

Cite seminar

Mapping intellectual disciplines using author co-citation analysis (ACA)

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Content

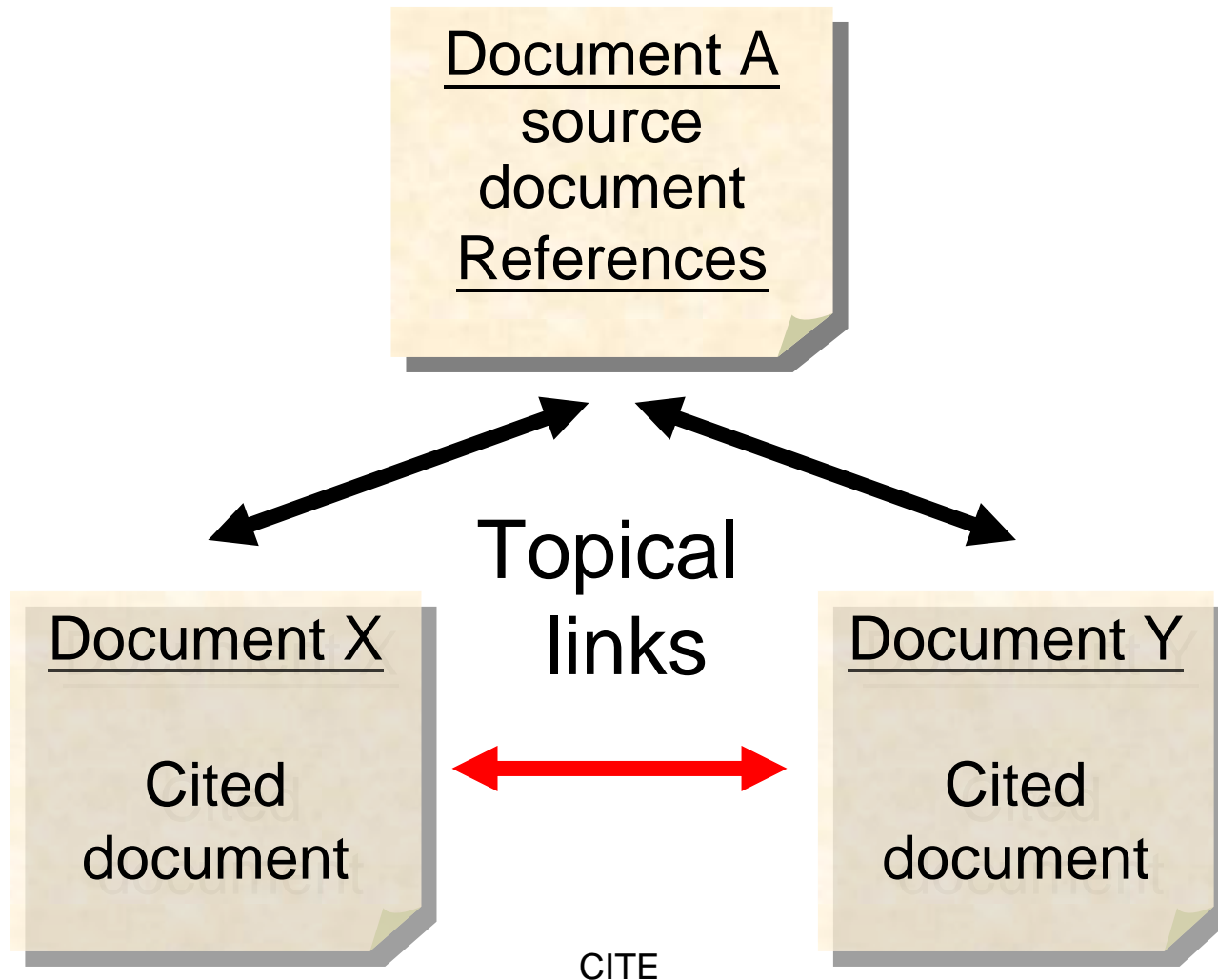
- Definitions & purpose
- Methodology
- Mapping results
- ACA examples from earlier research
- Sample ACA
- Interpretation
- Follow-up studies
- Limitations

