Whither the Muse: What Influences Empirical Research on Verbal Behavior?

Thomas S. Critchfield
Illinois State University

AND

William F. Buskist and Bryan Saville
Auburn University

To identify some of the published works that have helped to inspire empirical verbal behavior research, we searched for patterns in the sources cited in empirical studies published in *The Analysis of Verbal Behavior* between 1990 and 1999. Not unexpectedly, Skinner's (1957) *Verbal Behavior* was the most cited source, although a variety of more recent sources explicating verbal relations as conceptualized by Skinner also were frequently cited. About one third of the most frequently cited sources were fairly recent primary empirical papers. These outcomes suggest that scholars who are interested in a behavior-analytic approach to studying verbal behavior are beginning to generate a critical mass of work that renders *Verbal Behavior* no longer monolithic in its influence. Nevertheless, some aspects of the citation data could be interpreted as evidence of insularity, and we argue for the importance of a broad-based analysis of verbal behavior that can have substantial impact outside of behavior analysis.

Although the emphasis is not on experimental or statistical facts . . . the ultimate aim is the prediction and control of verbal behavior. (Skinner, 1957, p. 12)

It seems reasonable to speculate that a citation analysis conducted today would show that Skinner's analysis of verbal behavior has finally led to a productive line of empirical investigation. (Sundberg, 1998, p. 144)

Skinner (1957) was forthright in portraying *Verbal Behavior* as an interpretative, rather than an empirical, analysis, and the closing statement of his introductory chapter (quoted above) aptly characterized the challenge that would face his intellectual descendants in developing empirical research based on his analysis. The importance of empirical studies to the analysis of verbal behavior has been widely discussed (e.g., Hake, 1982; Michael, 1984; Schlinger, 1998; Sundberg, 1991), and, as Sundberg (1998)

noted, it is a positive sign that enough studies have now accumulated to allow an objective evaluation of progress. For example, several literature reviews now have examined the topical emphases and methodological approaches of empirical studies of verbal behavior (e.g., Eshleman, 1991; Normand, Fossa, & Poling, 2000; Oah & Dickinson, 1989).

Another way of taking stock of the field is to examine the important influences on verbal behavior research as revealed through citation analyses. One previous study employed a citation analysis to estimate the impact of Skinner's (1957) *Verbal Behavior* on works published between 1957 and 1983 (McPherson, Bonem, Green, & Osborne, 1984). The authors of this study concluded that relatively few empirical studies had been directly influenced by Skinner's analysis, and wondered why "*Verbal Behavior* has not provided a conception that has led to the empirical examination and explanation of verbal behavior" (p. 165).

Much has transpired since the pub-

Address correspondence to Thomas S. Critchfield, Department of Psychology, Illinois State University, Normal, Illinois 61790 (E-mail: tscritc@ilstu.edu).

lication of McPherson *et al.*'s (1984) study, and *Verbal Behavior* may, as some casual appraisals suggest, play a more prominent role in verbal behavior research than it once did (Sundberg, 1998). There are, however, other possibilities. For example, perhaps verbal behavior research has evolved simply as an extension of existing traditions in the experimental analysis of human behavior, which has generated its own substantial corpus of empirical literature, especially in the last 20 years (e.g., Dougherty, 1994; Dymond & Critchfield, *in press*; Hyten & Reilly, 1992). Or, perhaps many researchers have become interested in verbal relations, but not necessarily in Skinner's (1957) writings about them. In either case, *Verbal Behavior*, and sources based upon it, would be expected to play a relatively minor role in inspiring contemporary verbal behavior research.

McPherson *et al.* (1984) identified a potential root source (*Verbal Behavior*) and worked forward in time to assess its impact on empirical studies. This strategy was necessary because at the time there existed no periodical committed to publishing behavioral analyses of verbal behavior (*The Analysis of Verbal Behavior* [TAVB] published its first empirical paper in 1985). The strategy was also inefficient in that it identified many apparently superficial citations. Thus, we adopted a more focused strategy. As part of a larger citation-analysis project (Critchfield *et al.*, 2000), we identified a group of verbal behavior research studies, and worked backward to determine the sources that had influenced them. (The two approaches provide different kinds of information, as we address in the Discussion.) In particular, we looked for thematic patterns in these sources, and any indications regarding the possible impact of *Verbal Behavior* on verbal behavior research. In a previous report (Critchfield *et al.*), we described citation patterns in the experimental analysis of human behavior overall, with little specific emphasis on verbal

behavior research. The present report is intended to complement and extend our previous findings.

