DEPARTMENT OF ECONOMICS AND FINANCE

COLLEGE OF BUSINESS AND ECONOMICS

UNIVERSITY OF CANTERBURY

CHRISTCHURCH, NEW ZEALAND

How does Zinfluence Affect Article Influence?

Chia-Lin Chang, Michael McAleer, and Les Oxley

WORKING PAPER

No. 47/2010

Department of Economics and Finance
College of Business and Economics
University of Canterbury
Private Bag 4800, Christchurch
New Zealand

How does Zinfluence Affect Article Influence?*

Chia-Lin Chang
Department of Applied Economics
National Chung Hsing University
Taichung, Taiwan

Michael McAleer
Econometric Institute
Erasmus School of Economics
Erasmus University Rotterdam
and
Tinbergen Institute
The Netherlands
and
Institute for Economic Research
Kyoto University
Japan

Les Oxley
Department of Economics and Finance
University of Canterbury
New Zealand

Revised: August 2010

* For financial support, the first author acknowledges the National Science Council, Taiwan; the second author acknowledges the Australian Research Council, National Science Council, Taiwan, a Visiting Erskine Fellowship, College of Business and Economics, University of Canterbury, and the Japan Society for the Promotion of Science; and the third author acknowledges the Royal Society of New Zealand, Marsden Fund.

Abstract

The paper analyses the leading journals in Neuroscience using quantifiable Research Assessment Measures (RAM). Alternative RAM criteria are discussed for the Thomson Reuters ISI Web of Science database (hereafter ISI). The ISI RAM that are calculated annually or updated daily include the classic 2-year impact factor (2YIF), 5-year impact factor (5YIF), Immediacy (or zero-year impact factor (0YIF)), Eigenfactor score, Article Influence score, C3PO (Citation Performance Per Paper Online), h-index, Zinfluence, PI-BETA (Papers Ignored - By Even The Authors), and three new RAM, namely Self-citation Threshold Approval Rating (STAR), Impact Factor Inflation (IFI), and Cited Article Influence (CAI). The RAM criteria are analysed for 26 highly cited journals in the ISI category of Neurosciences. The paper highlights the similarities and differences in alternative RAM criteria, shows that several RAM capture similar performance characteristics of highly cited journals, and finds that the Eigenfactor score and PI-BETA are not highly correlated with the other RAM scores, and hence convey additional information regarding journal rankings. Harmonic mean rankings are also presented of the 13 RAM criteria for the 26 highly cited journals. It is shown that emphasizing the 2-year impact factor of a journal to the exclusion of other informative RAM criteria can lead to a distorted evaluation of journal performance and influence.

Keywords: Impact factors, Immediacy, Eigenfactor, Article Influence, h-index, C3PO, Zinfluence, PI-BETA, STAR, IFI, Cited Article influence.

1. Introduction

Encouraging, monitoring and publishing high quality research are fundamental to science, and research assessment rankings are essential to evaluate the research performance of individuals and the quality of academic journals. The perceived research performance of individual researchers can be crucial for hiring, firing, tenure and promotion decisions. In the absence of suitable information regarding the perceived quality of research output, the quality of a journal has frequently been used as a proxy for the research quality of an academic paper.

The perceived quality of a journal would be seen by many as an inappropriate and misleading proxy for the inherently latent quality of a paper, especially in the early years of publication. The quality and prestige of a journal is based on outstanding papers that have been published in the past. However, a prestigious journal cannot be an accurate reflection of the quality of a recently published paper, especially when the paper has received few if any citations to date.

The acceptance of a paper for publication in a journal is typically based on a subset of the Editor, Co-editor, Associate Editor, and 1-3 referees. This small group of experts decides the rejection rate **before** publication. It is well known that even experts can and do make mistakes. The rejection rate of a journal **after** publication depends on the academic profession. For this reason, the proportion of published papers that is ignored by the profession, and by even the authors, is an important performance measure. The large market of researchers worldwide is less prone to making errors regarding the quality of academic research papers than a small group of editorial experts at any journal.