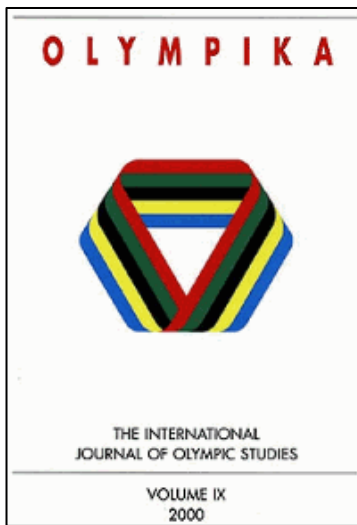
Definition : Author co-citation analysis (ACA)

A bibliometric tool that analyses the relationships of pairs of cited authors within source documents

ACA & other citation techniques were pioneered by White & Griffith from Drexel College of Information Studies, & Small & Garfield from ISI, who produce the computerised citation databases SciSearch & Social SciSearch. They have been further developed by McCain & others

Source & cited documents





THE IOC AND THE WORLD OF INTERDEPENDENCE

*Donald Macintosh and Michael Hawes**

Through most of its history, the IOC insisted that sport was apart from the world of politics, and that the Olympic Games should not be used by sovereign states to further their political goals.

REFERENCES

- 20 J. MacAloon, 'The Turn Of Two Centuries: Sport And The Politics Of Intercultural Relations,' in *Sport: The Third Millenium* (F. Landry, et al., eds.), Sainte-Foy, Quebec: University of Laval Press, 1991, p. 32
- 29 B. Kidd "A New Orientation to the Olympic Games," *Queen's Quarterly*, Vol. 98, No. 2, 1991, pp. 363-374.

ACA methodology

There are a number of variations to the methodology that can be employed at various stages of an author co-citation exercise. Often it may depend on some facet of the discipline being studied

The following outline is representative of the steps involved

ACA methodology

Step 1 : Identify the discipline or sub-discipline

- Must have a substantial body of knowledge

Step 2 : Identify list of representative, prolific &/or significant authors, eg by :

- Searching relevant databases
- Conducting field study etc

ACA methodology

Step 3 : Refine the list

- Supplement gross author statistics with field knowledge – self or group
- Conduct a preliminary citation search on *Social SciSearch* in *ISI web of knowledge* to eliminate authors with low citation rates

Step 4 : Run the co-citation search of paired authors

ACA methodology

Step 5 : Tabulate results

- Create a square matrix which included all results of matched author citations
- For cell entry of same author, insert highest co-citation number

Cited author matrix

Extract from an author co-citation matrix

	Kidd	MacAloon	Hoberman	Lenskyj
Kidd	19	7	9	10
MacAloon	7	19	17	0
Hoberman	9	17	17	3
Lenskyj	10	0	3	26

