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Extended Analysis of Empirical Citations with Skinner's *Verbal Behavior*: 1984–2004

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The present paper comments on and extends the citation analysis of verbal operant publications based on Skinner's *Verbal Behavior* (1957) by Dymond, O'Hora, Whelan, and O'Donovan (2006). Variations in population parameters were evaluated for only those studies that Dymond et al. categorized as empirical. Preliminary results indicate that the majority of empirical research in the area of verbal behavior has been conducted with the younger developmentally disabled population and has focused on verbal operants from the introductory chapters of Skinner's book. It is clear that *Verbal Behavior* has influenced empirical research over the past 50 years. We believe, however, that there are many underdeveloped research areas originating from *Verbal Behavior* that have not yet been addressed. Suggestions for extended areas of research are provided.

Key words: B. F. Skinner, verbal behavior, citation analysis, developmental disabilities, relational frame theory

During the past 50 years, B. F. Skinner's *Verbal Behavior* (1957) has received much attention within and beyond the field of behavior analysis. Although the book was a conceptual framework built on the foundations of behaviorism and the experimental analysis of behavior, it provided readers with the first comprehensive account of language from a naturalistic standpoint. In recent years, many behavior analysts have attempted to assess the impact of Skinner's seminal text on the field of behavior analysis. The data that exist speak to the continued influence of *Verbal Behavior* in behavior analysis (Dymond, O'Hora, Whelan, & O'Donovan, 2006; McPherson, Bonem, Green, & Osborne, 1984; Sautter & LeBlanc, 2006).

For example, in a recent citation analysis, Dymond et al. (2006) extended data reported by McPherson et al. (1984), which revealed that most citations of Skinner (1957) were from nonempirical articles. Specifically, Dymond et al. concluded that *Verbal Behavior* has consistently influenced the psychological literature, especially within nonresearch scholarly articles (i.e., conceptual and theoretical pieces). Although there has also been research in the applied literature, it has focused mainly on individuals with developmental disabilities and on the verbal operants from the introductory chapters of Skinner's book.

Although frequency counts of publications no doubt reveal important patterns and growth of a specific body of research, they are not sufficient to address questions regarding specific measurement parameters of a particular body of research. Citation analyses provide a quantitative measure of influence that a particular subject matter has had on research. For example, Sautter and LeBlanc (2006) assessed the frequency of studies on verbal behavior applications in various behavioral journals. An increasing publication trend between the years of 1963 and 2004 was revealed. This pattern has been consistently reported elsewhere (e.g., McPherson et al., 1984; Dymond et al., 2006). Sautter and LeBlanc's analysis revealed that during the last 15 years, the majority of studies have focused on two specific verbal operants (e.g., mands and tacts), but other operants have been virtually ignored

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in the empirical research (e.g., autoclitic, echoic, self-editing). Dymond et al. reported that the total number of citations of Skinner's *Verbal Behavior* between 1984 and 2004 averaged 52 articles per year. Of these citations, only 4% were from applied articles and 1.4% were from basic articles. These findings suggest an increased professional interest in Skinner's concept of verbal behavior, but also indicate that the greatest number of new publications have focused on mands and tacts. These analyses are useful but are limited to the research questions they posit. For example, it has not been determined what population has been the primary focus within the applied and basic literature in the area of verbal behavior. Some behavior analysts may be interested in extending generalization in this area of research by replicating procedures with typically developing populations. Thus, a critical descriptive analysis of the methods, participants, and concepts used in the empirical research stemming from Skinner's (1957) account of language is warranted to determine progress, chasms, and research interests more specifically. Conducting such an analysis can reveal specific information regarding areas of research that are underdeveloped and can determine which behavioral disorders are most commonly empirically addressed as well as study characteristics that are more emphasized than others. In essence, although it is clear that empirical applications of Skinner's analysis of verbal behavior have been more recently limited to mands and tacts, that body of research may be further limited to the study of particular populations.

The methodology in empirical research that teaches a person to ask for an item (i.e., mand) is of significant clinical utility and demonstrates Skinner's verbal operants in action. However, the ultimate merits of Skinner's book could be diminished if data continue to show that a high proportion of research on verbal operants is demographically restricted to certain population types, or that it is unnecessarily limited to measuring a disproportionate amount of certain basic verbal operants. Although the clinical utility of this research is evident, there is a growing need to demonstrate how Skinner's analysis of verbal behavior can also be applied to more complex forms of language and with typically developing populations. Empirical work designed to address some of Skinner's more complex issues and variables in his conceptualization of human language (i.e., multiple causation) is desired.

In attempts to provide a more extensive analysis of the empirical contributions of *Verbal Behavior*, the present analysis sought to classify population types, subject characteristics, methodology, and concepts used in the empirical data set gathered by Dymond et al. (2006).

METHOD

Selection of Empirical Articles

The data set consisted of the 100 articles referenced in Dymond et al.'s (2006, for a list of the complete set see their Table 1, pp. 80–81) citation analysis, which lists empirical citations that referenced Skinner (1957) or one of his verbal operants from 1984 through 2004. This set of empirical articles included categories of basic, observational, and applied studies based directly on McPherson et al.'s (1984) criteria. Examples of each type of study (i.e., basic, observational, and applied) can be found in Dymond et al. It should be noted that M. L. Sundberg (1985) was excluded from our analyses because our primary focus in data collection was on human population parameters.

