Doha, Qatar
The International School
on Research Impact Assessment
"Learning to assess research with the aim to optimise returns"

An Introduction to Bibliometrics

Prof Jonathan Grant
The policy institute, king's college London

November 10- 2015

الصندوق القطري لرعاية البحث العلمي
Qatar National Research Fund
Member of Qatar Foundation

Alberta Innovates Health Solutions

Agència de Qualitat i Avaluació Sanitàries de Catalunya

KING'S College LONDON

ASPIRE Academy for Sports Excellence

السمارة Sidra
مركز السمارة للطب والبحوث
Sidra Medical and Research Center
عضو في مؤسسة قطر
Member of Qatar Foundation

researchfish®
capture • evidence • share • inform

RAND EUROPE

LEARNING OBJECTIVES AND KEY MESSAGES

- Introduce you to bibliometrics in a general manner
- Show you the basic requirements for conducting bibliometric analyses
- You will learn about invalid bibliometric measures around

- ***Build up expertise in bibliometrics before using it !***
- ***Use bibliometrics wisely, and in context !***

CONTENT OF TALK

- Introduction of bibliometrics and data systems
- Basic requirements for bibliometric analysis
- Validity of research assessment
- Bibliometric indicators
- Some example uses

The Metrics Tide Provides Good overview on (biblio)metrics

http://www.hefce.ac.uk/media/HEFCE,2014/Content/Pubs/Independentresearch/2015/The,Metric,Tide/2015_metric_tide.pdf

WHAT IS BIBLIOMETRICS?

- The use of published scientific literature (articles, books, conference proceedings, etc.) for measuring research activity eg output volume, science 'quality', interdisciplinarity, networking

- New knowledge created by scientists is embedded in the scientific literature
  - By measuring scientific literature, we measure knowledge and the ways it is produced

BIBLIOMETRICS RELIES ON INFORMATION IN A PAPER

Journal →

Title →

Authors →

Addresses →

Abstract →

References →

Brain (2002), **125**, 1839–1849

Autism, Asperger syndrome and brain mechanisms for the attribution of mental states to animated shapes

Fulvia Castelli,[1] Chris Frith,[2] Francesca Happé[3] and Uta Frith[1]

[1]*Institute of Cognitive Neuroscience,* [2]*Wellcome Department of Cognitive Neurology, Institute of Neurology, University College London and* [3]*Institute of Psychiatry, Kings College London, London, UK*

Correspondence to: Uta Frith, Institute of Cognitive Neuroscience, University College London, 17 Queen Square, London WC1N 3AR, UK
E-mail: u.frith@ucl.ac.uk

Summary

Ten able adults with autism or Asperger syndrome and 10 normal volunteers were PET scanned while watching animated sequences. The animations depicted two triangles moving about on a screen in three different conditions: moving randomly, moving in a goal-directed fashion (chasing, fighting), and moving interactively with implied intentions (coaxing, tricking). The last condition frequently elicited descriptions in terms of mental states that viewers attributed to the triangles (mentalizing). The autism group gave fewer and less accurate descriptions of these latter animations, but equally accurate descriptions of the other animations compared with controls. While viewing animations that elicited mentalizing, in contrast to randomly moving shapes, the normal group showed increased activation in a previously identified mentalizing network (medial prefrontal cortex, superior temporal sulcus at the temporo-parietal junction and temporal poles). The autism group showed less activation than the normal group in all these regions. However, one additional region, extrastriate cortex, which was highly active when watching animations that elicited mentalizing, showed the same amount of increased activation in both groups. In the autism group this extrastriate region showed reduced functional connectivity with the superior temporal sulcus at the temporo-parietal junction, an area associated with the processing of biological motion as well as with mentalizing. This finding suggests a physiological cause for the mentalizing dysfunction in autism: a bottleneck in the interaction between higher order and lower order perceptual processes.

References

Castelli F, Happé F, Frith U, Frith C. Movement and mind: a functional imaging study of perception and interpretation of complex intentional movement patterns. Neuroimage 2000; 12: 314–25.

Critchley HD, Daly EM, Bullmore ET, Williams SC, Van Amelsvoort T, Robertson DM, et al. The functional neuroanatomy of social behaviour: changes in cerebral blood flow when people with autistic disorder process facial expressions. Brain 2000; 124: 2203–12.

