

# Identifying Core Literature Through Citation Analysis and Visualization

Presented by

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***Abstract: Eugene Garfield, founder of the Institute for Scientific Information, will show how contemporary scientific literature can be better understood and visualized through citation analysis, bibliometrics, and visualization, especially Historiographs. Illustrations show how to better understand the impact of specific journals and authors and to identify the core literature and history of specific topics.***

For this workshop I have made a probably false assumption -- that everyone here knows how to use the *Web of Science*, the electronic version of the *Science Citation Index (SCI)* and associated Social Sciences (SSCI) and Arts/Humanities (A&HCI) files. For those who use the CD-ROM editions of these products then you should have little difficulty following the examples..

In recent years, the emphasis in library and information science literature has changed from information retrieval and mining to identifying core literatures – how to separate the wheat from the chaff. This is fact has been accentuated by the advent of Google.

Ordinarily, the core literature for any given topic turns out to be a group of highly cited papers, books, or journals. And in the case of historically oriented topics, the citation frequency criterion must be modulated or tempered by age considerations. The citation frequency of a paper ranked highly in 1955 might not be ranked as highly by 2005 standards.

While other databases could be used as the source of data input, all of my examples will be based on the *ISI Web of Science*, a database which now covers over 35,000,000 items published, 1900 to the present. That provides considerable scope for contemporary as well as classical historical studies. Remarkably, many core works, even for contemporary science, appeared in the early part of the 20<sup>th</sup> century and provide important historical links to the recent literature. That will be illustrated by examining the citation record for Albert Einstein.

In addition to the *Web of Science*, my talk is focused on *HistCite*<sup>TM</sup> software which was developed over the past several years. *HistCite* analyzes the output of searches on the *Web of Science* whether by subject, by author, by cited reference or author, institution, or countries, or a combination thereof.<sup>1</sup>

So the first step in the *HistCite* process is to pick one or more of search terms to retrieve hundreds if not thousands of articles on your topic. From that group of retrieved papers a “marked” list will be created. When the marked list is saved, it is essential to include not only the typical bibliographic information such as title, authors, and journal, but also all the cited references for each source paper retrieved. From these data, *HistCite* creates a mini virtual citation index. By appropriate sorting, the system will enable you to quickly identify the core papers on the topic in question.

To recap: A search in *Web of Science* is conducted. Whatever search profile you chose -- whether keywords or authors and/or cited references -- the retrieved records you desire are marked. Then a marked list is created. From this marked list a .txt Export File is created and “saved.” The address for that “saved” text file is used as your input to *HistCite*. Let’s take a look at several searches we already have processed.

**Web of Science®**

WELCOME ? HELP GENERAL SEARCH CITED REF SEARCH STRUCTURE SEARCH SEARCH HISTORY ADVANCED SEARCH

**Search Results -- Summary**

TS=(digital librar\*)  
 DocType=All document types; Language=All languages; Databases=SCI-EXPANDED, SSCI, A&HCI; Timespan=1900-2005

Search within results:

**1,424 results found (Set #3)**

Go to Page:  of 143

Records 1 -- 10

Use the checkboxes to select individual records for marking, then click Submit to add them to the Marked List.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><input type="checkbox"/> 1. Borgman CL, Smart LJ, Millwood KA, et al.<br/> <a href="#">Comparing faculty information seeking in teaching and research: Implications for the design of digital libraries</a><br/>           JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE AND TECHNOLOGY 56 (6): 636-657 APR 2005<br/>           Times Cited: 0<br/> <input type="button" value="→ Links"/> <input type="button" value="VIEW FULL TEXT"/></p> <p><input type="checkbox"/> 2. Hanisch F, Strasser W<br/> <a href="#">How to include visuals and interactivities in an educational computer graphics repository</a><br/>           COMPUTERS &amp; GRAPHICS-UK 29 (2): 237-243 APR 2005<br/>           Times Cited: 0<br/> <input type="button" value="→ Links"/> <input type="button" value="VIEW FULL TEXT"/></p> <p><input type="checkbox"/> 3. Cherry K<br/> <a href="#">Digital library use: Social practice in design and evaluation</a><br/>           COLLEGE &amp; RESEARCH LIBRARIES 66 (2): 184-185 MAR 2005<br/>           Times Cited: 0<br/> <input type="button" value="→ Links"/></p> <p><input type="checkbox"/> 4. Secker J<br/> <a href="#">DELIVERing library resources to the virtual learning environment</a><br/>           PROGRAM-ELECTRONIC LIBRARY AND INFORMATION SYSTEMS 39 (1): 39-49 2005<br/>           Times Cited: 0<br/> <input type="button" value="→ Links"/> <input type="button" value="VIEW FULL TEXT"/></p> <p><input type="checkbox"/> 5. Haarhoff L<br/> <a href="#">Books from the past: an e-books project at Culturenet Cymru</a><br/>           PROGRAM-ELECTRONIC LIBRARY AND INFORMATION SYSTEMS 39 (1): 50-61 2005<br/>           Times Cited: 0<br/> <input type="button" value="→ Links"/> <input type="button" value="VIEW FULL TEXT"/></p> <p><input type="checkbox"/> 6. Chang NC<br/> <a href="#">Data manipulation in an XML-based digital image library</a><br/>           PROGRAM-ELECTRONIC LIBRARY AND INFORMATION SYSTEMS 39 (1): 62-72 2005<br/>           Times Cited: 0<br/> <input type="button" value="→ Links"/> <input type="button" value="VIEW FULL TEXT"/></p> | <p><b>Sort by:</b><br/> <input type="button" value="Latest date"/> <input type="button" value="SORT"/></p> <p><b>Mark:</b> [0 articles marked]</p> <p><input type="checkbox"/> <b>Selected records</b></p> <p><input type="checkbox"/> <b>All records on this page</b></p> <p><input type="checkbox"/> <b>Records</b> <input type="text" value=""/> <b>to</b> <input type="text" value=""/></p> <p><input type="button" value="SUBMIT"/></p> <p>You can print, save, export, e-mail, and order records after adding them to the Marked List. (The list can hold 500 records.)</p> <p><b>Analyze Results:</b><br/> <input type="button" value="ANALYZE"/></p> <p>View rankings and histograms of the authors, journals, etc. for this set of records. (Up to 2,000 records at a time.)</p> |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Key: = Structure available

Use the checkboxes to select individual records for marking, then click Submit to add them to the Marked List.

**1,424 results found (Set #3)**

Go to Page:  of 143

Records 1 -- 10

1,424 documents matched your query of the 35,676,584 in the data limits you selected.

## SLIDE 1: WOS LISTING OF SEARCH ON DIGITAL LIBRAR\*

I performed a simple keyword search on “Digital Librar\*”. The first paper is by Christine Borgman, et al. Note that the papers are in reverse chronological order. Since the search is not limited to title words, the next paper retrieved is by Hanisch and Strasser. However, the third paper by Cherry contains the term in the title. Note that we have retrieved over 1400 papers.

[Missing Links? Citation Matrix](#)

[Graphs](#)

[Glossary](#) [HistCite Guide](#) [About](#)

Papers found in an ISI Web of Science  
topic search: digital librar\*

Nodes: 1411, [Authors](#): 2483, [Journals](#): 350, [Outer References](#): 21614, [Words](#): 2402

Collection span: 1990 - 2005

View: Overview. Sorted by year, source, volume, issue, page.

Page 1: 1 [2](#) [3](#) [4](#) [5](#)

| #  | <a href="#">LCR</a> | <a href="#">NCR</a> | <a href="#">Nodes</a> / <a href="#">Date</a> / <a href="#">Journal</a> / <a href="#">Authors</a>                                                                                                                                                      | <a href="#">LCS</a> | <a href="#">GCS</a> |
|----|---------------------|---------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------|
| 1  | 0                   | 1                   | <a href="#">1</a> 1990 DATABASE 13(6):105-108<br><b>GILLIAM E; SLUZENSKI K</b><br><i>CD-ROM User Groups - The Experiences of Digital Equipment Corporations Digital Library Network</i>                                                               | 0                   | 2                   |
| 2  | 0                   | 2                   | <a href="#">2</a> 1990 INTERDISCIPLINARY SCIENCE REVIEWS 15(3):196-198<br><b>HEINZ L</b><br><i>Bridges - A Digital Library - Comment</i>                                                                                                              | 0                   | 0                   |
| 3  | 0                   | 0                   | <a href="#">3</a> 1991 SMPTE JOURNAL 100(6):423-426<br><b>CARSON K; DANIELSON J</b><br><i>An Integrated Digital Production Suite</i>                                                                                                                  | 0                   | 0                   |
| 4  | 0                   | 0                   | <a href="#">4</a> 1992 INFORMATION TECHNOLOGY AND LIBRARIES 11(1):40-41<br><b>SCHEID BL</b><br><i>1st Annual VTLS Library Directors Conference - Linking Multimedia Digital Libraries - Where We Are, Where Were Going - Introduction</i>             | 0                   | 0                   |
| 5  | 0                   | 0                   | <a href="#">5</a> 1992 INFORMATION TECHNOLOGY AND LIBRARIES 11(1):41-42<br><b>CHACHRA V</b><br><i>A Perspective on Linking Multimedia Digital Libraries</i>                                                                                           | 0                   | 0                   |
| 6  | <a href="#">1</a>   | 7                   | <a href="#">6</a> 1993 COMPUTER 26(11):79-81<br><b>FOX EA</b><br><i>Digital Libraries</i>                                                                                                                                                             | <a href="#">1</a>   | 0                   |
| 7  | 0                   | 37                  | <a href="#">7</a> 1993 IBM SYSTEMS JOURNAL 32(3):512-540<br><b>GLADNEY HM</b><br><i>A Storage Subsystem for Image and Records Management</i>                                                                                                          | <a href="#">2</a>   | 6                   |
| 8  | 0                   | 0                   | <a href="#">8</a> 1993 INFORMATION TECHNOLOGY AND LIBRARIES 12(2):239-240<br><b>SCHEID BL</b><br><i>Special Section - 2nd Annual Library Directors Conference - Linking Multimedia Digital Libraries - The Changing Infrastructure - Introduction</i> | 0                   | 0                   |
| 9  | <a href="#">1</a>   | 10                  | <a href="#">9</a> 1993 JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE 44(8):441-445<br><b>FOX EA; LUNIN LF</b><br><i>Perspectives On - Digital Libraries - Introduction and Overview</i>                                                     | <a href="#">6</a>   | 7                   |
| 10 | <a href="#">1</a>   | 35                  | <a href="#">10</a> 1993 JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE 44(8):480-491<br><b>FOX EA; HIX D; NOWELL LT; BRUENI DJ; WAKE WC; et al.</b><br><i>Users, User Interfaces, and Objects - Envision, a Digital Library</i>              | <a href="#">18</a>  | 31                  |

## SLIDE 2: HISTCITE DISPLAY OF WOS SEARCH ON DIGITAL LIBRAR\*

Following the procedure I described earlier, having saved the test files, we go from the *WOS* display to the opening page of *HistCite*. *WOS* is in reverse chronological order. The *HistCite* default is normal chronological order. So the earliest paper appeared in 1990. The grey indicates papers that have not been cited in the collection of 1400 papers..

When the original search was conducted, the collection consisted of 1411 papers. The *HistCite* display is not only in normal chronological order, but also is sorted within each year, by journal, volume, issue number, and page. Note the two papers from *ITAL – Information Technology and Libraries*. I will be using this journal as another example later. For each published paper, you will see at the top right both the local (LCS) or global (GCS) citation scores. At the top left, note that there are 2483 authors in this collection. The articles appeared

in 350 journals during the period 1990-2005. The other hot links in blue include “outer references” and words. Also at the very top are links to the editing, missing inks, and graphing features.

A click on LCS ranks the papers by their Local Citation Score, the number of times each record was cited in the collection itself. A click on GCS ranks the file by Global Citation Score, that is, how often the items are cited in the entire *WOS* file – *SCI*, *SSCI*, and *AHCI*. Remember that these papers may have been cited in other papers that did not use the term digital library. While some papers may rank well in the local collection, others may rank higher in global score because they are highly cited outside the immediate collection. Depending upon how far you wish to expand the search you can consider adding to the collection by retrieving from *WOS* those additional citing papers. However, it frequently is unnecessary to retrieve more than 500 to 1,000 papers to identify the core as they would represent a significant sampling of the relevant literature. This depends upon the size of the literature on your topic.