METHOD

As a convenient set of studies, we chose 37 empirical reports published in TAVB from 1990 to 1999. These studies had at least two desirable characteristics. First, they represent a more recent sample of empirical studies than those examined by McPherson *et al.* (1984). Second, because TAVB is dedicated to "a behavioral analysis of verbal behavior" (journal masthead), these studies can be assumed to represent the mainstream of behavior-analytic verbal behavior research. By contrast, many of the articles citing *Verbal Behavior* (1957) in McPherson *et al.*'s study may have been only tangentially related to behavior analysis or to verbal behavior.

To conduct our analysis, we recorded each source cited by the target articles, omitting self-citations. We then determined the sources cited most frequently during our census period, and organized them thematically based on our subjective appraisal of their content (we acknowledge that other groupings are possible). To provide a context for our findings, we also drew upon selected data from our larger citation project (Critchfield *et al.*, 2000) involving experimental analyses of human behavior published in the 1990s in four journals: TAVB, the *Journal of the Experimental Analysis of Behavior* (JEAB), *The Psychological Record* (TPR), and the *Experimental Analysis of Human Behavior Bulletin* (Bulletin).

RESULTS

Most Cited Sources

Appendix A lists the sources ($N = 35$, including ties) most frequently cited in recent empirical studies in TAVB. Skinner's (1957) *Verbal Behavior* was by far the most frequently cited source among our target articles. Figure 1 draws upon data presented by Critch-

Fig. 1. Top: citation frequency (citations per source) of the 10 most frequently cited sources from each of four journals. Bottom: ratio of relative citation rates for the two most cited sources in each journal (most cited source divided by second most cited source).

field et al. (2000) to illustrate the magnitude of this outcome. By two different metrics, it is clear that no source in any journal approached the relative citation frequency of *Verbal Behavior* in TAVB.

Several patterns were evident in the thematic groupings of sources in Appendix A. Nearly one third (11) of the most frequently cited sources addressed issues surrounding verbal operants as defined by Skinner (1957) or his intellectual descendants; seven of these sources were primary empirical articles published since the mid-1980s. Thus, *Verbal Behavior* appears to have had a direct impact on verbal behavior research, as well as an indirect impact through studies based upon Skinner's book. The second largest grouping of sources focused on verbal-nonverbal interactions, in particular the influence

of instructions and rules on nonverbal behavior. Five of these 10 sources were primary empirical studies. One additional source focused on verbal report methods. Overall, 22 of the 35 most cited sources explicitly addressed verbal phenomena, and three other sources addressed problems inherent in establishing verbal behavior research programs.

These findings suggest a clear topical focus in verbal behavior research, but is it a unique focus? Drawing upon the database described by Critchfield et al. (2000), we identified the sources most frequently cited in JEAB, TPR, and the *Bulletin* ($N = 33, 33,$ and 35 , respectively, including ties), and determined the degree of overlap between these lists and Appendix A. Among the sources most frequently cited in TAVB, only seven (21%) appeared on the JEAB list, only five (15%) appeared on the TPR list, and only one (3%) appeared on the *Bulletin* list. By contrast, the other lists overlapped substantially. For example, 64% of the most frequently cited sources were identical for JEAB and TPR. Thus, many of the preferred sources in TAVB were unique to this journal.

Another noteworthy feature of Appendix A is what it does *not* include. Previous reports suggest that the experimental analysis of human behavior, as represented in JEAB and TPR, recently has been dominated by stimulus equivalence and related topics in complex stimulus control (Dougherty, 1994; Dymond & Critchfield, in press). Figure 2 compares the relative emphasis on stimulus equivalence in TAVB and three other journals that publish empirical analyses of human behavior by showing the proportion of most frequently cited sources in each journal that addressed stimulus equivalence (the proportions actually are conservative estimates, because they omit sources addressing issues such as restricted stimulus control, which have attracted new attention in conjunction with attempts to devise applied technologies based on stimulus equiva-

Fig. 2. Proportion of most frequently cited sources, in each of four journals, addressing stimulus equivalence.

lence). Alone among the four journals, *TAVB* appears not to have drawn heavily upon stimulus equivalence research. Overall, it seems reasonable to conclude that the focus of empirical verbal behavior studies in *TAVB*, as represented in reference citations, is distinct from that of the experimental analysis of human behavior, as represented in other journals.

Other Findings

Appendix B lists the individuals whose work was cited most often, all sources combined. Aside from Skinner, whose presence on the list is unsurprising given the impact of *Verbal Behavior*, most of the individuals are best known for their work in applied behavior analysis (Baer, Lovaas) or the experimental analysis of human behavior (Sidman, Catania, Shimoff, Matthews, Lowe, Chase, Galizio). Many of these individuals, however, have made contributions to the understanding of verbal behavior through these literatures, making them logical influences on *TAVB* empirical papers. Three of the most frequently cited individuals are perhaps best known for their contributions to the analysis of verbal behavior (Michael, Sundberg, Schlinger).