empty cell

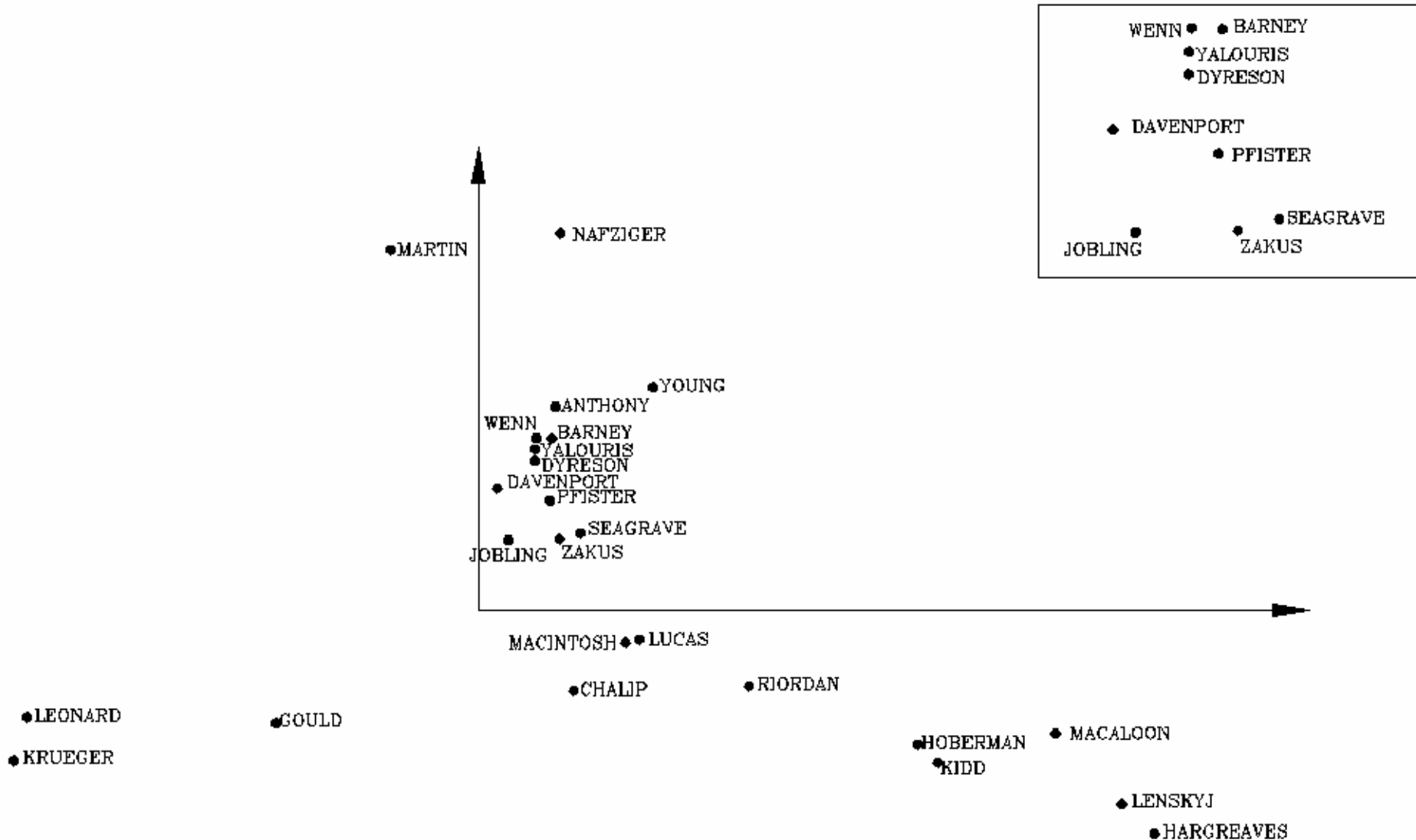
matched cells

ACA methodology

Step 6 : Process results by converting the raw matrix to a correlation matrix, applying multi-dimensional scaling; & cluster analysis

