the CrossRef. As we know, there are about 21,216 journals registered in CrossRef, but no more than 60 Chinese journals in the system. Thus Chinese journals reference unification could not be matched via Reference Resolver.

In order to know how many DOIs could actually be matched in the CrossRef System, we retrieved 2,000 English journal reference records, which were captured from CSCD for such a purpose. After deleting the duplicated reference records from the 2,000 journal references, we got 1,972 unique reference records retrieved by



Reference Resolver in CrossRef system. There were about 74% records being resolved and returned back their DOIs by the Reference Resolver of CrossRef system. The remaining records including 2 mismatched records were unresolved. By statistical calculations, all the matched records were from a spread of 551 journals that had a publication time-span from the 1920s to 2006. The highest probability of record matching was those journals which were published after 2000, whereas the lowest probability of record matching was those journals published during the period between 1950 and 1979.

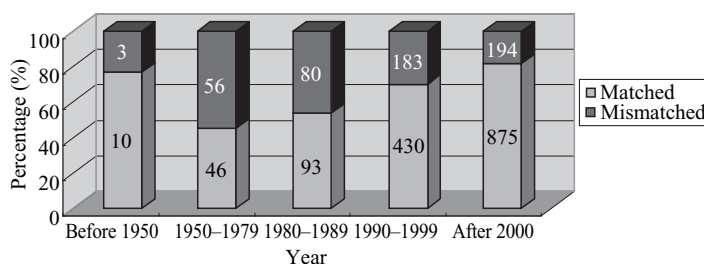


Fig. 4 References records as Non-Chinese journal articles captured from CSCD matched in CrossRef system by year.

Having noticed that matching algorithms had a great influence to the result, we scanned the returned results to find out how this fuzzy-match worked. Usually, the Reference Resolver needs 6 data elements, such as journal title, author name, year, volume, issue, start page for matching. All these elements except the year element could be matched by the fuzzy-match. Table 3 shows that the author element uses fuzzy-match more than any other elements.

Table 3 The probability of fuzzy-match of each of the data elements of a journal article

	Journal title	Author	Volume	Issue	Start page
Fuzzy match probability (%)	10.39	15.07	3.30	2.82	2.55

5 Conclusive remarks

Since reference linking has similar solutions as reference unification, barriers to reference unification should also be factored into the consideration in the implementation process of reference linking. Generally speaking, there are three such barriers as listed in the following: 1) Definition of a minimum set of data elements; 2) quality assurance of data for reference linking; and 3) appropriate linking results for the user.

The accuracy of metadata is very important in reference linking as well as in reference unification. It is the key element for a successfully linking. As Herbert van



Research Papers

de Sompel, creator of OpenURL/SFX once said: “When you do not have decent metadata, it is hard to provide decent services”^[14]. He was very interested in creating unique identifiers for objects. He believed that DOI changed the rule of the game for it not only uniquely identifies an object, but also allows users to obtain well-structured metadata by retrieving from the DOI system or from the CrossRef system for resolving issues related to reference linking.

As the quality of metadata may have great influence on reference linking, we should call on the authors, publishers, database suppliers and librarians to cooperate together for assurance of information quality because they are all responsible to the quality of data no matter whether they be information creators or information users, or a combination of the two.

Finally, we would like to say a few words about the importance of writers who should provide reference citations and bibliographic listings with the utmost care and accuracy. It is first of foremost the responsibility of the authors, who as the information/documentary originators should see to it that their reference citations are correct and complete. The accuracy of reference citation is not only an indication of the author's scholarship but also his magnanimousness in recognizing other author's fruit of labour and gives credit respectfully and fairly to where the credit is due. Publishers also play a very important role in insuring metadata quality. Nowadays, many publishers and database vendors give their author clientele some very smart toolkits for citing reference works in a standard format. For instance, Endnote, which was developed by Thomson Reuters, is a useful digital tool for research writers to cite references automatically and also in conformity with the established standard citation format of their chosen subject field. Undoubtedly, such digital reference tool, if developed and operated under the OAI protocol, will also greatly enhance not only the accuracy of the metadata on the one hand, but also the quality of reference unification and reference linking work on the other hand. We therefore strongly recommend that such similar citation tools for Chinese research paper writings be quickly developed in China and be widely adapted for use by Chinese authors in all subject fields for the benefit of our new digital information environment that is unmistakably in the offing.

References

- 1 Van de Sompel, H, & Hochstenbach, P. Reference linking in a hybrid library environment. Part 1: Frameworks for linking. *D-Lib Magazine*, 1999, 5(4). Retrieved on December 20, 2008, from http://www.dlib.org/dlib/april99/van_de_sompel/04van_de_sompel-pt1.html.
- 2 Grogg, J. E. Thinking about reference linking. *Online*, 2002, 10(4). Retrieved on December 20, 2008, from <http://www.infotoday.com/searcher/apr02/grogg.htm>
- 3 COPPUL — Reference Linking Analysis. Retrieved on December 20, 2008, from <http://cybrary.uwinnipeg.ca/resources/COPPUL/linking/index.html>
- 4 Cited reference searching: An introduction — A tutorial using Web of Science. Retrieved on December 20, 2008, from <http://scientific.thomsonreuters.com/tutorials/citedreference/crs5.htm>.
- 5 Blake, M. E., & Knudson, F. L. Metadata and reference linking. *Library Collections Acquisitions & Technical Services*, 2002, 26:219–230.



- 6 Roberson, J. Understanding the JCR: A Series 2000. Retrieved on December 20, 2008, from <http://www.isinet.com/isi/>.
- 7 IFLANET. Functional requirements for bibliographic records. München: K. G. Saur. 1998, IFLA section on cataloguing. Retrieved on December 20, 2008, from <http://www.ifla.org/VII/s13/frbr/frbr.htm>.
- 8 ANSI/NISO. Serial item and contribution identifier, 1996. Retrieved on December 20, 2008, from http://www.techstreet.com/cgi-bin/detail?product_id=52629.
- 9 Draft Standard of ANSI/NISO. Book item and component identifier. Retrieved on December 20, 2008, from <http://www.niso.org/pdfs/BICI-DS.pdf>.
- 10 IDF. The digital object identifier system. Retrieved on December 20, 2008, from <http://www.doi.org/>.
- 11 Atkins, H., Lyons, C., & Ratner, H. et al. Reference linking with DOIs, A case study. D-Lib Magazine, 2000, 6(2). Retrieved on December 20, 2008, from <http://www.dlib.org/dlib/february00/02risher.html>.
- 12 Pentz, E. CrossRef: Collaboration to build a digital infrastructure. Retrieved on December 20, 2008, from http://www.chinadoi.cn/img_news/CrossRef_Collaboration%20to%20Build%20a%20Digital%20Infrastructure.pdf.
- 13 Brand, A. Publishers joining forces through CrossRef. Serials Review, 2003(11):3–9.
- 14 Paskin, N. DOI: a 2003 progress report. D-Lib Magazine. 2003, 9(6). Retrieved on December 20, 2008, from <http://www.dlib.org/dlib/june03/paskin/6paskin.html>.