Appendix C lists the publications that were cited most often in our target articles. Among periodicals, *JEAB*, the *Journal of Applied Behavior Analysis*, *The Behavior Analyst*, and *The Psy-*

chological Record were heavily cited, demonstrating that the roots of *TAVB* lie in better established literatures. Interestingly, however, *TAVB* ranked second in citations, indicating that the analysis of verbal behavior may be on its way to generating an independent literature. The list of edited books provides a reminder of the multifaceted contributions of Steven Hayes. In addition to his many empirical publications (which helped to land Hayes among the most frequently cited individuals in Appendix B), Hayes has edited or published (through Context Press, <http://www.contextpress.com>) books that garnered nearly as many citations (21) as *Verbal Behavior*.

DISCUSSION

Overall, our findings leave little doubt that the empirical contributions of *TAVB* rest squarely on the conceptual traditions begun by Skinner (1957). *Verbal Behavior* was cited in more than two of every three empirical articles we surveyed. Several of our findings, however, suggest that the intellectual landscape in which the analysis of verbal behavior occurs may be changing. First, many of the most frequently cited sources we identified were fairly recent journal articles. Second, *TAVB* was the second most frequently cited journal of origin for these articles. Third, several of the most cited individuals we identified have made their mark at least partly in the verbal behavior arena. Fourth, the two most heavily cited edited books focused squarely on verbal behavior issues. It may well be that a new era has begun in the analysis of verbal behavior, in which scholars not only consult classic sources but also generate new work at a sufficient rate to sustain growth and evolution in the field.

In this sense, our findings are broadly consistent with Sundberg's (1998) assertion that a watershed has been crossed in the translation of Skinner's (1957) *Verbal Behavior* into productive research agendas. We found that

many of the most frequently cited sources were relatively recent empirical studies focusing explicitly on issues raised in Skinner's writings and those of his intellectual descendants concerned with verbal behavior. Critchfield (2000) also noted that the proportion of repeat empirical authors in *TAVB* (those with a previous empirical publication in the journal) began to rise for the first time beginning around 1996. Such trends suggest the beginnings of a self-sustaining, topically focused, research community.

As the behavior-analytic database on verbal behavior expands, logic suggests that classic conceptual sources like *Verbal Behavior* (1957) will assume a less central role in inspiring new studies. One reason is that empirical sources confer special advantages—for example, unlike conceptual sources, they often directly suggest strategies and tactics for conducting new investigations. But this is not to propose that sources like *Verbal Behavior* will be directly supplanted by empirical sources. Rather, concepts once attributed exclusively to Skinner may eventually be subsumed into, and disseminated through, a programmatic body of research to the extent that these concepts no longer are viewed as proprietary. As an analogy, consider that most modern empirical work in the experimental analysis of human behavior owes much to Skinner (1938), but *The Behavior of Organisms* is rarely cited in these studies (see Critchfield, et al., 2000). If and when this happens for *Verbal Behavior*, the book will have achieved the ultimate success by rendering itself dispensable.

A different sort of issue regarding *Verbal Behavior* (1957) concerns the extent to which it *should* dominate a contemporary analysis of verbal behavior. There is no question that *Verbal Behavior* is rife with research opportunities (Sundberg, 1991), but a case can be made for promoting a fully inclusive empirical science of verbal behavior that values multiple scholarly influences (e.g., Catania & Shimoff,

1998; Cherpas, 1998; Donahoe, 1998; Palmer, 1999). Our citation analysis found little to celebrate in this regard. Aside from *Verbal Behavior* and its by-products, the most frequently cited sources in Appendix A addressed verbal-nonverbal relations in rule and instructional control. These topics are not featured prominently in *Verbal Behavior* but were addressed in other places by Skinner (1963, 1969), who is regarded as a major source of inspiration for empirical work in this area (Baron & Galizio, 1983). Thus, nearly all of the heavily cited sources in our survey can be traced directly back to Skinner in some way.

One recent development that cannot be traced directly to Skinner is progress regarding stimulus equivalence and related forms of complex stimulus control. Approximately 30 years of empirical research and conceptual development suggests links between stimulus equivalence and language (Hayes, Hayes, Sato, & Ono, 1994; Sidman, 1971), so it is safe to say that equivalence researchers have discovered verbal behavior. At first glance, our analysis suggests that verbal behavior researchers have not yet discovered stimulus equivalence, in that only one stimulus equivalence article appeared among the most frequently cited sources in Appendix A. It is worth noting, however, that two of the most frequently cited individuals we identified (Sidman, Lowe) qualified on the strength of stimulus equivalence publications. Indeed, a remarkable 22 different publications authored by Murray Sidman—nearly all of them directly relevant to stimulus equivalence—were cited in the empirical articles we surveyed (for unknown reasons, few of these sources were cited more than once). This, combined with the appearance of several equivalence-related articles in *TAVB* (e.g., Barnes & Hegarty, 1997), suggests that verbal behavior researchers may be on the way to discovering the possibilities inherent in stimulus equivalence.