Evans AC, Kamber M, Collins DL, MacDonald D. A MRI-based probabilistic atlas of neuroanatomy. In: Shorvon S, Fish D, Andermann F, Bydder GM, Stefan H, editors. Magnetic resonance scanning and epilepsy. NATO ASI series A, Life Sciences, Vol. 264. New York: Plenum; 1994. p. 263–74.

Happé F, Frith U. The neuropsychology of autism. [Review]. Brain 1996; 119: 1377–400.

Happé F, Ehlers S, Fletcher S, Frith U, Johansson M, Gillberg C, et al. 'Theory of mind' in the brain. Evidence from a PET scan study of Asperger syndrome. Neuroreport 1996; 8: 197–201.

Heider F, Simmel M. An experimental study of apparent behavior. Am J Psychol 1944; 57: 243–59.

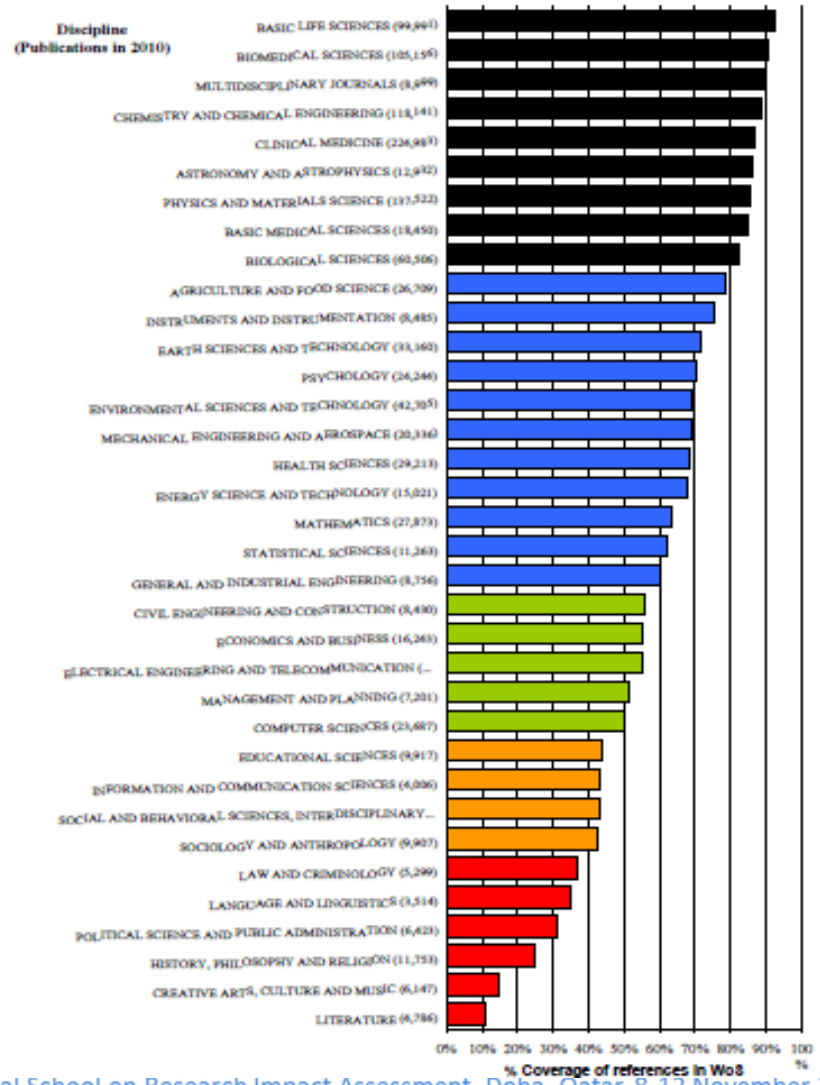
Howard MA, Cowell PE, Boucher J, Broks P, Mayes A, Farrant A, et al. Convergent neuroanatomical and behavioural evidence of an amygdala hypothesis of autism. Neuroreport 2000; 11: 2931–5.

Kanwisher N, McDermott J, Chun MM. The fusiform face area: a module in human extrastriate cortex specialized for face perception. J Neurosci 1997; 17: 4302–11.

BIBLIOGRAPHIC DATA SYSTEMS

- In the field we work with three bibliographic databases:
  - Web of Science by Thomson Reuters;
  - Scopus by Elsevier Science;
  - Google Scholar by Google.

