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This Week's Citation Classic

Attneave F. *Applications of information theory to psychology: a summary of basic concepts, methods, and results.* New York: Holt, Rinehart, and Winston, 1959. 120 p. [University of Oregon, Eugene, OR]

The book contains an introduction to the concept of information as a quantifiable variable, detailed descriptions of procedures for the calculation of informational statistics, a review of psychological studies using information theory, and suggestions for further developments. [The *Social Sciences Citation Index*® (*SSCI*™) indicates that this book has been cited over 355 times since 1966.]

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"In 1954 or 1955, when I was working on problems of shape and pattern perception for a remarkably tolerant and supportive Air Force laboratory, I set out to write a long review article on information theory for a series known as the Doubleday Papers in Psychology, which almost immediately became defunct when Doubleday was taken over by Random House. I put the manuscript away with only a little disappointment, since a major part of my motivation in writing it had been to clarify my own understanding of information measurement. It lay practically forgotten until a couple of years later when I happened to mention it to a representative of Holt, whose editors read it and decided that it was perhaps worth bringing out as a book.

"Information theory was new and exciting to a great many psychologists in the 1950s. The basic works of Wiener[1] and Shannon[2] in the late 1940s had an almost immediate impact on psychology. In 1949 Miller and Frick[3] showed how response sequences could be analyzed in informational terms, and in 1951 Garner and Hake[4] presented a method of multivariate informational analysis that had a generality far beyond its original application to absolute judgments. A small flood of studies —good, bad, and indifferent—ensued. In at least one area, that of unidimensional absolute judgments, it proved possible to specify a fairly definite performance limit in terms of the Shannon-Wiener information measure. More generally, human capacities showed little or no invariance in terms of bits. Even these negative findings had value in suggesting what people were doing: The bit was not a very good *psychological* unit, but Miller's 'chunk'[5] was.

"It is certainly true, however, that the enthusiasm for measuring everything possible in bits which developed during this period was excessive and ultimately counterproductive, fostering a view that 'information theory' was just a fad. This reaction was well under way by 1959 when my book appeared; thus the popularity of the book, in the original and in German and Japanese translations, was rather surprising. Perhaps I was fairly successful in emphasizing somewhat more basic and less faddish applications.

"The proposition that the function of the nervous system is to process information has been so widely assimilated that most psychologists would now accept it as a truism. The corollary is that information theory in a *sufficiently* general sense must be absolutely basic to psychology. MacKay[6] distinguished between structural information (logons) and selective information (bits), and current developments such as Leeuwenberg's[7] elegant system for evaluating the information in complex patterns indicate that the former is primary in psychological importance. The information theory pursued in the 1950s was simply too narrow, but the time may be approaching when a book on psychological applications of information theory far more profound than mine can be written."

1. **Wlener N.** *Cybernetics.* New York: Wiley, 1948. 194 p.
2. **Shannon C E & Weaver W.** *The mathematical theory of communication.* Urbana: University of Illinois Press, 1949. 125 p.
3. **Miller G A & Frick F C.** Statistical behavioristics and sequences of responses. *Psychol. Rev.* **56**:311-24, 1949.
4. **Garner W R & Hake H W.** The amount of information in absolute judgments. *Psychol. Rev.* **58**:446-59, 1951.
5. **Miller G A.** The magical number seven, plus or minus two: some limits on our capacity for processing information. *Psychol. Rev.* **63**:81-7, 1956.
6. **MacKay D M.** *Information, mechanism, and meaning.* Cambridge, MA: MIT Press, 1969. 196 p.
7. **Leeuwenberg E.** A perceptual coding language for visual and auditory patterns. *Amer. J. Psychol.* **84**:307-49, 1971.