

Highly Cited Articles. 18.<sup>1</sup>  
Physiologic Psychology  
and Animal Behavior

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Recently I reported a citation analysis of a group of psychology and behavior journals, listing the journals they cited most heavily, and the journals that cited them most heavily.<sup>3</sup> Usually we have supplemented these journal analyses with lists of highly cited articles that contributed to the journals' citation records. The first of two lists of highly cited articles from psychology and behavior journals is given here.

We have received many generous comments from readers about the lists of highly cited articles. It's gratifying that what began as an exercise in documentation and statistical bibliography has proven of such value and interest. Some readers have asked that I explain how we compile these lists of highly cited articles. I'm glad to do so.

Briefly, it's done this way. The *Science Citation Index*<sup>®</sup> (*SCI*<sup>®</sup>) now spans the period from 1961 to the present. We've processed some 45 million citations or more. Since the number changes by thousands every day, it's pointless to try to be more precise. The citations are processed, of course, to produce the volumes of the *SCI*, but we use this huge data bank for many other purposes. One such purpose is to compile 'highly cited' lists—of journals, authors, articles.

The millions of citations are scanned, manipulated, and then arranged in any sequence that's convenient or necessary for a particular analysis. Then they are listed in any desired order for high-speed-printer tabulations—by author, by article, by journal, by year, by citation count, etc. I hope that we will soon have various

arrangements of the data accessible online—both for our own use, and for that of students of the history and sociology of science. In most cases, the mass of the material requires us to limit the size of tabulated print-outs.

In compiling lists of highly cited articles, we have been limited for the time being by initial programming specifications. As a first screen, our selection has required that an article have been cited at least *ten* times in any one year.

This means it's possible that we've slighted articles that have been cited consistently eight or nine times each year. As it turns out, there aren't as many such articles as one might suppose. Considering articles that have been cited only *thirty* times over the 1961–1972 period, it's extremely rare to find one that has not been cited more than ten times in at least *two* years.

In the two lists of psychology articles we give articles that have been cited at least 75 times during the period 1961–1973. It should be noted that a total of seventy-five citations over that period is no mean record. It's well above average. The average cited article is cited about 1.7 times a year.<sup>3</sup> A thirteen-year citation count for the 'average' article would be about twenty-two. Thus, an article cited seventy-five times from 1961 through 1973 has been cited almost four times as often as the 'average' article.

The list given here shows the total number of times each article has been cited during the period 1961 through 1973. The citation count for the year 1973 only is given in parentheses after the total

citation count. Though some of these articles are very old in bibliographic terms, their average citation count for 1973 is about twenty. Only eleven, or about a sixth of them, were cited less than ten times in 1973. In the case of those eleven, the average citation count for 1973 was more than six.

As I've mentioned, this is the first of two lists of highly cited articles from psychology and behavior journals. The second will appear shortly. With the gener-

ous assistance of Professor Victor Laties of the University of Rochester Medical Center, the complete list of highly cited psychology and behavior articles was separated into two groups: those dealing with physiologic psychology and animal behavior; and those dealing with human psychology and behavior. The articles in the first group appear on the following pages. Their titles are listed by year of publication.

**1.** Though this is the first of these essays with this main title, it has been subtitled the eighteenth to establish the series to which it belongs, and, in answer to many requests, to allow me to list the series. Previously published lists of highly cited articles are:

- a. (1) Garfield E. Were the 1972 papers most cited in 1972 the most significant? *Current Contents* (CC) No. 42, 17 October 1973, p. 5-6.
- b. (2) ---. The 25 most cited 1971 papers reveal a great deal about research in 1971. *CC* No. 44, 31 October 1973, p. 5-8.
- c. (3) ---. Highly cited works in mathematics. 1. "Pure" mathematics. *CC* No. 47, 21 November 1973, p. 5-9.
- d. (4) ---. Highly cited works in mathematics. 2. "Applied" mathematics. *CC* No. 48, 28 November 1974, p. 5-9.
- e. (5) ---. The 1970 papers most frequently cited from 1970 to 1973. *CC* No. 51, 19 December 1973, p. 5-8.
- f. (6) ---. Selecting the all-time citation classics; here are the fifty most cited papers for 1961-1972. *CC* No. 1, 2 January 1974, p. 5-9.
- g. (7) ---. The second fifty papers most cited from 1961-1972. *CC* No. 6, 6 February 1974, p. 5-9.
- h. (8) ---. A list of 100 most cited 'chemical articles.' *CC* No. 10, 6 March 1974, p. 5-12.
- i. (9) ---. Journal citation studies. 8. Some highly cited articles from highly cited general medical and clinical journals. *CC* No. 27, 3 July 1974,

p. 5-12.

j. (10) ---. Journal citation studies. 9. Highly cited pediatric journals and articles. *CC* No. 29, 17 July 1974, p. 5-9.

k. (11) ---. Journal citation studies. 10. Geology and geophysics. *CC* No. 30, 24 July 1974, p. 5-9.

l. (12) ---. Journal citation studies. 11. *Journal of Geophysical Research*. *CC* No. 33, 14 August 1974, p. 5-8.

m. (13) ---. Journal citation studies. 12. *Astrophysical Journal* and its *Supplements*. *CC* No. 35, 28 August 1974, p. 5-7.

n. (14) ---. Journal citation studies. 13. *Acta Crystallographica*. *CC* No. 37, 11 September 1974, p. 5-10.

o. (15) ---. Journal citation studies. 15. Cancer journals and cancer articles. *CC* No. 42, 16 October 1974, p. 5-12.

p. (16) ---. Highly cited articles from plant physiology journals. *CC* No. 3, 20 January 1975, p. 5-10.

q. (17) ---. Highly cited botanical articles from botanical and other journals. *CC* No. 4, 27 January 1975, p. 5-9.

**2.** Garfield E. Journal citation studies. 19. Psychology and behavior journals. *CC* No. 9, 3 March 1975, p. 5-9.

**3.** *Science Citation Index 1973 Guide and Journal Lists*. (Philadelphia: Institute for Scientific Information, 1974) 108 p. — See page 21 for a statistical summary of each year's citation average.

