Research Paper

Do Chinese and American contributions in top journals have an equal citation potential?*

Jielan DING[1,2] & Ronald ROUSSEAU[3,4†]

[1]National Science Library, Chinese Academy of Sciences, Beijing 100190, China
[2]University of Chinese Academy of Sciences, Beijing 100049, China
[3]Information and Library Science (IBW), University of Antwerp (UA), Antwerp B-2000, Belgium
[4]Department of Mathematics, KU Leuven, Leuven B-3000, Belgium

Accepted: Jun. 16, 2015

Abstract

Purpose: We want to contribute to the evaluation of Chinese research, focusing on contributions in top journals.

Design/methodology/approach: Using a Mann-Whitney test we investigate if contributions in *Nature*, *Science* or the *Proceedings of the National Academy of Sciences of the United States of America* (*PNAS*) by Chinese or American authors only, i.e. articles for which all authors have a Chinese or an American address, have a different citation potential.

Findings: There is no reason to state that Chinese and American contributions in these top journals have a different citation potential.

Research limitations: Because of the small numbers involved we were not able to make a distinction between publications in *Nature*, *Science* or *the Proceedings of the National Academy of Sciences of the United States of America.*

Practical implications: These results suggest that the better Chinese research results are of a similar level as those by American colleagues.

Originality/value: It is well-known that the number of citations per publication by Chinese authors is still lagging with respect to leading scientific nations and in particular compared with the USA. We have shown that this difference does not necessarily hold in contributions in *Nature*, *Science* or the *Proceedings of the National Academy of Sciences of the United States of America.*

Keywords *Nature*; *Science*; *Proceedings of the National Academy of Sciences of the United States of America*; Chinese articles; Mann-Whitney test

* This work is supported by the National Natural Science Foundation of China (Grant No.: 71173185).
† Corresponding author: Ronald Rousseau (Email: ronald.rousseau@kuleuven.be).

CJLIS
Vol. 8 No. 2, 2015
pp 1–10
National Science Library, Chinese Academy of Sciences
http://www.chinalibraries.net

Research Paper

1 Introduction

Although it is common knowledge that China's increase in publications over the latest decade is astonishing[1], it is also well-known that the number of citations per publication is still lagging with respect to leading scientific nations and in particular compared with the USA[2,3]. Yet, numbers of citations are averages over all publications, at least as included in an international database. One may expect that citations per paper differ according to the level or the type of the journal. For instance, the intellectual requirements for acceptance of submissions in *Nature*, *Science* or the *Proceedings of the National Academy of Sciences of the United States of America* (*PNAS* in short) can hardly be compared with those for most national journals. These three journals are the ones we will focus on. Just as a short-hand, they will be referred to as top journals.

On the one hand, it is known that press releases are common in most American Universities making sure that scientific results obtained by American Universities are well-publicized. On the other hand, few Chinese universities dissipate English language press releases. Of course, also leading journals issue press releases[4] and in that respect American and Chinese publications are treated on an equal footing.

These observations lead to the following hypotheses:

1) Chinese and American publications in *Nature*, *Science* and *PNAS* are of equal citation potential as shown by received citations in the long run;
2) But American publications receive more citations than Chinese ones over a short period of time.

2 Data collection

Publication and citation data were retrieved from Thomson Reuter's Web of Science on May 30, 2015. We only considered the so-called top journals and restricted publications to those of article type. Citations received by articles published in the years 2004 to 2008 were collected year by year. Complete data are shown in Appendix (I–V). The terms "American" and "Chinese" publications are operationalized as articles for which all authors' addresses are in the USA or in China. By way of interest we also collected information for articles with at least one American or one Chinese address. Table 1 shows the total number of articles published in each of the three journals: maybe surprisingly, *Nature* and *Science* have a slightly decreasing trend in number of articles over the period 2004–2008, while *PNAS* has a slightly increasing trend.