- Understanding strengths and weakness of different databases is key (i.e. “Coverage”)



LEVELS OF BIBLIOMETRIC ANALYSIS

- Macro level eg country and region comparisons
- Meso level eg research organisation, universities, institutes
- Mirco level eg analysis of programmes, groups or individual researchers

THREE METHODS OF DATA COLLECTION

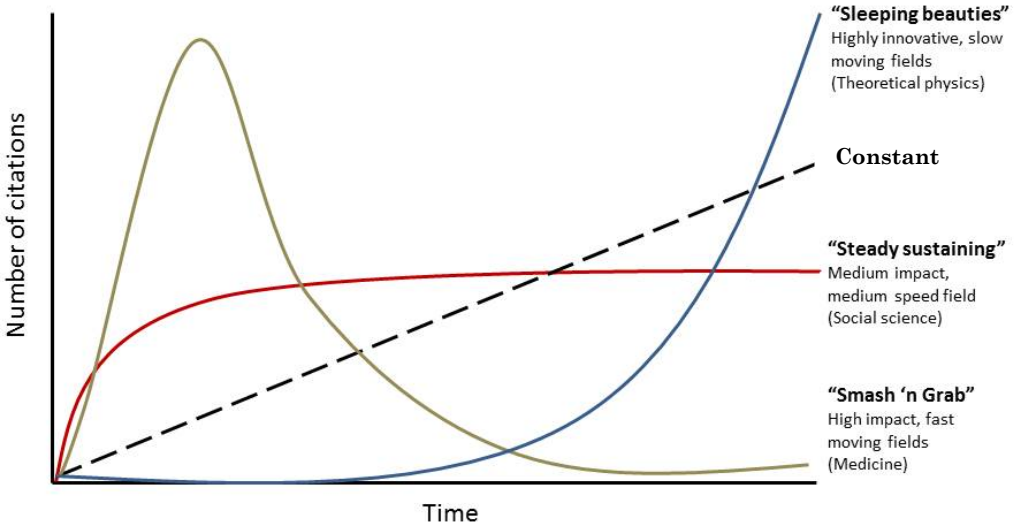
1. Based on list of names of researchers
2. Based on a list of publications of a unit
3. Based on the address of a country or an institute

ADDITIONAL ANALYSES CAN FOCUS ON ..

- ***Research profiles****: a break down of the output over various fields of science.*
- ***Scientific cooperation analysis:*** *a break down of the output over various types of scientific collaboration.*
- ***Knowledge user analysis:*** *a break down of the 'responding' output into citing fields, countries or institutions.*
- ***Highly cited paper analysis:*** *which publications are among the most highly cited output (top 10%, 5%, 1%) of the global literature in that same field(s).*
- ***Network analysis:*** *how is the network of partners composed, based on scientific cooperation?*

Analysis may give an incorrect impression, if data are not "normalized"

- Different fields have different citation patterns, expressed differently over time
- This means it is important to normalise citation patterns by both field of research and year of publication
- This is done by comparing observed citations to expected citations for a field/year combination



If bibliometrics data are not normalized, it could give the misimpression that certain fields or institutions are underperforming.

THE IMPORTANCE OF NORMALIZATION: TWO PAPERS

Year	Title	Journal	Raw Citations	Cites/yr	NCS	WoS category
2010	Instructive role of the vascular niche in promoting tumour growth and tissue repair by angiocrine factors	NATURE REVIEWS CANCER (JIF=37.54)	51	17.00	4.32	ONCOLOGY
2010	Inverse spectral problems for differential operators on arbitrary compact graphs	JOURNAL OF INVERSE AND ILL-POSED PROBLEMS (JIF=0.43)	5	1.67	4.81	MATHEMATICS

The (mean) normalised citation score compares actual citations against expected citations by taking into account the field, age and document type of a paper. Also know as the: Relative citation score, average relative citation score, etc.

WHICH MEANS THE H-INDEX AND JIF ARE POOR BIBLIOMETRICS INDICATORS!

