

More to-do about citation counts in British psychology

J. Philippe Rushton and Norman S. Endler

Additional validity data are provided for using citation and publication counts in assessing the work of British psychologists and departments of psychology. Tables are provided showing that the great majority of academic psychologists have very few of either publications or citations. Using the 1975 *Social Science Citation Index* as a data base, for example, 62 per cent of the 738 British psychologists studied were found to have zero publications in that year and 39 per cent had zero citations. We conclude once again that an extremely small number of psychologists account for the great bulk of impact on the field.

Citation counts, as indexed by the *Science Citation Index* (SCI) and the *Social Science Citation Index* (SSCI) have been used by the present authors in a number of recent studies of the discipline of psychology. We believe that citation counts can be used to provide a useful index of the impact of the work of not only individuals, but also of journals, departments, and even countries (see references).

To begin with let us consider some additional validity data. Garfield (1977a, b, c) listed the 250 most cited individuals in all disciplines for the period 1961—1975. These individuals had a yearly SCI citation average over this period of 266, compared to the yearly average of all authors cited in the SCI of 7. Seventeen per cent of them (42) had received the Nobel Prize. Forty-four per cent (110) had been elected to the USA National Academy of Science and 22 per cent (55) belonged to the Royal Society of London. In all, over 60 per cent (151) had been members of at least one national academy. Thus high citations for individuals are validated against clear recognition of scientific eminence.

When we turn to aggregates of individuals, as measured at the departmental level, again we get clear evidence for convergent validity against highly meaningful external criteria. In 1970, the American Council on Education published a study evaluating the quality of a number of graduate programmes in American Universities (Roose & Andersen, 1970). These evaluations consisted of average ratings given by departmental chairpersons in other universities. We have recently compiled a listing of the top 100 psychology departments from the United States, Canada, and the United Kingdom combined (Endler, *et al.*, (1978). The number of citations that the

American departments had accumulated correlated over 0.60 with the ratings of quality that chairpersons had assigned some 6 years earlier. Neither did it matter whether we calculated these correlations using a department's total citations, mean citations, or median citations. In all cases the Pearson product moments were greater than 0.60.

There was also evidence for consistency operating in the listings of the British universities (Rushton & Endler, 1977). There, total citations, mean citations, total publications, and mean publications all inter-correlated significantly. We have since calculated the median citations for British psychology departments. The top universities on this measure were Oxford with 25; Sussex (Experimental) with 9; Surrey with 5; Birmingham, Bristol, Cambridge, Cardiff, and Exeter with 4; Aberdeen, Durham, Sheffield, Swansea, and Warwick with 3; and Aston, Bradford, Liverpool, London (Total), Reading, Sussex (Social), and York with 2. Fifteen other universities had a median of one citation, and 10 had a median of 0. Despite the number of ties and the restricted amount of variance, this new rank ordering demonstrated a Pearson product moment correlation of $r = 0.47$ with total citations, $r = 0.93$ with mean citations, $r = 0.20$ with total publications and $r = 0.51$ with mean publications. It would seem that whatever measures are taken a fair degree of consistency is found.

It might be that the use of median citations would be particularly useful for evaluating individuals against norms. In our previous paper we calculated that the mean number of 1975 SSCI citations a British faculty member had was 7.2. This figure however might be misleading since in fact 78 per cent of faculty members had fewer than this. Accumulating a large number of citations to one's work is in fact very uncommon (as is also publishing more than one paper a year). Garfield (1976) has provided some interesting information in relation to the significance of numbers of citations per article. For example less than 25 per cent of all published papers will be cited 10 times in all eternity! Furthermore any paper cited 10 times in each of 2 successive years is well on its way to citation stardom. 'Whether the author is on the way to immortality (however) depends on how well he or she does in other papers' (Garfield, 1976, p. 5).