Among the most frequently cited

sources in Appendix A, only Green and Swets' (1966) influential treatise on signal detection analysis has its origin outside the behavior-analytic community. The implications of this finding bear some consideration. Possibly, it is important for nascent research communities to remain detached from the broader scholarly community in order to avoid diffusing their efforts or diluting their conceptual frameworks. In other words, an isolated verbal community can serve as an incubator that allows research programs to gain valuable momentum. Our own view, however, is that isolation is never healthy in scholarly development, and we find much to recommend in Palmer's (1999) call for verbal behavior researchers to examine non-behavior-analytic research traditions. Palmer stressed three points that bear repeating here: (a) Intellectual honesty demands a consideration of competing ideas; (b) methods and data from other traditions may well inform behavior-analytic theory; and (c) the credibility of behavior analysis in the broader scholarly community depends, in part, on addressing questions that this community has already identified as important. We add only the obvious: Behavior analysts are in the minority where research and theory on verbal behavior (broadly construed) are concerned. Because the community of verbal behavior researchers remains relatively small, valuable efficiency might be achieved by building upon the efforts of others. Unfortunately, our citation data provide no evidence that systematic efforts of this nature are currently underway.

A longstanding goal of behavior analysts has been to influence the course of psychological science, theory, and practice (e.g., see Skinner, 1976). Our data permit no comment on the extent to which the emerging research tradition in verbal behavior has influenced scholars outside the verbal behavior community. Herein lies a major difference between the present citation analysis and that conducted by McPherson

et al. (1984), who identified a broad spectrum of sources citing *Verbal Behavior* (1957). There is value in periodically replicating the sort of analysis conducted by McPherson *et al.* (1984) to assess progress in shaping general thinking on verbal behavior. Initial results, however, may not be encouraging. For example, Critchfield *et al.* (2000) found that no paper from *TAVB* was among the 98 sources most cited in the experimental analysis of human behavior overall during the 1990s. If verbal behavior research has a limited impact on such a friendly audience, then it is unlikely to persuade skeptics. Broad influence might thus be regarded as a long-term goal regarding which two positive observations can be offered. First, the world outside of behavior analysis may be gradually warming to a functional approach like that pursued in the analysis of verbal behavior (Andresen, 1992). Second, a behavior-analytic argument can be made more persuasively with data than without data. From this perspective, any evidence of increased attention to empirical issues in the analysis of verbal behavior is good news.

REFERENCES

- Andresen, J. T. (1992). The behaviorist turn in recent theories of language. *Behavior & Philosophy*, 20, 1–19.
- Barnes, D., & Hegarty, N. (1997). Relating equivalence relations to equivalence relations: A relational framing model of complex human functioning. *The Analysis of Verbal Behavior*, 14, 57–83.
- Baron, A., & Galizio, M. (1983). Instructional control of human operant behavior. *The Psychological Record*, 33, 495–520.
- Catania, A. C., & Shimoff, E. (1998). The experimental analysis of verbal behavior. *The Analysis of Verbal Behavior*, 15, 97–100.
- Cherpas, C. (1998). Why I stopped reading *Verbal Behavior* (and continue to study perceptual control theory). *The Analysis of Verbal Behavior*, 15, 101–105.
- Critchfield, T. S. (2000). Staffing the empirical analysis of verbal behavior. *The Analysis of Verbal Behavior*, 17, 175–177.
- Critchfield, T. S., Buskist, W., Saville, B., Crockett, J., Sherburne, T., & Keel, K. (2000). Sources cited most frequently in the experimental analysis of human behavior. *The Behavior Analyst*, 23, 255–266.