ISI Web of Science location:

Papers found in an ISI Web of Science  
topic search: digital library\*

#### Cited references outside of this network

Total: 21614 (top 300 shown)

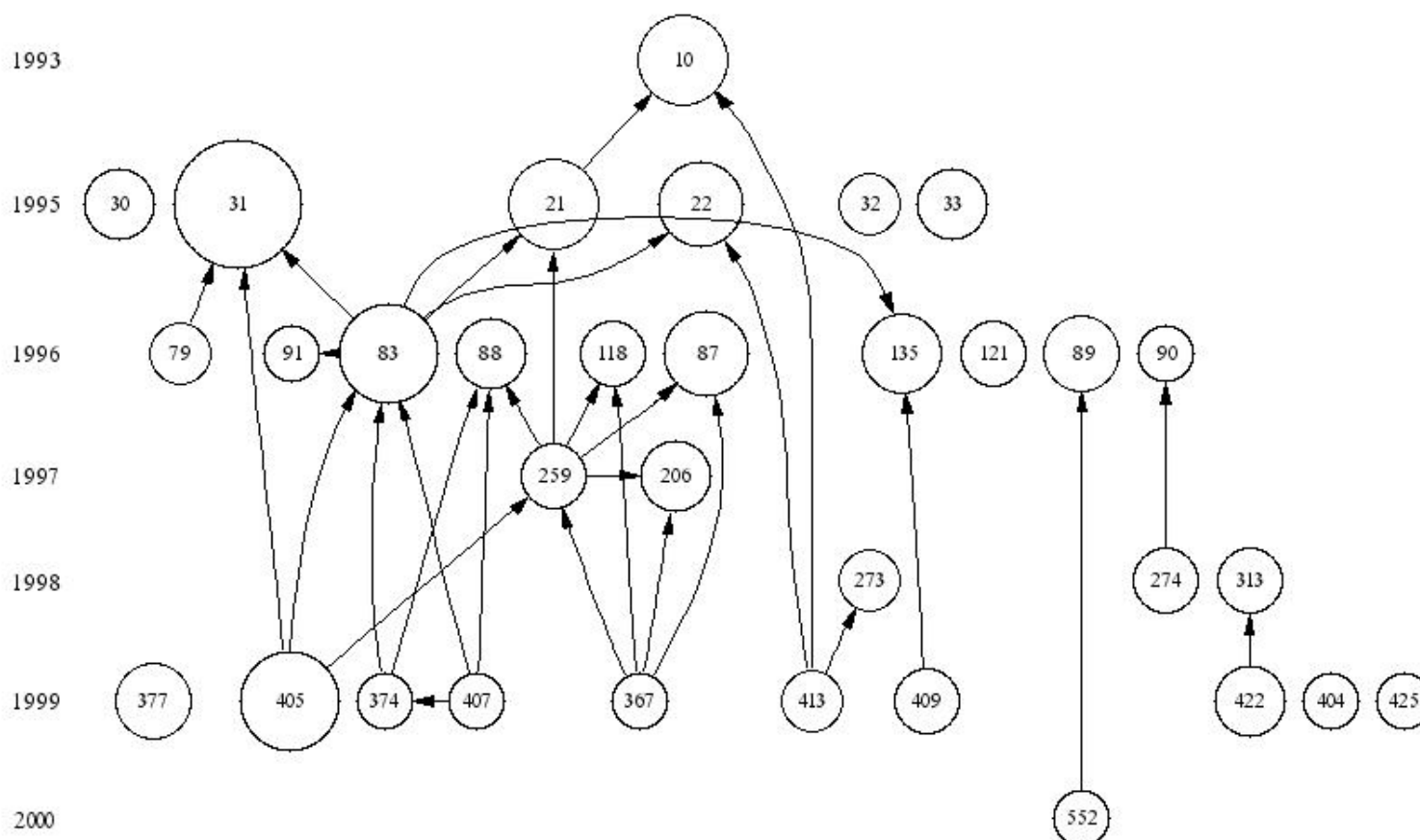
Sorted by LCS.

| #  | <a href="#">LCS</a> | <a href="#">Reference</a>                                              |
|----|---------------------|------------------------------------------------------------------------|
| 1  | <a href="#">40</a>  | SALTON G, 1983, INTRO MODERN INFORMA <a href="#">WoS</a>               |
| 2  | <a href="#">25</a>  | SALTON G, 1989, AUTOMATIC TEXT PROCE <a href="#">WoS</a>               |
| 3  | <a href="#">24</a>  | LESK M, 1997, PRACTICAL DIGITAL LI <a href="#">WoS</a>                 |
| 4  | <a href="#">20</a>  | BAEZAYATES R, 1999, MODERN INFORMATION R <a href="#">WoS</a>           |
| 5  | <a href="#">19</a>  | MARCHIONINI G, 1995, INFORMATION SEEKING <a href="#">WoS</a>           |
| 6  | <a href="#">19</a>  | BUSH V, 1945, ATLANTIC MONTHLY, V176, P101 <a href="#">WoS</a>         |
| 7  | <a href="#">17</a>  | KAHN R, 1995, FRAMEWORK DISTRIBUTE <a href="#">WoS</a>                 |
| 8  | <a href="#">16</a>  | ARMS WY, 2000, DIGITAL LIB <a href="#">WoS</a>                         |
| 9  | <a href="#">15</a>  | BATES MJ, 1989, ONLINE REV, V13, P407 <a href="#">WoS</a>              |
| 10 | <a href="#">14</a>  | NIELSEN J, 1993, USABILITY ENG <a href="#">WoS</a>                     |
| 11 | <a href="#">14</a>  | DEERWESTER S, 1990, J AM SOC INFORM SCI, V41, P391 <a href="#">WoS</a> |
| 12 | <a href="#">13</a>  | SILBERG WM, 1997, JAMA-J AM MED ASSOC, V277, P1244 <a href="#">WoS</a> |
| 13 | <a href="#">13</a>  | GOLDBERG D, 1992, COMMUN ACM, V35, P61 <a href="#">WoS</a>             |
| 14 | <a href="#">12</a>  | VANRIJSBERGEN CJ, 1979, INFORMATION RETRIEVA <a href="#">WoS</a>       |
| 15 | <a href="#">12</a>  | FURNAS GW, 1987, COMMUN ACM, V30, P964 <a href="#">WoS</a>             |
| 16 | <a href="#">12</a>  | CHEN HC, 1998, J AM SOC INFORM SCI, V49, P582 <a href="#">WoS</a>      |
| 17 | <a href="#">12</a>  | SHNEIDERMAN B, 1998, DESIGNING USER INTER <a href="#">WoS</a>          |
| 18 | <a href="#">12</a>  | BORGMAN CL, 2000, GUTENBERG GLOBAL INF <a href="#">WoS</a>             |
| 19 | <a href="#">11</a>  | WHITE HD, 1998, J AM SOC INFORM SCI, V49, P327 <a href="#">WoS</a>     |
| 20 | <a href="#">11</a>  | SWAIN MJ, 1991, INT J COMPUT VISION, V7, P11 <a href="#">WoS</a>       |
| 21 | <a href="#">11</a>  | BELKIN NJ, 1992, COMMUN ACM, V35, P29 <a href="#">WoS</a>              |
| 22 | <a href="#">11</a>  | BATES MJ, 1986, J AM SOC INFORM SCI, V37, P357 <a href="#">WoS</a>     |
| 23 | <a href="#">10</a>  | SALTON G, 1988, INFORMATION PROCESSI, V24, P513 <a href="#">WoS</a>    |
| 24 | <a href="#">10</a>  | FOX EA, 1995, COMMUN ACM, V38, P22 <a href="#">WoS</a>                 |
| 25 | <a href="#">10</a>  | LAGOZE C, 2001, P 1 ACM IEEE JOINT C, P54 <a href="#">WoS</a>          |

### SLIDE 3: DIGITAL LIBRARIES OUTER REFERENCES

One immediate source of additional key references can be found by looking at the list of outer references. Here you can see the entire group of papers cited in the virtual citation index, sorted by local citation score. This will be an indication of how important these references are to the topic. By clicking on *WOS* you will be able to automatically conduct a cited reference search on each paper selected. You must first enter your *WOS* access

# G1



LCS  $\geq 8$   
Nodes: 33, Links: 31  
LCS  $\geq 8$ ; Min: 8, Max: 36

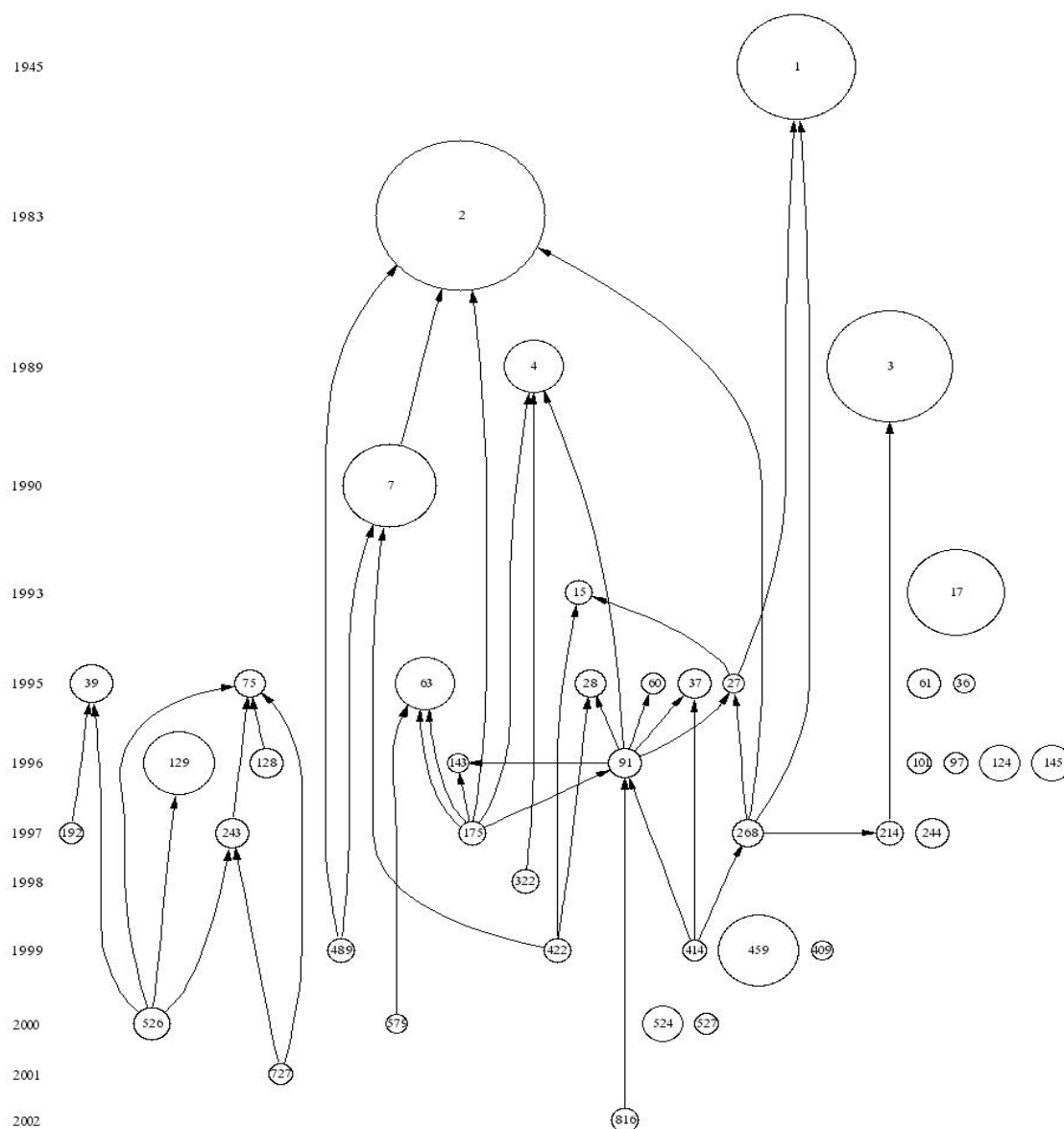
5. [31](#) 1995 COMMUNICATIONS OF THE ACM 38(4):77-84  
LEVY DM; MARSHALL CC  
*Going Digital - A Look At Assumptions Underlying Digital Libraries*  
**LCR:** 0 **NCR:** 17 **LCS:** 36 **GCS:** 55

9. [83](#) 1996 ANNUAL REVIEW OF INFORMATION SCIENCE AND TECHNOLOGY 31:301-401  
BISHOP AP; STAR SL  
*Social informatics of digital library use and infrastructure*  
LCR: 10 NCR: 320 LCS: 22 GCS: 49 3.

27. [405](#) 1999 INFORMATION PROCESSING & MANAGEMENT 35(3):227-243  
BORGMAN CL  
*What are digital libraries? Competing visions*  
LCR: 5 NCR: 41 LCS: 23 GCS: 26

## SLIDE 4: LCS HISTORIOGRAPH OF DIGITAL LIBRARIES

## GCS HISTORIOGRAPH: DIGITAL LIBRARIES

**G3**

GCS  $\geq 24$

Nodes: 42, Links: 40

GCS  $\geq 24$ ; Min: 24, Max: 1170

1. 1 1945 *The Atlantic Monthly* 176(1):101-108

BUSH V

### *As We May Think*

**LCR: 0   NCR: 1   LCS: 19   GCS: 600**

## 2.2 1983 INTRO MODERN INFORMA

SALTON G; MCGILL MJ

*An Introduction to Modern Information Retrieval*

LCR: 0 NCR: 1 LCS: 41 GCS: 1170

### 3.3 1989 AUTOMATIC TEXT PROC

SALTON G

*Automatic Text Processing - The Transformation, Analysis, and Retrieval of Information by Computer*

LCR: 0 NCR: 1 LCS: 25 GCS: 635



After adding a set of outer references to the digital library file, we find this G map. Note that paper #1 in this map is the 1945 paper by Vannevar Bush which is an historical link one might overlook in thinking about digital libraries.

**Web of Science®**

WELCOME HELP GENERAL SEARCH CITED REF SEARCH STRUCTURE SEARCH SEARCH HISTORY ADVANCED SEARCH

**Search Results -- Summary**

AU=(Salton G\*)  
 DocType=All document types; Language=All languages; Databases=SCI-EXPANDED, SSCI, A&HCI; Timespan=1900-2005

Search within results:  Enter a topic

Go to Page:  of 14

Records 1 -- 10

Use the checkboxes to select individual records for marking, then click Submit to add them to the Marked List.

