

301 Research Topics From Skinner's Book *Verbal Behavior*

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Skinner's (1957) analysis of verbal behavior addresses some of the most important issues in human behavior. However, relatively few of the analyses presented by Skinner in *Verbal Behavior* have been subjected to an experimental analysis. The current list of topics was assembled in an effort to stimulate empirical research on verbal behavior. The list contains thirty research areas with ten topics suggested for each area. A final topic, education, is presented as a challenge to behavior analysis.

Skinner's (1957) book *Verbal Behavior* contains a conceptual analysis of the topic of language. This book has not received the abundant amount of experimental attention that Skinner's other works have, yet Skinner stated several times that this book would prove to be his most important work (e.g., 1978, p. 122). There are a variety of reasons why Skinner's analysis of verbal behavior has been slow in affecting the behavioral community (e.g., see Eshleman, 1991; Michael, 1984; Vargas, 1986). A frequently raised point is the lack of supporting data for the analysis. McPherson, Bonem, Green, and Osborne (1984) conducted a citation analysis of *Verbal Behavior* and found that of the 836 citations only 31 were of an empirical nature. These authors have made a rather pessimistic prediction concerning the book stating that "*Verbal Behavior* has not provided a conception that has led to the empirical examination and explanation of verbal behavior. If the past is a predictor of the future there is no reason to suspect that it will eventually do so" (p. 165). The current list was developed to show that the book does contain many suggestions for empirical research, and that any observed lack of research is not due to a paucity of topics, but rather to a paucity of researchers. Also, the list lends

support to Skinner's proclamation that "The formulation is inherently practical and suggests immediate technological applications at almost every step" (1957, p. 12).

The list contains thirty research areas, each containing ten suggestions for specific research topics. The suggestions are brief and at times it may be difficult to determine exactly how to conduct a research project given so little information. Unfortunately, further elaboration of each topic is beyond the scope of the present paper. Nevertheless, it is hoped that individual readers will find topics of interest to them and conduct empirical research.

1. ESTABLISHING OPERATIONS AND VERBAL BEHAVIOR

Establishing operations (Michael, 1982, 1988) play a major role in controlling verbal behaviors (as well as nonverbal behaviors). The mand, for example, is always under the control of an establishing operation (EO). Skinner (1957) defined the mand "as a verbal operant in which the response is reinforced by a characteristic consequence and is therefore under the functional control of the relevant conditions of deprivation or aversive stimulation" (pp. 35-36). Many who use this definition focus only on the specific reinforcement, and neglect the importance of "relevant conditions of deprivation or aversive stimulation" (i.e., establishing operations). These motivational variables can be strong

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sources of control, and powerful independent variables in behavioral research. Unfortunately, experimental research on the establishing operation lags far behind the research on the other behavioral principles. However, there is a growing body of literature on the EO, both on verbal behavior (e.g., Hall & Sundberg, 1987; Lamarre & Holland, 1985; Sigafoos, Reichle, Doss, Hall, & Pettitt, 1990; Sundberg, San Juan, Dawdy, & Argüelles, 1990), and on nonverbal behavior (e.g., McPherson & Osborne, 1988; Pierce, Epling, & Boer, 1986). Further research on this important principle of behavior would benefit our understanding of human behavior.

Ten Suggestions for Research on Establishing Operations

The effects of the EO as an independent variable in VB development
 Unconditioned EOs vs. conditioned EOs as independent variables
 The effects of EOs on verbal vs. nonverbal behavior
 Bringing verbal behavior under EO control—the transfer from S^D control
 Procedures for breaking free from control by EOs
 Specific consequences vs. nonspecific consequences
 The effects of different levels of strength of EOs
 Evocative and repertoire-altering effects of EO control vs. S^D control
 Contrived vs. natural EOs—procedures for contriving and capturing EOs
 The effects of aversive EOs—escape and avoidance in verbal responding