Dependent Variables

Population parameters. This measure investigated various types of

TABLE 1

Interrater Agreement (%)

Variable	
Atypical population (AP)	99
Typical population (TP)	96
AP & TP	97
Children (age 17 or below)	99
Adults (age 18 or above)	98
Both age parameters	98
Atypical children	98
Atypical adults	98
Typical children	99
Typical adults	99
Verbal operants	94
Autism	96
Mental retardation	91
Language delay	90
Psychiatric	99
Geriatric	100
Genetic	87
Medical	88
Other	90

demographic information from each study including sample type (i.e., typically or atypically developed, hereafter *typical* or *atypical*), age of all subjects (i.e., children or adults), and all possible combinations of the two (e.g., atypical children). To determine the number of studies that used samples from an atypical population (AP), AP was defined as evident in any report of any type of label (e.g., physical, psychological, genetic, geriatric, developmental disabilities, etc.) or other descriptors that indicated below-average level of functioning (e.g., performed below grade level, mentally impaired, etc.) that the authors included in the description of the participants. To determine the number of studies that used samples from typical populations (TP), TP was defined as an exclusion of atypical subject characteristics that were used to describe the population used in a study or were described as typically developing (e.g., college students, preschool children, parents, etc.). A frequency count was also taken to determine how many studies used both population types.

Age or age range was recorded to determine the number of studies that used adults and children. First, individual ages of all participants (or the reported range) were recorded, and then both assessors classified those ages into groups of children and adults. Adults were defined as participants' ages reported at 18 years or older. Children were classified as participants' ages reported at 17 years or younger. If age or age ranges were not clearly reported for all participants, the descriptor the authors used was recorded (e.g., undergraduate psychology majors). If individual ages were not reported for all participants and an additional descriptor was not used, "did not specify" was recorded. Frequency counts were also taken on the number of studies that used children, adults, and both. Surprisingly, 55% of the 99 citations were scored as "did not specify." Our definitions of age were conservative, yet this was usually a cause of interrater disagreements.

For the next set of variables, each article was categorized in terms of number of studies that used all possible combinations of the above-described variables. Frequency counts were conducted to determine the total number of studies that used atypical adults, atypical children, typical children, and typical adults. Overall, there were 10 population variables measured.

Subclassifications of atypical development. These measures allowed us to take a closer look at what types of populations were most prevalent in this area of research. To determine this, all articles that used an AP were categorized into one or more of eight types. The following atypical categories were chosen on what we expected to be most common: autism, mental retardation, language delay, psychiatric, geriatric, genetic, medical, and other.

Autism was scored if the description of the participants fit into the general description of autism spec-

trum disorders (e.g., autism, pervasive developmental disorder). Mental retardation was scored if participants were characterized with terms that could be described by patterns of persistently slow learning of basic motor and language skills and a significantly below-normal intellectual capacity as an adult (e.g., mentally impaired). Language delay was scored if some speech or language impairment was specified in the description of the participants and there was not another label or diagnosis made in addition to this description. The psychiatric category was scored if there was a diagnosis listed that could be defined as a category of illnesses that may include affective or emotional instability, behavioral dysregulation, or cognitive dysfunction or impairment, as indicated by a *Diagnostic and Statistical Manual of Mental Disorders* (American Psychiatric Association, 2000) diagnosis (e.g., bipolar disorder, attention deficit hyperactivity disorder [ADHD]). Geriatric was scored if the diagnosis or label used to describe the participants were those that typically occur in the elderly population (e.g., dementia). Genetic was scored if there was a disease, syndrome, or disorder that is caused by an abnormal expression of one or more genes used to describe the participants (e.g., Down syndrome). Medical was scored if the description included any physical or health-related problems (e.g., seizures). The category of other was scored only if one of the describing factors did not fit into one of the other categories (e.g., developmental delay). For any given article, a number of categories could be scored depending on how the subjects were described. For example one subject in a study might have Rett syndrome and the other subject might be described as having a diagnosis of ADHD. In this case both genetic and psychiatric would be scored. To view the exact variation in reported subject characteristics for the group of AP articles as classified according to our categories, refer to the upper panel of Table 1.

Overall, there were eight variables in this set, and the total number of articles that resulted for AP was used (i.e., 77) for the denominator of the interrater reliability formula. Disagreements were not discussed because reliability was high for each category (>88%; see Table 2). The data from the primary observer were used for further analysis and discussion.

Verbal operant measure. To determine the number of articles that measured one or more of Skinner's verbal units, the methods and results sections of each article were reviewed by two raters who were doctoral-level students who had completed a course in Skinner's approach to verbal behavior. Each article was independently scored as a one or a zero. An article was given a value of one if it measured a verbal operant (i.e., occurrence), if one or more of the dependent variables were included in the results section in which verbal operants are defined as tact (including impure, simple, multiple, standard, and reversed, percentage of items correctly tacted); echoic; textual; dictation; autoclitic responses, intraverbals, and mands (including impure, simple, multiple, standard, and reversed) *and* the dependent variable had to be described or labeled in Skinnerian terminology somewhere in the methods or results section (but did not count if it was mentioned only in the title, literature review, or discussion). An article was assigned a value of zero if it did not measure a verbal operant (i.e., nonoccurrence), if a verbal operant was used as an independent variable, if the results were discussed only in terms of verbal operants but weren't measured as such, or if the dependent variable was parent or caregiver responses about their children's emissions of verbal operants on a standardized questionnaire (i.e., Ver-

TABLE 2

Upper panel: Includes all descriptors and specifiers for each atypical category that authors used to describe participants' characteristics for the total number of articles that were scored with AP. Lower panel: Includes types of occurrences and nonoccurrences found during the verbal operant analysis