National Science Library, Chinese Academy of Sciences

Table 1 Number of publications (only article type) in the three journals

Publication year	2004	2005	2006	2007	2008
Nature	916	986	906	786	868
Science	873	881	830	818	809
PNAS	3,077	3,196	3,290	3,481	3,501
Total	4,866	5,063	5,026	5,085	5,178

The percentage of articles with at least one American address stays more or less at about 72%, while articles with only American addresses decrease somewhat (from 49% to 45 %). The percentage of articles with a least one Chinese address increases from about 2% to 3%, while the percentage of articles with only Chinese addresses stays small at about 0.3% (Table 2).

Table 2 Numbers of American and Chinese articles

Publication year	2004	2005	2006	2007	2008
USA (At least one American)	3,535	3,692	3,665	3,641	3,754
USA (Only American)	2,394	2,387	2,332	2,256	2,350
CHINA (At least one Chinese)	95	102	113	166	160
CHINA (Only Chinese)	15	21	14	26	20

3 Methods

We use the Mann-Whitney test with the following null-hypothesis.

H_0: The distribution of received citations for American articles in top journals is, in the long run (i.e. till the year 2014) the same as that for Chinese ones.
H_1: The alternative hypothesis is that they are different.

The same hypotheses are studied using a three year citation window, including the year of publication.

It has been stated by Huber and Wagner-Döbler[5] that the Mann-Whitney test can be used on informetric data, regardless of the fact that such data often have many ties. These ties reduce the discriminatory power of the test but do not preclude its use. For each publication year we performed two tests: one for citations received from the year of publication till the year 2014, and the other for a 3-year citation window consisting of the period: Publication year till publication year plus 2. Actual calculations were performed using SPSS 16.0, which includes a correction for ties.

4 Results

Table 3 shows the results for the ten tests. Considering data referring to citations received till the end of the year 2014 there is never a reason to reject the null-hypothesis that American and Chinese publications have the same distribution of received citations. For the short term, the citation window of the null-hypothesis

can be rejected in two cases, namely, for the year 2006 (p=0.038) and for the year 2007 (p= 0.072).

Table 3 Results of Mann-Whitney test for 10 tests

Publication year	Citation window	c*	a**	|z-value|	p (Two-sided)
2004	Citations till 2014	15	2,394	0.698	0.485
2004	Citations till 2006	15	2,394	0.522	0.602
2005	Citations till 2014	21	2,387	0.424	0.672
2005	Citations till 2007	21	2,387	0.451	0.652
2006	Citations till 2014	14	2,332	0.818	0.413
2006	Citations till 2008	14	2,332	2.073	0.038
2007	Citations till 2014	26	2,256	1.120	0.263
2007	Citations till 2009	26	2,256	1.799	0.072
2008	Citations till 2014	20	2,350	0.842	0.400
2008	Citations till 2010	20	2,350	0.158	0.874

Note: *c: number of Chinese only articles; **a: number of American only articles.

Figures 1 to 5 illustrate the average number of cumulative citations for American and Chinese authors only, as well as for publications with at least one American or one Chinese address from the year 2004 to the year 2008.

Depending on the publication year citations to American publications dominate or Chinese ones do. These figures do not suggest that the average citation performance of one country is systematically higher than that for the other. For each publication year the average number of citations for collaborated American publications is higher than that for American only publications. This suggests that American scientists, i.e. scientists with an American address, benefit from international collaboration. We investigated this phenomenon in a separate publication[6] and found that it is not as straightforward as could be expected. Concretely, we found that, statistically, American scientists publishing in *Nature* and *Science* do not

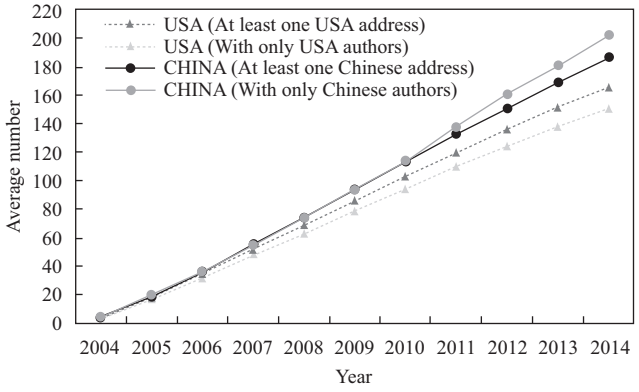

Fig. 1 Average number of cumulative citations of papers published in 2004.