2. AUTOMATIC CONSEQUENCES AND VERBAL BEHAVIOR

Skinner proposed that under certain circumstances the response *product* of a behavior may have reinforcing (or punishing) properties. These circumstances involve a conditioning history where a neutral stimulus is paired with some other already strong form of reinforcement (or punishment), and as a result becomes a form of conditioned reinforcement (or punishment). The emission of a response which has topographical similarities with the previously neutral stimulus may have self-strengthening (or weakening) properties, thus the term *automatic* consequences. Skinner frequently wrote about automatic consequences (e.g., 1957, p. 58), and their

importance to behavior analysis has been stressed (Vaughan & Michael, 1982). However, like establishing operations, very little research has been conducted on this unique type of independent variable. In one study on vocal babbling (Sundberg, 1980), the rate of babbling specific words by a blind toddler increased as a function of pairing the words with strong reinforcers. More research with automatic consequences as an independent variable could produce useful language training procedures.

Ten Suggestions for Research on Automatic Consequences

The role of automatic reinforcement in infant babbling
 Automatic reinforcement and the acquisition of verbal behavior
 Automatic reinforcement and deviant behavior, self-stimulation, etc.
 The lack of automatic reinforcement pairings—the effects of neglect on VB
 Automatic punishment and defective verbal behavior
 Automatic punishment and antisocial, delinquent, and criminal behavior
 Automatic reinforcement and the development of codic repertoires
 Automatic reinforcement and the acquisition of musical and artistic skills
 Automatic reinforcement and accents, slang, and grammatical conventions
 The development of stimulus control with automatic consequences

3. TEACHING VERBAL BEHAVIOR TO NONHUMANS

There is now an abundant number of demonstrations that nonhumans can acquire various forms of verbal behavior (e.g., Gardner & Gardner, 1969; Rumbaugh, 1971; Pepperberg, 1981; Patterson & Linden, 1981). However, there is very little research on the application of Skinner's concepts from *Verbal Behavior* to teaching language to nonhumans. Interestingly enough, one of the few demonstrations of the use of Skinner's verbal behavior came from outside the field, and was done for purposes other than to develop the concepts from the book (Savage-Rumbaugh, 1984). It seems likely that the use of *Verbal Behavior* could result in more extensive and

functional repertoires with nonhumans. A line of research on teaching verbal behavior to pigeons was started by Michael, Whitley, & Hesse (1983), and followed by Sundberg (1984, May), McDoung and Sundberg (1985), and Winfrey (1985). These researchers found that pigeons could acquire some simple forms of verbal behavior, and have provided a methodology for conducting research in this area. In addition to the potential advancement to the basic concepts in verbal behavior and the verbal development in nonhumans, this type of research is less likely to draw protests by animal rights activists.

Ten Suggestions for Research on Nonhuman Verbal Behavior

Teaching mands, tacts, intraverbals, duplcs, and codics to nonhumans
 Conditioned EOs and manding in nonhumans—contriving EOs
 Teaching verbal interactions with, and between, humans and nonhumans
 Transfer of stimulus control between operants with nonhumans
 Replicate human VB research with nonhumans, mand vs. tact, transfer, etc.
 Establishment of unprompted (pure) VB in nonhumans
 Nonhumans teaching other nonhumans verbal behavior
 Rule-governed behavior with nonhumans
 Stimulus equivalence relations with nonhumans
 Analysis of current practices of verbal training for nonhumans using VB

4. AUGMENTATIVE COMMUNICATION SYSTEMS FOR NONVOCAL INDIVIDUALS

During the past two decades there have been several successful demonstrations of augmentative communication systems (e.g., Bonvillian & Nelson, 1978; Carr, 1979; McNaughton, 1976). Many individuals, who would have otherwise remained nonverbal, have acquired rather extensive verbal repertoires using sign language, pointing systems, or computer generated speech. The important point in this line of research is that verbal behavior requires a response form, and if speech is unavailable other response forms need to be developed. Although this area, like work with

the DD in general, has received a lot of attention, there is still much to be done. For example, the current trend in speech pathology is to favor pointing systems over sign language. However, recent data (Sundberg & Sundberg, 1990; Wraikat, Sundberg, & Michael, 1991) have shown that pointing systems are actually harder to acquire and may be less functional in the long run. In addition, Lowenkron (1991) has cited evidence that shows that generalization may be much more difficult with pointing systems. There are still many unanswered questions in this area, and Michael's (1985) distinction between topography-based and stimulus-selection based verbal behavior provides a conceptual framework to guide research.

