The Behavior Analyst 1985, 8, 185–189 No. 2 (Fall)

On the Impact of Human Operant Research: Asymmetrical Patterns of Cross-Citation Between Human and Nonhuman Research

Michael Perone
West Virginia University

Reactions to published accounts of research with human subjects, as well as research with nonhuman subjects, were assessed by examining citations in several samples of empirical articles in the *Journal of the Experimental Analysis of Behavior*. A stable, asymmetrical pattern emerged: Nonhuman research was cited in both human and nonhuman articles, but human research was cited primarily in human articles. Thus, human operant research appears to have had little influence on the nonhuman research which constitutes the bulk of the experimental analysis of behavior. Interpretation of this lack of impact depends on the functions one envisions for human research, several of which are discussed.

Within the experimental analysis of behavior, published studies involving human subjects are rare by comparison with those involving nonhumans (Buskist & Miller, 1982). Accounting for the relative lack of human research is difficult. Studies with humans allow not only for important tests of the interspecies generality of behavioral principles (Buskist, Morgan, & Barry, 1983), but also for the analysis of complex processes that are not easily discerned in nonhumans, such as those involved in verbal and social behavior (Hake, 1982). Admittedly, special problems and procedures are associated with the laboratory study of human behavior, but these do not pose insurmountable obstacles (Baron & Perone, 1982; Lowenkron, 1983).

To understand the relative lack of human operant research, it may be helpful to consider the consequences of the behavior of conducting such research. Given the social nature of the scientific enterprise, among the most important consequences are the reactions of colleagues. Although these reactions can vary considerably in formality and immediacy (e.g., from hallway discussions to editorial reviews to tenure decisions), they all require that some attention be paid to the products of research. Considering the dominance of nonhuman research within the experimental analysis of behavior, one may wonder whether much attention is paid to human research.

A comprehensive account of reactions to research would be difficult, if not impossible, as it would have to consider informal reactions to unpublished works, pilot studies, experimental failures, and so on. A more practical, albeit limited, approach is to assess reactions to published works by counting the number of times they are cited in the literature. In citing earlier research, authors tact stimuli that have affected their own scientific behavior, and the frequency of an article's citation is an accepted index of its research impact (cf. Endler, Rushton, & Roediger, 1978; Garfield, 1972).

The purpose of this article is to consider the impact of basic research with humans on the experimental analysis of behavior as a whole. Because research with nonhumans constitutes the "mainstream" of experimental analysis, the impact of human research on the nonhuman literature is of particular interest, as compared to its impact on other work with humans. A citation analysis was conducted to assess the relative attention paid to human and nonhuman research.

An earlier version was presented at the Association for Behavior Analysis convention, Milwaukee, Wisconsin, May 1983. Thanks are due K. A. Lattal and M. Galizio for advice regarding the manuscript. Requests for reprints should be sent to the author, Department of Psychology, West Virginia University, P.O. Box 6040, Morgantown, WV 26506-6040.

TABLE 1

Citation of human and nonhuman research in human and nonhuman articles published in *JEAB*

Datum	Human articles in *JEAB*, Volumes:			Nonhuman articles in *JEAB*, Volumes:		
	17-19	27-29	37-39	18	28	38
Articles in sample	9	12	11	44	24	29
Citations of human research (%)	97 (71)	110 (58)	176 (71)	24 (3)	15 (3)	19 (4)
Citations of nonhuman research (%)	40 (29)	79 (42)	73 (29)	695 (97)	529 (97)	509 (96)
Articles citing any human research (%)	8 (89)	11 (92)	11 (100)	11 (25)	4 (17)	7 (24)
Articles citing any nonhuman research (%)	9 (100)	9 (75)	9 (82)	44 (100)	24 (100)	29 (100)

METHOD

Reference lists were examined from the empirical articles in selected volumes of the *Journal of the Experimental Analysis of Behavior* (*JEAB*), the primary journal for basic operant research. The restriction to empirical articles excluded technical notes describing new apparatuses, historical notes, editorials, book reviews, and commentaries (e.g., Branch, 1977). The exclusions amounted to only 55 pages, about 4% of the total. The sample included studies of both human and nonhuman behavior in volumes 18, 28, and 38, published at 5-year intervals in 1972, 1977, and 1982. Each of these volumes yielded at least two dozen articles reporting nonhuman research, but only a few reporting data from humans. To enlarge the latter sample, human articles were added from the volumes immediately preceding and following the ones listed above. This procedure yielded 9 to 12 human articles for each sample period. Altogether, the analysis considered the most recent issues of *JEAB* at the time of the analysis (volumes 37–39), as well as the issues published 5 and 10 years earlier (volumes 27–29, 17–19). This made it possible to assess the stability of the citation patterns.