- Journal Impact Factor (**JIF**) is the mean citation score of a journal, determined by dividing all citations in year T by all citable documents in years T-1 and T-2
  - Not (field or type) normalised
  - Variance in citations of papers within a journal (so inflates the impact of all researchers publishing in a journal)

- The h-**index** is based on the set of the scientist's most cited papers and the number of citations that they have received in other publications
  - Not field normalised
  - Is biased against youth and favours the old and the experienced

San Francisco Declaration on Research Assessment (DORA)

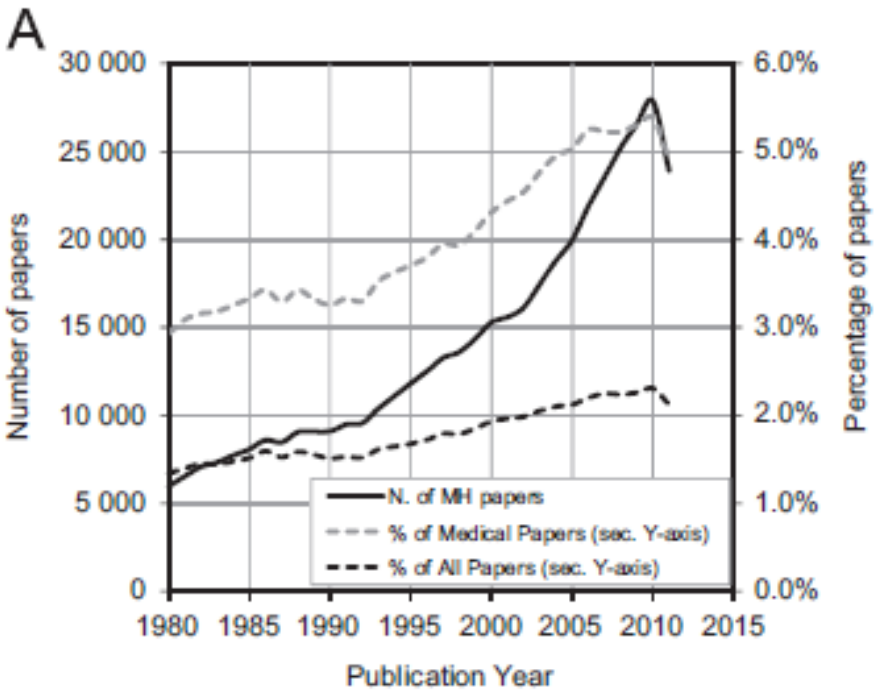
"Do not use journal-based metrics, such as Journal Impact Factors, as a surrogate measure of the quality of individual research articles, to assess an individual scientist's contributions, or in hiring, promotion, or funding decisions"

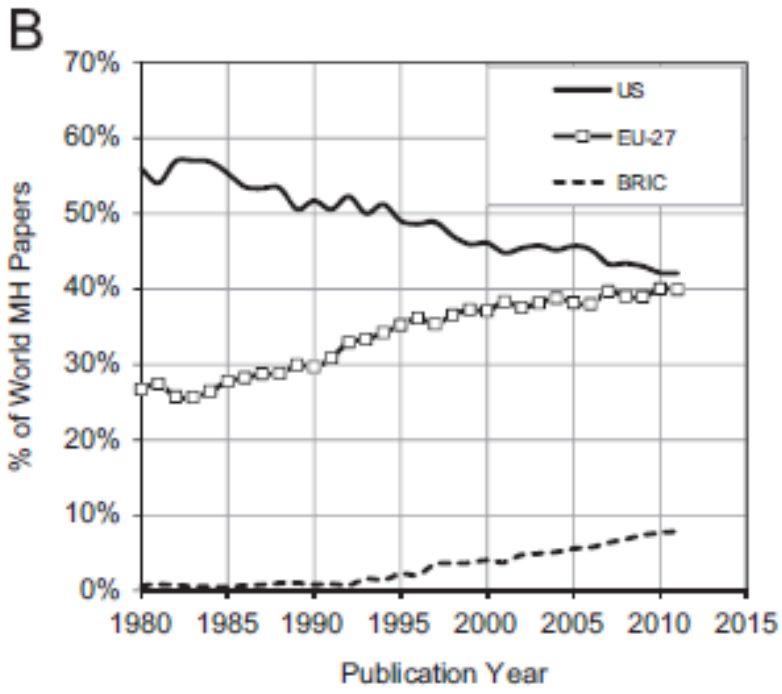
PREFERRED INDICATORS SHOULD BE NORMALISED

- Bibliometric indicators could best reflect actual impact of a unit under study.
- Therefore, compare ***actual*** versus ***expected*** impact.
- Take into account the field, age , and types of document you are dealing with.
- Stay away from "One-Indicator" thinking: preferably use a variety of indicators.

