Table 1. 57 'best' papers from NAL during 1981–1997 from the point of view of the quality of the journal as measured by expected citation rate above a threshold value (XCR > 10) of the journal in which it appeared. Names have been replaced by rank according to XCR to preserve anonymity

Cites actually received	Expected citation rate (XCR)	Rank code for name of first author	Name of journal	Year	Type
1.00	32.38	XCR-1	*Phys. Rev. B*	1987	N
1.00	24.17	XCR-2	*J. Fluid Mech.*	1981	
4.00	21.93	XCR-3	*J. Non-Cryst.*	1984	
35.00	21.07	XCR-4	*J. Non-Cryst.*	1981	
22.00	21.07	XCR-5	*J. Non-Cryst.*	1981	
5.00	20.95	XCR-6	*Polymer*	1983	
6.00	18.93	XCR-7	*IEEE Comput.*	1983	
25.00	18.70	XCR-8	*J. Non-Cryst.*	1983	
0.00	18.39	XCR-9	*Int. J. Fract.*	1981	
12.00	18.20	XCR-10	*J. Non-Cryst.*	1982	
4.00	18.19	XCR-11	*J. Appl. Phys.*	1983	
1.00	17.19	XCR-12	*J. Phys. F*	1981	
51.00	16.73	XCR-13	*J. Non-Cryst.*	1986	
16.00	16.69	XCR-14	*Comput. Methods*	1986	
2.00	15.65	XCR-15	*J. Appl. Phys.*	1984	
2.00	15.23	XCR-16	*Phys. Rev. B*	1991	N
5.00	15.13	XCR-17	*J. Compos. Mater.*	1984	
3.00	14.76	XCR-18	*J. Elec. Chem.*	1986	N
0.00	14.51	XCR-19	*Solid State Commun.*	1987	
0.00	14.25	XCR-20	*J. Acoust. Soc.*	1981	
3.00	14.03	XCR-21	*J. Phys. C*	1982	
1.00	13.66	XCR-22	*Solid State Commun.*	1982	
4.00	13.62	XCR-23	*J. Appl. Poly.*	1981	
10.00	13.48	XCR-24	*J. Mater Sci.*	1982	
2.00	12.95	XCR-25	*Solid State Commun.*	1982	
1.00	12.95	XCR-26	*Solid State Commun.*	1983	
13.00	12.87	XCR-27	*Int. J. Num. M.*	1985	
36.00	12.87	XCR-28	*Int. J. Num. M.*	1985	
21.00	12.87	XCR-29	*Int. J. Num. M.*	1985	
16.00	12.87	XCR-30	*Int. J. Num. M.*	1985	
5.00	12.87	XCR-31	*Int. J. Num. M.*	1985	
10.00	12.81	XCR-32	*Int. J. Num. M.*	1987	
0.00	12.81	XCR-33	*Int. J. Num. M.*	1987	
71.00	12.76	XCR-34	*Int. J. Num. M.*	1982	
4.00	12.68	XCR-35	*J. Mater. Sci.*	1981	
3.00	12.68	XCR-36	*J. Mater. Sci.*	1981	
9.00	12.66	XCR-37	*Talanta*	1985	
2.00	12.00	XCR-38	*Solid State Commun.*	1984	
5.00	11.77	XCR-39	*J. Appl. Phys.*	1982	N
29.00	11.70	XCR-40	*Int. J. Num. M.*	1983	
2.00	11.56	XCR-41	*J. Mater. Sci.*	1984	
8.00	11.24	XCR-42	*J. Mater. Sci.*	1983	
3.00	11.19	XCR-43	*J. Appl. Poly.*	1984	
0.00	10.97	XCR-44	*J. Elec. Chem.*	1991	
4.00	10.79	XCR-45	*Atmos. Env. A*	1990	
2.00	10.65	XCR-46	*Physica C*	1992	
18.00	10.43	XCR-47	*Int. J. Num. M.*	1986	
6.00	10.43	XCR-48	*Int. J. Num. M.*	1986	
26.00	10.43	XCR-49	*Int. J. Num. M.*	1986	
15.00	10.43	XCR-50	*Int. J. Num. M.*	1986	
12.00	10.43	XCR-51	*Int. J. Num. M.*	1986	
0.00	10.42	XCR-52	*Int. J. Fract.*	1984	
13.00	10.30	XCR-53	*Int. J. Num. M.*	1988	
2.00	10.17	XCR-54	*J. Non-Cryst.*	1988	
9.00	10.17	XCR-55	*J. Non-Cryst.*	1988	
6.00	10.12	XCR-56	*Phys. Chem.*	1991	
9.00	10.11	XCR-57	*J. Non-Cryst.*	1990	

