

Choosing Physiology Journals

By ESTELLE BRODMAN

FOR MANY YEARS administrators of library collections have sought objective criteria for assembling well-rounded periodical collections in the subject fields represented by their collections. The nearest approach to any criterion which does away with the *a priori* knowledge of the specialist was first suggested by Gross and Gross in 1927.¹⁰ This method consists, essentially, of counting the bibliographic citations at the conclusions of the articles in a basic periodical of the field under consideration, and of arranging the journals cited in order of the frequency of their citation. Thus, in the field of chemistry, the references in the *Journal of the American Chemical Society* are counted and a list is made of the most frequently cited journals. According to Gross and Gross, the journals which are cited most frequently in the *Journal of the American Chemical Society* are the most valuable journals for a library to purchase in order to possess a well-rounded collection in chemistry.

Since 1927 this method has been used frequently and for many diverse subject fields¹⁻²² with only one fundamental change: namely, the use of several journals representing different languages or different countries in place of the single journal as the basis for counting. Where a single journal has been desired, a journal of the "annual review" type (known also as *Jahresbericht*, *Ergebnisse*, *Année*, etc.) has frequently been employed.

Although the Gross and Gross method has been in use for almost twenty years, the fundamental assumptions upon which the method is based have never been examined. These assumptions are:

1. The value of a periodical to a professional worker is in direct proportion to the number of times it is cited in the professional literature.
2. The journal or journals used as the base for the tabulation are representative of the entire field.
3. If more than one journal is used as a base, all of them can be weighted equally.

Recently an investigation has been undertaken³ to examine these assumptions. If a periodical is valuable to professional workers in direct proportion to the number of times it is cited in the professional literature, it should follow that a list of the periodicals actually considered valuable by professional workers in a particular field should approximate

a list obtained by the Gross and Gross method. Such a correlation was sought for in the field of physiology.

METHOD

The members of the Department of Physiology of the College of Physicians and Surgeons, Columbia University, were asked to list the periodicals which they considered of most value to them in order of their value (Table 1). This list was compared with lists obtained by counting the citations in the *Annual Review of Physiology* and in the three leading "national" physiological journals: the *American Journal of Physiology*, the *Journal of Physiology* and *Pflüger's Archiv* (Table 2). The lists were then examined by the Spearman rank-difference formula:

$$(\text{rho}) P = 1 - \frac{6 \sum D^2}{N(N^2 - 1)} \quad \text{where } \sum D^2 = \text{sum of squares of the differences between two ranks}$$

N = no. of ranked pairs

This formula is intended to show a correlation or lack of correlation between two sets of ranked items. A correlation (rho) of ± 1.00 shows absolute correlation: $+1.00$ being absolute positive correlation, and -1.00 being absolute negative correlation (Figure 1). A correlation of $\pm .50$ or less indicates a lack of correlation; $\pm .50$ to $\pm .75$ indicates a trend, but is not proof of a correlation; while a rho of $\pm .75$ or more is evidence of real correlation.²³

rho = +1.00			rho = -1.00		
	A	B		A	B
a	1	1	a	1	5
b	2	2	b	2	4
c	3	3	c	3	3
d	4	4	d	4	2
e	5	5	e	5	1

FIG. 1. Absolute correlation. Positive and negative rhos.

When the departmental list was compared with the *Annual Review* list and the "national journals" list (Table 2), and correlation coefficients of only .573 and .618 were obtained, a grave doubt was thrown on the validity of the first basic assumption.

To test the second and third assumptions, various journals and combinations of journals were used as the base, and periodical references counted (Table 3). Theoretically, if any journal chosen is representative of the entire field, samplings of the rest of the field should give approximately equal findings. Table 3 shows that lists obtained by the use of the *American Journal of Physiology*, or the *Annual Review of Physiology*, or the *Journal of Physiology* as the base were not similar to lists obtained from the use of *Pflüger's Archiv* as the base. Nor did lists obtained from the use of the *Annual Review of Physiology* as a

base and any other journal chosen have a high coefficient of correlation. If the results obtained depend upon the journal selected as the base, it appears that no journal is representative of the entire field, and that, moreover, the journals cannot be weighted equally.

TABLE 1

Journals most frequently listed by the members of the Department of Physiology, College of Physicians and Surgeons, Columbia University, in the order of frequency of citation.

No.	Journal	Votes
1.	American journal of physiology	87
2.	Physiological reviews	67
3.	Journal of physiology	59
4.	Journal of biological chemistry	33
4.	Journal of general physiology	33
5.	Journal of clinical investigation	31
6.	Journal of experimental medicine	30
7.	Biochemical journal	24
7.	Pflügers Archiv	24
8.	Quarterly journal of experimental physiology	17
9.	American heart journal	13
9.	Society for experimental biology and medicine. Proceedings.	13
10.	Ergebnisse der Physiologie	11
10.	Biochemische Zeitschrift	11
10.	American Medical Association. Journal	11
11.	Royal Society of London. Proceedings, B	10
11.	Journal of cellular and comparative physiology	10
12.	Archives of internal medicine	8
13.	Nature	7
14.	Skandinävisches Archiv für Physiologie	6
15.	American journal of the medical sciences	5
16.	Archives internationales de physiologie	3
16.	Journal of neurophysiology	3

TABLE 2

Rank-order correlations of journals appearing in all lists (Annual review list; national journals list; departmental list)