National Science Library, Chinese Academy of Sciences

benefit from international collaboration. This statement also holds for communicated submissions to *PNAS*, but not for direct and for contributed submissions.

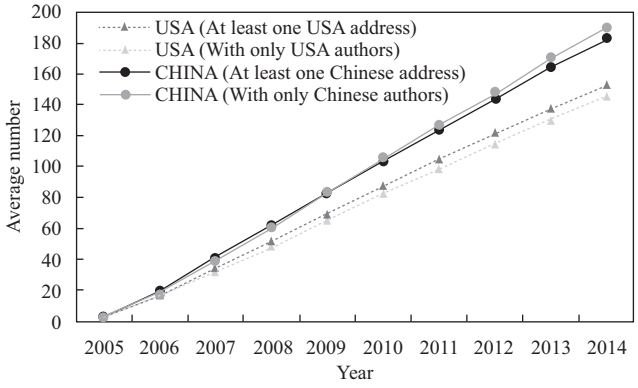

Fig. 2 Average number of cumulative citations of papers published in 2005.

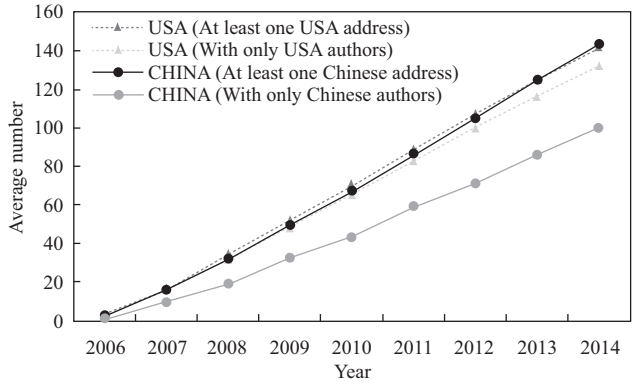

Fig. 3 Average number of cumulative citations of papers published in 2006.

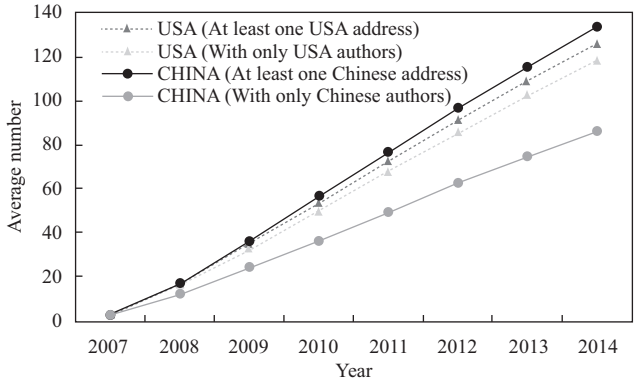

Fig. 4 Average number of cumulative citations of papers published in 2007.

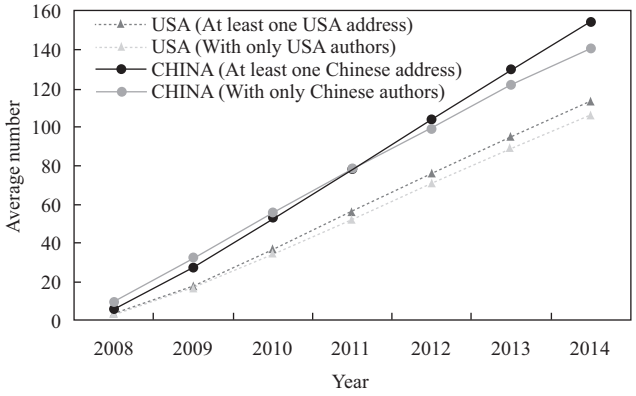

Fig. 5 Average number of cumulative citations of papers published in 2008.

5 Discussion and conclusion

It is clear that, statistically, there is no reason to assume that citation distributions of American only and Chinese only contributions in *Nature*, *Science* and *PNAS* differ. Of course, this does not exclude the fact that there may be differences. For instance, it may be that fewer Chinese contributions belong to the top 5% most-cited articles in these journals (but note that numbers are too small to make such a conclusion). Yet, none of the Chinese contributions was uncited, not even for the 3-year period, while several American ones remained uncited for the complete period under investigation. We stress the caveat that this investigation is, by necessity, based on a small numbers of Chinese contributions. For the same reason it was impossible to take the relative numbers of articles published in each of the three journals into account.