- Create 2-dimensional author map etc

Mapping the results



ACA methodology

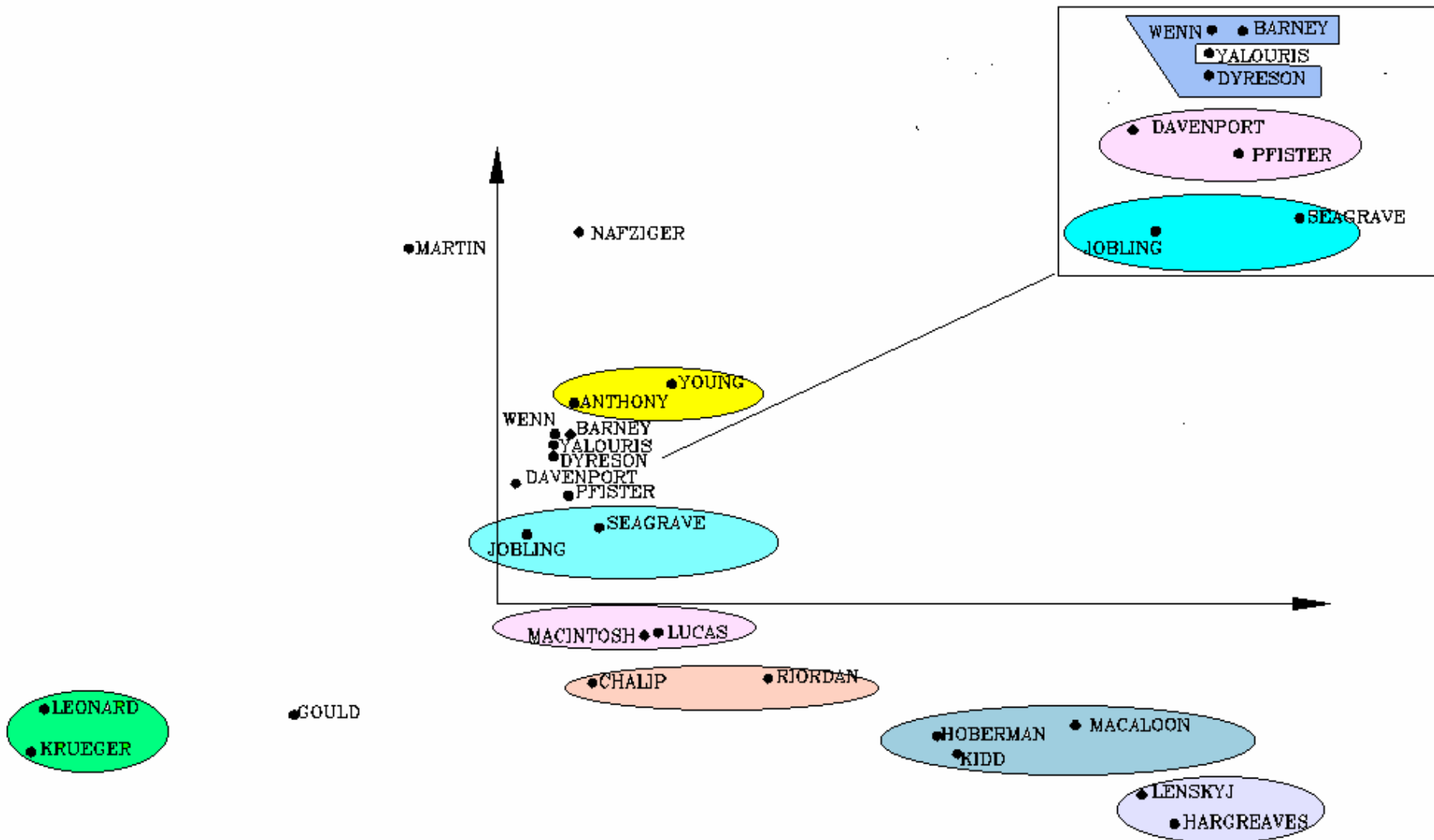
Step 7 : Identify clusters of authors

Step 8 : Assign labels to the clusters

- Using LCSH (or equivalent) subject headings
- Using field knowledge

Step 9 : Analyse the results & draw conclusions

Mapping the results



Labeling the clusters

Example – partial subject headings for author Riordan :

<ul style="list-style-type: none">• Olympic Games, Moscow 1980	<ul style="list-style-type: none">• politics & government - ideology
<ul style="list-style-type: none">• communism	<ul style="list-style-type: none">• People's Republic of China
<ul style="list-style-type: none">• Eastern Europe	<ul style="list-style-type: none">• sociology - social change
<ul style="list-style-type: none">• sociology	<ul style="list-style-type: none">• diplomacy
<ul style="list-style-type: none">• history	<ul style="list-style-type: none">• policy
<ul style="list-style-type: none">• sex factor	<ul style="list-style-type: none">• Olympism
<ul style="list-style-type: none">• women	<ul style="list-style-type: none">• Olympic Games – philosophy

Labeling the clusters

• Sport policy & international relations	• North American perspective
• Critical reformers	• Olympism
• Critical feminists	<u>Stand-alones</u> • Legal aspects • Performance (1) • Performance (2) • The ancient Olympic Games
• Ideals & questions	
• Drugs	
• The revival	
• History of women's involvement	