- ☐ 1. **Salton G**, Singhal A, Mitra M, et al.  
[Automatic text structuring and summarization](#)  
 INFORMATION PROCESSING & MANAGEMENT 33 (2): 193-207 MAR 1997  
 Times Cited: [34](#)
- ☐ 2. Singhal A, **Salton G**, Mitra M, et al.  
[Document length normalization](#)  
 INFORMATION PROCESSING & MANAGEMENT 32 (5): 619-633 SEP 1996  
 Times Cited: [12](#)
- ☐ 3. **Salton G**  
[A new horizon for information science](#)  
 JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE 47 (4): 333-333 APR 1996  
 Times Cited: [3](#)
- ☐ 4. **Salton G**, Allan J, Singhal A  
[Automatic text decomposition and structuring](#)  
 INFORMATION PROCESSING & MANAGEMENT 32 (2): 127-138 MAR 1996  
 Times Cited: [13](#)
- ☐ 5. **SALTON G**, ALLAN J  
[SELECTIVE TEXT UTILIZATION AND TEXT TRAVERSAL](#)  
 INTERNATIONAL JOURNAL OF HUMAN-COMPUTER STUDIES 43 (3): 483-497 SEP 1995  
 Times Cited: [2](#)
- ☐ 6. **SALTON G**  
[PERFORMANCE OF TEXT RETRIEVAL-SYSTEMS](#)  
 SCIENCE 268 (5216): 1418-1419 JUN 9 1995  
 Times Cited: [2](#)
- ☐ 7. BUCKLEY C, ALLAN J, **SALTON G**  
[AUTOMATIC ROUTING AND RETRIEVAL USING SMART - TREC-2](#)  
 INFORMATION PROCESSING & MANAGEMENT 31 (3): 315-326 MAY-JUN 1995  
 Times Cited: [2](#)

**Sort by:**

Latest date

**Mark:** [0 articles marked]

☐ **Selected records**

☐ **All records on this page**

☐ **Records**  **to**

You can print, save, export, e-mail, and order records after adding them to the Marked List. (The list can hold 500 records.)

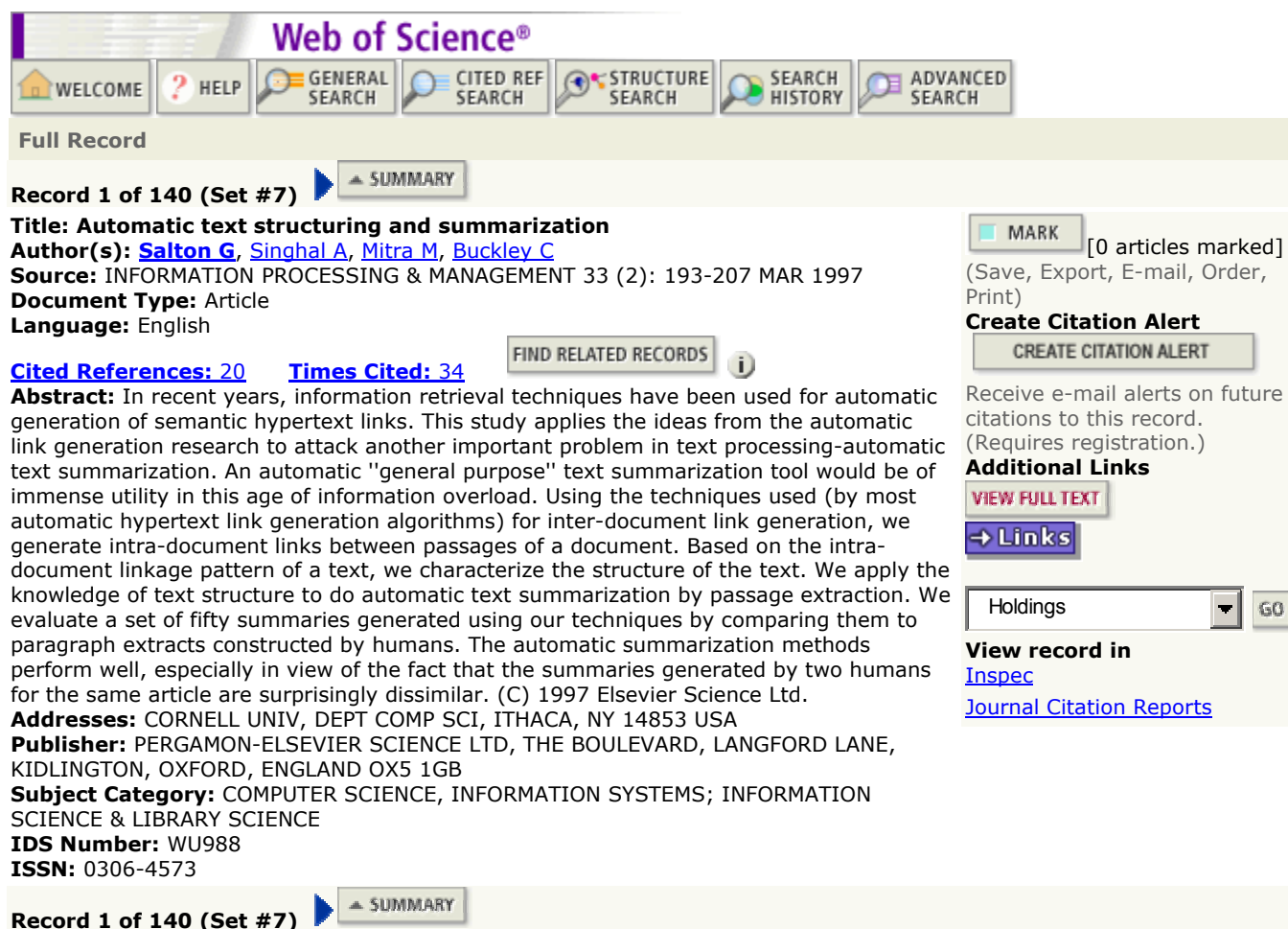
**Analyze Results:**

View rankings and histograms of the authors, journals, etc. for this set of records. (Up to 2,000 records at a time.)

Key: = Structure available

Use the checkboxes to select individual records for marking, then click Submit to add them to the Marked List.

In our next example we will demonstrate the results of a *WOS* author search for Gerald Salton, formerly professor of computer science at Cornell University. His name happens to be quite relevant to the history of digital libraries even though he died about 10 years ago. A straight-forward search of *WOS* demonstrates that 140 of his published papers are covered in the database. His work overall has been cited in more than 4,000 papers.



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Full Record

Record 1 of 140 (Set #7) [SUMMARY](#)

**Title:** Automatic text structuring and summarization  
**Author(s):** [Salton G.](#), [Singhal A.](#), [Mitra M.](#), [Buckley C.](#)  
**Source:** INFORMATION PROCESSING & MANAGEMENT 33 (2): 193-207 MAR 1997  
**Document Type:** Article  
**Language:** English

[Cited References: 20](#) [Times Cited: 34](#) [FIND RELATED RECORDS](#) [i](#)

**Abstract:** In recent years, information retrieval techniques have been used for automatic generation of semantic hypertext links. This study applies the ideas from the automatic link generation research to attack another important problem in text processing-automatic text summarization. An automatic "general purpose" text summarization tool would be of immense utility in this age of information overload. Using the techniques used (by most automatic hypertext link generation algorithms) for inter-document link generation, we generate intra-document links between passages of a document. Based on the intra-document linkage pattern of a text, we characterize the structure of the text. We apply the knowledge of text structure to do automatic text summarization by passage extraction. We evaluate a set of fifty summaries generated using our techniques by comparing them to paragraph extracts constructed by humans. The automatic summarization methods perform well, especially in view of the fact that the summaries generated by two humans for the same article are surprisingly dissimilar. (C) 1997 Elsevier Science Ltd.

**Addresses:** CORNELL UNIV, DEPT COMP SCI, ITHACA, NY 14853 USA  
**Publisher:** PERGAMON-ELSEVIER SCIENCE LTD, THE BOULEVARD, LANGFORD LANE, KIDLINGTON, OXFORD, ENGLAND OX5 1GB  
**Subject Category:** COMPUTER SCIENCE, INFORMATION SYSTEMS; INFORMATION SCIENCE & LIBRARY SCIENCE  
**IDS Number:** WU988  
**ISSN:** 0306-4573

[MARK](#) [0 articles marked]  
 (Save, Export, E-mail, Order, Print)  
**Create Citation Alert**  
[CREATE CITATION ALERT](#)  
 Receive e-mail alerts on future citations to this record. (Requires registration.)  
**Additional Links**  
[VIEW FULL TEXT](#)  
[Links](#)  
 Holdings [GO](#)  
**View record in**  
[Inspec](#)  
[Journal Citation Reports](#)

Record 1 of 140 (Set #7) [SUMMARY](#)

#### SLIDE 7: SOURCE RECORD OF ARTICLE

To illustrate the format of a source record, I have selected his 1997 paper in *Information Processing & Management*, "Automatic Text Structuring and Summarization."



9

WELCOME

HELP

GENERAL SEARCH

STRUCTURE SEARCH

SEARCH HISTORY

ADVANCED SEARCH

Cited Reference Search

[<< Back to query](#)

**Your search has found the following references.**  
**Select only those cited references you want to include,**  
**then click FINISH SEARCH.**

(Hint: Look for variants. Papers are sometimes cited incorrectly.)

FINISH SEARCH >>

View the articles that cite the selected references.  
 The completed search will be added to the search history.  
[\(Limit by language and document type\)](#)

CITED REFERENCE INDEX

Go to Page:  of 49

References 621 -- 640

SELECT PAGE

SELECT ALL\*

CLEAR ALL

or select specific references from the list.  
 When desired references have been selected from all pages, click FINISH SEARCH to complete your search.

| Select                   | Times Cited** | Cited Author | Cited Work           | Year | Volume | Page | Article ID | View Record                 |
|--------------------------|---------------|--------------|----------------------|------|--------|------|------------|-----------------------------|
| <input type="checkbox"/> | 3             | SALTON G     | J AM S INFO          | 1972 | 23     |      |            |                             |
| <input type="checkbox"/> | 2             | SALTON G     | J AM SOC INF SCI MAR | 1980 |        | 75   |            |                             |
| <input type="checkbox"/> | 1             | SALTON G     | J AM SOC INFORM MAR  | 1972 |        |      |            |                             |
| <input type="checkbox"/> | 1             | SALTON G     | J AM SOC INFORM SCI  |      | 36     | 200  |            |                             |
| <input type="checkbox"/> | 3             | SALTON G     | J AM SOC INFORM SCI  | 1996 | 47     | 333  |            | <a href="#">View record</a> |
| <input type="checkbox"/> | 1             | SALTON G     | J AM SOC INFORM SCI  | 1993 | 41     | 388  |            |                             |
| <input type="checkbox"/> | 5             | ...Salton G  | J AM SOC INFORM SCI  | 1991 | 42     | 723  |            | <a href="#">View record</a> |
| <input type="checkbox"/> | 1             | SALTON G     | J AM SOC INFORM SCI  | 1990 | 41     | 188  |            |                             |
| <input type="checkbox"/> | 1             | SALTON G     | J AM SOC INFORM SCI  | 1990 | 41     | 287  |            |                             |
| <input type="checkbox"/> | 204           | SALTON G     | J AM SOC INFORM SCI  | 1990 | 41     | 288  |            | <a href="#">View record</a> |
| <input type="checkbox"/> | 10            | SALTON G     | J AM SOC INFORM SCI  | 1987 | 38     | 375  |            | <a href="#">View record</a> |
| <input type="checkbox"/> | 44            | SALTON G     | J AM SOC INFORM SCI  | 1985 | 36     | 200  |            | <a href="#">View record</a> |
| <input type="checkbox"/> | 8             | SALTON G     | J AM SOC INFORM SCI  | 1985 | 36     | 268  |            | <a href="#">View record</a> |
| <input type="checkbox"/> | 27            | SALTON G     | J AM SOC INFORM SCI  | 1983 | 34     | 262  |            | <a href="#">View record</a> |
| <input type="checkbox"/> | 373           | SALTON G     | SMART RETRIEVAL SYST | 1971 |        |      |            |                             |
| <input type="checkbox"/> | 1             | SALTON G     | SMART RETRIEVAL SYST | 1971 |        | 39   |            |                             |
| <input type="checkbox"/> | 1             | SALTON G     | SMART RETRIEVAL SYST | 1971 |        | 55   |            |                             |
| <input type="checkbox"/> | 6             | SALTON G     | SMART RETRIEVAL SYST | 1971 |        | 115  |            |                             |
| <input type="checkbox"/> | 5             | SALTON G     | SMART RETRIEVAL SYST | 1971 |        | 143  |            |                             |

# SLIDE 8: WOS CITED REFERENCE SEARCH ON SALTON.

When conducting searches in the *Web of Science* we must always keep in mind the distinction between source and cited works. *WOS* retrieved 140 of his papers in an author search in the “General Search” Section. However, in the Cited Reference section, we learn that he also published several well-cited books including *The SMART Retrieval System*. [A complete scan of the Cited Reference search shows over 800 lines of citations not only to his journal articles and books but also to dozens of conference papers and technical reports.]

[Missing Links?](#) [Citation Matrix](#)
[Graphs](#)
[Glossary](#) [HistCite Guide](#) [About](#)

**Papers and Books by Gerard Salton  
and the papers citing them**

Nodes: 4017, [Authors](#): 5372, [Journals](#): 778, [Outer References](#): 83149, [Words](#): 4345

Collection span: 1960 - 2005

View: Overview. Sorted by **year, source, volume, issue, page**.