NAL papers arranged according to decreasing XCR which is the average citation per paper based on the journal title, year of publication and type of document. Thus, a paper published earlier should be expected to have more citations than the one published later. Categories (i.e. type of document) also matter: A full paper, a note and a letter to the editor may receive different citations. I have chosen all items which have appeared from NAL in an issue and category where XCR > 10. These can be considered to be the best journals ever used by NAL scientists during this period (1981–1997), implying that they have the highest IF. It is easier to use this criterion than the IF values as the latter keep changing from year to year. However this does not mean that the paper which is fortunate to appear in such a prestigious journal will ever be used. In fact the 57 papers which belong to this category include many which have 0 or 1 citations since they appeared!

and see in which journals these citations occur, rather than merely look at the IF of the journal in which a paper is published'.

My exercise, outlined below, showed that this is really true, by carrying out a retrospective analysis. In fact, it will turn out that papers which have appeared in high IF journals may sink without a trace and that the really good papers will attract citations in excess of the number expected for that issue of that journal (the expected citation rate). What I have done is to track such papers which have a relative citation rate (RCR) greater than 1, implying that actual citations received by the paper are greater than that expected of a contribution in that category in that journal. To ensure that only the really good journals are screened, one can consider only papers that have originally appeared in journals which have an XCR greater than a prescribed and meaningful threshold.

The exercise was carried out with some statistics I have of the National Aerospace Laboratories' (NAL) record in this aspect of research assessment. Recently, we procured the Institute of Scientific Information's (ISI) Institutional Citation Report. Arguably, this allows us to compile an objective assessment of the published literature originating from NAL during 1981–1997, the period covered by the ISI database.

It is proposed to conduct the Research Assessment exercise by evaluating the performance of published papers using the RCR > 1 criteria, where RCR is taken as the ratio of actual citations received to the expected citation rate (XCR). The XCR is the average citation per paper based on the journal title, year of publication and type of document. Thus, a paper published earlier should be expected to have more citations than the one published later. Categories (i.e. type of document) also matter: A full paper, a note and a letter to the editor may receive different citations. This is why the RCR approach may be better than using the IF or citations approach as is usually done.

What I have done is to choose all items which have appeared from NAL in a journal issue and category where XCR > 10 from the ISI database (57 papers out of the 587 papers that had NAL listed in one of the author's addresses in the ISI database). This is a strict criterion, considering that such distributions are highly

Table 2. 15 papers from the 57 'best' papers of Table 1 which have RCR > 1, i.e. actually received citations in excess of XCR, ranked according to RCR

Relative citation rate (RCR)	Cites actually received	Expected citation rate (XCR)	XCR rank from Table 1	Name of journal	Year
5.56	71.00	12.76	XCR-34	*Int. J. Num. M*	1982
3.05	51.00	16.73	XCR-13	*J. Non-Cryst.*	1986
2.80	36.00	12.87	XCR-28	*Int. J. Num. M*	1985
2.49	26.00	10.43	XCR-49	*Int. J. Num. M*	1986
2.48	29.00	11.70	XCR-40	*Int. J. Num. M*	1983
1.73	18.00	10.43	XCR-47	*Int. J. Num. M*	1986
1.66	35.00	21.07	XCR-4	*J. Non-Cryst.*	1981
1.63	21.00	12.87	XCR-29	*Int. J. Num. M*	1985
1.44	15.00	10.43	XCR-50	*Int. J. Num. M*	1986
1.34	25.00	18.70	XCR-8	*J. Non-Cryst.*	1983
1.26	13.00	10.30	XCR-53	*Int. J. Num. M*	1988
1.24	16.00	12.87	XCR-30	*Int. J. Num. M*	1985
1.15	12.00	10.43	XCR-57	*Int. J. Num. M*	1986
1.04	22.00	21.07	XCR-5	*J. Non-Cryst.*	1981
1.01	13.00	12.87	XCR-27	*Int. J. Num. M*	1985