The Thomson Reuters ISI Web of Science database (hereafter ISI) is a leading high quality database for generating RAM to evaluate the research performance of individual researchers and the quality of academic journals. This paper examines the importance of RAM as viable rankings criteria, highlights the usefulness of existing RAM from ISI, and evaluates the usefulness of three new RAM criteria using ISI data for the 26 most highly cited journals in the Neurosciences.

2. Research Assessment Measures (RAM)

2.1 Annual RAM

With two exceptions, namely the Eigenfactor and Article Influence scores, existing RAM is reported separately for the sciences and social sciences. RAM may be computed annually or updated daily. Annual RAM is calculated for a Journal Citations Reports (JCR) calendar year, which is the year before the annual RAM is released. Alternative RAM criteria are given below.

(1) 2-year impact factor (2YIF):

The classic 2-year impact factor (2YIF) of an ISI journal is typically referred to as "the impact factor", and is calculated annually. For a JCR year, the 2YIF of an ISI journal is defined as" Total citations in a JCR year to papers published in an ISI journal in the previous 2 years/Total papers published in an ISI journal in the previous 2 years".

(2) 2-year impact factor without self citations (2YIF*):

ISI also reports a 2-year impact factor that excludes journal self citations (that is, citations to a journal in which a citing paper is published). We will refer to this RAM measure as 2YIF*.

(3) 5-year impact factor (5YIF):

The 5-year impact factor (5YIF) of an ISI journal is calculated annually. For a JCR year, the 5YIF of an ISI journal is defined as "Total citations in a JCR year to papers published in an ISI journal in the previous 5 years/Total papers published in an ISI journal in the previous 5 years."

(4) Immediacy:

Immediacy is a zero-year impact factor (0YIF) of an ISI journal, and is calculated annually. For a JCR year, Immediacy of an ISI journal is defined as "Total citations to papers published in an ISI journal in a JCR year/Total papers published in an ISI journal in a JCR year."

(5) Eigenfactor score:

The Eigenfactor score (Bergstrom (2007), Bergstrom, West and Wiseman (2008)) is a modified 5YIF, and is calculated annually. For a JCR year, the Eigenfactor algorithm (see www.eigenfactor.org/methods.htm) effectively ranks journals according to citations and the

length of time that researchers are logged on to a journal's website. The Eigenfactor does not check how much time researchers spend reading hard copies of journals.

(6) Article Influence:

The Article Influence score measures the relative importance of an ISI journal on a per-article basis, and is a standardized Eigenfactor score. Like the Eigenfactor score, Article Influence is calculated annually. For a JCR year, Article Influence of an ISI journal is defined as "Eigenfactor score divided by the fraction of all ISI articles published by the ISI journal."

2.2 Two New RAM (computed annually)

(7) IFI:

The ratio of 2YIF to 2YIF* is intended to capture how journal self citations inflate the impact factor of a journal. The Impact Factor Inflation (IFI) score is defined for a JCR year as "IFI score = 2YIF/2YIF*". The minimum value for IFI is 1, with any value above the minimum capturing the effect of journal self citations on the 2-year impact factor.

(8) STAR:

ISI has implicitly recognized the inflation in journal self citations by calculating an impact factor that excludes self citations, and provides data on journal self citations, both historically and for the preceding two years, in calculating 2YIF. We suggest a new RAM, namely the Self-citation Threshold Approval Rating (STAR) score, which is the difference between citations in other journals and journal self citations. If S = journal self citations, the STAR score is defined as "STAR score = [(100-S) - S] = (100-2S)". If S = 0, 25, 50 or 100, for example, STAR = 100, 50, 0 and -100, respectively. As the STAR score is based on journal self citations, both historically and for the preceding two years, an historical STAR score is H-STAR, and a 2-year STAR is 2Y-STAR.

2.3 Daily Updated RAM

Other RAM are updated daily, and are reported for a given day in a calendar year rather than for a JCR year.

(9) C3PO:

ISI reports the mean number of citations for an ISI journal, namely total citations up to a given day divided by the number of papers published in an ISI journal up to the same day, as the "average" number of citations. In order to distinguish the mean from the median and mode, the C3PO of an ISI journal on any given day is defined by Chang et al. (2010) as "C3PO (Citation Performance Per Paper Online) = Total citations to an ISI journal in ISI/Total papers published in an ISI journal." [Note: C3PO should not be confused with C-3PO, the Star Wars android.]