Previous ACA studies

ACA is a portable methodology. I have applied it to :

- Consumer research
- Physical education pedagogy
- Olympic Games

Other examples :

<http://www.garfield.library.upenn.edu/histcomp/cocitation-1973-2001/>

Address <http://isi15.isiknowledge.com/portal.cgi?DestApp=WOS&Func=Frame>

Links »

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Select a search option:

Quick search:

GO

Example: chess AND comput*

GENERAL SEARCH

Search by topic, author, journal, or address.

CITED REFERENCE SEARCH

Search for articles that cite an author or work.

STRUCTURE SEARCH

Search for reactions and compounds using chemical structures.

ADVANCED SEARCH

Search using complex queries including field tags and set combinations.

OPEN SAVED SEARCH

Open a previously saved search history.

Select database(s) and timespan:

Citation Databases:

 Science Citation Index Expanded (SCI-EXPANDED)--1970-present Social Sciences Citation Index (SSCI)--1970-present Arts & Humanities Citation Index (A&HCI)--1975-present

Chemistry Databases:

 Latest (updated May 14, 2005) Year From to (default is all years)To remember these settings, first [sign in or](#)

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 50

References 1 -- 20 |<<< [1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10] >>>|

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

Select	Times Cited**	Cited Author	Cited Work	Year	Volume	Page	Article ID	View Record
<input type="checkbox"/>	56	...Hargreav.JA	NATURE	1974	252	316		View record
<input type="checkbox"/>	102	...Hargreav.JB	BRIT MED J	1972	3	559		View record
<input type="checkbox"/>	3	...Hargreav.JK	J ATMOS TERR PHYS	1974	36	1555		View record
<input type="checkbox"/>	1	HARGREAVES J	2ND P INT C APPL MAG	1994				
<input type="checkbox"/>	2	HARGREAVES J	3 AUSTR I HLTH WELF	2001				
<input type="checkbox"/>	1	HARGREAVES J	4TH C BRIT SOC SPORT	1987				
<input type="checkbox"/>	1	HARGREAVES J	5 RING CIRCUS	1984				
<input type="checkbox"/>	4	HARGREAVES J	5 RING CIRCUS MONEY	1984		53		
<input type="checkbox"/>	1	HARGREAVES J	5 RING CIRCUS MONEY	1984		58		
<input type="checkbox"/>	1	HARGREAVES J	5 RING CIRCUS MONEY	1984		68		
<input type="checkbox"/>	1	HARGREAVES J	ABERDEEN U 1945 1981	1989				
<input type="checkbox"/>	1	HARGREAVES J	ADV DENT RES	1989	3	126		
<input type="checkbox"/>	1	HARGREAVES J	ADV DENT RES	1989	2	110		
<input type="checkbox"/>	1	HARGREAVES J	ADV DENT RES	1989	2	126		
<input type="checkbox"/>	13	HARGREAVES J	AEROSPACE MED	1966	37	552		View record

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- STRUCTURE SEARCH
- SEARCH HISTORY
- ADVANCED SEARCH

Search History

Search Results -- Summary

<< Return to Cited Reference Index

Cited Author=hargreaves j*

DocType=All document types; Language=All languages; Databases=SCI-EXPANDED, SSCI, A&HCI; Timespan=1970-2005

Search within results: Enter a topic SEARCH

2,478 results found (Set #6)

Go to Page: 1 of 248 GO

Records 1 -- 10

Navigation arrows: << < [1 | 2 ...] > >>

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

- 1. Haywood KL, Garratt AM, Dawes PT
[Patient-assessed health in ankylosing spondylitis: a structured review](#)
 RHEUMATOLOGY 44 (5): 577-586 MAY 2005
 Times Cited: 0
- 2. Liu PG, Yang Q
[Identification of genes with a biocontrol function in Trichoderma harzianum mycelium using the expressed sequence tag approach](#)
 RESEARCH IN MICROBIOLOGY 156 (3): 416-423 APR 2005
 Times Cited: 0
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Search History