Ten Suggestions for Research on Augmentative Systems

The effects of sign training vs. picture and symbol board training
 Topography-based VB (TBVB) vs. stimulus selection-based VB (SSBVB)
 The establishment of equivalence classes with TBVB vs. SSBVB
 The unprompted use of the two systems, transfer, generalization, etc.
 The development of intraverbal behavior with pointing systems
 The effects of sign training and pointing training on speech development
 The effects of fingerspelling on speech development
 Training the verbal operants using computer generated speech
 The effects of the verbal community—teaching signs to family, staff, etc.
 Yes/no as stimulus selection-based verbal behavior

5. THE AUTISTIC AND OTHER INDIVIDUALS WITH DEVELOPMENTAL DISABILITIES

A majority of the existing body of verbal behavior research has been conducted with individuals with developmental disabilities (see Oah & Dickinson, 1989 for a review). The results have been impressive, yet professionals in this area still seem far from adopting a verbal behavior model for daily language intervention. Many of the most popular language training programs tend to focus too much on receptive and tact training, with a general neglect of the

mand and intraverbal. The importance of all the verbal repertoires is not well appreciated, nor are all the long-term effects of teaching a functional verbal repertoire to a previously nonverbal person. There is still a need for research and development in this area. It should be noted that efforts by behaviorists using *Verbal Behavior* are often well appreciated by parents and teachers who have tried and failed to teach language using other approaches.

Ten Suggestions for Research With the Developmentally Disabled

- The effects of verbal training on the rate of self-stimulation
- The effects of intraverbal training on social interaction
- The effects of mand training on the rate of negative behavior
- The effects of early/intensive verbal intervention
- The point at which intraverbal training should begin
- The effects of different levels of a verbal community
- Skinner's VB program compared to Distar; Lovaas; Guess, Sailor, and Baer, etc.
- Teaching survival VB to independent and/or high functioning clients
- The effects of particular features of the VB training procedures
- The effects of the use of punishment in verbal training

6. THE DEAF POPULATION

Language deficits are the primary handicapping conditions of deafness (Moore, 1978). As a result, much of the focus of early education is on language development. Unfortunately, the instructional techniques employed are usually based on traditional linguistics and overemphasize receptive and tact training. The mand, intraverbal, and autoclitic relations are often neglected. In addition, verbal operants are often taught in isolation and responses are not brought under the control of all the necessary variables. Skinner's analysis of verbal behavior has much to offer the field of deafness. Research in this area could benefit millions of individuals.

Ten Suggestions for Research With the Deaf Population

- The effects of total vs. oral communication on verbal development

- Procedures for teaching mands, autoclitics, and intraverbals to the deaf
- Procedures for teaching codic behaviors to the deaf
- Procedures and contingencies for teaching hearing people sign language
- The relation between language development and emotional problems
- Effects of fingerspelling on articulation
- Effects of sign language on articulation
- The effects of establishing a signing verbal community
- The role of the verbal community in shaping signed intraverbal behavior
- The acquisition of Signed English as a second language and ASL as a first language

7. THE GERIATRIC POPULATION

It is a known fact that the verbal repertoires of elderly individuals tend to weaken. However, it is unclear what the critical variables are. It is often assumed that biological deterioration is responsible for verbal problems, when quite possibly, it is environmental deterioration that is the key variable. Individuals who maintain a strong verbal community, and are in a profession involving the frequent emission of verbal behavior, tend to maintain their repertoires well into the later years of life (e.g., politicians, preachers, college professors). Research on the application of Skinner's work to the maintenance of verbal behavior in the elderly is virtually nonexistent. Thematic lines of research in this area could also benefit a great number of people.