# Highly Cited Articles on Physiologic Psychology and Animal Behavior

| Times cited 1961-1973<br>↓<br>Times cited 1973 only |          | Bibliographic Data  |
|---|----------|---|
| 1.  | 196 (20) | Gellermann L W. Chance orders of alternating stimuli in visual discrimination experiments. <i>J. Genetic Psychol.</i> 42:206-08, 1933.  |
| 2.  | 119 (16) | Hall C S. Emotional behavior in the rat. I. Defecation and urination as measures of individual differences in emotionality. <i>J. Comp. Psychol.</i> 18:385-403, 1934.  |
| 3.  | 176 (38) | Lorente de No R. Studies on the structure of the cerebral cortex. II. Continuation of the study of the ammonic system. <i>J. Psychologie und Neurologie</i> 46:113-77, 1934.  |
| 4.  | 112 (13) | Spence K W. The nature of discrimination learning in animals. <i>Psychol. Review</i> 43:427-49, 1936.   |
| 5.  | 84 (10)  | Loomis A L, Harvey E N & Hobart G A III. Cerebral states during sleep, as studied by human brain potentials. <i>J. Exp. Psychol.</i> 21:127-44, 1937.   |
| 6.  | 228 (15) | Estes W K & Skinner B F. Some quantitative properties of anxiety. <i>J. Exp. Psychol.</i> 29:390-400, 1941.   |
| 7.  | 179 (14) | Harlow H F. The formation of learning sets. <i>Psychol. Review</i> 56:51-65, 1949.  |
| 8.  | 97 (19)  | Miller N E & Bailey C J. Decreased "hunger" but increased food intake resulting from hypothalamic lesions. <i>Science</i> 112:256-59, 1950.   |
| 9.  | 191 (20) | Kaada B R. Somato-motor, autonomic and electrocorticographic responses to electrical stimulation of 'rhinencephalic' and other structures in primates, cat and dog. <i>Acta. Physiol. Scand.</i> 24(Suppl. 83):1-285, 1951. |
| 10.   | 79 (11)  | Amsel A & Roussel J. Motivational properties of frustration. I. Effect on a running response of the addition of frustration to the motivational complex. <i>J. Exp. Psychol.</i> 43:363-68, 1952.                           |
| 11.   | 147 (30) | Brady J V & Nauta W J H. Subcortical mechanisms in emotional behavior; affective changes following septal forebrain lesions in the albino rat. <i>J. Comp. Physiol. Psychol.</i> 46:339-46, 1953.                           |
| 12.   | 219 (12) | Sidman M. Avoidance conditioning with brief shock and no exteroceptive warning signal. <i>Science</i> 118:157-58, 1953.   |
| 13.   | 380 (43) | Nauta W J H & Gyax P A. Silver impregnation of degenerating axons in the central nervous system: a modified technique. <i>Stain Technol.</i> 29:91-3, 1954.   |
| 14.   | 213 (24) | Olds J & Milner P. Positive reinforcement produced by electrical stimulation of septal area and other regions of rat brain. <i>J. Comp. Physiol. Psychol.</i> 47:419-27, 1954.  |
| 15.   | 245 (17) | Hebb D O. Drives and the C.N.S. (conceptual nervous system). <i>Psychol. Review</i> 62:243-54, 1955.  |
| 16.   | 79 (10)  | Guttman N & Kalish H I. Discriminability and stimulus generalization. <i>J. Exp. Psychol.</i> 51:79-88, 1956.   |
| 17.   | 128 (6)  | Lacey J I. The evaluation of autonomic responses; toward a general solution. <i>Ann. N. Y. Acad. Sci.</i> 67:123-63, 1956.  |
| 18.   | 79 (24)  | Nauta W J H. An experimental study of the fornix systems in the rat. <i>J. Comp. Neurol.</i> 104:247-71, 1956.  |
| 19.   | 590 (45) | Dement W & Kleitman N. Cyclic variations in EEG during sleep and their relation to eye movements, body motility, and dreaming. <i>EEG Clin. Neurol.</i> 9:673-90, 1957.   |

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22. 78 (6) **Campbell B A & Teghtsoonian R.** Electrical and behavioral effects of different types of shock stimuli on the rat. *J. Comp. Physiol. Psychol.* 51:185-92, 1958.
23. 178 (6) **Dement W.** The occurrence of low voltage, fast, electroencephalogram patterns during behavioral sleep in the cat. *EEG Clin. Neurol.* 10: 291-96, 1958.
24. 301 (41) **Nauta W J H.** Hippocampal projections and related neural pathways to the mid-brain in the cat. *Brain* 81:319-40, 1958.
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28. 119 (8) **Glickman S E.** Preservative neural processes and consolidation of the memory trace. *Psychol. Bull.* 58:218-33, 1961.
29. 77 (11) **Herrnstein R J.** Relative and absolute strength of response as a function of frequency of reinforcement. *J. Exp. Analys. Behav.* 4:267-72, 1961.
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38. 94 (21) **Schachter S & Singer J E.** Cognitive, social, and physiological determinants of emotional state. *Psychol. Review* 69:379-99, 1962.
39. 178 (39) **Teitelbaum P & Epstein A N.** The lateral hypothalamic syndrome; recovery of feeding and drinking after lateral hypothalamic lesions. *Psychol. Review* 69:74-90, 1962.

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41. 178 (23) **Carlton P L.** Cholinergic mechanisms in the control of behavior by the brain. *Psychol. Review* 70:19-39, 1963.
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