Some examples of bibliometric analysis: Mental Health Research

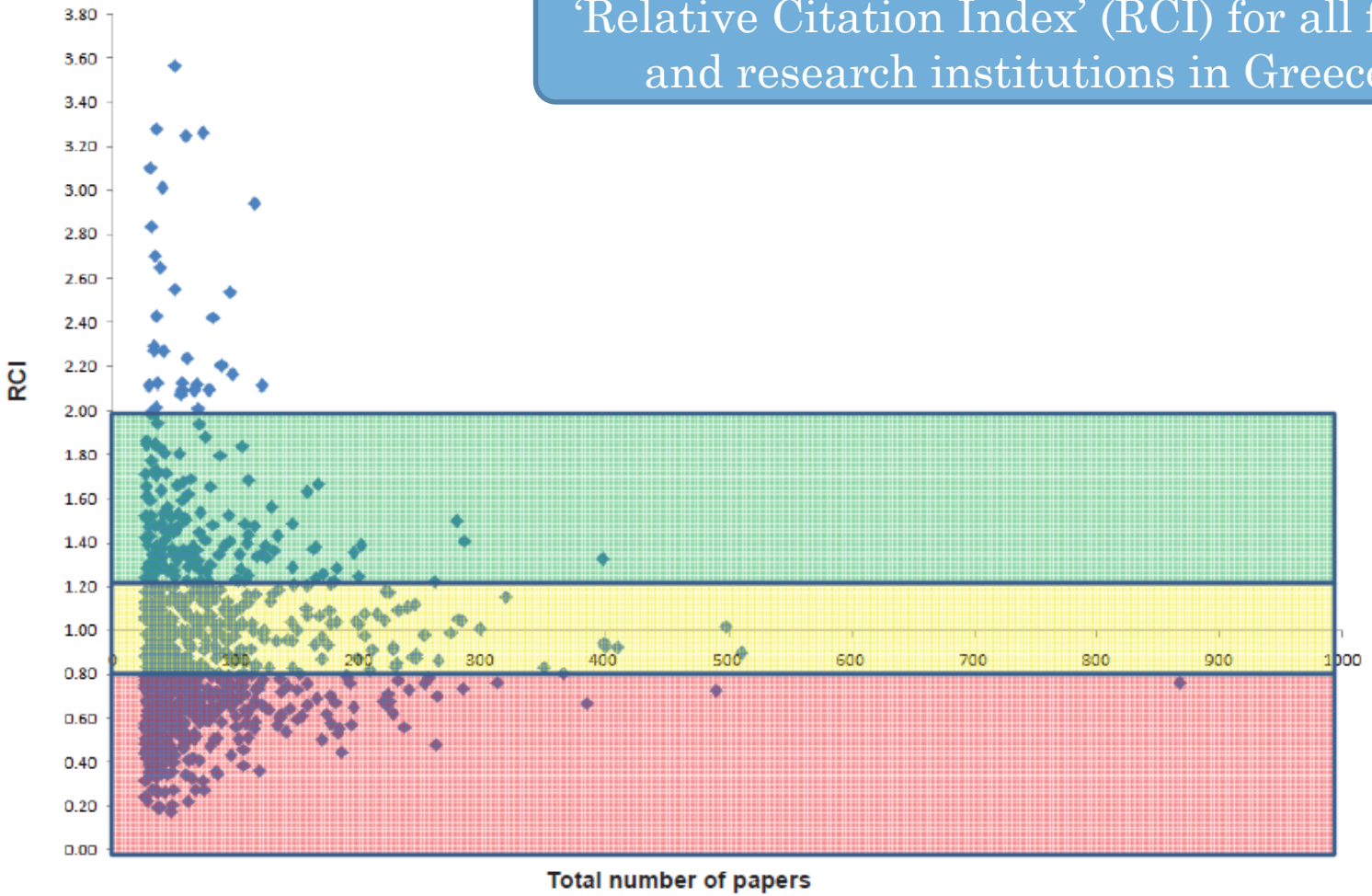
Volume of research publication in 'mental health' research