(10) h-index:

The h-index (Hirsch, 2005)) was proposed to assess the scientific research productivity and citations impact of individual researchers. Although the h-index can also be calculated for journals, it should be interpreted as assessing the impact or influence of highly cited publications in ISI journals. The h-index of an ISI journal on any given day is based on cited and citing papers, including self citations of ISI journals, and is defined as "h-index = each of h papers in an ISI journal has been cited at least h times in ISI journals."

(11) PI-BETA:

A recently suggested ISI RAM measures the proportion of papers in a journal that has never been cited, which is, in effect, a rejection rate **after** publication. Chang et al. (2010) argue that lack of citations of a published paper, especially over an extended period, may detract from the quality of a journal by exposing: (i) what might be considered as incorrect decisions by the editorial board of a journal; and (ii) the lost opportunities of papers that might have been cited had they not been rejected by the journal. For this reason, Chang et al. (2010) define a paper with Zinfluence as "zero influence, based on zero citations in ISI journals." Zinfluence can be measured by the PI-BETA (= Papers Ignored (PI) - By Even The Authors (BETA)) score, and is calculated for an ISI journal on any given day as "Number of Zinfluence papers in an ISI journal/Total papers published in an ISI journal."

2.4 A New RAM (updated daily)

(12) CAI:

The Article Influence score is intended to measure the average influence of an article across the sciences and social sciences. As an article that is not cited cannot have influence, a more

suitable measure of the influence of cited articles is the Cited Article Influence (CAI) score, which is defined as "CAI = (1 - PI-BETA)(Article Influence)". If PI-BETA = 0, then CAI is equivalent to the Article Influence score; if PI-BETA = 1, then CAI = 0. As Article Influence is calculated annually, whereas PI-BETA is updated daily, CAI may be updated daily.

3. Analysis of ISI RAM Data for Neurosciences

Bergstrom et al. (2008) have presented "Article Influence Scores and total articles published for the top 25 journals by Eigenfactor score in the field of Neurosciences" (Figure 1, p. 11434). Seven leading journals are highlighted in the figure. Six of these journals are in the ISI category of Neurosciences, with 221 journals, while the seventh, Neurology, is in the ISI category of Clinical Neurology, with 156 journals, where it is ranked fourth according to 2YIF.

In Table 1 we evaluate the 25 most highly cited journals, according to 2YIF, in the Neurosciences, as well as in the Neurology journal. Only articles from ISI Web of Science are included in the citation data. Data for all journals were downloaded from ISI on 12 June 2010 for all citations for 1988-2010, so that citations are counted from 1988 for all papers published in an ISI journal since 1988. As ISI does not provide daily updates for more than 10,000 articles for purposes of calculating the h-index, C3PO, PI-BETA and CAI, the initial years of several journals were chosen so that no journal had more than 10,000 articles. Owing to the large numbers of articles published in some journals, data for the following four journals started after 1988, namely Annals of Neurology (from 1998), Biological Psychiatry (from 2001), Journal of Neuroscience (from 2004), and Neurology (from 2008).

As can be seen from Table 1, the range of 2YIF is (5.694, 26.405), of 2YIF* is (4.682, 26.190), of 5YIF is (5.516, 31.209), and of Immediacy is (0.535, 4.859). As journal self citations in the neurosciences seems relatively low, the range of IFI is (1.011, 1.216), with the second highest IFI score being 1.101. The h-index has a wide range of (10, 325), and C3PO (mean) also has a wide range of (0.99, 235.60). The Eigenfactor score ranges from (0.00433, 0.52179), with Journal of Neuroscience having the highest score. The H-STAR and 2Y-STAR scores are reasonably high, with only one journal having a score below 70, which accords with a journal self citation rate of 15%.