Page 1: 1 [2](#) [3](#) [4](#) [5](#) [6](#) [7](#) [8](#) [9](#) [10](#) [11](#) [12](#) [13](#) [14](#)



| #  | <a href="#">LCR</a> | <a href="#">NCR</a> | <a href="#">Nodes</a> / <a href="#">Date</a> / <a href="#">Journal</a> / <a href="#">Authors</a>                                                                 | <a href="#">LCS</a> | <a href="#">GCS</a> |
|----|---------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------|
| 1  | 0                   | 7                   | <a href="#">1</a> 1960 JOURNAL OF THE ACM 7(2):140-149<br><b>SALTON G</b><br><i>A New Method for the Payment of Bills and the Transfer of Credit</i>             | <a href="#">1</a>   | 1                   |
| 2  | 0                   | 0                   | <a href="#">2</a> 1961 COMMUNICATIONS OF THE ACM 4(9):379-379<br><b>SALTON G</b><br><i>Manipulation of Trees in Information Retrieval</i>                        | 0                   | 0                   |
| 3  | 0                   | 21                  | <a href="#">3</a> 1962 COMMUNICATIONS OF THE ACM 5(2):103-114<br><b>SALTON G</b><br><i>Manipulation of Trees in Information Retrieval</i>                        | <a href="#">7</a>   | 7                   |
| 4  | 0                   | 7                   | <a href="#">4</a> 1963 AMERICAN DOCUMENTATION 14(3):213-&<br><b>SALTON G</b><br><i>Some Hierarchical Models for Automatic Document Retrieval</i>                 | <a href="#">3</a>   | 3                   |
| 5  | <a href="#">1</a>   | 11                  | <a href="#">5</a> 1963 COMMUNICATIONS OF THE ACM 6(2):58-63<br><b>MILLER JC; MALONEY CJ</b><br><i>Systematic Mistake Analysis of Digital Computer Programs</i>   | 0                   | 5                   |
| 6  | 0                   | 8                   | <a href="#">6</a> 1963 JOURNAL OF THE ACM 10(3):334-&<br><b>KLEIN S; SIMMONS RF</b><br><i>A Computational Approach To Grammatical Coding of English Words</i>    | <a href="#">5</a>   | 15                  |
| 7  | 0                   | 12                  | <a href="#">7</a> 1963 JOURNAL OF THE ACM 10(4):440-&<br><b>SALTON G</b><br><i>Associative Document Retrieval Techniques Using Bibliographic Information</i>     | <a href="#">29</a>  | 29                  |
| 8  | 0                   | 536                 | <a href="#">8</a> 1964 AMERICAN ARCHIVIST 27(4):531-561<br><b>QUIMBY G; EVANS FB</b><br><i>Writings on Archives, Current Records, and Historical Manuscripts</i> | <a href="#">1</a>   | 1                   |
| 9  | <a href="#">1</a>   | 60                  | <a href="#">9</a> 1964 ASLIB PROCEEDINGS 16(4):132-152<br><b>LANCASTER FW</b><br><i>Mechanized Document Control - A Review of Some Recent Research</i>           | <a href="#">2</a>   | 3                   |
| 10 | 0                   | 0                   | <a href="#">10</a> 1964 COMMUNICATIONS OF THE ACM 7(7):400-400<br><b>SALTON G</b><br><i>A Document Retrieval System for Man-Machine Interaction</i>              | 0                   |                     |

## SLIDE 9: SALTON *HISTCITE* FILE CONTAINING HIS BOOKS

The next slide is a chronological *HistCite* display from 1960 to 2005 of the 4,000 papers that cited Salton's work. These were captured in a simple generic cited author search of G. Salton. They were saved to a new *HistCite* file. Note that without checking his CV the fact that he published books was evident by inspecting the outer references. Since *WOS* does not include books as sources, per se, we then added these works manually to the revised *HistCite* file.

[Missing Links?](#) [Citation Matrix](#)
[Graphs](#)
[Glossary](#) [HistCite Guide](#) [About](#)

**Papers and Books by Gerard Salton  
and papers citing them, sorted by GCS**

Nodes: 4017, [Authors](#): 5372, [Journals](#): 778, [Outer References](#): 83149, [Words](#): 4345

Collection span: 1960 - 2005

View: Overview. Sorted by **GCS**.

Page 1: 1 [2](#) [3](#) [4](#) [5](#) [6](#) [7](#) [8](#) [9](#) [10](#) [11](#) [12](#) [13](#) [14](#)

| #  | <a href="#">LCR</a> | <a href="#">NCR</a> | <a href="#">Nodes</a> / <a href="#">Date</a> / <a href="#">Journal</a> / <a href="#">Authors</a>                                                                                                                     | <a href="#">LCS</a>  | <a href="#">GCS</a> |
|----|---------------------|---------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------|
| 1  | 0                   | 1                   | <a href="#">767</a> 1983 INTRO MODERN INFORMA<br><b>SALTON G</b><br><i>Introduction to Modern Information Retrieval</i>                                                                                              | <a href="#">1333</a> | 1333                |
| 2  | <a href="#">5</a>   | 52                  | <a href="#">1121</a> 1988 SCIENCE 240(4857):1285-1293<br><b>SWETS JA</b><br><i>Measuring The Accuracy Of Diagnostic Systems</i>                                                                                      | <a href="#">4</a>    | 761                 |
| 3  | 0                   | 1                   | <a href="#">1132</a> 1989 AUTOMATIC TEXT PROCE<br><b>SALTON G</b><br><i>Automatic Text Processing: the transformation, analysis, and retrieval of information by computer</i>                                        | <a href="#">700</a>  | 700                 |
| 4  | 0                   | 1                   | <a href="#">247</a> 1971 SMART RETRIEVAL SYST<br><b>SALTON G</b><br><i>The Smart Retrieval System-Experiments in Automatic Document Processing</i>                                                                   | <a href="#">400</a>  | 400                 |
| 5  | <a href="#">7</a>   | 36                  | <a href="#">1300</a> 1990 JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE 41(6):391-407<br><b>DEERWESTER S; DUMAIS ST; FURNAS GW; LANDAUER TK; HARSHMAN R</b><br><i>Indexing By Latent Semantic Analysis</i> | <a href="#">185</a>  | 372                 |
| 6  | 0                   | 1                   | <a href="#">112</a> 1968 AUTOMATIC INFORMATIO<br><b>SALTON G</b><br><i>Automatic Information Organization and Retrieval</i>                                                                                          | <a href="#">368</a>  | 368                 |
| 7  | <a href="#">4</a>   | 21                  | <a href="#">475</a> 1976 JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE 27(3):129-146<br><b>ROBERTSON SE; JONES KS</b><br><i>Relevance Weighting of Search Terms</i>                                        | <a href="#">246</a>  | 326                 |
| 8  | <a href="#">21</a>  | 55                  | <a href="#">1074</a> 1988 INFORMATION PROCESSING & MANAGEMENT 24(5):513-523<br><b>SALTON G; BUCKLEY C</b><br><i>Term-Weighting Approaches in Automatic Text Retrieval</i>                                            | <a href="#">306</a>  | 306                 |
| 9  | <a href="#">1</a>   | 20                  | <a href="#">330</a> 1973 JOURNAL OF THE AMERICAN SOCIETY FOR INFORMATION SCIENCE 24(4):265-269<br><b>SMALL H</b><br><i>Cocitation in Scientific Literature - New Measure of Relationship Between 2 Documents</i>     | <a href="#">57</a>   | 293                 |
| 10 | <a href="#">1</a>   | 25                  | <a href="#">1621</a> 1994 COMMUNICATIONS OF THE ACM 37(7):31-40<br><b>MAES P</b><br><i>Agents That Reduce Work and Information Overload</i>                                                                          | <a href="#">29</a>   | 224                 |

## SLIDE 10: SALTON HISTCITE SORTED BY GCS

After sorting by GCS, we can see that his books are not only highly cited but that many of his works have been cited by other highly cited works, for example, see the papers by Swets and Deerwester.

# GCS HISTORIOGRAPH: G. SALTON

## G2

1963 ⑤

1968

1970

1971

1972

1973

1975

1976

1978

1983

1984

1985

1986

1988

1989

1990

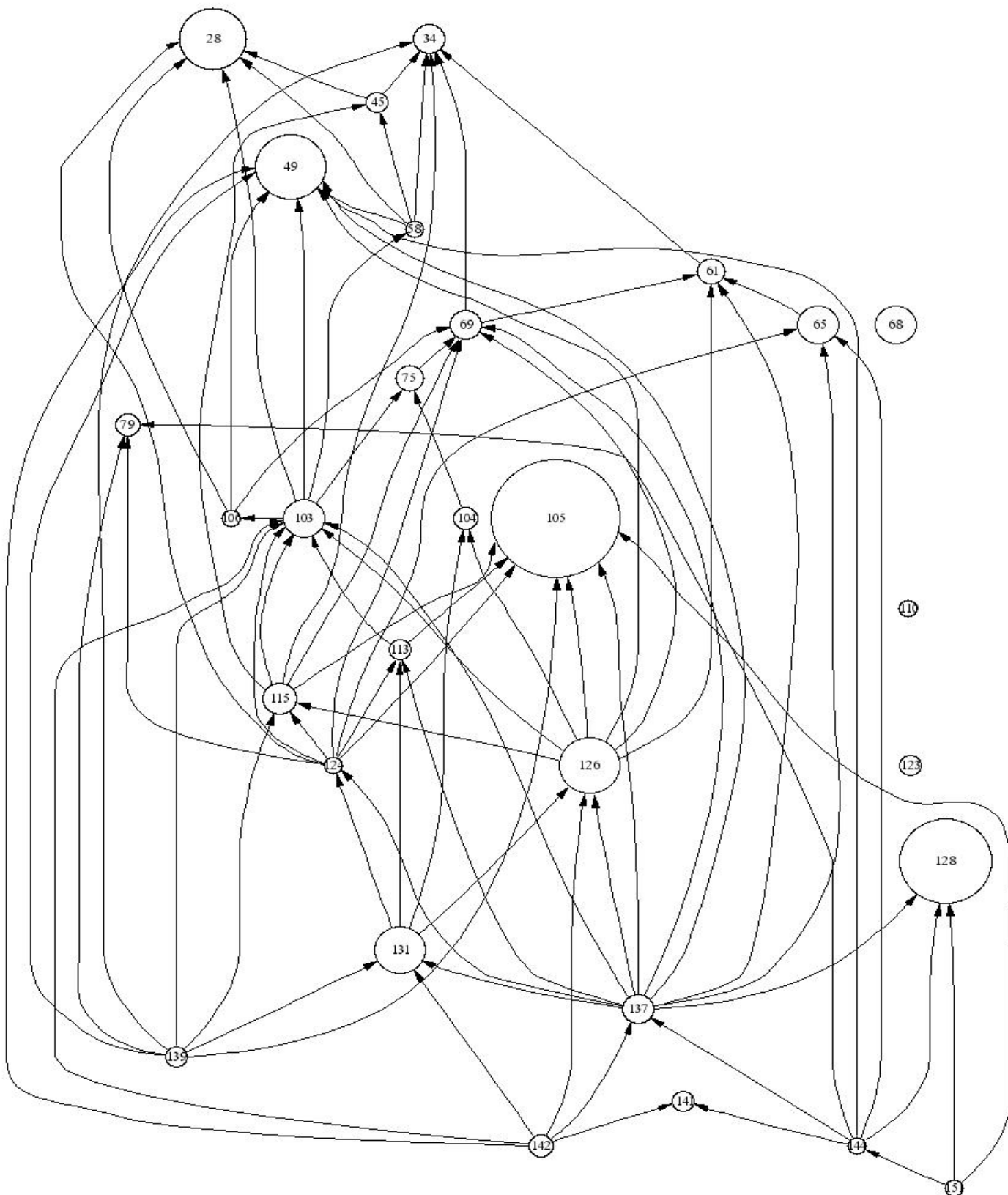
1991

1992

1993

1994

1997



SLIDE 11: GCS HISTORIOGRAPH OF WORKS CITING SALTON

By clicking on the graphs link, we are able to display one of the historiographs for this collection, highlighting visually the core works. Note that Node 767 is his book *Introduction to Modern Information Retrieval*, 1983. We can identify each of these 36 papers by clicking on each node. The arrows between nodes indicate citation links.

[Missing Links? Citation Matrix](#)

[Graphs](#)

[Glossary](#) [HistCite Guide](#) [About](#)

**Papers from *Information Technology and Libraries*, 1982-2004  
(formerly *Journal of Library Automation*, 1968-1981)**

Nodes: 1780, [Authors](#): 1608, [Journals](#): 2, [Outer References](#): 8344, [Words](#): 3284

Collection span: 1968 - 2004

View: Overview. **Sorted by year, source, volume, issue, page.**

Page 1: 1 [2](#) [3](#) [4](#) [5](#) [6](#)

| #  | <a href="#">LCR</a> | <a href="#">NCR</a> | <a href="#">Nodes</a> / <a href="#">Date</a> / <a href="#">Journal</a> / <a href="#">Authors</a>                                                                                                                                      | <a href="#">LCS</a> | <a href="#">GCS</a> |
|----|---------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------|
| 1  | 0                   | 4                   | <a href="#">1</a> 1968 JOURNAL OF LIBRARY AUTOMATION 1(1):1-12<br><b>MORRIS NC</b><br><i>Computer Based Acquisitions System at Texas AAndI University</i>                                                                             | 0                   | 7                   |
| 2  | 0                   | 12                  | <a href="#">2</a> 1968 JOURNAL OF LIBRARY AUTOMATION 1(1):13-50<br><b>JOHNSON RD</b><br><i>Book Catalog At Stanford</i>                                                                                                               | <a href="#">4</a>   | 9                   |
| 3  | 0                   | 4                   | <a href="#">3</a> 1968 JOURNAL OF LIBRARY AUTOMATION 1(1):51-65<br><b>WEDGEWORTH R</b><br><i>Brown-University-Library Fund Accounting System</i>                                                                                      | <a href="#">2</a>   | 4                   |
| 4  | 0                   | 5                   | <a href="#">4</a> 1968 JOURNAL OF LIBRARY AUTOMATION 1(1):66-74<br><b>CHAPIN RE; PRETZER DH</b><br><i>Comparative Costs of Converting Shelf List Records to Machine Readable Form</i>                                                 | <a href="#">3</a>   | 4                   |
| 5  | 0                   | 7                   | <a href="#">5</a> 1968 JOURNAL OF LIBRARY AUTOMATION 1(1):75-91<br><b>DEGENNARO R</b><br><i>Development and Administration of Automated Systems in Academic Libraries</i>                                                             | <a href="#">4</a>   | 10                  |
| 6  | 0                   | 8                   | <a href="#">6</a> 1968 JOURNAL OF LIBRARY AUTOMATION 1(2):93-109<br><b>AULD L</b><br><i>Automated Book Order and Circulation Control Procedures at Oakland-University-Library</i>                                                     | <a href="#">1</a>   | 3                   |
| 7  | <a href="#">1</a>   | 12                  | <a href="#">7</a> 1968 JOURNAL OF LIBRARY AUTOMATION 1(2):110-120<br>BLACK DV<br><i>CREATION OF COMPUTER INPUT IN AN EXPANDED CHARACTER SET</i>                                                                                       | <a href="#">2</a>   | 3                   |
| 8  | <a href="#">1</a>   | 8                   | <a href="#">8</a> 1968 JOURNAL OF LIBRARY AUTOMATION 1(2):121-127<br>KILGOUR FG<br><i>COSTS OF LIBRARY CATALOG CARDS PRODUCED BY COMPUTER</i>                                                                                         | <a href="#">3</a>   | 5                   |
| 9  | 0                   | 13                  | <a href="#">9</a> 1968 JOURNAL OF LIBRARY AUTOMATION 1(2):128-146<br>KENNEDY RA<br><i>BELL-LABORATORIES-LIBRARY REAL-TIME LOAN SYSTEM (BELLREL)</i>                                                                                   | <a href="#">4</a>   | 10                  |
| 10 | 0                   | 1                   | <a href="#">10</a> 1968 JOURNAL OF LIBRARY AUTOMATION 1(2):147-147<br>MURDOCK JW<br><i>3RD CONFERENCE ON TECHNICAL INFORMATION CENTER ADMINISTRATION (TICA 3), PHILADELPHIA, PENNSYLVANIA, AUGUST 29-SEPTEMBER 1, 1966 - ELIAS,AW</i> | 0                   |                     |

**SLIDE 12: CHRONOLOGICAL LISTING FOR *ITAL***

In addition to doing searches on a particular author, one can also view the output and citation records for an entire journal. In a general search of *WOS* we identified 1780 articles published in *Information Technology and Libraries*, formerly the *Journal of Library Automation*.