In order to put productivity and impact for individuals into perspective, we offer the data in Table 1 for consideration. From Table 1 it can be readily seen that 62 per cent of faculty in British

Table 1. Frequencies and cumulative percentage frequencies for distribution of citations to and publications of 738 British psychology faculty from the 1975 SSCI

Number	Publications		Citations	
	Frequency	Cumulative percentage frequency	Frequency	Cumulative percentage frequency
15 or greater	1	100	80	100
14	0	99	8	89
13	0	99	10	88
12	0	99	10	87
11	0	99	14	85
10	0	99	13	83
9	1	99	9	82
8	2	99	18	80
7	1	99	18	78
6	5	99	17	76
5	10	99	21	73
4	11	97	36	70
3	36	96	44	66
2	71	91	48	60
1	140	81	102	53
0	460	62	290	39
Total	738		738	

psychology departments did not produce a paper in 1975 (as indexed by the 1975 SSCI). This is analogous to Canadian data where 67 per cent did not produce a paper in the same year by the same criterion (Endler, 1977). At the other extreme, one individual published a total of 22 papers by our criterion. Although many of these papers constituted either book reviews or short comments on other people's papers, it is, by any standards, a remarkable degree of productivity. It is extremely rare. The picture is quite similar for the data on citations. The great majority of academic psychologists have very few citations. These findings underscore our previous conclusions that it is a very small proportion of individuals who have a disproportionately large impact on the field. The great majority of us need not feel slighted therefore if our own names (or departments) do not figure highly in the 'league tables' as our previous offering was recently characterized (Gwynne-Jones, 1978). Departments rate high in such tables only to the degree to which they have attracted 'stars' and 'superstars'. Even at the best institutions there are individuals who do highly competent research but who do not gain large numbers of citations for it. And there are obviously others who do little in the way of actual research and yet serve as catalysts and teachers and producers of people in the helping professions (which hopefully psychology is also largely about). We do not want to leave the impression that high citations are the be-all and end-all of psychology.

It is now time to turn to a specification of some of the sources of measurement error in studies using citation counts. One set of problems centres around the actual counting of citations. One common

problem is the misspelling of an author's name when cited in a publication, or the omission of an initial. Another difficulty is presented by people with hyphenated names or people who change their surnames. Often too, the same name can refer to more than one person. These factors and others, such as the sheer tedium associated with counting up citations and publications for over 700 psychologists, mean that great care must be exercised to separate out appropriate credit. We naturally attempted to check obvious sources of error such as these as much as possible.

A second problem is that using the SSCI does bias results against physiological psychologists somewhat, so the impact and productivity of departments that are strong in biological psychology may be underestimated in our study. The SSCI does selectively abstract such journals as the *Journal of Comparative and Physiological Psychology*, *Brain*, and the *Journal of Comparative Neurology*, but still it is the case that the SSCI will generally provide lower citation rates than the SCI for physiological psychologists.

A third difficulty is that the SSCI and SCI only include citations to the first author of an article and thus may underestimate the impact of the other authors. Cole & Cole (1971) however report a study of 120 physicists which contained the full range of citation data for the whole sample, including citations where the author was first, second, or third. They reported a correlation of 0.96 between citations to first author only and citations to all authors. Assuming that these results can be generalized to psychologists, it would appear that citing only first authors does not seriously bias the results. Certainly though it would be good to have more data on this problem.

A fourth objection to citation counts in the SSCI is that self-citations are included. However, Endler (1978a) found a correlation of 0.994 between total citations and citations excluding self-citations for the 56 faculty members of York University in Canada. Thus we decided not to exclude self-citations in our studies.

A fifth objection may be that work is cited for a variety of reasons; it may be cited because it was poorly done, cannot be replicated, etc., as well as being cited in a positive sense. When measuring the impact of entire departments or highly cited individuals, it is unlikely that this kind of 'negative citation' has much influence.

Except for the bias against biological psychology, we think that none of the problems discussed is serious for the evaluation of entire departments or individuals with large numbers of citations. Of course these other difficulties (inclusion of self-citations, citations accruing only to the first author on a report, and citations for poor work) may be much more important for other purposes. For example, if citation counts were to be used for the evaluation of the impact of individuals (e.g. for promotion), consideration of these other difficulties would be critical.

It would seem that citation counts are potentially extremely useful in providing an objective assessment of the quality of work of both individual faculty members and of departments. Citation counts are highly correlated with very many measures of quality. We believe that a great deal of exciting research lies in the future in the area of citation analysis.

Acknowledgement

The research was supported in part by minor research grants to the two authors from their respective universities and by Grant No. 410-78-0108 to J. Philippe Rushton from the Social Science and Humanities Research Council of Canada.

