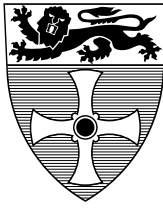


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University of Newcastle upon Tyne

COMPUTING SCIENCE

Science production in top 20 UK universities is catching-up with the US universities

P. Andras, N. D. J. Herald and B. G. Charlton

TECHNICAL REPORT SERIES

No. CS-TR-1053 October, 2007

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Peter Andras, Neil D. J. Herald, Bruce G. Charlton

Abstract

Measuring science production and stimulating top scientific performance are hotly debated internationally. It is commonly believed that there is a widening gap between UK and US universities in both quantity and quality of scientific output. We measured science production of UK and US universities using the ISI Web of Science data for the period 1975 – 2004. Surprisingly, we found that the top 20 UK universities are now catching-up with the US universities.

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Newcastle upon Tyne: University of Newcastle upon Tyne: Computing Science, 2007.

(University of Newcastle upon Tyne, Computing Science, Technical Report Series, No. CS-TR-1053)

Added entries

UNIVERSITY OF NEWCASTLE UPON TYNE
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About the author

Peter Andras obtained his BSc (Computer Science, 1995), MSc (Artificial Intelligence, 1996) and PhD (Neural Networks, 2000) from the Babes - Bolyai University (Cluj/Kolozsvár, Romania). He joined the University of Newcastle in 2000 as a Research Associate in the Department of Psychology. He was a Lecturer in the Department of Psychology between 2001-2002. He joined the School of Computing Science in 2002 as a Lecturer. His main scientific interests are in the area of information processing in complex systems (e.g., neural systems, protein interaction systems, social information systems).

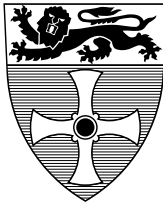
Mr Neil DJ Herald, formerly a research associate of Dr Andras, School of Computing Science, University of Newcastle.

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Suggested keywords

SCIENTOMETRICS,
INTERNATIONAL COMPARISON,
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Abstract

Measuring science production and stimulating top scientific performance are hotly debated internationally. It is commonly believed that there is a widening gap between UK and US universities in both quantity and quality of scientific output. We measured science production of UK and US universities using the ISI Web of Science data for the period 1975 – 2004. Surprisingly, we found that the top 20 UK universities are now catching-up with the US universities.

The US has most of the best universities in the world¹, but science production in the European Union nations has now grown to surpass America^{2,3}. Nonetheless, it is commonly believed that there is a widening gap between UK and US universities in both quantity and quality of scientific output. We measured science production of UK and US universities using the ISI Web of Science⁴ data for the period 1975 – 2004, production being defined as publications and citations^{2,3,5}. Surprisingly, we found that the top 20 UK universities are now catching-up with the US universities.

The ISI Web of Science (WoS)⁴ is organised into three domains: Science (medical and natural sciences), Social Science, and Arts and Humanities (A&H). We determined publication and citation counts for 94 UK universities⁶ and 299 US universities⁷ (national universities and top 50 liberal arts colleges) for all years between 1975 – 2004. The WoS was searched for each university and each year to determine the number of publications published by members of the given university in the given year and the number of citations that these papers received since they were published up to the time of data collection (February 2006). Total counts for five year periods were pooled to reduce yearly fluctuations.

The UK universities were ranked for the six five-year periods, the three domains of WoS, and for publication and citation counts. The top 20 UK universities were determined for each of these 36 UK rankings. The joint set of UK and US universities was also ranked in the same way, producing 36 UK-US ranking. For the top 20 UK universities in each UK ranking we calculated their average rank in the corresponding UK-US ranking (see Figure 1 and Table 1 for numerical values).

Contrary to common belief, the top 20 UK universities showed improving average UK-US ranking in all three domains of academic research. Improvement in number (quantity) of publications has been progressive and accelerating over 30 years. The citation (quality) ranking decreased in the first 15 years, but has rapidly improved over the past 15 years with a rise of 20 – 30 places in average rankings in all three research domains.

Top UK universities have improved most in the Arts and Humanities compared with US universities, both in quantity and quality. However, Arts and Humanities contribute a decreasing proportion of total research production throughout this period⁴. If UK universities aim to maintain the current trend of relative improvement,

incentives for maximum growth will need to be shifted towards the Science domain, which generates by-far the greatest proportion of publications and citations⁴. This might be assisted if the UK Research Assessment Exercise (RAE)⁸ moved towards measuring research output metrics such as publication and citation counts⁹.