- Donahoe, J. W. (1998). Interpreting verbal behavior. *The Analysis of Verbal Behavior*, 15, 107–112.
- Dougherty, D. M. (1994). The selective renaissance of the experimental analysis of human behavior. *The Behavior Analyst*, 17, 165–168.
- Dymond, S., & Critchfield, T. S. (in press). Neither Dark Age nor Renaissance: Research and publication trends in the experimental analysis of human behavior (1980–1999). *The Behavior Analyst*.
- Eshleman, J. W. (1991). Quantified trends in the history of verbal behavior research. *The Analysis of Verbal Behavior*, 9, 61–80.
- Green, D. M., & Swets, J. A. (1966). *Signal detection theory and psychophysics*. New York: Wiley.
- 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.
- Hayes, S. C., Hayes, L. J., Sato, M., & Ono, K. (Eds.). (1994). *Behavior analysis of language and cognition*. Reno, NV: Context Press.
- Hyten, C., & Reilly, M. P. (1992). The renaissance of the experimental analysis of human behavior. *The Behavior Analyst*, 15, 109–114.
- McPherson, A., Bonem, M., Green, G., & Osborne, J. G. (1984). A citation analysis of the influence on research of Skinner's *Verbal Behavior*. *The Behavior Analyst*, 7, 157–167.
- Michael, J. L. (1984). Verbal behavior. *Journal of the Experimental Analysis of Behavior*, 42, 363–376.
- Normand, M. P., Fossa, J. F., & Poling, A. (2000). Publication trends in *The Analysis of Verbal Behavior*: 1982–1998. *The Analysis of Verbal Behavior*, 17, 167–173.
- Oah, S., & Dickinson, A. M. (1989). A review of empirical studies of verbal behavior. *The Analysis of Verbal Behavior*, 7, 53–68.
- Palmer, D. C. (1999). A call for tutorials on alternative approaches to the study of verbal behavior. *The Analysis of Verbal Behavior*, 16, 49–55.
- Schlinger, H. D. (1998). Current status and future directions of the analysis of verbal behavior: Introductory remarks. *The Analysis of Verbal Behavior*, 15, 93–96.
- Sidman, M. (1971). Reading and auditory-visual equivalences. *Journal of Speech and Hearing Research*, 14, 5–13.
- Skinner, B. F. (1938). *The behavior of organisms*. Englewood Cliffs, NJ: Prentice Hall.
- Skinner, B. F. (1957). *Verbal behavior*. Englewood Cliffs, NJ: Prentice Hall.
- Skinner, B. F. (1963). Operant behavior. *American Psychologist*, 18, 503–515.
- Skinner, B. F. (1969). *Contingencies of reinforcement*. New York: Appleton-Century-Crofts.
- Skinner, B. F. (1976). *Particulars of my life*. New York: McGraw-Hill.
- Sundberg, M. L. (1991). 301 research topics from Skinner's *Verbal Behavior*. *The Analysis of Verbal Behavior*, 9, 81–96.
- Sundberg, M. L. (1998). Realizing the potential of Skinner's analysis of verbal behavior. *The Analysis of Verbal Behavior*, 15, 143–147.

APPENDIX A

Sources cited most often in empirical studies published in The Analysis of Verbal Behavior between 1990 and 1999. Self-citations were excluded from the analysis. Shown in parentheses is the total number of citations of each source. Portions of these data appeared previously in Appendix B of Critchfield et al. (2000). JEAB = Journal of the Experimental Analysis of Behavior; TAVB = The Analysis of Verbal Behavior.

I. General behavior analysis

- Catania, A. C. (1992). *Learning* (4th ed.). Upper Saddle River, NJ: Prentice Hall. (6: includes citations of previous editions)
- Michael, J. L. (1982). Distinguishing between discriminative and motivational functions of stimuli. *JEAB*, 37, 149–155. (4)
- Skinner, B. F. (1969). *Contingencies of reinforcement*. New York: Appleton-Century-Crofts. (4)
- Skinner, B. F. (1974). *About behaviorism*. New York: Knopf. (4)
- Donahoe, J. W., & Palmer, D. C. (1994). *Learning and complex behavior*. Boston: Allyn & Bacon. (3)
- Skinner, B. F. (1953). *Science and human behavior*. New York: Macmillan. (3)

APPENDIX A

Continued.

II. Development of verbal behavior as an empirical discipline

Michael, J. L. (1984). Verbal behavior. *JEAB*, 42, 363–376. (3)

Oah, S., & Dickinson, A. M. (1989). A review of empirical studies of verbal behavior. *TAVB*, 7, 53–68. (3)

Sundberg, M. L. (1991). 301 research topics from Skinner's *Verbal Behavior*. *TAVB*, 9, 81–96. (3)

III. Verbal relations

A. Verbal operants

1. Conceptual and theoretical sources

Skinner, B. F. (1957). *Verbal behavior*. Englewood Cliffs, NJ: Prentice Hall. (25)

Michael, J. (1985). Two kinds of verbal behavior and a possible third. *TAVB*, 3, 2–3. (5)

Michael, J. (1988). The establishing operation and the mand. *TAVB*, 6, 3–9. (5)

Schlinger, H. D. (1993). Separating discriminative and function-altering effects of verbal stimuli. *The Behavior Analyst*, 16, 9–23. (3)

2. Empirical sources

Watkins, C. L., Pack-Teixeira, L., & Howard, J. S. (1987). Teaching intraverbal behavior to severely retarded children. *TAVB*, 7, 69–81. (5)