The PI-BETA outcomes are revealing. Only 6 journals have less than 10% of papers that have never been cited, and 7 journals have PI-BETA in the range (10, 19). Annual Review of Neuroscience has an extraordinarily low PI-BETA score of 0.0002. Beyond the 20% mark, 4 journals have 20-29% of papers that have never been cited, one journal has 43.91% of papers that have never been cited, 3 journals have 50-59% of papers that have never been cited, 4 journals have 60-69% of papers that have never been cited, and one journal has 83.31% of papers that have never been cited. It should be emphasized that these are the leading journals in the neurosciences. The Article Influence scores range from (1.718, 18.915). As CAI is Article Influence score multiplied by (1 – PI-BETA), it is not surprising that the Article Influence scores are different from CAI, which ranges from (0.349, 18.876).

The simple correlations of the 13 RAM for the 26 highly cited journals in the Neurosciences are given in Table 2. The 7 pairs of RAM for which the correlations exceed 0.95 (in absolute value) are (2YIF, 2YIF*), (2YIF, 5YIF), (2YIF*, 5YIF), (2YIF, Article Influence), (2YIF*, Article Influence), (5YIF, Article Influence), and (IFI, 2Y-STAR). Three RAM pairs for which the simple correlations are in the range (0.90, 0.95) are (C3PO, CAI), (CAI, Article Influence), and (H-STAR, 2Y-STAR).

It is not surprising that Article Influence and 5YIF are very highly and positively correlated (at 0.98) as the former is a modification of the latter. Given the very high correlation between 5YIF and Article Influence, the modification of 5YIF would seem to be unnecessary, at least for the Neurosciences.

The Eigenfactor and PI-BETA scores are the only two RAM that have very low simple correlations with each of the other RAM scores, so that they convey additional information to what is contained in the other RAM scores. Fersht (2009) showed that there was a very strong positive correlation between the Eigenfactor score and the total number of journal citations, with a correlation coefficient of 0.968 for the top 200 cited ISI journals in 2007. Such a high correlation is not entirely surprising as it captures the size effect of journals, with the total number of publications and total citations typically being positively and highly correlated.

It remains to be seen whether an emphasis on the 2-year impact factor of a journal, to the exclusion of other informative RAM criteria, can lead to a distorted evaluation of journal

performance and influence. In order to summarize the 13 RAM criteria, the rankings of the 26 journals in the Neurosciences are given in Table 3, where the final ranking is based on the harmonic mean. Only the first three journals, namely Annual Review of Neuroscience, Nature Reviews Neuroscience and Neuron, and the number 15 ranked journal, Neuroscience and Biobehavioral Reviews, remain unchanged. Four journals to have moved up considerably are Current Opinion in Neurobiology (from 14 to 6), Journal of Neuroscience (from 16 to 8), Brain Research Reviews (from 19 to 10), and Neuroscientist (from 24 to 14). Journals to have moved appreciably in the opposite direction are Behavioral and Brain Sciences (from 5 to 11), Annals of Neurology (from 9 to 16), and Biological Psychiatry (from 13 to 19). All other journals have moved by 5 or fewer positions in either direction.

A linear regression relationship, with the Article Influence score as a function of 5YIF, is given in Figure 1. The estimated model shows that the Article Influence score increases, on average, by 0.6266 for each unit increase in 5YIF. The goodness-of-fit measure, as given by R-squared = 0.9605, shows that the Article Influence score can be estimated accurately on the basis of a linear relationship between the Article Influence score and 5YIF.

4. Conclusion

The paper analysed the leading journals in Neuroscience using quantifiable Research Assessment Measures (RAM). Alternative RAM criteria were discussed for the Thomson Reuters ISI Web of Science database (hereafter ISI). The RAM criteria were analysed for 26 highly cited journals in the ISI category of Neurosciences. The paper highlighted the similarities and differences in alternative RAM criteria, showed that several RAM captured similar performance characteristics of highly cited journals, and found that the Eigenfactor score and PI-BETA were not highly correlated with the other RAM scores, and hence conveyed additional information regarding journal rankings. Harmonic mean rankings were also presented of the 13 RAM criteria for the 26 highly cited journals. It was shown that emphasizing the 2-year impact factor of a journal to the exclusion of other informative RAM criteria could lead to a distorted evaluation of journal performance and influence.

References

Bergstrom C. (2007), Eigenfactor: Measuring the value and prestige of scholarly journals, *C&RL News*, 68, 314-316.