Variable	
Autism	Pervasive developmental disorder, autistic characteristics, autism
Mental retardation	Moderate, profound, severe mental retardation, mentally impaired, moderate intellectual disability, very low reading rates below grade level, learning disabilities
Language delay	Was not scored as such if another description was provided; no other specifiers were included.
Psychiatric	ADHD, bipolar disorder
Geriatric	Dementia
Genetic	Hirshsprung's disease, Rett syndrome, Down syndrome, Cockayne syndrome, fragile X syndrome, Sotos syndrome, Angelman syndrome/ happy puppet syndrome
Medical	Apraxia, visual impairments, seizure or seizure disorder, cerebral palsy, short bowel syndrome, severe pulmonary hypertension, atrialeptal defect, bronchopulmonary dysplagia, chronic food refusal, emesis, failure to thrive, traumatic brain injury, microcephalic, blindness, deaf
Other	Descriptor was placed herein only if it did not fit into any of the above categories. Developmental disability, phonological disorder, developmental delay, severe, profound, or moderate multiple disabilities, moderate and severe handicaps
Occurrence	Tact (including impure, simple, multiple, standard, reversed, percent of items correctly tacted), autoclitics, intraverbals, mands (including impure, simple, multiple, standard, reversed)
Nonoccurrence	Transfer of control from an echoic prompt, length or rate of utterance, noun classes, requesting/requests (when used without any referent to 'mand' in methods), phonemes, receptive naming (when used without any referent to 'tact' in methods), manual signing, word reading/teaching reading, opportunities for naming/requesting (when used without any referent to 'mand' in methods), signing, touching, pointing, correspondence

BAS), or if the authors did not use Skinner's taxonomy (i.e., names of operants) to describe the methods or results.

To view the variability in the names of the operants that were used in the verbal operant analysis and how they were categorized for the articles in this data set, refer to the lower panel of Table 1. Disagreements were not discussed because interrater agreement was high (i.e., 94%) for this factor. The data from the primary observer were used for further analysis and discussion.

General Scoring Procedure

After obtaining the 100 articles, the authors names and published year were entered into an Excel® worksheet. Columns were created for each variable, and each assessor had her own electronic copy of the Excel sheets for independent data entry. Content was analyzed by searching for, examining, and reading specific pieces of each study that were relevant to a given variable, and notes were taken for anomalous findings. Next, each study was independently

scored according to operational definitions and analyzed by two raters (the second and third authors) for 18 different variables pertaining to each study's demographic and subject characteristic data. After each rater completed data entry, disagreements and agreements were compared by combining data columns from each rater into a separate spreadsheet.

Because disagreements were tracked, this allowed definitional nuances to be identified and addressed. For the first 10 variables of population parameters and subject characteristics, disagreements were individually discussed by both assessors to arrive at agreement. This entailed the assessors rereading relevant pieces in the articles while examining definitions. As a part of that process, modifications were then made to the operational definitions as agreed on. Following that, all citations were rescored to obtain a final frequency count with 100% agreement. Modified definitions are stated herein; however, the original interrater agreement data are reported. In addition, one more factor related to what verbal operants were employed in each study was assessed.

Interrater Agreement Analyses

Interrater agreement was defined as both raters assigning an article to an identical category for each dependent variable. Agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100%. Unlike other similar analyses (e.g., Northup, Vollmer, & Serrett, 1993), averages were never used to assess reliability. Similarly, 100% of the articles were assessed for interrater agreement as opposed to only a smaller proportion, which is sometimes the case in citation analyses (e.g., Carr & Stewart, 2005). Overall percentage agreement was high for all variables, with the highest and lowest agreement scores being 100% and 87%, respectively. Individual agreement scores are reported for each dependent variable in Table 2.

RESULTS AND DISCUSSION

Population Parameters

Results of this analysis indicate that the majority of empirical research in the area of verbal behavior has been conducted with a young AP (see Figure 1). Of the 99 total articles in this analysis, 77 (77.7%) were conducted with AP. Of that number, 63 employed children and 23 employed adult participants. (It should be noted that because some studies assessed both children and adult populations, subcategory numbers will not sum to the total number of articles.) Twenty-seven articles (27.3%) investigated TP. Of those citations, 19 examined children and 10 were with just adults. Only four studies (4%) examined both AP and TP in one article.

Dominating with 76 total citations (76.8%), the younger population clearly represents the most popular age group in empirical studies on verbal behavior. The total number of studies that were conducted with only the adult population was 9 (9%), and 32 (32.3%) were conducted with both age parameters. Mixing both population types in one study was rare, but studies that used both age types was a more common finding. Thus, the majority of studies that used the adult population (either adults only or in combination with children) were in the AP category, as is the case with studies that used only children.

Atypical Classifications

The majority of data in the area of verbal behavior are derived from participants with autism or mental retardation (see Figure 2). Over half of the citations in this analysis (40; 52%) recruited participants with autism and 37 (48%) used participants with mental retardation. In the lan-

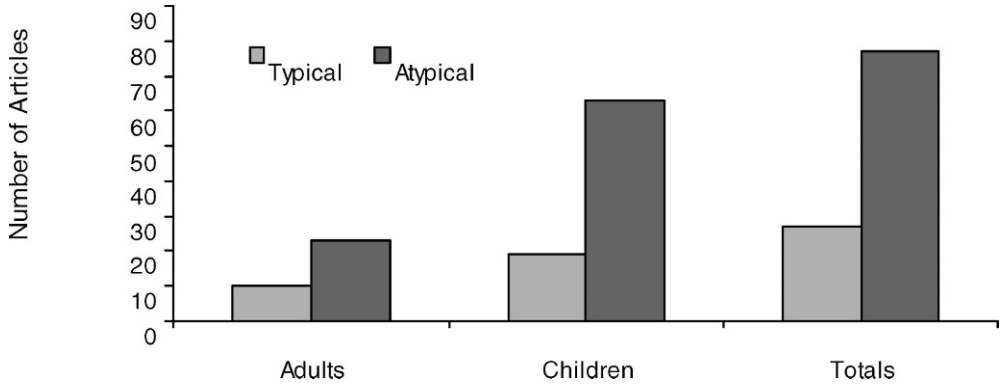

Figure 1. The number of articles categorized as typical or atypical adult and children populations.