References were classified as citing human or nonhuman research. About 10% could not be classified by this scheme, including methodological works (e.g., Sidman, 1960, and technical notes), general psychology textbooks (e.g., Keller & Schoenfeld, 1950), broad theoretical papers (e.g., Skinner, 1966), and non-psychological material. Such references were eliminated from the analysis.

To determine what kinds of human research had the greatest impact, references to human research were tabulated according to the particular journal or book that published the cited article. This was done separately for the human and nonhuman samples, to determine whether these literatures differed in the kinds of human research that influenced them.

RESULTS

Of nearly 2,400 references, about 19% were to research with humans. Table 1 presents information on the distribution of these human citations, as well as the nonhuman ones, in both the human and nonhuman samples of *JEAB* articles. The table shows the absolute and relative frequencies with which human and nonhuman research was cited, as well as the number and percentage of sample articles citing *any* human and nonhuman research. These data are shown separately for each of the three sample periods. The citation patterns are remarkably stable over the decade of publication represented by the samples.

Authors of human articles cited hu-

man research frequently; such citations account for 67% of references to empirical work. By comparison, authors of nonhuman reports rarely cited human research—only about 3% of their references were to human work. In other words, authors of human articles in *JEAB* tended to cite previous human research, whereas authors of nonhuman articles tended to cite previous nonhuman research. One explanation is that authors are likely to cite research directly influencing their procedures and consequently to cite research with the same type of subject. But such a tendency cannot fully account for the asymmetrical pattern evident in Table 1: Investigators using nonhuman subjects cited human research much less than investigators using human subjects cited nonhuman research (relative rates of 3% versus 33%).

Because human research is relatively rare in the experimental analysis of behavior, citation frequency may underestimate its influence. To correct for this, a further analysis counted the number of *JEAB* articles citing any human research, regardless of the number of such citations. For purposes of comparison, the number of articles citing any nonhuman research also was determined. Not surprisingly, virtually all (94%) of the human articles cited earlier human research. Although relatively few (23%) of the nonhuman articles cited human work, the percentages are much higher than might have been suspected on the basis of the analysis of citation frequency. All of the nonhuman articles cited previous nonhuman research, and most (84%) of the human articles did so as well. These data confirm the asymmetrical pattern seen in the citation frequencies, in that the percentage of nonhuman articles citing human research was substantially less than the percentage of human articles citing nonhuman research.

A third analysis considered what kind of human research had the most impact and whether the human and nonhuman literatures differed in this regard. Six journals accounted for the majority of human research citations appearing in the human articles: *JEAB* (32% of human research citations), *Journal of Experimental Child Psychology* (6%), *Journal of Applied Behavior Analysis* (6%), *Journal of Personality and Social Psychology* (6%), *American Journal of Mental Deficiency* (4%), and the *Psychological Record* (4%). With the exception of the *Journal of Personality and Social Psychology,* these journals are known for publishing operant research. Thus, the human studies having the greatest influence on human operant research tended to be operant research as well.

Although the journals mentioned above accounted for 58% of the human citations appearing in human articles, they accounted for only 16% of human citations in nonhuman articles. The human research influencing nonhuman studies evidently was not the same as that influencing the human studies. What sort of human research did influence the nonhuman literature? Most references were to traditional areas of experimental psychology such as human memory, information processing, and signal detection. Books or chapters on such topics accounted for 40% of human research citations. The most frequently cited periodical was the *Journal of Experimental Psychology,* which accounted for nearly 20% of the human citations appearing in the nonhuman articles. In contrast, this journal ranked 16th of the 17 journals cited in human studies, accounting for less than one percent of the human citations there.

DISCUSSION

The stable patterns of human and nonhuman research citations in *JEAB* over a span of a decade depict a situation reminiscent of ones described by other commentators on behavior analysis. Krantz (1971) showed that operant and non-operant psychology have so little contact that they may be considered separate worlds. Poling and his colleagues (Poling, Picker, Grossett, Hall-Johnson, & Holbrook, 1981) confirmed the presence of worlds *within* the world of operant psychology: a world of applied behavior analysis and one of experimental analy-

sis. The present data suggest that even the world of experimental analysis may be divided into encapsulated fields: analysis of human behavior and analysis of nonhuman behavior. The schism between human and nonhuman research, however, differs from those described by Krantz and Poling et al. in an important way—it is somewhat one sided. Investigators of human behavior definitely are influenced by nonhuman research; almost every human operant paper in the sample volumes of *JEAB* cited nonhuman research, with such citations accounting for a third of references to empirical work. By comparison, less than a quarter of the nonhuman papers cited human research, and the human work that was cited often was nonoperant.

How is this situation to be judged? Interpretations may vary depending on the functions one envisions for the experimental analysis of human behavior. From at least three standpoints, the lack of interchange between human and nonhuman laboratories may be regarded as quite appropriate. First, human research may be viewed simply as a way to test the generality of nonhuman-based principles. As such, it naturally would be subsidiary to nonhuman research.