We conclude by stating that there is no indication that Chinese and American contributions in top journals have a different citation potential. Yet, there might be a small tendency, depending on the publication year, for American only articles to be cited earlier.

Author contributions

R. Rousseau (ronald.rousseau@kuleuven.be, corresponding author) proposed the research idea, planned and designed the outline, wrote the first draft and revised the paper. J.L. Ding (dingjielan@mail.las.ac.cn) performed data analysis, joined discussion of the findings and contributed to writing the paper.

References

1 Cheetham, A. China still rising (interview by Nic Fleming). Nature, 2015, 520(7549): S34–S35. Retrieved on August 3, 2015, from http://www.nature.com/nature/journal/v520/n7549_supp/full/520S34a.html. DOI:10.1038/520S34a.

National Science Library, Chinese Academy of Sciences

2 Zhou, P., & Leydesdorff, L. The emergence of China as a leading nation in science. Research Policy, 2006, 35(1): 83–104. Retrieved on August 3, 2015, from http://www.sciencedirect.com/science/article/pii/S0048733305001794. DOI: 10.1016/j.respol.2005.08.006.

3 Leydesdorff, L., Wagner, C. S., & Bornmann, L. The European Union, China, and the United States in the top-1% and top-10% layers of most-frequently cited publications: Competition and collaborations. Journal of Informetrics, 2014, 8(3): 606–617. Retrieved on August 3, 2015, from http://www.sciencedirect.com/science/article/pii/S1751157714000509. DOI: 10.1016/j.joi.2014.05.002.

4 Kiernan, V. Public relations practices at medical journals. Learned Publishing, 2014, 27(1): 5–13. Retrieved on August 3, 2015, from http://chinesesites.library.ingentaconnect.com/content/alpsp/lp/2014/00000027/00000001/art00002?token=004a1036275c277b42573a6728483f256245517975592f653b672c57582a72752d704f3876. DOI: 10.1087/20140102.

5 Huber, J.C., & Wagner-Döbler, R. Using the Mann-Whitney test on informetric data. Journal of the American Society for Information Science and Technology, 2003, 54(8):798–801. Retrieved on August 3, 2015, from http://onlinelibrary.wiley.com/doi/10.1002/asi.10252/abstract;jsessionid=8EFAB79AD211D51FF3AEDA891B1004EF.f01t03. DOI: 10.1002/asi.10252.

6 Rousseau, R., & Ding, J. L. Does international collaboration yield a higher citation potential for US scientists publishing in highly visible interdisciplinary journals? Journal of the Association for Information Science and Technology. 2016 (To appear). DOI: 10.1002/asi.235.

Research Paper

National Science Library,
Chinese Academy of
Sciences

Appendix I: Yearly citation data of papers published in 2004

Year	Publ.	Citations received in each year										
	2004	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
USA (At least one)	3,535	11,782	48,886	60,561	60,836	60,667	60,720	60,623	59,557	57,348	54,892	51,291
USA (Only USA)	2,394	7,315	30,899	38,000	37,690	37,620	37,290	37,260	36,453	34,992	33,407	31,163
CHINA (At least one)	95	290	1,428	1,714	1,804	1,787	1,853	1,908	1,819	1,734	1,706	1,721
CHINA (Only China)	15	67	223	261	270	278	302	311	350	356	301	317
Average: At least one USA address	-	3.33	13.83	17.13	17.21	17.16	17.18	17.15	16.85	16.22	15.53	14.51
Average: USA only	-	3.06	12.91	15.87	15.74	15.71	15.58	15.56	15.23	14.62	13.95	13.02
Average: At least one Chinese address	-	3.05	15.03	18.04	18.99	18.81	19.51	20.08	19.15	18.25	17.96	18.12
Average: China only	-	4.47	14.87	17.40	18.00	18.53	20.13	20.73	23.33	23.73	20.07	21.13