guage delay category, there were only four (5.2%) identified citations. This number may have underrepresented participants with language delays because by our definition an article was categorized herein only if there was an absence of any other type of label that could be scored elsewhere. Only two (2.6%) studies were scored in the psychiatric category. Similarly, there was only one study conducted with an elderly population that could be scored in the geriatric category. There were 16 (20.8%) studies scored in the medical category. Nine studies (11.7%) had descriptions that did not clearly fit into any of the other seven categories according to our definitions (see Table 1).

Verbal Operant Measure

The results indicate that 60 (60.6%) articles of the original 99 in Dymond et al.'s (2006) set measured at least one of Skinner's verbal operants according to our definitions. The types of variables that were taken from this 60 are reported under "occurrence" in the lower panel of Table 1.

Summary

In summary, Skinner's (1957) *Verbal Behavior* has made a lasting contribution in the field of behavior analysis at both a conceptual and empirical level since its publication 50 years ago. Dymond et al. (2006)

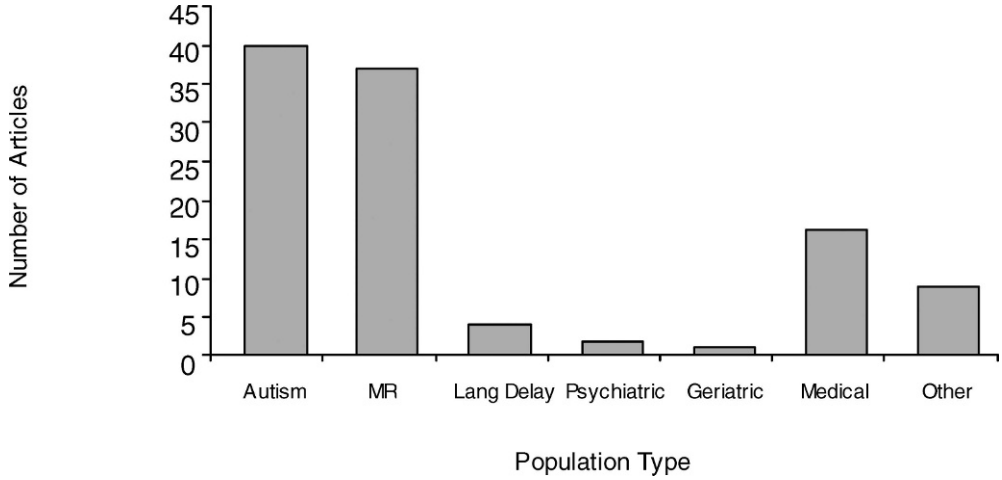

Figure 2. The number of articles categorized into each atypical classification defined.

provided readers of *The Behavior Analyst* with an overview of the degree of empirical contribution the book has made, but our analysis has attempted to reveal both the limited and population dimensions of the research more specifically. The results indicate that the study of verbal behavior has overwhelmingly been conducted with children with developmental disabilities. Although the invaluable clinical significance of this research is not questioned, this alone cannot sustain the reliance on *Verbal Behavior* as a conceptualization of human language. Consequently, there is a need to expand basic research on verbal behavior to typically developing individuals and to more advanced forms of language. As a field, it is imperative that behavior analysis move beyond the experimental study of the verbal operants defined in the introductory chapters of *Verbal Behavior* and develop innovative methods to do so. Thus, within the analysis of *Verbal Behavior*, there are many research opportunities to be had in applied, basic, and observational work with people with complex verbal repertoires. Limiting the study of verbal behavior only to the dimensions that have been uncovered in this citation analysis could unnecessarily limit the impact of Skinner's conceptualization of language.

Research that could be conducted in the area of verbal behavior to expand on the existing empirical work may include replications with typically developing individuals of data obtained from studies that recruited participants with developmental disabilities. The demonstration of more complex verbal operants such as autoclitics, controlling variables such as the audience, and characteristics of verbal behavior such as self-editing could be studied. Protocol analysis (Ericsson & Simon, 1993) is one method by which these operants could be studied with typically developing adults in a variety of clinical, laboratory, and natural settings. Digital voice recorders could be used during clinical interviews to reveal more complex patterns of verbal behavior in therapy sessions. In addition, on-line chat rooms may provide a convenient venue for examining rates of autoclitics or frequencies of intraverbals. The continued development of technology can help to facilitate such procedural methodologies. For example, many on-line teaching interfaces (e.g., WebCT or BlackBoard) have text-capturing software that allows a review and analysis of chat room verbal interchanges. Similarly, technological gains have provided ways to reduce the labor required for protocol data analysis. For example, computer software is available that can type out spoken words to a document. These kinds of programs may help to reduce the time spent in transcribing content from audiotapes (e.g., Dragon Naturally Speaking, etc.).

Due to the lack of basic research on verbal behavior, there have been criticisms of Skinner's book that will continue to grow if nothing is done to rebut them. For this reason, the time is right for direct comparisons that pit competing behavioral theories (e.g., relational frame theory, naming hypothesis) of verbal behavior against one another empirically and conceptually. There have been some proposals for a synthesis of Skinner's *Verbal Behavior* with relational frame theory (Barnes-Holmes, Barnes-Holmes, & Cullinan, 2000) and empirical demonstrations of how this could be developed (Luciano, Gomez Becerra, & Rodriguez Valverde, 2007; Murphy, Barnes-Holmes, & Barnes-Holmes, 2005). Synthesizing these two conceptualizations of verbal skill acquisition may help to provide a comprehensive empirical account of human language.