Bergstrom, C.T., J.D. West and M.A. Wiseman (2008), The Eigenfactor™ metrics, *Journal of Neuroscience*, 28(45), 11433–11434 (November 5, 2008).

Chang, C.-L., M. McAleer and L. Oxley (2010), Great Expectatrics: Great papers, great journals, great econometrics. Available at SSRN: http://ssrn.com/abstract=1618167.

Fersht, A. (2009), The most influential journals: Impact factor and Eigenfactor, *Proceedings of the National Academy of Sciences of the United States of America*, 106(17), 6883-6884 (April 28, 2009).

ISI Web of Science (2010), *Journal Citation Reports, Essential Science Indicators*, Thomson Reuters ISI.

Table 1
Research Assessment Measures (RAM) for 26 Neuroscience Journals

Journal	2YIF	2YIF*	5YIF	IFI	Immediacy	h-index	C3PO	PI-BETA	Eigenfactor	CAI	Article Influence	H-STAR	2Y-STAR
Annual Review of Neuroscience	26.405	26.190	31.209	1.008	3.348	183	235.60	0.0020	0.04611	18.876	18.915	100	100
Nature Reviews Neuroscience	25.497	24.940	26.678	1.022	4.859	169	42.50	0.5749	0.11399	5.925	13.939	98	98
Neuron	14.170	13.370	14.857	1.060	2.599	325	96.78	0.0696	0.28702	7.719	8.296	92	90
Nature Neuroscience	14.164	13.841	16.825	1.023	3.297	201	56.00	0.1572	0.19666	7.687	9.120	98	96
Behavorial and Brain Sciences	12.818	11.318	19.355	1.133	2.667	109	5.22	0.5654	0.01173	3.709	8.533	92	78
Trends in Neurosciences	12.817	12.640	14.475	1.014	1.925	235	80.30	0.1048	0.06325	6.186	6.910	100	98
Molecular Psychiatry	12.537	11.932	11.937	1.051	4.161	102	25.59	0.2111	0.04612	3.351	4.247	92	92
Trends in Cognitive Sciences	10.981	10.560	13.826	1.040	1.086	120	33.29	0.2669	0.05323	4.633	6.320	98	94
Annals of Neurology	9.935	9.429	9.081	1.054	2.166	145	13.79	0.6106	0.07996	1.300	3.337	96	90
Brain	9.603	9.153	9.808	1.049	1.593	198	53.68	0.1106	0.09864	3.137	3.527	94	92
Progress in Neurobiology	9.130	8.900	12.346	1.026	1.169	163	78.33	0.0563	0.02492	4.478	4.745	98	96
Frontiers in Neuroendocrinology	8.692	8.385	11.288	1.037	3.188	10	1.12	0.6553	0.00433	1.142	3.314	96	94
Biological Psychiatry	8.672	8.305	9.015	1.044	1.943	114	9.29	0.6730	0.11389	1.042	3.186	94	92
Current Opinion in Neurobiology	8.102	7.946	9.143	1.020	0.535	136	53.65	0.0949	0.05407	4.562	5.040	100	98
Neuroscience and Biobehavioral Reviews	7.804	7.641	9.563	1.021	1.426	120	41.06	0.1016	0.02488	2.810	3.128	96	96
Journal of Neuroscience	7.452	6.771	8.122	1.101	1.138	108	19.92	0.1429	0.52179	3.038	3.544	86	82
Neurology (ISI: Clinical Neurology)	7.043	6.675	6.857	1.055	1.796	31	0.99	0.8331	0.17775	0.349	2.089	94	90
Neuropsychopharmacology	6.835	6.444	6.716	1.061	2.106	116	16.55	0.4391	0.05970	1.214	2.164	92	90
Brain Research Reviews	6.236	6.062	7.260	1.029	1.972	128	63.33	0.0511	0.02113	2.400	2.529	98	96
Sleep Medicine Reviews	6.143	5.873	6.630	1.046	1.690	43	16.33	0.1807	0.00753	1.808	2.207	92	92
Pain	6.030	5.235	6.653	1.152	1.038	159	34.15	0.1296	0.05218	1.495	1.718	88	84
Neurobiology of Aging	5.959	5.768	6.132	1.033	1.591	109	9.28	0.6039	0.03439	0.761	1.921	92	94
Cerebal Cortex	5.907	5.515	6.939	1.071	1.619	131	37.00	0.0843	0.06793	2.864	3.128	88	88
Neuroscientist	5.896	5.833	6.455	1.011	0.667	54	8.81	0.5657	0.01391	1.127	2.594	98	98
Journal of Cerebral Blood Flow and Metabolism	5.741	5.340	5.516	1.075	1.027	149	33.06	0.2312	0.03189	1.435	1.866	90	88
Neuroimage	5.694	4.682	6.884	1.216	0.984	150	21.83	0.2793	0.15549	1.670	2.317	68	66