This is only one of the many journals in the “*Information and Library Science*” category in the 2003 *Journal Citation Reports Social Sciences Edition*. In principle we could expand the *HistCite* file to include all the journals in this category. *HistCite* can handle collections that far exceed the output of

the average *WOS* search. However, the limiting factor will be the size and power of your computer which will affect the speed of response.

Note that we have included data from *WOS* for the present and previous title of *ITAL*, that is, *Journal of Library Automation*.

[Missing Links? Citation Matrix](#)

[Graphs](#)

[Glossary](#) [HistCite Guide](#) [About](#)

Papers from *Information Technology and Libraries*, 1982-2004  
(formerly *Journal of Library Automation*, 1968-1981)

Nodes: 1780, [Authors](#): 1608, [Journals](#): 2, [Outer References](#): 8344, [Words](#): 3284

Collection span: 1968 - 2004

View: Overview. Sorted by **GCS**.

Page 1: 1 [2](#) [3](#) [4](#) [5](#) [6](#)



| #  | <a href="#">LCR</a> | <a href="#">NCR</a> | <a href="#">Nodes</a> / <a href="#">Date</a> / <a href="#">Journal</a> / <a href="#">Authors</a>                                                                                                                                                             | <a href="#">LCS</a> | <a href="#">GCS</a> |
|----|---------------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------|
| 1  | 0                   | 9                   | <a href="#">586</a> 1983 INFORMATION TECHNOLOGY AND LIBRARIES 2(4):364-380<br><b>DOSZKOCS TE</b><br><i>Cite NLM - Natural-Language Searching in an Online Catalog</i>                                                                                        | <a href="#">1</a>   | 54                  |
| 2  | 0                   | 3                   | <a href="#">208</a> 1974 JOURNAL OF LIBRARY AUTOMATION 7(4):267-274<br><b>CLARK AS</b><br><i>Subject Access To a Data Base of Library Holdings</i>                                                                                                           | 0                   | 43                  |
| 3  | <a href="#">3</a>   | 15                  | <a href="#">145</a> 1972 JOURNAL OF LIBRARY AUTOMATION 5(3):157-183<br><b>KILGOUR FG; LONG PL; LANDGRAF AL; WYCKOFF JA</b><br><i>Shared Cataloging System of Ohio-College Library-Center</i>                                                                 | <a href="#">8</a>   | 31                  |
| 4  | <a href="#">4</a>   | 8                   | <a href="#">116</a> 1971 JOURNAL OF LIBRARY AUTOMATION 4(4):207-&<br><b>KILGOUR FG; LONG PL; LIEDERMA.EB; LANDGRAF AL</b><br><i>Title-Only Entries Retrieved by Use of Truncated Search Keys</i>                                                             | <a href="#">12</a>  | 23                  |
| 5  | 0                   | 9                   | <a href="#">341</a> 1979 JOURNAL OF LIBRARY AUTOMATION 12(2):125-142<br><b>HICKEY TB; RYPKA DJ</b><br><i>Automatic Detection of Duplicate Monographic Records</i>                                                                                            | <a href="#">4</a>   | 21                  |
| 6  | <a href="#">1</a>   | 13                  | <a href="#">20</a> 1968 JOURNAL OF LIBRARY AUTOMATION 1(4):227-238<br><b>RUECKING FH</b><br><i>Bibliographic Retrieval from Bibliographic Input - Hypothesis and Construction of a Test</i>                                                                  | <a href="#">10</a>  | 20                  |
| 7  | <a href="#">1</a>   | 20                  | <a href="#">191</a> 1974 JOURNAL OF LIBRARY AUTOMATION 7(2):105-118<br><b>FOKKER DW; LYNCH MF</b><br><i>Application of Variety-Generator Approach To Searches of Personal Names in Bibliographic Data Bases .1. Microstructure of Personal Authors Names</i> | <a href="#">3</a>   | 20                  |
| 8  | <a href="#">1</a>   | 4                   | <a href="#">288</a> 1977 JOURNAL OF LIBRARY AUTOMATION 10(4):304-319<br><b>COOPER MD; DEWATH NA</b><br><i>Effect of User Fees on Cost of Online Searching in Libraries</i>                                                                                   | 0                   | 20                  |
| 9  | 0                   | 10                  | <a href="#">483</a> 1982 INFORMATION TECHNOLOGY AND LIBRARIES 1(2):84-97<br><b>FERGUSON D; KASKE NK; LAWRENCE GS; MATTHEWS JR; ZICH R</b><br><i>The CLR Public Online Catalog Study - An Overview</i>                                                        | <a href="#">6</a>   | 20                  |
| 10 | <a href="#">2</a>   | 28                  | <a href="#">644</a> 1984 INFORMATION TECHNOLOGY AND LIBRARIES 3(4):354-376<br><b>MATTHEWS JR; LAWRENCE GS</b><br><i>Further Analysis Of The CLR Online Catalog Project</i>                                                                                   | 0                   | 20                  |

### SLIDE 13: GCS LISTING FOR *ITAL*

After sorting the *ITAL* collection by GCS, it can be seen that the paper by Tom Doszkoecs is the most cited in the database .



**586 View: Overview**

|                                              |                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Author(s)</b>                             | DOSZKOCS TE                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Title</b>                                 | CITE NLM - NATURAL-LANGUAGE SEARCHING IN AN ONLINE CATALOG                                                                                                                                                                                                                                                                                                                            |
| <b>Source</b>                                | INFORMATION TECHNOLOGY AND LIBRARIES 2(4):364-380                                                                                                                                                                                                                                                                                                                                     |
| <b>Date</b>                                  | 1983                                                                                                                                                                                                                                                                                                                                                                                  |
| <b>Type</b>                                  | Journal : Article                                                                                                                                                                                                                                                                                                                                                                     |
| LCR: 0 NCR: 9 LCS: <a href="#">1</a> GCS: 54 |                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Comment</b>                               |                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Address</b>                               |                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Reprint</b>                               | DOSZKOCS, TE, NATL LIB MED,DIV SPECIALIZED INFORMAT SERV,BETHESDA,MD 20209.                                                                                                                                                                                                                                                                                                           |
| <b>Abstract</b>                              |                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>CR</b>                                    | *NAT LIBR MED, 1981, NAT LIBR MED CLASS<br>DOSZKOCS TE, 1979, 16 P ASIS ANN M, P131<br>GOLDSTEIN CM, 1981, TR8105 LIST HILL NAT<br>HOROWITZ GL, 1981, NEW ENGL J MED, V305, P924<br>JANKE R, 1983, ONLINE, V7, P12<br>OJALA M, 1983, ONLINE, V7, P31<br>SIEGEL ER, 1983, NAT ONL M P 1983 APR, P503<br>STOUT C, 1983, ONLINE, V7, P112<br>ULMSCHNEIDER JE, 1983, ONLINE REV, V7, P301 |

**SLIDE 14: SOURCE RECORD FOR TOM DOSZKOCS PAPER**

Here is a view of the full *HistCite* Source record for Tom's paper. Tom was pleasantly surprised to learn of this distinction.

CENTURY OF SCIENCE

ISI recently completed the processing of several hundred key journals going back to 1900. This makes it possible to do some interesting retrospective science studies on the literature of the 20<sup>th</sup> Century. In the following example, I have done a *WOS* search from 1900 to 1955 for papers published by Albert Einstein (1879-1955).

**Web of Science®**

WELCOME ? HELP GENERAL SEARCH CITED REF SEARCH STRUCTURE SEARCH SEARCH HISTORY ADVANCED SEARCH

**Search Results -- Summary**

AU=(Einstein A)  
 DocType=All document types; Language=All languages; Databases=SCI-EXPANDED, SSCI, A&HCI; Timespan=1900-1955

Search within results:

**154 results found (Set #1)**

Records 1 -- 10

Go to Page:  of 16

Use the checkboxes to select individual records for marking, then click Submit to add them to the Marked List.

- ☐ 1. **EINSTEIN A, KAUFMAN B**  
[A NEW FORM OF THE GENERAL RELATIVISTIC FIELD EQUATIONS](#)  
 ANNALS OF MATHEMATICS 62 (1): 128-138 1955  
 Times Cited: [42](#)
- ☐ 2. BRIDGMAN PW, **EINSTEIN A**, INFELD L, et al.  
[NUCLEAR WAR - AN APPEAL TO SCIENTISTS AND THE PUBLIC](#)  
 LANCET 2 (JUL16): 131-132 1955  
 Times Cited: 0
- ☐ 3. COHEN IB, **EINSTEIN A**  
[AN INTERVIEW WITH EINSTEIN](#)  
 SCIENTIFIC AMERICAN 193 (1): 69-73 1955  
 Times Cited: [2](#)
- ☐ 4. **EINSTEIN A, KAUFMAN B**  
[ALGEBRAIC PROPERTIES OF THE FIELD IN THE RELATIVISTIC THEORY OF THE ASYMMETRIC FIELD](#)  
 ANNALS OF MATHEMATICS 59 (2): 230-244 1954  
 Times Cited: [15](#)
- ☐ 5. **EINSTEIN A**  
[A COMMENT ON A CRITICISM OF UNIFIED FIELD THEORY](#)  
 PHYSICAL REVIEW 89 (1): 321-321 1953  
 Times Cited: [7](#)
- ☐ 6. **EINSTEIN A**  
[THE ADVENT OF THE QUANTUM THEORY](#)  
 SCIENCE 113 (2926): 82-84 1951  
 Times Cited: 0

#### Sort by:

Latest date

**Mark:** [0 articles marked]



**Selected records**



**All records on this page**



Records  to



You can print, save, export, e-mail, and order records after adding them to the Marked List. (The list can hold 500 records.)

#### Analyze Results:

View rankings and histograms of the authors, journals, etc. for this set of records. (Up to 2,000 records at a time.)

Key: = Structure available

Use the checkboxes to select individual records for marking, then click Submit to add them to the Marked List.

**154 results found (Set #1)**

Records 1 -- 10

Go to Page:  of 16

154 documents matched your query of the 1,651,551 in the data limits you selected.

## SLIDE 15: WOS SEARCH ON EINSTEIN A, 1900-1955

Some of you may have read the April 8, 2005 *New York Times* commentary ("One Hundred Years of Uncertainty," page A27) by Brian Greene in which he discusses Einstein's work and the remarkable

achievement of having published four classic papers in one year alone – 1905! This slide shows the first page of a *WOS* search in reverse chronological order. The remainder of these 154 papers would have to be examined in order to see the 1905 papers.

**Web of Science®**

WELCOME ? HELP GENERAL SEARCH CITED REF SEARCH STRUCTURE SEARCH SEARCH HISTORY ADVANCED SEARCH

**Search Results -- Summary**

AU=(Einstein A)  
DocType=All document types; Language=All languages; Databases=SCI-EXPANDED, SSCI, A&HCI; Timespan=1900-1955

Search within results:

**154 results found (Set #1)**

Go to Page:  of 16

Records 1 -- 10

Use the checkboxes to select individual records for marking, then click Submit to add them to the Marked List.