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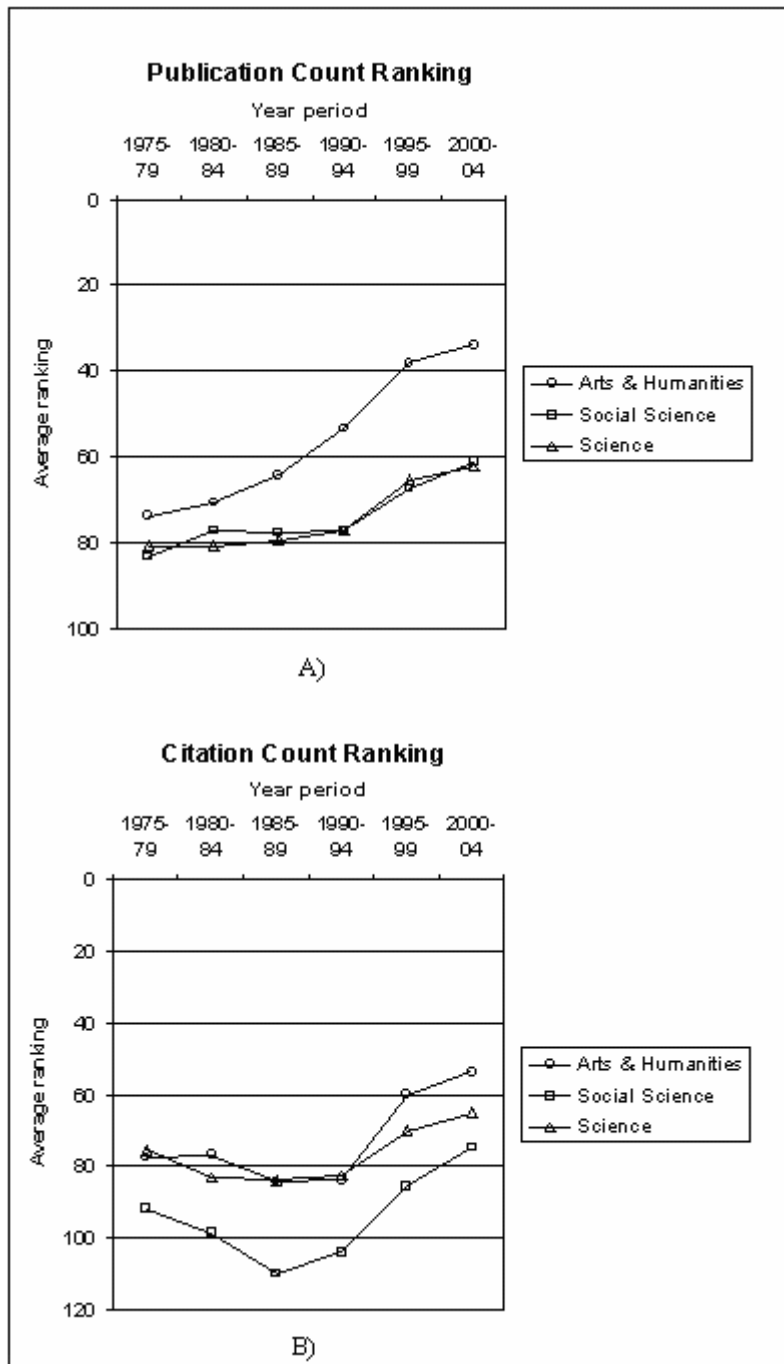


Figure 1. Average ranking of top 20 UK universities according to publication (A) and citation (B) counts in the joint US – UK rank lists in Arts & Humanities, Social Science and Science.

Table 1. The calculated average values and standard deviations of the ranking of top 20 UK universities according to publication and citation counts in the joint US – UK rank list in Arts & Humanities, Social Science and Science.

Publication count		1975-79	1980-84	1985-89	1990-94	1995-99	2000-04
Science	Average	80.9	80.85	79.4	77.4	65.35	62.4
	<i>Stdev</i>	27.85092	28.46655	27.61655	31.06089	28.88138	29.66373
Social Science	Average	83.35	77.2	77.6	77.35	67.35	61.05
	<i>Stdev</i>	33.51869	30.32734	28.92713	30.8362	28.16918	26.6961
Arts & Humanities	Average	73.7	70.65	64.5	53.65	38.25	34
	<i>Stdev</i>	36.76111	36.15795	34.14289	30.36146	21.09596	20.03155
Citation count		1975-79	1980-84	1985-89	1990-94	1995-99	2000-04
Science	Average	75.55	83.3	84	82.65	70.45	65.3
	<i>Stdev</i>	28.69894	30.13147	29.36521	30.09682	27.2174	28.8099
Social Science	Average	91.85	98.75	109.9	104	85.55	74.7
	<i>Stdev</i>	35.08377	34.17582	35.15065	33.4428	29.01266	30.85637
Arts & Humanities	Average	77.75	77.05	84.45	84.15	60.35	53.9
	<i>Stdev</i>	36.44011	34.58396	36.2077	38.57225	28.7517	26.69299