Note: Citations data were downloaded from ISI on 12 June 2010 for 1988-2010.

Table 2
Correlations of 13 RAM Criteria for 26 Neuroscience Journals

RAM	**2YIF**	**2YIF***	**5YIF**	**IFI**	**Immed**	**h-index**	**C3PO**	**PI-BETA**	**Eigenf**	**CAI**	**AI**	**H-STAR**	**2Y-STAR**
2YIF	1.0000												
2YIF*	0.9983	1.0000											
5YIF	0.9718	0.9663	1.0000										
IFI	-0.3175	-0.3649	-0.2682	1.0000									
Immediacy	0.7490	0.7419	0.6902	-0.2410	1.0000								
h-index	0.4210	0.4128	0.3803	0.0038	0.1326	1.0000							
C3PO	0.6542	0.6686	0.6656	-0.3084	0.2249	0.5723	1.0000						
PI-BETA	-0.0803	-0.0874	-0.1075	0.0243	0.1772	-0.5482	-0.6005	1.0000					
Eigenfactor	0.0584	0.0424	0.0024	0.2514	-0.0055	0.2733	-0.0052	-0.0919	1.0000				
CAI	0.8188	0.8255	0.8437	-0.3037	0.4107	0.5263	0.9297	-0.4704	0.0843	1.0000			
Article Inf	0.9626	0.9608	0.9800	-0.2897	0.6178	0.4423	0.7446	-0.1840	0.0641	0.9083	1.0000		
H-STAR	0.3908	0.4256	0.3878	-0.8944	0.2526	0.0373	0.3148	0.0020	-0.3217	0.3409	0.3792	1.0000	
2Y-STAR	0.3537	0.4013	0.3020	-0.9705	0.2390	0.0435	0.3718	-0.0928	-0.3215	0.3450	0.3232	0.9161	1.0000

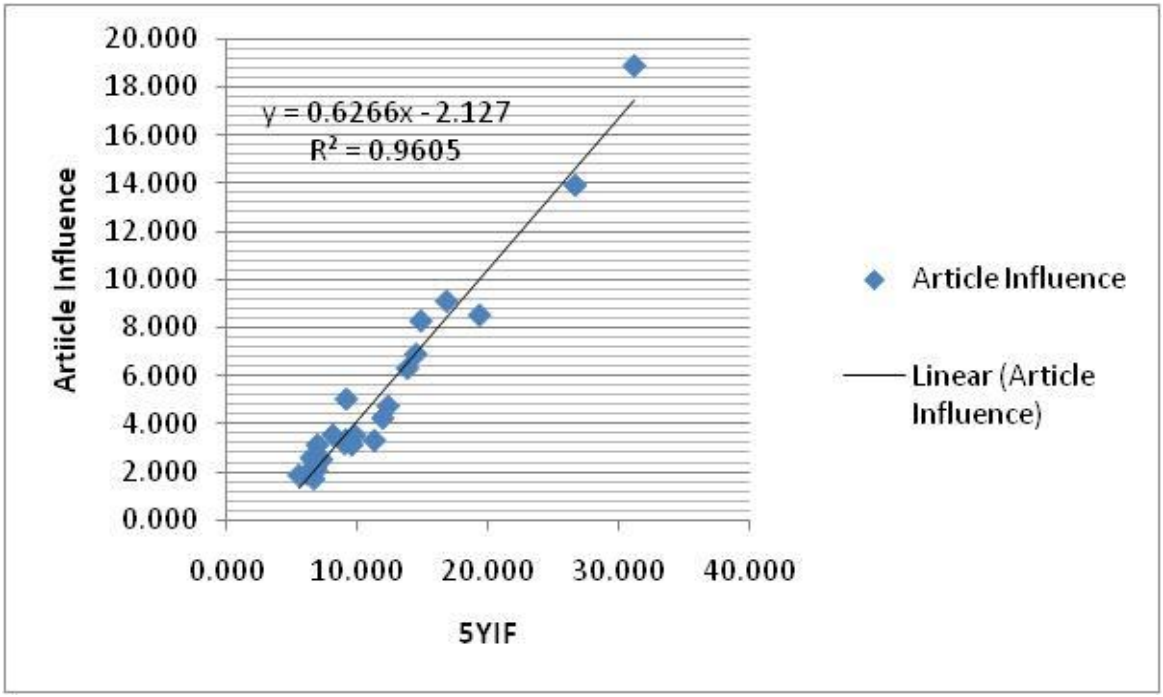
Note: Citations data were downloaded from ISI on 12 June 2010 for 1988-2010.