Behavior analysis has always been a field that has rested on a foundation of data prior to generating theory. Skinner's book was theoretical, yet as

he claimed, it was based on data from the animal laboratory. Some behavior analysts are comfortable with the inferences Skinner made, but others are not. Nonetheless, data have been generated based on *Verbal Behavior*; thus, it holds empirical merit. The remaining question stands: Is Skinner's text sufficient to explain human language? Given the analyses of our investigation, we would be most comfortable responding "no" or at least "not yet." Until researchers construct experiments that more closely resemble the complexities of human conversation, there will be doubters of Skinner's approach within and beyond the behavior-analytic community. Simple demonstration of vocal responses using individuals with developmental disabilities is an admirable start, but such demonstrations are only the beginning of what Skinner's *Verbal Behavior* was written to explain.

REFERENCES

Alpert, C. L., & Kaiser, A. P. (1992). Training parents as milieu teachers. *Journal of Early Intervention*, *16*, 31–52.

American Psychiatric Association. (2000). *Diagnostic and statistical manual of mental disorders* (4th ed., text rev.). Washington, DC: Author.

Arntzen, E., & Almas, I. K. (2002). Effects of mand-tact versus tact-only training on the acquisition of tacts. *Journal of Applied Behavior Analysis*, *35*, 419–422.

Barnes-Holmes, D., Barnes-Holmes, Y., & Cullinan, V. (2000). Relational frame theory and Skinner's *Verbal Behavior*: A possible synthesis. *The Behavior Analyst*, *23*, 69–84.

Barnes-Holmes, D., Barnes-Holmes, Y., Roche, B., & Smeets, P. M. (2001). Exemplar training and a derived transformation of function in accordance with symmetry. *The Psychological Record*, *51*, 287–308.

Bourret, J., Vollmer, T. R., & Rapp, J. T. (2004). Evaluation of a vocal mand assessment and vocal mand training procedures. *Journal of Applied Behavior Analysis*, *37*, 129–144.

Bowman, L. G., Fisher, W. W., Thompson, R. H., & Piazza, C. C. (1997). On the relation of mands and the function of destructive behavior. *Journal of Applied Behavior Analysis*, *30*, 251–265.

Braam, S. J., & Sundberg, M. L. (1991). The effects of specific versus nonspecific reinforcement on verbal behavior. *The Analysis of Verbal Behavior*, *9*, 19–28.

Brown, K. A., Wacker, D. P., Derby, K. M., Peck, S. M., Richman, D. M., Sasso, G. M., et al. (2000). Evaluating the effects of functional communication training in the presence and absence of establishing operations. *Journal of Applied Behavior Analysis*, *33*, 53–71.

Brown-Gorton, R., & Wolery, M. (1998). Teaching mothers to imitate their handicapped children: Effects on maternal mands. *The Journal of Special Education*, *22*, 97–107.

Calculator, S. N. (2002). Use of enhanced natural gestures to foster interaction between children with Angelman syndrome and their parents. *American Journal of Speech-Language Pathology*, *11*, 340–355.

Carr, J. E., & Stewart, K. K. (2005). Citation performance of behaviorally oriented journals. *The Behavior Analyst Today*, *6*, 83–87.

Carroll, R. J., & Hesse, B. E. (1987). The effects of alternating mand and tact training on the acquisition of tacts. *The Analysis of Verbal Behavior*, *5*, 55–65.

Chambers, M., & Rehfeldt, R. A. (2003). Assessing the acquisition and generalization of two mand forms with adults with severe developmental disabilities. *Research in Developmental Disabilities*, *24*, 265–280.

Charlop, M. H., Schreibman, L., & Thibodeau, M. G. (1985). Increasing spontaneous verbal responding in autistic children using a time delay procedure. *Journal of Applied Behavior Analysis*, *18*, 155–166.

Charlop, M. H., & Trasowech, J. E. (1991). Increasing autistic children's daily spontaneous speech. *Journal of Applied Behavior Analysis*, *24*, 747–761.

Charlop-Christy, M. H., Carpenter, M., LeBlanc, L. A., & Kellet, K. (2002). Using the picture exchange communication system (PECS) with children with autism: Assessment of PECS acquisition, speech, social-communicative behavior, and problem behavior. *Journal of Applied Behavior Analysis*, *35*, 213–231.

Chase, P. N., Johnson, K. R., & Sulzer-Azaroff, B. (1985). Verbal relations within instruction: Are there subclasses of the intraverbal? *Journal of the Experimental Analysis of Behavior*, *43*, 301–313.

Daly, P. M. (1987). A description of the verbal behavior of students during two reading instruction methods. *The Analysis of Verbal Behavior*, *5*, 67–76.

DeLeon, I. G., Fisher, W. W., Herman, K. M., & Crosland, K. C. (2000). Assessment of a response bias for aggression over functionally equivalent appropriate behavior. *Journal of Applied Behavior Analysis*, *33*, 73–77.

Derby, K. M., Fisher, W. W., Piazza, C. C., Wilke, A. E., & Johnson, W. (1998). The effects of noncontingent and contingent

attention for self-injury, manding, and collateral responses. *Behavior Modification*, *22*, 474–484.

Derby, K. M., Wacker, D. P., Berg, W., DeRaad, A., Ulrich, S., Asmus, J., et al. (1997). The long-term effects of functional communication training in home settings. *Journal of Applied Behavior Analysis*, *30*, 507–531.