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><input type="checkbox"/> 1. <b>Einstein A</b>, Podolsky B, Rosen N<br/><a href="#">Can quantum-mechanical description of physical reality be considered complete?</a><br/>PHYSICAL REVIEW 47 (10): 0777-0780 MAY 1935<br/>Times Cited: <a href="#">2443</a><br/><input type="button" value="LINKS"/> <input type="button" value="VIEW FULL TEXT"/></p> <p><input type="checkbox"/> 2. <b>Einstein A</b><br/><a href="#">A new determination of the molecular dimensions</a><br/>ANNALEN DER PHYSIK 19 (2): 289-306 FEB 1906<br/>Times Cited: <a href="#">1622</a><br/><input type="button" value="LINKS"/></p> <p><input type="checkbox"/> 3. <b>Einstein A</b><br/><a href="#">The motion of elements suspended in static liquids as claimed in the molecular kinetic theory of heat</a><br/>ANNALEN DER PHYSIK 17 (8): 549-560 JUL 1905<br/>Times Cited: <a href="#">1509</a><br/><input type="button" value="LINKS"/></p> <p><input type="checkbox"/> 4. <b>Einstein A</b><br/><a href="#">A new determination of the molecular dimensions (vol 19, pg 289, 1906)</a><br/>ANNALEN DER PHYSIK 34 (3): 591-592 1911<br/>Times Cited: <a href="#">990</a><br/><input type="button" value="LINKS"/></p> <p><input type="checkbox"/> 5. <b>Einstein A</b><br/><a href="#">The electrodynamic moving body</a><br/>ANNALEN DER PHYSIK 17 (10): 891-921 SEP 1905<br/>Times Cited: <a href="#">714</a><br/><input type="button" value="LINKS"/></p> <p><input type="checkbox"/> 6. <b>Einstein A</b><br/><a href="#">Quantum theory of radiation.</a><br/>PHYSIKALISCHE ZEITSCHRIFT 18: 121-128 1917<br/>Times Cited: <a href="#">703</a><br/><input type="button" value="LINKS"/></p> | <p><b>Sort by:</b><br/><input type="text" value="Times Cited"/> <input type="button" value="SORT"/></p> <p><b>Mark:</b> [0 articles marked]</p> <p><input type="checkbox"/> <b>Selected records</b></p> <p><input type="checkbox"/> <b>All records on this page</b></p> <p><input type="checkbox"/> <b>Records</b> <input type="text" value=""/> <b>to</b> <input type="text" value=""/></p> <p><input type="button" value="SUBMIT"/></p> <p>You can print, save, export, e-mail, and order records after adding them to the Marked List. (The list can hold 500 records.)</p> <p><b>Analyze Results:</b><br/><input type="button" value="ANALYZE"/></p> <p>View rankings and histograms of the authors, journals, etc. for this set of records. (Up to 2,000 records at a time.)</p> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Key: = Structure available

Use the checkboxes to select individual records for marking, then click Submit to add them to the Marked List.

**154 results found (Set #1)**

Go to Page:  of 16

Records 1 -- 10

The Einstein papers covered by *WOS* are normally listed in reverse chronological order. Using the *WOS* sort feature you can view the file ranked by citation frequency. The four papers mentioned by Brian Greene are # 3, 5, 10, 20. While his 1935 paper is his most cited, his paper on the diffusion equation is second. The third listed is one of the four 1905 papers as is the fifth.

[Missing Links? Citation Matrix](#)

[Graphs](#)

[Glossary](#) [HistCite Guide](#) [About](#)

#### Papers and books by Albert Einstein (1900-1955)

Nodes: 186, [Authors](#): 39, [Journals](#): 35, [Outer References](#): 159, [Words](#): 488

Collection span: 1901 - 1955

View: Overview. Sorted by **year, source, volume, issue, page**.

Page 1 of 2: [ 1 2 ]

| #  | <a href="#">LCR</a> | <a href="#">NCR</a> | <a href="#">Node</a> / <a href="#">Date</a> / <a href="#">Journal</a> / <a href="#">Author</a>                                                                                                                                                                                 | <a href="#">LCS</a> | <a href="#">GCS</a> |
|----|---------------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------|
| 1  | 0                   | 0                   | <a href="#">1</a> 1901 ANNALEN DER PHYSIK 4 (3): 513-523<br><b>EINSTEIN A</b><br><i>Conclusions from the capillarity occurrences</i>                                                                                                                                           | <a href="#">1</a>   | 33                  |
| 2  | <a href="#">1</a>   | 1                   | <a href="#">2</a> 1902 ANNALEN DER PHYSIK 8 (8): 798-814<br><b>EINSTEIN A</b><br><i>The thermodynamic theory of the potential differences between metals and complete dissociation solutions of their salts and a electrical method towards the probing of molecular power</i> | 0                   | 6                   |
| 3  | 0                   | 1                   | <a href="#">3</a> 1902 ANNALEN DER PHYSIK 9 (10): 417-433<br><b>EINSTEIN A</b><br><i>Kinetic theory of the heat equilibrium and the second fundamental theorem of the thermodynamics</i>                                                                                       | <a href="#">1</a>   | 25                  |
| 4  | 0                   | 0                   | <a href="#">4</a> 1903 ANNALEN DER PHYSIK 11 (5): 170-187<br><b>EINSTEIN A</b><br><i>A theory on the basics of thermodynamics</i>                                                                                                                                              | <a href="#">5</a>   | 40                  |
| 5  | 0                   | 0                   | <a href="#">5</a> 1904 ANNALEN DER PHYSIK 14: 354<br><b>EINSTEIN A</b><br><i>Zur allgemeinen molekularen Theorie der Waerme</i>                                                                                                                                                | 0                   | 29                  |
| 6  | 0                   | 4                   | <a href="#">6</a> 1905 ANNALEN DER PHYSIK 17 (6): 132-148<br><b>EINSTEIN A</b><br><i>Generation and conversion of light with regard to a heuristic point of view</i>                                                                                                           | <a href="#">2</a>   | 372                 |
| 7  | <a href="#">3</a>   | 4                   | <a href="#">7</a> 1905 ANNALEN DER PHYSIK 17 (8): 549-560<br><b>EINSTEIN A</b><br><i>The motion of elements suspended in static liquids as claimed in the molecular kinetic theory of heat</i>                                                                                 | <a href="#">3</a>   | 1536                |
| 8  | 0                   | 0                   | <a href="#">8</a> 1905 ANNALEN DER PHYSIK 17 (10): 891-921<br><b>EINSTEIN A</b><br><i>The electrodynamic moving body</i>                                                                                                                                                       | <a href="#">7</a>   | 713                 |
| 9  | <a href="#">1</a>   | 1                   | <a href="#">9</a> 1905 ANNALEN DER PHYSIK 18 (13): 639-641<br><b>EINSTEIN A</b><br><i>Is the inertia of a body dependent on its energy content?</i>                                                                                                                            | <a href="#">2</a>   | 106                 |
| 10 | <a href="#">1</a>   | 2                   | <a href="#">10</a> 1906 ANNALEN DER PHYSIK 19 (2): 289-306<br><b>EINSTEIN A</b><br><i>A new determination of the molecular dimensions</i>                                                                                                                                      | <a href="#">1</a>   | 1703                |

#### SLIDE 17: HISTCITE CHRONOLOGICAL SORT OF EINSTEIN PAPERS AND BOOKS COLLECTION

Having transferred the *WOS* search to the *HistCite* format, we see his work in chronological order. Back in 1905 and even up to the war, some of his papers were highly cited, but nothing like the later years. These classics were increasingly cited as the literature grew. The four 1905 papers are nodes #6, 7, 8, and 9.

## Papers and books by Albert Einstein (1900-1955)

### Cited Reference outside of this network

Total: 159 (top 200 cited shown).

Sorted by LCS.

ISI Web of Science location:

| #  | <a href="#">Author</a> / <a href="#">Year</a> / <a href="#">Journal</a> / <a href="#">Reference</a> | <a href="#">LCS</a> |
|----|-----------------------------------------------------------------------------------------------------|---------------------|
| 1  | PLANCK M, 1900, ANN PHYS, V1, P99 <a href="#">WoS</a>                                               | <a href="#">3</a>   |
| 2  | ABRAHAM M, 1912, PHYS Z, V13, P2 <a href="#">WoS</a>                                                | <a href="#">2</a>   |
| 3  | FRANK P, 1908, ANN PHYS-BERLIN, V27, P1059 <a href="#">WoS</a>                                      | <a href="#">2</a>   |
| 4  | MIRIMANOFF D, 1909, ANN PHYS, V28, P192 <a href="#">WoS</a>                                         | <a href="#">2</a>   |
| 5  | PLANCK M, 1901, ANN PHYS, V4, P561 <a href="#">WoS</a>                                              | <a href="#">2</a>   |
| 6  | RITZ W, 1908, PHYS Z, V9, P903 <a href="#">WoS</a>                                                  | <a href="#">2</a>   |
| 7  | ABRAHAM BM, 1905, THEORIE ELEKTRIZITAT, V2, P319 <a href="#">WoS</a>                                | <a href="#">1</a>   |
| 8  | ABRAHAM M, 1904, ANN PHYS, V14, P273 <a href="#">WoS</a>                                            | <a href="#">1</a>   |
| 9  | ABRAHAM M, 1912, PHYS Z, V13 <a href="#">WoS</a>                                                    | <a href="#">1</a>   |
| 10 | ANGELI, 1894, ATTI ACCAD LINCEI, V3, P72 <a href="#">WoS</a>                                        | <a href="#">1</a>   |
| 11 | BACH R, 1922, MATH Z, V13 <a href="#">WoS</a>                                                       | <a href="#">1</a>   |
| 12 | BAUER H, 1918, PHYS Z, V19, P163 <a href="#">WoS</a>                                                | <a href="#">1</a>   |
| 13 | BEHREND, 1888, ANN CHEM, V245, P213 <a href="#">WoS</a>                                             | <a href="#">1</a>   |
| 14 | BEHREND, 1888, ANN CHEM, V258, P347 <a href="#">WoS</a>                                             | <a href="#">1</a>   |
| 15 | BEHREND, 1889, ANN CHEM, V251, P235 <a href="#">WoS</a>                                             | <a href="#">1</a>   |
| 16 | BEHREND, 1901, ANN CHEM, V315, P246 <a href="#">WoS</a>                                             | <a href="#">1</a>   |
| 17 | BEHREND, 1901, ANN CHEM, V315, P259 <a href="#">WoS</a>                                             | <a href="#">1</a>   |
| 18 | BEHREND, 1905, ANN CHEM, V343, P133 <a href="#">WoS</a>                                             | <a href="#">1</a>   |
| 19 | BEHREND, 1908, ANN CHEM, V343, P115 <a href="#">WoS</a>                                             | <a href="#">1</a>   |
| 20 | BOLTZMANN L, GASTHEORIE, V2                                                                         | <a href="#">1</a>   |
| 21 | CARTAN E, 1931, B SOC MATH FRANCE <a href="#">WoS</a>                                               | <a href="#">1</a>   |
| 22 | CHRISTOFFEL EB, 1869, J REINE ANGEW MATH, V70, P46 <a href="#">WoS</a>                              | <a href="#">1</a>   |
| 23 | CIVILY L, 1919, NOTE RED ACC LINCEI <a href="#">WoS</a>                                             | <a href="#">1</a>   |
| 24 | DAVIDSON, IN PRESS                                                                                  | <a href="#">1</a>   |
| 25 | DEBROGLIE L, 1924, THESIS PARIS <a href="#">WoS</a>                                                 | <a href="#">1</a>   |

## SLIDE 18: OUTER REFERENCES OF EINSTEIN PAPERS COLLECTION, 1900-1955

Historians want to know who influenced a particular author. *HistCite* makes this apparent. I exported this small Einstein *WOS* collection to *HistCite*. Now we can not only see who cited Einstein but also who he cited. To put it mildly, he was notoriously terse in what he chose to cite. Were he publishing today, he would not have been able to omit many relevant works. In those days, he could take for granted that relevant earlier works were known to his contemporaries.

Since this is a collection of papers by Einstein, then all the papers he cited are included in the outer references. The only papers not included there are the 154 by Einstein we have retrieved in the *WOS* search.

In this new HistCite collection, we have included the 11,432 papers that cite the 150 Einstein papers included in the previous list. They are sorted chronologically from 1901 onward.

[Missing Links?](#) [Citation Matrix](#)

[Graphs](#)

[Glossary](#) [HistCite Guide](#) [About](#)



**Papers by Albert Einstein, 1900-1956  
and the papers citing them.**

**Nodes:** 11432, **Authors:** 13266, **Journals:** 1655, **Outer References:** 247418, **Words:** 11901

Collection span: 1901 - 2005

View: Overview. Sorted by **year, source, volume, issue, page**.