(For complex set combinations, use Advanced Search)

Combine Sets	Results		Delete Sets
<input checked="" type="radio"/> AND <input type="radio"/> OR <input type="button" value="COMBINE"/>			<input type="button" value="SELECT ALL"/> <input type="button" value="DELETE"/>
<input checked="" type="checkbox"/> #2 <input type="button" value="Combine"/>	2,478	Cited Author=hargreaves j* <i>DocType=All document types; Language=All languages; Databases=SCI-EXPANDED, SSCI, A&HCI; Timespan=1970-2005</i>	View Reference Selections <input type="checkbox"/>
<input checked="" type="checkbox"/> #1	173	Cited Author=lenskyj h* <i>DocType=All document types; Language=All languages; Databases=SCI-EXPANDED, SSCI, A&HCI; Timespan=1970-2005</i>	View Reference Selections <input type="checkbox"/>
<input type="radio"/> AND <input type="radio"/> OR <input type="button" value="COMBINE"/>			<input type="button" value="SELECT ALL"/> <input type="button" value="DELETE"/>

Search Tag Key: TS=Topic, TI=Title, AU=Author, GP=Group Author, SO=Source, AD=Address, OG=Organization, SG=Suborganization, SA=Street Address, CI=City, PS=Province/State, CU=Country, ZP=Zip/Postal Code
 x.x = Structure search results. Displayed within parentheses (), representing [approximate values](#).

Search History (For complex set combinations, use Advanced Search)

Combine Sets <input type="radio"/> AND <input type="radio"/> OR <input type="button" value="COMBINE"/>	Results		Delete Sets <input type="button" value="SELECT ALL"/> <input type="button" value="DELETE"/>
<input type="checkbox"/> #3	44	#2 AND #1 <i>DocType=All document types; Language=All languages; Databases=SCI-EXPANDED, SSCI, A&HCI; Timespan=1970-2005</i>	<input type="checkbox"/>
<input type="checkbox"/> #2	2,478	Cited Author=hargreaves j* <i>DocType=All document types; Language=All languages; Databases=SCI-EXPANDED, SSCI, A&HCI; Timespan=1970-2005</i>	<input type="checkbox"/>
<input type="checkbox"/> #1	173	Cited Author=lenskyj h* <i>DocType=All document types; Language=All languages; Databases=SCI-EXPANDED, SSCI, A&HCI; Timespan=1970-2005</i>	<input type="checkbox"/>
<input type="checkbox"/> AND <input type="checkbox"/> OR <input type="button" value="COMBINE"/>			<input type="button" value="SELECT ALL"/> <input type="button" value="DELETE"/>

Search Tag Key: TS=Topic, TI=Title, AU=Author, GP=Group Author, SO=Source, AD=Address, OG=Organization, SG=Suborganization, SA=Street Address, CI=City, PS=Province/State, CU=Country, ZP=Zip/Postal Code
x.x = Structure search results. Displayed within parentheses (), representing approximate values.

Making sense of the results

- Relationship of co-cited authors is 'mapped'
- Groups (clusters) of authors are identified & labeled
- Provides insights on what topics are being pursued (& which are not) in the literature of the discipline

Making sense of the results

- Identify central & peripheral topics/authors
- Identify relationships between topics
- Identify gaps in the scholarship
- Identify patterns of citation
- Characteristics of clusters can be explored
- Identify 'invisible colleges'

Follow-up studies

- Because it is possible to restrict the date coverage of source documents, ACA lends itself to longitudinal studies that can identify the evolution of disciplines
- Citation analysis can be applied to documents – ie document citation rather than ACA
- Bias towards English language authors

Limitations

- First authors only listed in index
- Common names can be a problem
- Chinese names??!!
- Publication lag – eg source document published in 2005 written when?
- Citation lag – eg document published in 2004, ‘picked up’ & cited when?
- Author error
- Input formats in citing document
- Weighting relative significance of citations

Questions



Thank you