Didden, R., Korzilius, H., Duker, P., & Curfs, L. M. G. (2004). Communicative functioning in individuals with Angelman syndrome: A comparative study. *Disability & Rehabilitation*, *26*, 1263–1267.

Drasgow, E., Halle, J. W., & Ostrosky, M. M. (1998). Effects of differential reinforcement on the generalization of a replacement mand in three children with severe language delays. *Journal of Applied Behavior Analysis*, *31*, 357–374.

Drasgow, E., Halle, J. W., & Phillips, B. (2001). Effects of different social partners on the discriminated requesting of a young child with autism and severe language delays. *Research in Developmental Disabilities*, *22*, 125–139.

Drash, P. W., High, J. W., & Tudor, R. M. (1999). Using mand training to establish an echoic repertoire in young children with autism. *The Analysis of Verbal Behavior*, *16*, 29–44.

Duker, P. C., Dortmans, A., & Lodder, E. (1993). Establishing the manding function of communicative gestures with individuals with severe/profound mental retardation. *Research in Developmental Disabilities*, *14*, 39–49.

Duker, P. C., Kraaykamp, M., & Visser, E. (1994). A stimulus control procedure to increase requesting with individuals who are severely/profoundly intellectually disabled. *Journal of Intellectual Disability Research*, *38*, 177–186.

Duker, P. C., van Driel, S., & Bercken, J. (2002). Communication profiles of individuals with Down's syndrome, Angelman syndrome, and pervasive developmental disorder. *Journal of Intellectual Disability Research*, *46*, 35–40.

Dymond, S., O'Hora, D., Whelan, R., & O'Donovan, A. (2006). Citation analysis of Skinner's *Verbal Behavior*: 1984–2004. *The Behavior Analyst*, *29*, 75–88.

Eikeseth, S., & Nesset, R. (2003). Behavioral treatment of children with phonological disorder: The efficacy of vocal imitation and sufficient-response-exemplar training. *Journal of Applied Behavior Analysis*, *36*, 325–337.

Ericsson, K. A., & Simon, H. A. (1993). *Protocol analysis: Verbal reports as data*. Cambridge, MA: MIT Press.

Ewing, C. B., Magee, S. K., & Ellis, J. (2001). The functional analysis of problematic verbal behavior. *The Analysis of Verbal Behavior*, *18*, 51–60.

Farmer, J. A., Gast, D. L., Wolery, M., & Winterling, V. (1991). Small group instruction for students with severe handicaps: A study of observational learning. *Education and Training in Mental Retardation*, *26*, 190–201.

Finkel, A. S., Weber, K. P., & Derby, K. M. (2004). Use of a Braille exchange communication system to improve articulation and acquire mands with a legally blind and developmentally disabled female. *Journal of Developmental & Physical Disabilities*, *16*, 321–336.

Finkel, A. S., & Williams, R. L. (2001). A comparison of textual and echoic prompts on the acquisition of intraverbal behavior in a six-year-old boy with autism. *The Analysis of Verbal Behavior*, *18*, 61–70.

Gobbi, L., Cipani, E., Hudson, C., & Lapenta-Neudeck, R. (1986). Developing spontaneous requesting among children with severe mental retardation. *Mental Retardation*, *24*, 357–363.

Goh, H. L., Iwata, B. A., & DeLeon, I. G. (2000). Competition between noncontingent and contingent reinforcement schedules during response acquisition. *Journal of Applied Behavior Analysis*, *33*, 195–205.

Hall, G., & Sundberg, M. L. (1987). Teaching mands by manipulating conditioned establishing operations. *The Analysis of Verbal Behavior*, *5*, 41–53.

Hancock, T. B., & Kaiser, A. P. (1996). Siblings' use of milieu teaching at home. *Topics in Early Childhood Special Education*, *16*, 168–190.

Henry, L. M., & Horne, P. J. (2000). Partial remediation of speaker and listener behaviors in people with severe dementia. *Journal of Applied Behavior Analysis*, *33*, 631–634.

Hersh, S. B. (1990). A description of teacher-student verbal interactions in a resource room versus regular classroom. *The Analysis of Verbal Behavior*, *8*, 101–112.

Horne, P. J., Lowe, C. F., & Randle, V. R. L. (2004). Naming and categorization in young children: II. Listener behavior training. *Journal of the Experimental Analysis of Behavior*, *81*, 267–288.

Howard, J. S., & Rice, D. E. (1988). Establishing a generalized autoclitic repertoire in preschool children. *The Analysis of Verbal Behavior*, *6*, 45–59.

Johnson, L., McComas, J., Thompson, A., & Symons, F. J. (2004). Obtained versus programmed reinforcement: Practical considerations in the treatment of escape reinforced aggression. *Journal of Applied Behavior Analysis*, *37*, 239–242.

Kaiser, A. P., & Hester, P. P. (1994). Generalized effects of enhanced milieu teaching. *Journal of Speech & Hearing Research*, *37*, 1320–1340.

Kern, L., Carberry, N., & Haidara, C. (1997). Analysis and intervention with two topog-

raphies of challenging behavior exhibited by a young woman with autism. *Research in Developmental Disabilities*, *18*, 275–287.

Khang, S., Hendrickson, D. J., & Vu, C. P. (2000). Comparison of single and multiple functional communication training responses for the treatment of problem behavior. *Journal of Applied Behavior Analysis*, *33*, 321–324.

Kritch, K. M., & Bostow, D. E. (1993). Verbal response to past events: Intraverbal relations, or tacts to private events? *The Analysis of Verbal Behavior*, *11*, 1–7.

Lalli, J. S., & Browder, D. M. (1993). Comparison of sight word training procedures with validation of the most practical procedure in teaching reading for daily living. *Research in Developmental Disabilities*, *14*, 107–127.