References

- Cole, J. & Cole, S. (1971). Measuring the quality of sociological research: Problems in the use of the Science Citation Index. *American Sociologist*, 6, 23-29.
- Endler, N. S. (1977). Research productivity and scholarly impact of Canadian psychology departments. *Canadian Psychological Review*, 18, 152-168.
- Endler, N. S. (1978a). Beyond citation counts: Developing research profiles. *Canadian Psychological Review*, 19, 152-157.
- Endler, N. S. (1978b). Where the 'stars' are: The 25 most cited psychologists in Canada. *Canadian Psychological Review*, (in press).
- Endler, N. S. Rushton, J. P. & Roediger, H. L. III (1978). Productivity and scholarly impact of British, Canadian and US departments of psychology. *American Psychologist*, 33, 1064-1083.
- Garfield, E. (1976). Is the ratio between number of citations and publications cited a true constant? *Current Contents* 8 (6), 5-7.

- Garfield, E. (1977a). The 250 most-cited primary authors, 1961-1975. Part I. How the names were selected. *Current Contents* 9 (49), 5-15.
- Garfield, E. (1977b). The 250 most-cited primary authors, 1961-1975. Part II. The correlation between citedness, nobel prizes and academy memberships. *Current Contents* 9 (50), 5-15.
- Garfield, E. (1977c). The 250 most-cited primary authors, 1961-1975. Part III. Each author's most-cited publication. *Current Contents* 9 (51), 5-20.
- Gwynne-Jones, H. (1978). Correspondence. *Bulletin of The Psychological Society*, 31, 55.
- Roose, K. D. & Andersen, C. J. (1970). *A rating of graduate programs*. Washington, DC: American Council on Education.
- Rushton, J. P. (1977). The impact of British psychology journals on science. *Bulletin of The British Psychological Society*, 30, 212-213.
- Rushton, J. P. & Endler, N. S. (1977). The scholarly impact and research productivity of departments of psychology in the United Kingdom. *Bulletin of The British Psychological Society*, 30, 369-373.
- Rushton, J.P. & Endler, N. S. (1979). Assessing impact (quality?) in psychology: The use of citation counts. *Personality and Social Psychology Bulletin* (in press).
- Rushton, J. P. & Roediger, H. L. III. (1978). An evaluation of 80 psychology journals based on the *Science Citation Index American Psychologist*, 33, 520-533.
- Science Citation Index*. Philadelphia: Institute for Scientific Information.
- Social Science Citation Index*. Philadelphia: Institute for Scientific Information.

Requests for reprints should be sent to **J. Philippe Rushton**, Department of Psychology, University of Western Ontario, London, Ontario, Canada N6A 5C2.

Norman S. Endler is at the Department of Psychology, York University, Toronto, Ontario, Canada M3J 1P3.

Abstracts

Abstract of papers read at the International Conference on Practical Aspects of Memory (*continued*).

U. Neisser (Cornell University)

MEMORY: WHAT ARE THE IMPORTANT QUESTIONS?

Psychologists have studied memory for over a century, but usually with artificial materials and in laboratory settings. Although this tradition has generated many theoretical questions, none has been resolved. We may need a more naturalistic approach, based on the observation of memory in everyday life. The important questions are still pre-theoretical: on what occasions do people use memory? Who uses it, and for what purpose? Do different individuals remember or forget different kinds of things? How do the uses of memory vary with age, education or culture? What are the relations between laboratory memory and ordinary remembering?

Some information on these issues is already available. Cross-cultural studies of memory, developmental studies, experiments on the memory of witnesses to accidents and crimes, studies of memory distortion as functions of

self-image or belief, studies of memory for events of long ago all provide relevant information. An additional line of research, which I have undertaken together with D. Herrmann of Hamilton College, concerns individual differences in memory as used in everyday situations. We have devised a 72-item Inventory of Memory Experiences which asks people how often they fail to remember people's names, lose their way, have to look up a telephone number a second time, forget to bring up an intended topic, fail to carry out errands, and so on. The Inventory also inquires about memory of early childhood and other remote experiences. A factor analysis of the results with 205 subjects suggests that there is not only a general memory factor but specific memories for names, errands, rote material like phone numbers, and so on. The relations between these factors on the one hand, and memory for childhood, self-appraisal of one's memory, use of mnemonic devices, etc., on the other hand are being explored. We plan further research on changes in these factors with age, and on their relation to actual performance in laboratory tests. Work of this kind may make it possible to see the problem of memory from a new perspective that has both practical and theoretical implications.