Caroll, R., & Hesse, B. E. (1987). The effect of alternating mand and tact training on the acquisition of tacts. *TAVB*, 5, 55–65. (4)

Hall, G., & Sundberg, M. (1987). Teaching mands by manipulating conditioned establishing operations. *TAVB*, 5, 41–53. (4)

Lamarre, J., & Holland, J. G. (1985). The functional independence of mands and tacts. *JEAB*, 43, 5–19. (4)

Greenspoon, J. (1955). The reinforcing effect of two spoken sounds on the frequency of two responses. *American Journal of Psychology*, 68, 409–416. (3)

Stafford, M. W., Sundberg, M. L., & Braam, S. J. (1988). A preliminary investigation of the consequences that define the mand and tact. *TAVB*, 8, 31–41. (3)

Sigafoos, J., Reichle, J., Doss, S., Hall, K., & Pettit, L. (1990). “Spontaneous” transfer of stimulus control from tact to mand contingencies. *Research in Developmental Disabilities*, 11, 165–176. (3)

Sundberg, C. T., & Sundberg, M. L. (1990). Comparing topography-based verbal behavior with stimulus selection-based verbal behavior. *TAVB*, 8, 31–41. (3)

B. Verbal–nonverbal interactions

1. Conceptual and theoretical sources

Cerutti, D. T. (1989). Discrimination theory of rule-governed behavior. *JEAB*, 51, 259–276. (4)

Baron, A., & Galizio, M. (1983). Instructional control of human operant behavior. *The Psychological Record*, 33, 495–520. (3)

Blakely, E., & Schlinger, H. (1987). Rules: Function-altering contingency-specifying stimuli. *The Behavior Analyst*, 10, 183–187. (3)

Dugdale, N., & Lowe, C. F. (1990). Naming and stimulus equivalence. In D. E. Blackman & H. Lejeune (Eds.), *Behavior analysis in theory and practice: Contributions and controversies* (pp. 115–138). Hillsdale, NJ: Erlbaum. (3)

Schlinger, H. D. (1990). A reply to behavior analysts writing about rules and rule-governed behavior. *TAVB*, 8, 77–82. (3)

APPENDIX A

Continued.

2. Empirical sources

Shimoff, E., Catania, A. C., & Matthews, B. A. (1981). Uninstructed human responding: Sensitivity of low-rate performance to schedule contingencies. *JEAB*, 36, 207–220. (5)

Galizio, M. (1979). Contingency-shaped and rule-governed behavior: Instructional control of human loss avoidance. *JEAB*, 31, 53–70. (4)

Braam, C., & Malott, R. W. (1990). “I’ll do it when the snow melts”: The effects of deadlines and delayed outcomes on rule-governed behavior in preschool children. *TAVB*, 8, 67–76. (3)

Hayes, S. C., Brownstein, A. J., Haas, J. R., & Greenway, D. E. (1986). Instructions, multiple schedules, and extinction: Distinguishing rule-governed from schedule-controlled behavior. *JEAB*, 46, 137–147. (3)

Matthews, B. A., Shimoff, E., Catania, A. C., & Sagvolden, T. (1977). Uninstructed human responding: Sensitivity to ratio and interval contingencies. *JEAB*, 27, 453–467. (3)

IV. Child development

Bijou, S. W., & Baer, D. M. (1965). *Child development. Vol. 2: Universal stage of infancy*. Englewood Cliffs, NJ: Prentice Hall. (4)

Schlinger, H. D. (1995). *A behavior-analytic view of child development*. New York: Plenum. (4)

V. Specialized methods

Hayes, S. C. (1986). The case of the silent dog—verbal reports and the analysis of rules. A review of Ericsson and Simon’s *Protocol Analysis: Verbal Reports as Data*. *JEAB*, 45, 351–363. (4)

Green, D. M., & Swets, J. A. (1966). *Signal detection theory and psychophysics*. New York: Wiley. (3)

APPENDIX B

Individuals cited most frequently (at least once per volume on average) in empirical studies published in The Analysis of Verbal Behavior during the 1990s, and their most cited publications. Sources identified below for each individual were cited at least twice during the census period; the number of citations of each source is shown in parentheses. Full reference information is provided only for sources not also listed in Appendix A. JEAB = Journal of the Experimental Analysis of Behavior; TAVB = The Analysis of Verbal Behavior.

B. F. Skinner (58 citations of 20 sources)

In Appendix A: Skinner (1957) (25); Skinner (1969) (4); Skinner (1974) (4); Skinner (1953) (3)

Skinner, B. F. (1935). The generic nature of the concepts of stimulus and response. *Journal of General Psychology*, 12, 40–65. (2)

Skinner, B. F. (1956). A case history in scientific method. *American Psychologist*, 11, 221–233. (2)

Skinner, B. F. (1986). The evolution of verbal behavior. *JEAB*, 45, 115–122. (2)

Skinner, B. F. (1989). Recent issues in the analysis of behavior. Columbus, OH: Merrill. (2)

APPENDIX B

Continued.