Lalli, J. S., Mauro, B. C., & Mace, F. C. (2000). Preference for unreliable reinforcement in children with mental retardation: The role of conditioned reinforcement. *Journal of Applied Behavior Analysis*, *33*, 533–544.

Lamarre, J., & Holland, J. G. (1985). The functional independence of mands and tacts. *Journal of the Experimental Analysis of Behavior*, *43*, 5–19.

Leigland, S. (1996). An experimental analysis of ongoing behavior, reinforcement, verbal operants and superstitious behavior. *The Analysis of Verbal Behavior*, *20*, 3–10.

Lerman, D. C., Iwata, B. A., Smith, R. G., & Vollmer, T. R. (1994). Restraint fading and the development of alternative behavior in the treatment of self-restraint and self-injury. *Journal of Intellectual Disability Research*, *38*, 135–148.

Leung, J. P., & Wu, K. I. (1997). Teaching receptive naming of Chinese characters to children with autism by incorporating echolalia. *Journal of Applied Behavior Analysis*, *30*, 59–68.

Lodhi, S., & Greer, R. D. (1989). The speaker as listener. *Journal of the Experimental Analysis of Behavior*, *51*, 353–359.

Lowe, C. F., Horne, P. J., Harris, F. D. A., & Randle, V. R. L. (2002). Naming and categorization in young children vocal tact training. *Journal of the Experimental Analysis of Behavior*, *78*, 527–549.

Lowenkron, B., & Colvin, V. (1992). Joint control and generalized nonidentity matching: Saying when something is not. *The Analysis of Verbal Behavior*, *10*, 1–10.

Luciano, M. C. (1986). Acquisition, maintenance, and generalization of productive intraverbal behavior through transfer of stimulus control procedures. *Applied Research in Mental Retardation*, *7*, 1–20.

Luciano, M. C., Gomez Becerra, I., & Rodriguez Valverde, M. (2007). The role of multiple-exemplar training and naming in establishing derived equivalence in an infant. *Journal of the Experimental Analysis of Behavior*, *87*, 349–365.

MacGreene, D., & Hafer Bry, B. (1991). A descriptive analysis of family discussions about everyday problems and decisions. *The Analysis of Verbal Behavior*, *9*, 29–39.

Marcus, B. A., & Vollmer, T. R. (1996). Combining noncontingent reinforcement and differential reinforcement schedules as treatment for aberrant behavior. *Journal of Applied Behavior Analysis*, *29*, 43–51.

Marion, C., Vause, P., Harapiak, S., Martin, G. L., Yu, D. C. T., Sakko, G., et al. (2003). The hierarchical relationship between several visual and auditory discriminations and three verbal operants among individuals with developmental disabilities. *The Analysis of Verbal Behavior*, *19*, 91–105.

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.

Miguel, C. F., Carr, J. E., & Michael, J. (2002). The effects of a stimulus-stimulus pairing procedure on the vocal behavior of children diagnosed with autism. *The Analysis of Verbal Behavior*, *18*, 3–13.

Murphy, C., Barnes-Holmes, D., & Barnes-Holmes, Y. (2005). Derived manding in children with autism: Synthesizing Skinner's *Verbal Behavior* with relational frame theory. *Journal of Applied Behavior Analysis*, *38*, 445–462.

Northup, J., Vollmer, T. R., & Serrett, K. (1993). Publication trends in 25 years of the *Journal of Applied Behavior Analysis*. *Journal of Applied Behavior Analysis*, *26*, 527–537.

Nuzzolo-Gomez, R., & Greer, R. D. (2004). Emergence of untaught mands or tacts of novel adjective-object pairs as a function of instructional history. *The Analysis of Verbal Behavior*, *20*, 63–76.

O'Conner, J. T., Sorensen-Burnworth, R. J., Rush, K. S., & Eidman, S. L. (2003). A mand analysis and levels of treatment in an outpatient clinic. *Behavioral Interventions*, *18*, 139–150.

O'Neill, R. E., Faulkner, C., & Horner, R. H. (2000). The effects of general case training of manding responses on children with severe disabilities. *Journal of Developmental and Physical Disabilities*, *12*, 43–60.

Partington, J. W., & Bailey, J. S. (1993). Teaching intraverbal behavior to preschool children. *The Analysis of Verbal Behavior*, *11*, 9–18.

Partington, J. W., Sundberg, M. L., Newhouse, L., & Spengler, S. M. (1994). Overcoming an autistic child's failure to acquire a tact repertoire. *Journal of Applied Behavior Analysis*, *27*, 733–734.

Peck, S. M., Wacker, D. P., Berg, W. K., Cooper, L. J., Brown, K. A., Richman, D., et al. (1996). Choice-making treatment of

young children's severe behavior problems. *Journal of Applied Behavior Analysis*, *29*, 263–290.

Polson, D. A. D., Grabavac, D. M., & Parsons, J. A. (1997). Intraverbal stimulus-response reversibility: Fluency, familiarity effects, and implications for stimulus equivalence. *The Analysis of Verbal Behavior*, *14*, 19–40.

Potter, B., Huber, S., & Michael, J. (1997). The role of mediating verbal behavior in selection-based responding. *The Analysis of Verbal Behavior*, *38*, 101–105.

Ribeiro, A. D. (1998). Correspondence in children's self-report: Tacting and manding aspects. *Journal of the Experimental Analysis of Behavior*, *51*, 361–367.

Richman, D. M., Wacker, D. P., & Winborn, L. (2001). Response efficiency during functional communication training: Effects of effort on response allocation. *Journal of Applied Behavior Analysis*, *34*, 73–76.