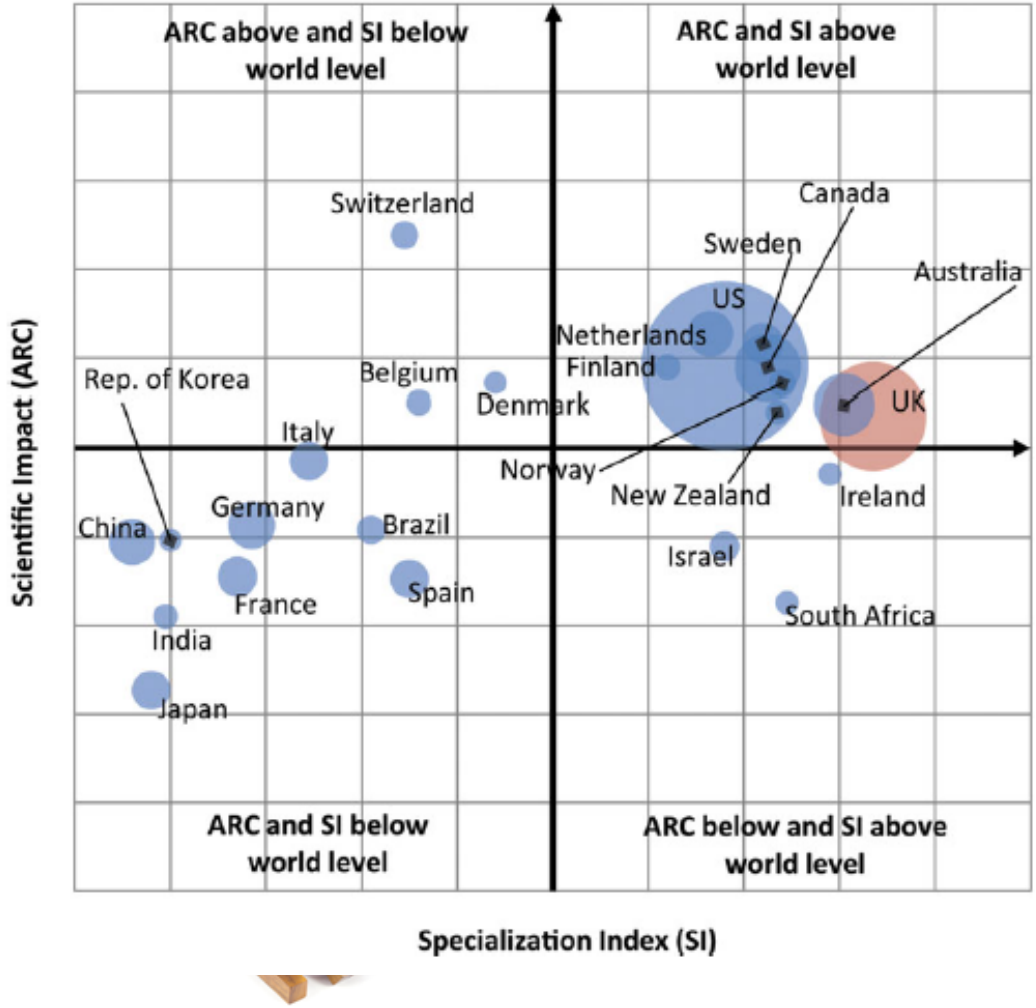
Some examples of bibliometric analysis Greece R&D System

'Relative Citation Index' (RCI) for all field and research institutions in Greece