Journal	A Annual review	B National journals	C Departmental list
American journal of physiology	1	1	1
Journal of physiology	3	2	2
Pflüger's Archiv	4	3	6
Journal of biological chemistry	5	4	3
Society for experimental biology and medicine. Proceedings	2	5	7
Biochemische Zeitschrift	11	6	8
Royal Society of London. Proceedings, B	8	7	9
Biochemical journal	6	8	5
Archives internationales de physiologie	9	9	11
Skandinävisches Archiv für Physiologie	7	10	10
Journal of general physiology	10	11	4

The rho of AC is .573
rho of AB is .764
rho of BC is .618

TABLE 3

Rank-order correlation between results of Annual Review method and National journals results

Journal	Annual review of physiology A	American journal of physiology B	Journal of physiology C	Pfänger's Archiv D	National journals E
American journal of physiology	1	1	2	3	1
Journal of physiology	3	2	1	2	2
Journal of biological chemistry .	6	3	4	10	4
Society for experimental biology					
—Proceedings	2	4	8	11	5
Pfänger's Archiv	5	5	3	1	3
Société de biologie C.R.	4	6	5	6	6
Biochemical journal	7	7	7	13	10
Archiv für experimentelle pathologie	9		10	5	9
Royal society of London Proc., B	11	10	6	8	8
Klinische wochenschrift	10	11	11	7	11
Journal of general physiology . .	13	12	14	14	14
Archives internationales de physiologie	12	13	13	9	12
Skandinävisches archiv für physiologie	8	14	12	12	13
Biochemische zeitschrift	14	8	9	4	7

The rho of AE is .728
 rho of AB is .793
 rho of AC is .737
 rho of AD is .302
 rho of BC is .888
 rho of BD is .492
 rho of CD is .718

CONCLUSIONS

The Gross and Gross method has been extremely valuable in helping administrators to build up periodical collections in many diverse fields about which they could not themselves have expert subject knowledge. For this reason it has probably been accepted more or less uncritically, with the feeling that any method was better than no method. Yet it appears to be a somewhat unscientific and unscholarly method, as well as one which gives untrustworthy results. In spite of these extremely grave drawbacks, the method will probably continue to be employed by librarians until the library profession is presented with a better one. Individuals using the method, however, should be aware of the small dependence which can scientifically be placed on its results.

SUMMARY

An attempt has been made to test mathematically the fundamental assumptions upon which the Gross and Gross method of choosing jour-

nals for a library is based, using physiology journals as the example. The author has shown that the assumptions are not true.

BIBLIOGRAPHY

(A complete discussion of the pertinent literature on the subject of the Gross and Gross method of choosing journals can be found in reference number 3.)

1. ALLEN, E. S. Periodicals for mathematicians. *Science*, 70:592-94, 1929.
2. BARNARD, C. C. Selected of periodicals for medical and scientific libraries. *Library association record*, s. 5, 5:549-57, 1938.
3. BRODMAN, ESTELLE. Methods of choosing physiology journals. Master's essay, School of Library Service, Columbia University, Oct. 1943.
4. COX, F. L. What are the basic education periodicals for a teachers college library? Master's thesis, School of Library Service, Columbia University, 1936.
5. CROFT, KENNETH. Periodical publications and agricultural analysis; a bibliographical study. *J. of chemical education*, 18:315-16, 1941.
6. DALZIEL, C. F. Evaluation of periodicals for electrical engineers. *Library quarterly*, 7:354-72, 1937.
7. FORD, N. N. What is an adequate collection of periodical material for the land-grant college offering graduate work in agriculture? Master's essay, School of Library Service, Columbia University, 1932.
8. GREGORY, JENNY. Evaluation of medical periodicals. *Bull. Med. Lib. A.*, 25:172-88, 1937.
9. ———. Evaluation of periodical literature from the standpoint of endocrinology. *Endocrinology*, 19:213-15, 1935.
10. GROSS, P. L. K. and GROSS, E. M. College libraries and chemical education. *Science*, 66: 385-89, 1927.
11. GROSS, P. L. K. and WOODWARD, A. O. Serial literature used by American geologists. *Science*, 73:660-64, 1931.
12. HACKH, INGO. Periodicals useful in the dental library. *Bull. Med. Lib. A.* 25:109-12, 1936.
13. HENKLE, H. H. Periodical literature in biochemistry. *Bull. Med. Lib. A.*, 27:139-47, 1939.
14. HOOKER, R. H. Study of scientific periodicals. *Rev. of scient. instruments*, n.s. 6:333-38, 1935.
15. HUNT, J. W. Non-medical journals for the clinical library. *Library quarterly*, 8:503-09, 1938.
16. ———. Periodicals for small bio-medical and clinical library. *Library quarterly*, 7:121-40, 1937.
17. JENKINS, R. L. Periodicals for child guidance clinics. *Mental hygiene*, 16:624-30, 1932.
18. ———. Periodicals for medical libraries. *J.A.M.A.*, 97:608-10, 1931.
19. LYLE, G. R. Selection of civil engineering journals in the college engineering library. Master's essay, School of Library Service, Columbia University, 1932.
20. MCNEELY, J. K. and CROSNO, C. D. Periodicals for electrical engineers. *Science*, 72:81-84, 1930.
21. MENGERT, W. F. Periodicals on endocrinology of sex. *Endocrinology*, 18:421-22, 1934.
22. SHERWOOD, K. K. Relative value of medical magazines. *Northwest med.*, 31:273-76, 1932.
23. SORENSON, HERBERT. Statistics for students of psychology and education. N.Y., McGraw-Hill, 1936.