Appendix II: Yearly citation data of papers published in 2005

Year	Publ.	Citations received in each year										
	2005	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
USA (At least one)	3,692	11,405	50,664	63,599	64,767	65,381	66,010	64,287	62,331	59,816	56,198
USA (With only USA authors.)	2,387	6,860	30,711	38,547	39,551	39,861	40,906	39,839	38,567	37,107	34,909
CHINA (At least one)	102	333	1,661	2,205	2,102	2,166	2,127	2,105	2,024	2,042	1,886
CHINA (Only China)	21	53	323	448	447	478	466	442	453	460	412
Average: At least one USA address	-	3.09	13.72	17.23	17.54	17.71	17.88	17.41	16.88	16.20	15.22
Average: USA only	-	2.87	12.87	16.15	16.57	16.70	17.14	16.69	16.16	15.55	14.62
Average: At least one Chinese address	-	3.26	16.28	21.62	20.61	21.24	20.85	20.64	19.84	20.02	18.49
Average: China only	-	2.52	15.38	21.33	21.29	22.76	22.19	21.05	21.57	21.90	19.62

Appendix III: Yearly citation data of papers published in 2006

Year	Publ.	Citations received in each year								
	2006	2006	2007	2008	2009	2010	2011	2012	2013	2014
USA (At least one)	3,665	11,556	49,763	63,721	66,133	68,172	68,148	66,600	64,170	61,263
USA (Only USA)	2,332	6,970	29,485	37,137	39,035	40,242	40,642	39,800	38,527	37,241
CHINA (At least one)	113	303	1,503	1,809	1,969	2,023	2,131	2,141	2,220	2,109
CHINA (Only China)	14	12	127	131	187	154	217	169	207	195
Average: At least one USA address	-	3.15	13.58	17.39	18.04	18.60	18.59	18.17	17.51	16.72
Average: USA only	-	2.99	12.64	15.92	16.74	17.26	17.43	17.07	16.52	15.97
Average: At least one Chinese address	-	2.68	13.30	16.01	17.42	17.90	18.86	18.95	19.65	18.66
Average: China only	-	0.86	9.07	9.36	13.36	11.00	15.50	12.07	14.79	13.93

Appendix IV: Yearly citation data of papers published in 2007

Year	Publ.	Citations received in each year								
	2007	2007	2008	2009	2010	2011	2012	2013	2014
USA (At least one)	3,641	11,232	50,941	65,555	68,504	69,286	67,223	65,219	61,494
USA (Only USA)	2,256	6,667	29,471	37,641	39,638	40,483	38,951	38,110	35,872
CHINA (At least one)	166	474	2,384	3,177	3,371	3,358	3,295	3,122	3,025
CHINA (Only China)	26	75	253	305	322	323	357	301	307
Average: At least one USA address	-	3.08	13.99	18.00	18.81	19.03	18.46	17.91	16.89
Average: USA only	-	2.96	13.06	16.68	17.57	17.94	17.27	16.89	15.90
Average: At least one Chinese address	-	2.86	14.36	19.14	20.31	20.23	19.85	18.81	18.22
Average: China only	-	2.88	9.73	11.73	12.38	12.42	13.73	11.58	11.81

Research Paper

Appendix V: Yearly citation data of papers published in 2008

Year	Publ.	Citations received in each year						
	2008	2008	2009	2010	2011	2012	2013	2014
USA (At least one)	3,754	12,353	55,702	71,642	73,624	74,128	71,880	68,414
USA (Only USA)	2,350	7,431	32,244	41,709	43,287	43,584	42,413	40,610
CHINA (At least one)	160	867	3,526	4,069	4,093	4,139	4,146	3,924
CHINA (Only China)	20	189	457	467	472	415	445	375
Average: At least one USA address	-	3.29	14.84	19.08	19.61	19.75	19.15	18.22
Average: USA only	-	3.16	13.72	17.75	18.42	18.55	18.05	17.28
Average: At least one Chinese address	-	5.42	22.04	25.43	25.58	25.87	25.91	24.53
Average: China only	-	9.45	22.85	23.35	23.60	20.75	22.25	18.75

National Science Library,
Chinese Academy of
Sciences