-
- J. Michael (29 citations of 13 sources)
 In Appendix A: Michael (1985) (5); Michael (1988) (5); Michael (1982) (4); Michael (1984) (3)
 Michael, J. L. (1983). Evocative and repertoire-altering effects of an environmental event. *TAVB*, 2, 19–21. (2)
 Vaughan, M. E., & Michael, J. L. (1982). Automatic reinforcement: An important but ignored concept. *Behaviorism*, 10, 217–227. (2)
 Wraikat, R. M., Sundberg, C. T., & Michael, J. L. (1991). Topography-based and selection-based verbal behavior: A further comparison. *TAVB*, 9, 1–18. (2)
- M. Sidman (26 citations of 22 sources)
 Sidman, M. (1971). Reading and auditory-visual equivalences. *Journal of Speech and Hearing Research*, 14, 5–13. (2)
 Sidman, M. (1986). Functional analysis of emergent verbal classes. In T. Thompson & M. D. Zeiler (Eds.), *Analysis and integration of behavioral units* (pp. 213–245). Hillsdale, NJ: Erlbaum. (2)
 Sidman, M. (1994). *Equivalence relations and behavior: A research story*. Boston: Authors Cooperative. (2)
 Sidman, M., & Tailby, W. (1982). Conditional discrimination vs. matching-to-sample: An expansion of the testing paradigm. *JEAB*, 37, 5–22. (2)
- M. L. Sundberg (25 citations of 13 sources)
 In Appendix A: Hall and Sundberg (1987) (4); Stafford, Sundberg, and Braam (1988) (3); Sundberg (1991) (3); Sundberg and Sundberg (1990) (3)
 Braam, S., & Sundberg, M. L. (1991). The effects of specific versus nonspecific reinforcement of verbal behavior. *TAVB*, 9, 1–17. (2)
 Sundberg, M. L. (1990). *Teaching verbal behavior to the developmentally disabled*. Danville, CA: Behavior Analysts, Inc. (2)
 Sundberg, M. L., San Juan, B., Dawdy, M., & Argueles, M. (1990). The acquisition of tacts, mands, and intraverbals by individuals with traumatic brain injury. *TAVB*, 8, 83–99. (2)
- S. C. Hayes (24 citations of 14 sources)
 In Appendix A: Hayes (1986) (4); Hayes, Brownstein, Haas, and Greenway (1986) (3)
 Hayes, S. C. (1991). A relational theory of stimulus equivalence. In L. J. Hayes & P. N. Chase (Eds.), *Dialogues on verbal behavior* (pp. 19–40). Reno, NV: Context Press. (2)
 Hayes, S. C., Brownstein, A. J., Zettle, R. D., Rosenfarb, I., & Korn, Z. (1986). Rule-governed behavior and sensitivity to changing consequences of responding. *JEAB*, 45, 237–256. (2)
 Hayes, S. C., & Hayes, L. J. (1989). The verbal action of the listener as a basis for rule governance. In S. C. Hayes (Ed.), *Rule-governed behavior: Cognition, contingencies, and instructional control* (pp. 153–190). New York: Plenum. (2)
 Hayes, S. C., Zettle, R. D., & Rosenfarb, I. (1989). Rule-following. In S. C. Hayes (Ed.), *Rule-governed behavior: Cognition, contingencies, and instructional control* (pp. 191–220). New York: Plenum. (2)
 Wulfert, E., & Hayes, S. C. (1988). Transfer of a conditional ordering process through conditional equivalence classes. *JEAB*, 44, 411–439. (2)
-

APPENDIX B

Continued.

A. C. Catania (19 citations of 10 sources)

In Appendix A: Catania (1992) (6: includes citations of previous editions); Matthews, Shimoff, Catania, and Sagvolden (1977) (3); Shimoff, Catania, and Matthews (1981) (3)

Matthews, B. A., Catania, A. C., & Shimoff, E. (1985). Effects of uninstructed verbal behavior on nonverbal responding: Contingency descriptions versus performance descriptions. *JEAB*, 43, 155–164. (2)

Shimoff, E., Matthews, B. A., & Catania, A. C. (1986). Human operant performance: Sensitivity and pseudosensitivity to contingencies. *JEAB*, 46, 149–157. (2)

D. M. Baer (13 citations of 8 sources)

In Appendix A: Bijou and Baer (1963) (4)