Table 3
Harmonic Mean Rankings of 13 RAM Criteria for 26 Neuroscience Journals

Journal	2YIF	2YIF*	5YIF	IFI	Immediacy	h-index	C3PO	PI-BETA	Eigenfactor	CAI	Article Influence	H-STAR	2Y-STAR	Rank
Annual Review of Neuroscience	1	1	1	1	3	5	1	1	17	1	1	1	1	1
Nature Reviews Neuroscience	2	2	2	6	1	6	9	21	6	5	2	4	4	2
Neuron	3	4	5	19	7	1	2	4	2	2	5	17	19	3
Trends in Neurosciences	6	5	6	3	12	2	3	8	11	4	6	2	2	4
Nature Neuroscience	4	3	4	7	4	3	6	12	3	3	3	5	6	5
Current Opinion in Neurobiology	14	14	13	4	26	12	8	6	13	7	8	3	3	6
Progress in Neurobiology	11	11	8	8	19	7	4	3	20	8	9	7	7	7
Journal of Neuroscience	16	16	16	23	20	21	17	11	1	12	11	25	24	8
Molecular Psychiatry	7	6	9	16	2	22	15	14	16	10	10	18	15	9
Brain Research Reviews	19	19	17	9	10	14	5	2	22	15	19	9	8	10
Behavorial and Brain Sciences	5	7	3	24	6	19	24	19	24	9	4	16	25	11
Trends in Cognitive Sciences	8	8	7	12	21	15	13	16	14	6	7	6	10	12
Brain	10	10	11	15	16	4	7	9	8	11	12	13	13	13
Neuroscientist	24	21	24	2	25	23	23	20	23	23	18	8	5	14
Neuroscience and Biobehavioral Reviews	15	15	12	5	18	16	10	7	21	14	17	12	9	15
Annals of Neurology	9	9	14	17	8	11	20	23	9	20	13	10	17	16
Frontiers in Neuroendocrinology	12	12	10	11	5	26	25	24	26	22	14	11	11	17
Cerebal Cortex	23	23	18	21	15	13	11	5	10	13	16	23	22	18
Biological Psychiatry	13	13	15	13	11	18	21	25	7	24	15	14	14	19
Neurology (ISI: Clinical Neurology)	17	17	20	18	13	25	26	26	4	26	23	15	18	20
Neuroimage	26	26	19	26	24	9	16	17	5	17	20	26	26	21
Pain	21	25	22	25	22	8	12	10	15	18	26	24	23	22
Neuropsychopharmacology	18	18	21	20	9	17	18	18	12	21	22	20	20	23
Sleep Medicine Reviews	20	20	23	14	14	24	19	13	25	16	21	19	16	24
Neurobiology of Aging	22	22	25	10	17	20	22	22	18	25	24	21	12	25
Journal of Cerebral Blood Flow and Metabolism	25	24	26	22	23	10	14	15	19	19	25	22	21	26

Note: Citations data were downloaded from ISI on 12 June 2010 for 1988-2010.

Figure 1



Note: Citations data for Neurosciences were downloaded from ISI on 12 June 2010 for 1988-2010.