Page 1: 1 [2](#) [3](#) [4](#) [5](#) [6](#) [7](#) [8](#) [9](#) [10](#) [11](#) [12](#) [13](#) [14](#) [15](#) [16](#) [17](#) [18](#) [19](#) [20](#) [21](#) [22](#) [23](#) [24](#) [25](#) [26](#) [27](#) [28](#) [29](#) [30](#) [31](#) [32](#) [33](#) [34](#) [35](#) [36](#) [37](#) [38](#) [39](#)

| #  | <a href="#">LCR</a> | <a href="#">NCR</a> | <a href="#">Nodes</a> / <a href="#">Date</a> / <a href="#">Journal</a> / <a href="#">Authors</a>                                                                                                                                                                               | <a href="#">LCS</a>  | <a href="#">GCS</a> |
|----|---------------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------|
| 1  | 0                   | 0                   | <a href="#">1</a> 1901 ANNALEN DER PHYSIK 4 (3): 513-523<br><b>EINSTEIN A</b><br><i>Conclusions from the capillarity occurrences</i>                                                                                                                                           | <a href="#">33</a>   | 33                  |
| 2  | <a href="#">1</a>   | 1                   | <a href="#">2</a> 1902 ANNALEN DER PHYSIK 8 (8): 798-814<br><b>EINSTEIN A</b><br><i>The thermodynamic theory of the potential differences between metals and complete dissociation solutions of their salts and a electrical method towards the probing of molecular power</i> | <a href="#">6</a>    | 6                   |
| 3  | 0                   | 1                   | <a href="#">3</a> 1902 ANNALEN DER PHYSIK 9 (10): 417-433<br><b>EINSTEIN A</b><br><i>Kinetic theory of the heat equilibrium and the second fundamental theorem of the thermodynamics</i>                                                                                       | <a href="#">25</a>   | 25                  |
| 4  | 0                   | 0                   | <a href="#">4</a> 1903 ANNALEN DER PHYSIK 11 (5): 170-187<br><b>EINSTEIN A</b><br><i>A theory on the basics of thermodynamics</i>                                                                                                                                              | <a href="#">40</a>   | 40                  |
| 5  | 0                   | 4                   | <a href="#">5</a> 1905 ANNALEN DER PHYSIK 17 (6): 132-148<br><b>EINSTEIN A</b><br><i>Generation and conversion of light with regard to a heuristic point of view</i>                                                                                                           | <a href="#">373</a>  | 372                 |
| 6  | <a href="#">1</a>   | 4                   | <a href="#">6</a> 1905 ANNALEN DER PHYSIK 17 (8): 549-560<br><b>EINSTEIN A</b><br><i>The motion of elements suspended in static liquids as claimed in the molecular kinetic theory of heat</i>                                                                                 | <a href="#">1504</a> | 1507                |
| 7  | 0                   | 0                   | <a href="#">7</a> 1905 ANNALEN DER PHYSIK 17 (10): 891-921<br><b>EINSTEIN A</b><br><i>The electrodynamic moving body</i>                                                                                                                                                       | <a href="#">714</a>  | 713                 |
| 8  | <a href="#">1</a>   | 1                   | <a href="#">8</a> 1905 ANNALEN DER PHYSIK 18 (13): 639-641<br><b>EINSTEIN A</b><br><i>Is the inertia of a body dependent on its energy content?</i>                                                                                                                            | <a href="#">106</a>  | 106                 |
| 9  | 0                   | 2                   | <a href="#">9</a> 1906 ANNALEN DER PHYSIK 19 (2): 289-306<br><b>EINSTEIN A</b><br><i>A new determination of the molecular dimensions</i>                                                                                                                                       | <a href="#">1621</a> | 1620                |
| 10 | <a href="#">1</a>   | 5                   | <a href="#">10</a> 1906 ANNALEN DER PHYSIK 19 (2): 371-381<br><b>EINSTEIN A</b><br><i>The theory of the Brownian motion</i>                                                                                                                                                    | <a href="#">497</a>  | 498                 |

**SLIDE 19: PAPERS BY ALBERT EINSTEIN, 1900-1956, AND THE PAPERS CITING THEM.**

In this new *HistCite* collection, we have included the 11,432 papers that cite the 150 Einstein papers included in the previous list. They are sorted chronologically from 1901 onward.

[Missing Links? Citation Matrix](#)[Graphs](#)[Glossary](#) [HistCite Guide](#) [About](#)

**Papers by Albert Einstein, 1900-1956  
and the papers citing them**

Nodes: 11432, [Authors](#): 13266, [Journals](#): 1655, [Outer References](#): 247418, [Words](#): 11901

Collection span: 1901 - 2005

View: Overview. Sorted by **GCS**.Page 1: 1 [2](#) [3](#) [4](#) [5](#) [6](#) [7](#) [8](#) [9](#) [10](#) [11](#) [12](#) [13](#) [14](#) [15](#) [16](#) [17](#) [18](#) [19](#) [20](#) [21](#) [22](#) [23](#) [24](#) [25](#) [26](#) [27](#) [28](#) [29](#) [30](#) [31](#) [32](#) [33](#) [34](#) [35](#) [36](#) [37](#) [38](#) [39](#)

| #  | <a href="#">LCR</a> | <a href="#">NCR</a> | <a href="#">Nodes</a> / <a href="#">Date</a> / <a href="#">Journal</a> / <a href="#">Authors</a>                                                                                                                                                  | <a href="#">LCS</a>  | <a href="#">GCS</a>  |
|----|---------------------|---------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|----------------------|
| 1  | <a href="#">10</a>  | 101                 | <a href="#">793</a> 1943 REVIEWS OF MODERN PHYSICS 15 (1): 1-89<br><b>CHANDRASEKHAR S</b><br><i>Stochastic problems in physics and astronomy</i>                                                                                                  | <a href="#">177</a>  | <a href="#">4509</a> |
| 2  | 0                   | 0                   | <a href="#">625</a> 1935 PHYSICAL REVIEW 47 (10): 777-780<br><b>EINSTEIN A; PODOLSKY B; ROSEN N</b><br><i>Can quantum-mechanical description of physical reality be considered complete?</i>                                                      | <a href="#">2430</a> | <a href="#">2430</a> |
| 3  | <a href="#">2</a>   | 38                  | <a href="#">7657</a> 1995 SCIENCE 269 (5221): 198-201<br><b>ANDERSON MH; ENSHER JR; MATTHEWS MR; WIEMAN CE; CORNELL EA</b><br><i>Observation of Bose-Einstein Condensation in a Dilute Atomic Vapor</i>                                           | <a href="#">68</a>   | <a href="#">2342</a> |
| 4  | <a href="#">15</a>  | 720                 | <a href="#">6390</a> 1990 REVIEWS OF MODERN PHYSICS 62 (2): 251-341<br><b>HANGGI P; TALKNER P; BORKOVEC M</b><br><i>Reaction-Rate Theory - 50 Years After Kramers</i>                                                                             | <a href="#">23</a>   | <a href="#">1669</a> |
| 5  | 0                   | 2                   | <a href="#">9</a> 1906 ANNALEN DER PHYSIK 19 (2): 289-306<br><b>EINSTEIN A</b><br><i>A new determination of the molecular dimensions</i>                                                                                                          | <a href="#">1621</a> | <a href="#">1620</a> |
| 6  | <a href="#">3</a>   | 12                  | <a href="#">538</a> 1931 PHYSICAL REVIEW 38 (12): 2265-2279<br><b>ONSAGER L</b><br><i>Reciprocal relations in irreversible processes. II.</i>                                                                                                     | <a href="#">81</a>   | <a href="#">1564</a> |
| 7  | <a href="#">10</a>  | 25                  | <a href="#">7062</a> 1993 PHYSICAL REVIEW LETTERS 70 (13): 1895-1899<br><b>BENNETT CH; BRASSARD G; CREPEAU C; JOZSA R; PERES A; et al.</b><br><i>Teleporting an Unknown Quantum State Via Dual Classical and Einstein-Podolsky-Rosen Channels</i> | <a href="#">401</a>  | <a href="#">1563</a> |
| 8  | <a href="#">1</a>   | 17                  | <a href="#">1778</a> 1963 PROCEEDINGS OF THE IEEE 51 (1): 89-&<br><b>JAYNES ET; CUMMINGS FW</b><br><i>Comparison of Quantum and Semiclassical Radiation Theories with Application To Beam Maser</i>                                               | <a href="#">43</a>   | <a href="#">1520</a> |
| 9  | <a href="#">1</a>   | 4                   | <a href="#">6</a> 1905 ANNALEN DER PHYSIK 17 (8): 549-560<br><b>EINSTEIN A</b><br><i>The motion of elements suspended in static liquids as claimed in the molecular kinetic theory of heat</i>                                                    | <a href="#">1504</a> | <a href="#">1507</a> |
| 10 | <a href="#">1</a>   | 34                  | <a href="#">798</a> 1944 BELL SYSTEM TECHNICAL JOURNAL 23: 282-332<br><b>RICE SO</b><br><i>Mathematical analysis of random noise</i>                                                                                                              | <a href="#">15</a>   | <a href="#">1433</a> |

**SLIDE 20: PAPERS BY ALBERT EINSTEIN, 1900-1956 AND THE PAPERS CITING THEM, SORTED BY GCS.**

In Slide 20, the file is sorted by GCS and include dozens of classical papers starting with Chandrasekhar among others. A measure of the quality of an author's work is reflected in the number of classic papers who have cited him. This is clearly seen in the case of Einstein.



[Missing Links?](#) [Citation Matrix](#)
[Graphs](#)
[Glossary](#) [HistCite Guide](#) [About](#)


Papers and books by Albert Einstein (1900-1955)  
and papers citing Albert Einstein (1900-1955)

**Nodes:** 16536, **Authors:** 17854, **Journals:** 2484, **Outer References:** 377401, **Words:** 15810

Collection span: 1901 - 2005

View: Overview. Sorted by **year, source, volume, issue, page**.

Page 1: 1 [2](#) [3](#) [4](#) [5](#) [6](#) [7](#) [8](#) [9](#) [10](#) [11](#) [12](#) [13](#) [14](#) [15](#) [16](#) [17](#) [18](#) [19](#) [20](#) [21](#) [22](#) [23](#) [24](#) [25](#) [26](#) [27](#) [28](#) [29](#) [30](#) [31](#) [32](#) [33](#) [34](#) [35](#) [36](#) [37](#) [38](#) [39](#) [40](#) [41](#) [42](#) [43](#)  
[44](#) [45](#) [46](#) [47](#) [48](#) [49](#) [50](#) [51](#) [52](#) [53](#) [54](#) [55](#) [56](#)

| #  | <a href="#">LCR</a> | <a href="#">NCR</a> | <a href="#">Nodes</a> / <a href="#">Date</a> / <a href="#">Journal</a> / <a href="#">Authors</a>                                                                                                                                                                               | <a href="#">LCS</a>  | <a href="#">GCS</a> |
|----|---------------------|---------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|---------------------|
| 1  | 0                   | 0                   | <a href="#">1</a> 1901 ANNALEN DER PHYSIK 4 (3): 513-523<br><b>EINSTEIN A</b><br><i>Conclusions from the capillarity occurrences</i>                                                                                                                                           | <a href="#">33</a>   | 33                  |
| 2  | <a href="#">1</a>   | 1                   | <a href="#">2</a> 1902 ANNALEN DER PHYSIK 8 (8): 798-814<br><b>EINSTEIN A</b><br><i>The thermodynamic theory of the potential differences between metals and complete dissociation solutions of their salts and a electrical method towards the probing of molecular power</i> | <a href="#">6</a>    | 6                   |
| 3  | 0                   | 1                   | <a href="#">3</a> 1902 ANNALEN DER PHYSIK 9 (10): 417-433<br><b>EINSTEIN A</b><br><i>Kinetic theory of the heat equilibrium and the second fundamental theorem of the thermodynamics</i>                                                                                       | <a href="#">25</a>   | 25                  |
| 4  | 0                   | 0                   | <a href="#">4</a> 1903 ANNALEN DER PHYSIK 11 (5): 170-187<br><b>EINSTEIN A</b><br><i>A theory on the basics of thermodynamics</i>                                                                                                                                              | <a href="#">40</a>   | 40                  |
| 5  | 0                   | 0                   | <a href="#">5</a> 1904 ANNALEN DER PHYSIK 14: 354<br><b>EINSTEIN A</b><br><i>Zur allgemeinen molekularen Theorie der Waerme</i>                                                                                                                                                | <a href="#">29</a>   | 29                  |
| 6  | 0                   | 4                   | <a href="#">6</a> 1905 ANNALEN DER PHYSIK 17 (6): 132-148<br><b>EINSTEIN A</b><br><i>Generation and conversion of light with regard to a heuristic point of view</i>                                                                                                           | <a href="#">373</a>  | 372                 |
| 7  | <a href="#">1</a>   | 4                   | <a href="#">7</a> 1905 ANNALEN DER PHYSIK 17 (8): 549-560<br><b>EINSTEIN A</b><br><i>The motion of elements suspended in static liquids as claimed in the molecular kinetic theory of heat</i>                                                                                 | <a href="#">1534</a> | 1534                |
| 8  | 0                   | 0                   | <a href="#">8</a> 1905 ANNALEN DER PHYSIK 17 (10): 891-921<br><b>EINSTEIN A</b><br><i>The electrodynamic moving body</i>                                                                                                                                                       | <a href="#">714</a>  | 713                 |
| 9  | <a href="#">1</a>   | 1                   | <a href="#">9</a> 1905 ANNALEN DER PHYSIK 18 (13): 639-641<br><b>EINSTEIN A</b><br><i>Is the inertia of a body dependent on its energy content?</i>                                                                                                                            | <a href="#">106</a>  | 106                 |
| 10 | 0                   | 13                  | <a href="#">10</a> 1905 PHYSIKALISCHE ZEITSCHRIFT 6: 566-572<br><b>SANO S</b><br><i>About the balance of fluid in an electromagnetic field.</i>                                                                                                                                | 0                    | 0                   |

## SLIDE 21: HISTCITE SHOWING CITATIONS TO EINSTEIN'S WORKS

In this slide, you see that there are 16,532 papers that have cited Einstein's complete works – books as well as papers. We have added 5,000 additional citing papers to the collection. However, to show you the data on ten books, we have created a separate listing.