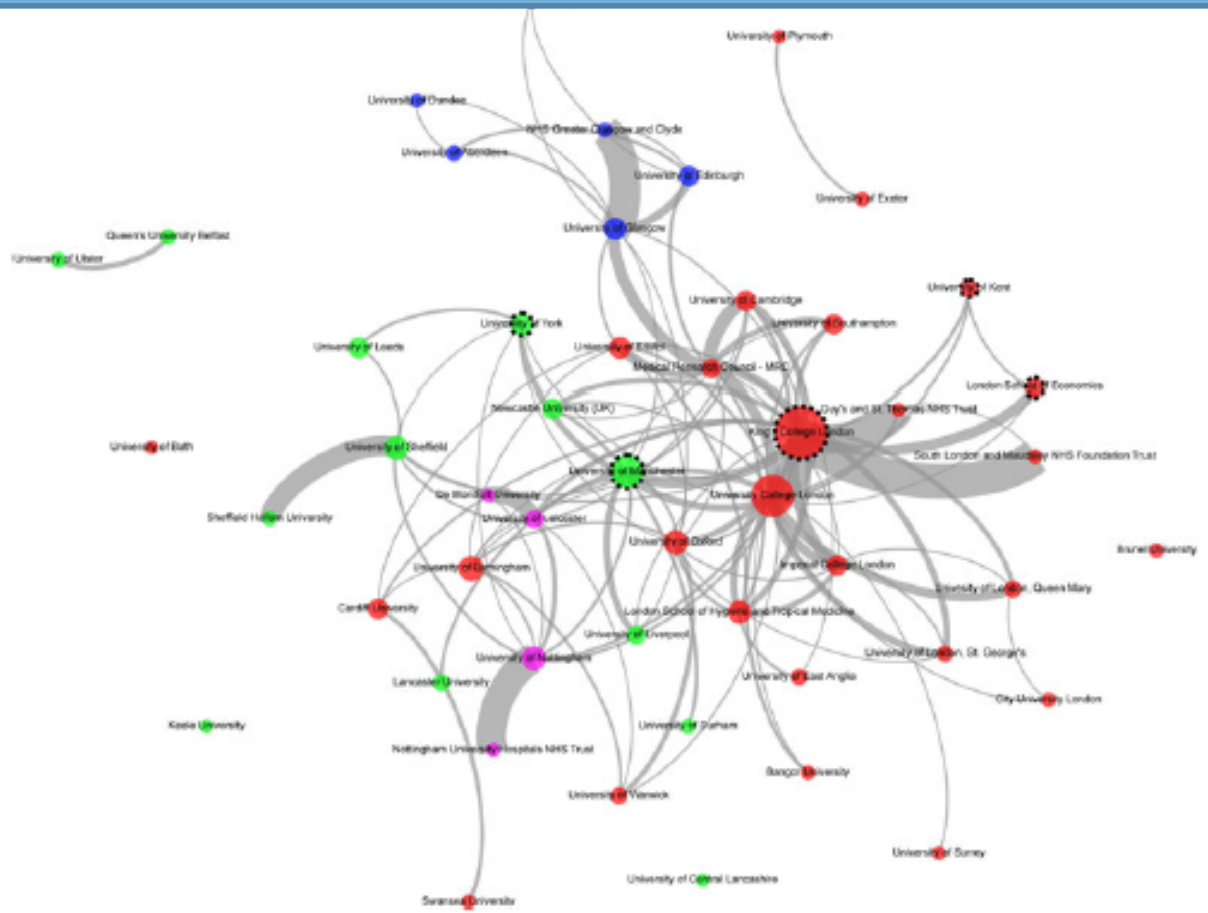
Some examples of bibliometric analysis: Social Care Research (1)

Relationship between 'Average Relative Citations' and 'Specialisation Index' by country



Some examples of bibliometric analysis: Social Care Research (2)

Network analysis of relationships between UK universities



Further Reading

- Wilsdon, J., et al. (2015). *The Metric Tide: Report of the Independent Review of the Role of Metrics in Research Assessment and Management.* DOI: 10.13140/RG.2.1.4929.1363

- Campbell et al (2015). Comparative Performance of Adult Social Care Research, 1996–2011: A Bibliometric Assessment. *British Journal of Social Work,* 1–19. doi:10.1093/bjsw/bcv022.

- Lariviere et al (2013). International comparative performance of mental health research, 1980-2011. *European Neuropyscopharmacology,* 23, 1340–1347.

- Guthrie et al (2013) Measuring research: A guide to research evaluation frameworks and tools. Santa Monica, CA, RAND Corporation. Available: http://cssip.org/docs/meeting/RAND_Full.pdf. Accessed 2015 May 23.

- Moed HF (2005) Citation analysis in research evaluation. Springer, Dordrecht.

- van Leeuwen T (2004) "Descriptive versus Evaluative bibliometrics. Monitoring and assessing of national R&D systems, pp. 373–388, in: Handbook of Quantitative Science and Technology Research, editors Moed H., Glanzel W., & Schmoch U, Kluwer Academic Publishers.