Robbins, J. K., Layng, T. V. J., & Karp, H. J. (1995). Ambiguity and the abstract tact: A signal detection analysis. *The Analysis of Verbal Behavior*, *12*, 1–11.

Romer, L. T., Cullian, T., & Schoenberg, B. (1994). General-case training of requesting: A demonstration and analysis. *Education and Training in Mental Retardation and Developmental Disabilities*, *29*, 57–68.

Ross, D. E., & Greer, R. D. (2003). Generalized imitation and the mand: Inducing first instances of speech in young children with autism. *Research in Developmental Disabilities*, *24*, 58–74.

Sautter, R. A., & LeBlanc, L. A. (2006). The empirical applications of Skinner's analysis of verbal behavior with humans. *The Analysis of Verbal Behavior*, *22*, 35–48.

Schussler, N. G., & Spradlin, J. E. (1991). Assessment of stimuli controlling the requests of students with severe mental retardation during a snack routine. *Journal of Applied Behavior Analysis*, *24*, 791–797.

Sigafoos, J. (1998). Assessing conditional use of graphic mode requesting in a young boy with autism. *Journal of Developmental and Physical Disabilities*, *10*, 133–151.

Sigafoos, J., & Couzens, D. (1995). Teaching functional use of an eye gaze communication board to a child with multiple disabilities. *British Journal of Developmental Disabilities*, *41*, 114–125.

Sigafoos, J., Doss, S., & Reichle, J. (1989). Developing mand and tact repertoires in persons with severe developmental disabilities using graphic symbols. *Research in Developmental Disabilities*, *10*, 183–200.

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

Sigafoos, J., Roberts, D., Kerr, M., Couzens, D., & Baglioni, A. J. (1994). Opportunities for communication in classrooms serving children with development disabilities. *Journal of Autism and Developmental Disorders*, *24*, 259–279.

Sigafoos, J., Woodyatt, G., Tucker, M., Toberts-Pennell, D., & Pittendreigh, N. (2000). Assessment of potential communicative acts in three individuals with Rett syndrome. *Journal of Developmental and Physical Disabilities*, *12*, 203–216.

Skinner, B. F. (1957). *Verbal behavior*. New York: Appleton-Century-Crofts.

Smith, R., Michael, J., & Sundberg, M. L. (1996). Automatic reinforcement and automatic punishment in infant vocal behavior. *The Analysis of Verbal Behavior*, *13*, 39–48.

Sprague, J. R., & Horner, R. H. (1992). Covariation within functional-response classes: Implications for treatment of severe problem behavior. *Journal of Applied Behavior Analysis*, *25*, 735–745.

Stafford, M. W., Sundberg, M. L., & Braam, S. J. (1988). A preliminary investigation of the consequences that define the mand and the tact. *The Analysis of Verbal Behavior*, *6*, 61–71.

Sundberg, C. T., & Sundberg, M. L. (1990). Comparing topography-based verbal behavior with stimulus selection-based verbal behavior. *The Analysis of Verbal Behavior*, *8*, 31–34.

Sundberg, M. L. (1985). Teaching verbal behavior to pigeons. *The Analysis of Verbal Behavior*, *3*, 11–18.

Sundberg, M. L., Endicott, K., & Eigenheer, P. (2000). Using intraverbal prompts to establish tacts for children with autism. *The Analysis of Verbal Behavior*, *18*, 15–29.

Sundberg, M. L., Michael, J., Partington, J. W., & Sundberg, C. A. (1996). The role of automatic reinforcement in early language acquisition. *The Analysis of Verbal Behavior*, *13*, 21–37.

Tenenbaum, H. A., & Wolking, W. D. (1989). Effects of oral reading rate and inflection on intraverbal responding. *The Analysis of Verbal Behavior*, *7*, 83–89.

Tiger, J. H., & Hanley, G. P. (2004). Developing stimulus control of preschooler mands: An analysis of schedule-correlated and contingency-specifying stimuli. *Journal of Applied Behavior Analysis*, *37*, 517–521.

Tincani, M. J., Castrogiovanni, A., & Axelrod, S. A. (1999). Comparison of the effectiveness of brief versus traditional functional analyses. *Research in Developmental Disabilities*, *20*, 327–338.

Twyman, J. S. (1996). The functional independence of impure mands and tacts of abstract stimulus properties. *The Analysis of Verbal Behavior*, *13*, 1–19.

Vollmer, T. R., Borrero, J. C., Lalli, J. S., & Daniel, D. (1999). Evaluating self-control and impulsivity in children with severe behavior disorders. *Journal of Applied Behavior Analysis*, *32*, 451–466.

Warren, S. F., McQuarter, R. J., & Rogers-Warren, A. K. (1984). The effects of mands and models on the speech of unresponsive language-delayed preschool children. *Journal of Speech and Hearing Disorders*, *49*, 43–52.

Watkins, C. L., Pack-Teixeira, L., & Howard, J. (1989). Teaching intraverbal behavior to severely retarded children. *The Analysis of Verbal Behavior*, *7*, 69–81.

Woods, T. S. (1984). Generality in the verbal tacting of autistic children as a function of naturalness in antecedent control. *Journal of Behavior Therapy & Experimental Psychiatry*, *15*, 27–32.

Yamamoto, J., & Mochizuki, A. (1988). Acquisition and functional analysis of manding with autistic students. *Journal of Applied Behavior Analysis*, *21*, 57–64.

Yoon, Y. S., & Bennett, G. M. (2000). Effects of a stimulus-stimulus pairing procedure on conditioning vocal sounds as reinforcers. *The Analysis of Verbal Behavior*, *17*, 75–88.