[Missing Links? Citation Matrix](#)[Graphs](#)[Glossary](#) [HistCite Guide](#) [About](#)**Books by Einstein**Nodes: 16, [Authors](#): 1, [Journals](#): 8, [Outer References](#): 0, [Words](#): 19

Collection span: 1920 - 1961

View: Overview. Sorted by **GCS**.

| #  | <a href="#">LCR</a> | <a href="#">NCR</a> | <a href="#">Nodes</a> / <a href="#">Date</a> / <a href="#">Journal</a> / <a href="#">Authors</a>                                   | <a href="#">LCS</a> | <a href="#">GCS</a> |
|----|---------------------|---------------------|------------------------------------------------------------------------------------------------------------------------------------|---------------------|---------------------|
| 1  | 0                   | 0                   | <a href="#">13</a> 1955 MEANING RELATIVITY<br><b>EINSTEIN A</b><br><i>The Meaning of Relativity</i>                                | 0                   | 306                 |
| 2  | 0                   | 0                   | <a href="#">6</a> 1949 A EINSTEIN PHILOS SC<br><b>EINSTEIN A</b><br><i>Albert Einstein: Philosopher-Scientist (PA Schilpp, ed)</i> | 0                   | 255                 |
| 3  | 0                   | 0                   | <a href="#">12</a> 1954 IDEAS OPINIONS<br><b>EINSTEIN A</b><br><i>Ideas and Opinions</i>                                           | 0                   | 203                 |
| 4  | 0                   | 0                   | <a href="#">5</a> 1938 EVOLUTION PHYSICS<br><b>EINSTEIN A</b><br><i>The Evolution of Physics</i>                                   | 0                   | 190                 |
| 5  | 0                   | 0                   | <a href="#">7</a> 1950 MEANING RELATIVITY<br><b>EINSTEIN A</b><br><i>The Meaning of Relativity</i>                                 | 0                   | 179                 |
| 6  | 0                   | 0                   | <a href="#">3</a> 1923 PRINCIPLE RELATIVITY<br><b>EINSTEIN A</b><br><i>The Principle of Relativity</i>                             | 0                   | 170                 |
| 7  | 0                   | 0                   | <a href="#">4</a> 1926 INVESTIGATIONS THEOR<br><b>EINSTEIN A</b><br><i>Investigations on the Theory of Brownian Movement</i>       | 0                   | 160                 |
| 8  | 0                   | 0                   | <a href="#">16</a> 1961 RELATIVITY SPECIAL G<br><b>EINSTEIN A</b><br><i>Relativity: the special and the general theory</i>         | 0                   | 138                 |
| 9  | 0                   | 0                   | <a href="#">10</a> 1952 PRINCIPLE RELATIVITY<br><b>EINSTEIN A</b><br><i>The Principle of Relativity</i>                            | 0                   | 132                 |
| 10 | 0                   | 0                   | <a href="#">8</a> 1950 OUT OF MY LATER YEARS<br><b>EINSTEIN A</b><br><i>Out of My Later Years</i>                                  | 0                   | 125                 |

**SLIDE 22 : HISTCITE OF EINSTEIN'S BOOKS SHOWING GCS FOR EACH**

If you click on the graphs link, you can select the book category under document type. Ten of the 16 are displayed here as sorted by GCS.

## Papers by Albert Einstein, 1900-1956 and the papers citing them

### Potentially missed citations

2823 nodes have citations that may potentially refer to other nodes.

1 | [12](#) 1906 ANNALEN DER PHYSIK 20 (6): 199-206

Einstein A

*Theory of light production and light absorption*

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EINSTEIN A, 1905, ANN PHYS, V17, P182 may refer to [5](#) EINSTEIN-A-1905-V17-I6-P132-148  
 EINSTEIN A, 1905, ANN PHYS, V17, P182 may refer to [6](#) EINSTEIN-A-1905-V17-I8-P549-560  
 EINSTEIN A, 1905, ANN PHYS, V17, P182 may refer to [7](#) EINSTEIN-A-1905-V17-I10-P891-921

2 | [20](#) 1907 ANNALEN DER PHYSIK 23 (6): 197-198

Einstein A

*Possibility of a new examination of the relativity principle*

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EINSTEIN A, 1905, ANN PHYS, V17, P903 may refer to [5](#) EINSTEIN-A-1905-V17-I6-P132-148  
 EINSTEIN A, 1905, ANN PHYS, V17, P903 may refer to [6](#) EINSTEIN-A-1905-V17-I8-P549-560  
 EINSTEIN A, 1905, ANN PHYS, V17, P903 may refer to [7](#) EINSTEIN-A-1905-V17-I10-P891-921

3 | [23](#) 1907 ANNALEN DER PHYSIK 23 (7): 371-384

Einstein A

*On the inertia of energy required by the relativity principle*

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EINSTEIN A, 1905, ANN PHYS, V17 may refer to [5](#) EINSTEIN-A-1905-V17-I6-P132-148  
 EINSTEIN A, 1905, ANN PHYS, V17 may refer to [6](#) EINSTEIN-A-1905-V17-I8-P549-560  
 EINSTEIN A, 1905, ANN PHYS, V17 may refer to [7](#) EINSTEIN-A-1905-V17-I10-P891-921  
 EINSTEIN A, 1905, ANN PHYS, V17, P917 may refer to [5](#) EINSTEIN-A-1905-V17-I6-P132-148  
 EINSTEIN A, 1905, ANN PHYS, V17, P917 may refer to [6](#) EINSTEIN-A-1905-V17-I8-P549-560  
 EINSTEIN A, 1905, ANN PHYS, V17, P917 may refer to [7](#) EINSTEIN-A-1905-V17-I10-P891-921  
 EINSTEIN A, 1907, ANN PHYS, V22, P180 may refer to [18](#) EINSTEIN-A-1907-V22-I3-P569-572

4 | [27](#) 1907 SITZUNGSBERICHTE DER KONIGLICH PREUSSISCHEN AKADEMIE DER WISSENSCHAFTEN : 542-570

Planck M

*The dynamics of motion systems.*

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EINSTEIN A, 1905, ANN PHYS, V17, P909 may refer to [5](#) EINSTEIN-A-1905-V17-I6-P132-148  
 EINSTEIN A, 1905, ANN PHYS, V17, P909 may refer to [6](#) EINSTEIN-A-1905-V17-I8-P549-560  
 EINSTEIN A, 1905, ANN PHYS, V17, P909 may refer to [7](#) EINSTEIN-A-1905-V17-I10-P891-921

5 | [30](#) 1908 ANNALEN DER PHYSIK 25 (1): 175-184

Laub J

*The optical characteristics of moving bodies.*

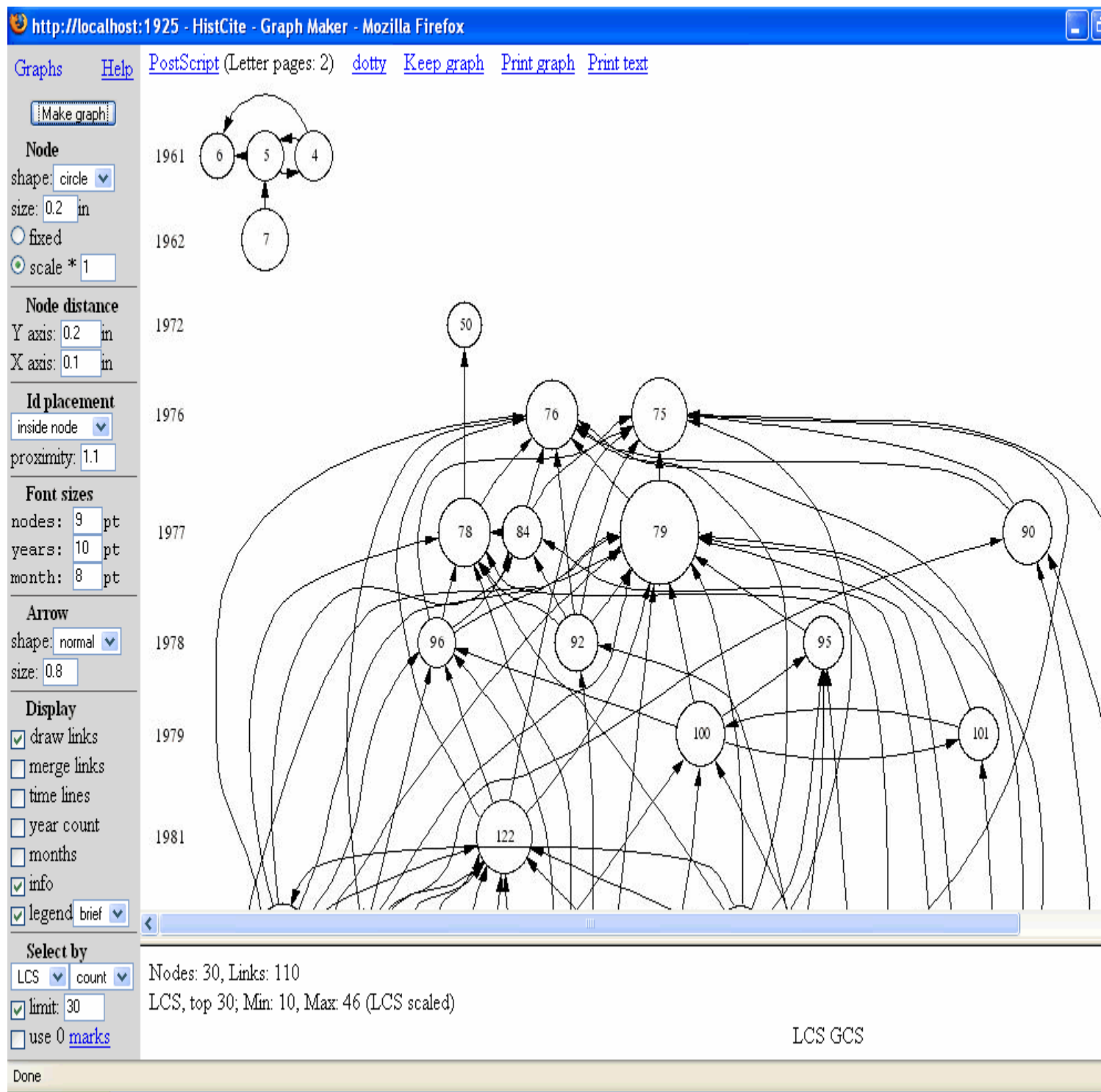
---

LAUB J, 1907, ANN PHYS, V23, P740 may refer to [24](#) LAUB-J-1907-V23-I9-P738-744

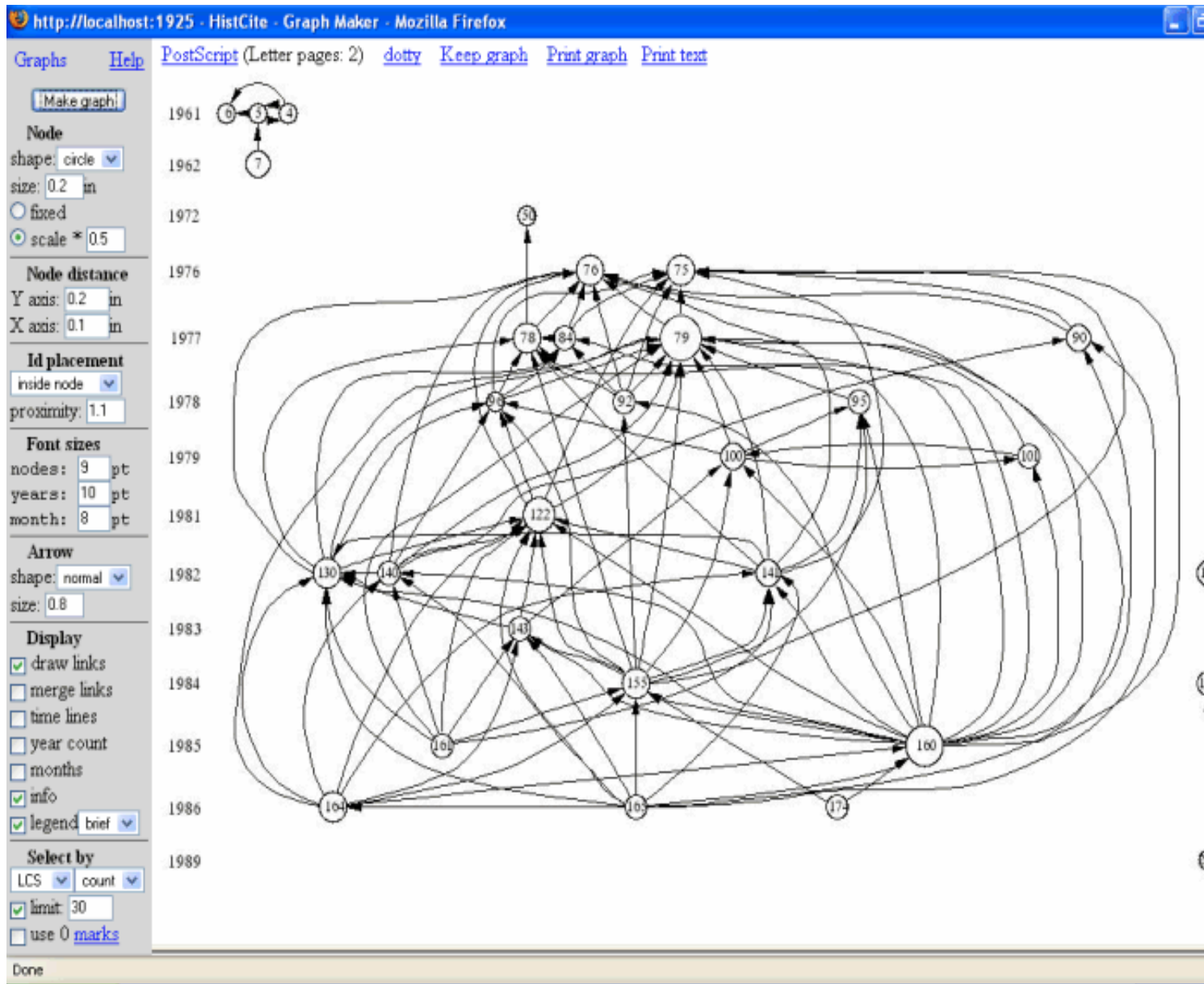
### SLIDE 23: MISSING LINKS

Time does not permit me to dwell on another feature of *HistCite* which we call “missing links.” This feature tells us whether an author has cited a wrong or variant page in the original work. Rather than cite the first page of an article, it is quite common to cite the specific page of text containing a chemical reaction formula, a data set, or a chemical compound. These page variants will not match the first page of the article cited and can be edited, once identified in *HistCite*. Once the text file is edited, the program can be run again.

# HISTORIOGRAPH CREATION



## SLIDE 24: HISTORIOGRAPH CREATION



## SLIDE 25: HISTORIOGRAPH

In closing, let me remind you that several dozen publicly available *HistCite* files are available at [www.histcite.org](http://www.histcite.org). *HistCite* has been evaluated by a group of volunteers. If you would like to participate in the next phase of *HistCite* evaluations, contact me directly. *HistCite* is a work in progress but we hope to make it available to the public in the near future.

<sup>1</sup> See <http://www.histcite.com/> for further information.