Performance of a published article has been evaluated using the RCR criterion. This is computed as the ratio of the actual citations received by the item published to the expected citation rate, XCR. The criterion here is to select from the list of 57 in Table 1, only those papers which actually received citations in excess of XCR (i.e. RCR > 1). Only 15 papers are found now. Arguably, these are the best papers published from NAL during this period. Note now the reversal of fortunes: The RCR rank has little correlation to the XCR rank. One more confounding factor when XCR or IF value is used to rank quality is that these values vary across disciplines. Thus, in this instance, in a multi-disciplinary institution like NAL, science-based papers earn much higher XCR than engineering-based papers and a larger share of the former appears in Table 1. The use of RCR removes this complication, and the relative rankings have changed considerably.

If one were to relax this criterion more generously, so that journals which have XCR > 5 are all included, then we find an enlarged number of 150 papers from NAL appearing in such a list. Under this relaxation, about 37 papers from NAL (out of 587 listed in the ISI database) have received RCR > 1, i.e. citations in excess of the XCR = 5 stipulation.

skewed, with long tails, and with the mean likely to be very much to the right of the median. These papers have appeared in what can be considered to be the best journals ever used by NAL scientists during 1981–1997, implying that they have the highest IF. However, this does not mean that the paper which is fortunate to appear in such a prestigious journal will ever be used. In fact as Table 1 shows, the 57 papers which belong to this category include many which have 0 and 1 citations since they appeared! In fact more than half the papers in this list have RCR < 0.5, confirming Tibor Braun's assessment that the RCR of Indian papers is less than one.

My further criterion is to select from this list of 57, only those papers which actually received citations in excess of XCR. This is again an extremely strict criterion, especially considering the recent debate in *Nature* which establishes that papers from the Third World are often under-cited. Only 15 papers are found now (Table 2). Arguably, these are the best papers published from NAL during this period.

The RCR criterion, more than the IF criterion, gives on a retrospective basis, an appreciation of what really are the papers that have been used over a well-defined period. Thus, this approach meets exactly Arunachalam's prescription[1] that 'one should count the number of times a paper is cited and see in which journals these citations occur, rather than merely look at the IF of the journal in which a paper is published'.

Discrimination here operates very unfairly at two levels. There is an accepted perception of discrimination regarding publication of papers. It is believed that a paper from 'weaker section' authors (e.g. women scientists, or those from the developing nations, as seen here) has to be much better than one from the 'stronger sections' to be accepted, i.e. the rejection criterion is more stringently applied to them. Seemingly, this would imply that their accepted publications would on an average, be of better quality. This is discrimination at one level.

One would then expect that these papers would invite better citation rates. The operation of Arun's Law of IF depreciation is an expression of the fact that discrimination probably manifests at the citation level too – that papers from the 'weaker sections', which may arguably be better than average, are fated to receive lower than average citations. Such concerns about region-based citation bias have appeared earlier[2].

1. Arunachalam, S., *Curr. Sci.*, 1999, **76**, 1191–1203.
2. Paris, G., De Leo, G., Menozzi, P. and Gatto, M., *Nature*, 1998, **396**, 210.

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Genetics of hot-water epilepsy: A preliminary analysis

Reflex or sensory epilepsy commonly refers to a group of epileptic syndromes in which convulsions are precipitated by various kinds of sensory stimuli[1]. Hot-water epilepsy (HWE), also known as water-immersion epilepsy[2] or bathing epilepsy[3,4], is a particularly interesting syndrome in which epileptic seizures are induced by the stimulus of bathing with hot water poured over the head[5–9]. Although sporadic cases of HWE have been reported widely from across the world[10], there appears to be a surprisingly high prevalence of the disease in southern India[6,7,9,11,12]; in one study, for example, HWE accounted for 3.6 to 3.9% of all reported cases of epilepsy[9]. A recent neuroepidemiological survey of this syndrome in the Bangalore-urban and Bangalore-rural districts of Karnataka, however, estimated that almost