Guess, D., Sailor, W., & Baer, D. M. (1976). *Functional speech and language training for the severely handicapped*. Austin, TX: Pro-Ed. (2)

Guess, D., Sailor, W., Rutherford, G., & Baer, D. M. (1968). An experimental analysis of linguistic development: The productive use of the plural morpheme. *Journal of Applied Behavior Analysis*, 1, 297–306. (2)

H. Schlinger (13 citations of 4 sources)

In Appendix A: Schlinger (1995) (4); Blakely and Schlinger (1987) (3); Schlinger (1990) (3); Schlinger (1993) (3)

E. Shimoff (13 citations of 7 sources)

In Appendix A: Matthews, Shimoff, Catania, and Sagvolden (1977) (3); Shimoff, Catania, and Matthews (1981) (3)

Matthews, B. A., Catania, A. C., & Shimoff, E. (1985). Effects of uninstructed verbal behavior on nonverbal responding: Contingency descriptions versus performance descriptions. *JEAB*, 43, 155–164. (2)

Shimoff, E., Matthews, B. A., & Catania, A. C. (1986). Human operant performance: Sensitivity and pseudosensitivity to contingencies. *JEAB*, 46, 149–157. (2)

B. A. Matthews (12 citations of 6 sources)

In Appendix A: Matthews, Shimoff, Catania, and Sagvolden (1977) (3); Shimoff, Catania, and Matthews (1981) (3)

Matthews, B. A., Catania, A. C., & Shimoff, E. (1985). Effects of uninstructed verbal behavior on nonverbal responding: Contingency descriptions versus performance descriptions. *JEAB*, 43, 155–164. (2)

Shimoff, E., Matthews, B. A., & Catania, A. C. (1986). Human operant performance: Sensitivity and pseudosensitivity to contingencies. *JEAB*, 46, 149–157. (2)

C. F. Lowe (10 citations of 5 sources)

In Appendix A: Dugdale and Lowe (1990) (3)

Horne, P. J., & Lowe, C. F. (1996). On the origins of naming and other symbolic behavior. *JEAB*, 65, 185–241. (2)

Lowe, C. F. (1979). Determinants of human operant behavior. In M. D. Zeiler & P. Harzem (Eds.), *Advances in the analysis of behavior. Vol. 1: Reinforcement and organization of behavior* (pp. 159–192). New York: Wiley. (2)

APPENDIX B*Continued.*

-
- P. N. Chase (9 citations of 8 sources)
 LeFrancois, J. R., Chase, P. N., & Joyce, J. H. (1988). The effects of a variety of instructions on human fixed-interval performance. *JEAB*, 49, 383–393. (2)
- M. Galizio (9 citations of 3 sources)
 In Appendix A: Galizio (1979) (4); Baron and Galizio (1983) (3)
 Perone, M., Galizio, M., & Baron, A. (1988). The relevance of animal-based principles in the laboratory study of human operant conditioning. In G. Davey & C. Cullen (Eds.), *Human operant conditioning and behaviour modification* (pp. 59–85). New York: Wiley. (2)
- O. I. Lovaas (9 citations of 7 sources)
 Lovaas, O. I. (1977). *The autistic child: Language development through behavior modification*. New York: Irvington. (2)
 Lovaas, O. I. (1987). Behavioral treatment and normal educational and intellectual functioning in young autistic children. *Journal of Consulting & Clinical Psychology*, 55, 3–9. (2)
-

APPENDIX C

Publications cited most often in empirical verbal behavior research published in The Analysis of Verbal Behavior from 1990 to 1999. Citation counts for edited books include references to the overall volume or to any chapter within it.

Citations**Periodicals**

116	<i>Journal of the Experimental Analysis of Behavior</i>
79	<i>The Analysis of Verbal Behavior</i>
35	<i>Journal of Applied Behavior Analysis</i>
29	<i>The Behavior Analyst</i>
15	<i>The Psychological Record</i>
7	<i>American Psychologist</i>
7	<i>Psychological Bulletin</i>
6	<i>Research in Developmental Disabilities</i>
6	<i>Journal of General Psychology</i>
6	<i>Journal of Speech and Hearing Disorders</i>
5	<i>Analysis and Intervention in Developmental Disabilities</i>
5	<i>Behaviorism</i>
5	<i>Pharmacology Biochemistry and Behavior</i>

Edited books

10	Hayes, S. C. (Ed.). (1989). <i>Rule-governed behavior: Cognition, contingencies, and instructional control</i> . New York: Plenum.
9	Hayes, L. J., & Chase, P. N. (Eds.). <i>Dialogues on verbal behavior</i> . Reno, NV: Context Press.
4	Honig, W. K. (1966). <i>Handbook of operant behavior</i> . Englewood Cliffs, NJ: Prentice Hall.
-