A second position is that human research should emphasize phenomena that are unique to humans, or at least more common in humans than in nonhumans. On this view, a niche for human operant research may be found in the study of social and verbal behavior (Hake, 1982; Harzem & Williams, 1983) or in the behavior analytic treatment of matters traditionally within the realms of other branches of behavioral and social science, for example, economics and decision theory (Miller, 1983). This strategy would seem to allow for a relatively independent human operant area. An unresolved question, however, is whether such research could become both independent and behavior analytic: Would it not rely on basic behavioral principles that, by default, would have to be discovered in experiments with nonhumans?

Yet a third view defines psychology as the science of *human behavior* and therefore holds that nonhuman research is of interest only in so far as it functions as a model of human behavior. Buskist et al. (1983) argued along these lines when they stated that "the important point is what operant psychology can contribute to the understanding of the variables that govern human behavior" (p. 108).

A contrasting position is that psychology is a science of *behavior in general,* and that any research, human or nonhuman, is valuable if it carries us a step closer to a general, systematic understanding of behavior. Accordingly, psychological theory should incorporate data from human and nonhuman subjects into a single account. For example, a general theory of responding under schedules of reinforcement would require thorough analysis of the discrepancies and similarities between human and nonhuman performances (see Lowe, 1979, and Weiner, 1983, for contrasting approaches to this issue). A unified account would constitute a departure from traditional practice in behavior analysis, which has been to regard nonhuman performances as reflecting "true" or "pure" schedule control and to discount the validity of human performances or, in many cases, to ignore human data altogether. From this standpoint, then, basic human research is to be evaluated for its contribution to the analysis of behavior qua behavior. Of course, human behavior may assume a place of special importance for practical or even personal reasons, but not because it is necessarily of special theoretical significance.

The minimal impact of human operant research on the nonhuman literature suggests that human research has not been contributing to the development of basic behavioral principles. The present analysis does not reveal the source of the failure, for example, whether human data are irrelevant or simply ignored. Ultimately, however, investigators are responsible for ensuring that their research is relevant to the goals of behavior analysis and for showing that their results do contribute to the analysis. Until concerted efforts are made in this regard, human

operant researchers would act hastily in giving up a role in the basic study of the behavior of organisms.

REFERENCES

Baron, A., & Perone, M. (1982). The place of the human subject in the operant laboratory. *The Behavior Analyst, 5,* 143–158.

Branch, M. (1977). On the role of "memory" in the analysis of behavior. *Journal of the Experimental Analysis of Behavior, 28,* 171–179.

Buskist, W. F., & Miller, H. L., Jr. (1982). The analysis of human operant behavior: A brief census of the literature, 1958–1981. *The Behavior Analyst, 5,* 137–141.

Buskist, W. F., Morgan, D., & Barry, A. (1983). Interspecies generality and human behavior: An addendum to Baron and Perone. *The Behavior Analyst, 6,* 107–108.

Endler, N. S., Rushton, J. P., & Roedigger, H. L., III. (1978). Productivity and scholarly impact (citations) of British, Canadian, and U.S. departments of psychology (1975). *American Psychologist, 33,* 1064–1082.

Garfield, E. (1972). Citation analysis as a tool in journal evaluation. *Science, 178,* 471–479.

Hake, D. F. (1982). The basic-applied continuum and the possible evolution of human operant social and verbal research. *The Behavior Analyst, 5,* 21–28.

Harzem, P., & Williams, R. A. (1983). On searching for a science of human behavior. *The Psychological Record, 33,* 565–574.

Keller, F. S., & Schoenfeld, W. N. (1950). *Principles of psychology.* New York: Appleton-Century-Crofts.

Krantz, D. L. (1971). The separate worlds of operant and non-operant psychology. *Journal of Applied Behavior Analysis, 4,* 61–70.

Lowe, F. (1979). Determinants of human operant behaviour. In M. D. Zeiler & P. Harzem (Eds.), *Advances in analysis of behaviour. Vol. 1: Reinforcement and the organization of behaviour* (pp. 159–192). New York: Wiley.

Lowenkron, B. (1983). Children are human too. *The Behavior Analyst, 6,* 191–192.

Miller, H. L., Jr. (1983). More than promissory? Reflections on the once and future experimental analysis of human behavior. *The Psychological Record, 33,* 551–564.

Poling, A., Picker, M., Grossett, D., Hall-Johnson, E., & Holbrook, M. (1981). The schism between experimental and applied behavior analysis: Is it real and who cares? *The Behavior Analyst, 4,* 93–102.

Sidman, M. (1960). *Tactics of scientific research.* New York: Basic.

Skinner, B. F. (1966). The phylogeny and ontogeny of behavior. *Science, 153,* 1205–1213.

Weiner, H. (1983). Some thoughts on discrepant human-animal performances under schedules of reinforcement. *The Psychological Record, 33,* 521–532.