Ten Suggestions for Research With the Geriatric Population

- Procedures for maintaining the aged person's verbal repertoire
- The role of computers in maintaining intraverbal and textual repertoires
- Procedures for reducing the verbal errors of aged individuals
- Contriving and capturing EOs for facilitating verbal interaction
- The role of the aged person's verbal community
- Textual behavior as a way to maintain intraverbal behavior
- Procedures for strengthening stimulus control
- Procedures for the reduction of bizarre and irrelevant verbal behavior
- Procedures to reduce or soften excessive manding
- The effects of punishment and extinction on the senior citizen's VB

8. THE TRAUMATIC BRAIN INJURED

Individuals who sustain a traumatic brain injury (TBI) frequently experience severe verbal deficits. The most common intervention techniques are based on traditional theories of cognitive rehabilitation. An alternative approach to analyzing and ameliorating these verbal deficits has been suggested by Skinner (1957, p. 190). Unfortunately, the behavioral literature on TBI and language training is sparse. However, an excellent series of studies by Sidman and his colleagues (e.g., Sidman, 1971; Sidman, Stoddard, Mohr, & Leicester, 1971) demonstrated that Skinner was correct when he proposed that brain injury can affect specific classes of stimulus-response relations, but not others. In addition, these authors showed "the existence of orderly but different recovery courses for the various stimulus-response relations" (Sidman et al., 1971, p. 135). A replication and extension of Sidman's work was conducted by Sundberg, San Juan, Dawdy, and Argüelles (1990). They showed that tacts and intraverbals were acquired quicker than mands (the opposite of what had been found with the developmentally disabled), and that training on the tact produced the greatest amount of transfer to the untrained verbal operants. In addition, direct mand training proved to be the least efficient way to generate a mand repertoire, and when acquired showed the least amount of transfer. There are several other types of verbal behavior research which could greatly benefit this population.

Ten Suggestions for Research With Individuals with TBI

- Bringing verbal behavior under audience control
- Reducing perseverative VB and loose intraverbal behavior (rambling)
- Establishing initial mands, tacting private events, emotions, etc.
- Establishing social mand and intraverbal behavior, tacting social behavior
- Effects of alternative response forms (e.g., signs, pictures)
- Differences from the DD population, and attempts to replicate procedures
- Procedures for the acquisition of the verbal operants

Teaching tacts and intraverbals—transfer from echoic vs. textual stimuli

Effects of computer verbal training on vocal tacts and intraverbals

Generalization and the formation of equivalence relations

9. CLINICAL INTERVENTIONS

Much of the clinical intervention conducted by psychologists involves verbal behavior and rule-governed behavior. However, there is very little research on these interventions from a verbal behavior perspective. It certainly seems possible that new discoveries on the causes and cures for various problems could occur by using the concepts from Skinner's book. Verbal behavior is relevant to the analysis of bizarre verbal behaviors and to the analysis of complex personal and family problems. The analyses of hallucinations and hearing voices by Burns, Heiby, and Tharp (1983), and other maladaptive behaviors by Glenn (1983), have provided evidence of the value of Skinner's analysis. Hayes (1989) has also pointed out the importance of rule-governed behavior to this area and has suggested, and conducted, a variety of research projects (e.g., Zettle & Hayes, 1986). The work of Willard Day and his students (e.g., McCorkle, 1978) has provided an analysis and a methodology for studying clinical issues. These lines of research have tremendous potential and should be continued. The clinical area offers many challenges to the behavior analyst, and the concepts from *Verbal Behavior* can be useful tools in ameliorating the problems they face.

Ten Suggestions for Research in the Clinical Area

- The role of verbal behavior in depressed behavior
- Defective stimulus control and bizarre verbal behavior, audience control
- The contributions of rule-governed behavior to clinical interventions
- Verbally unlocking old VB to evoke events from the distant past
- The intraverbal repertoires necessary for effective therapy
- Verbal behavior and its relation to phobias
- The role of verbal behavior in overcoming homelessness

Psychotic verbal behavior, hallucinations, hearing voices, etc.
 Changing verbal behavior in marriage and family interventions
 Changing juvenile delinquent verbal behavior

The effects of a verbal community
 The formation of equivalence relations
 The value and development of rule-governed behavior in acquisition
 Current methods vs. VB methods of instruction (use all the verbal operants)

10. LEARNING A SECOND LANGUAGE

There is virtually no research on the use of Skinner's analysis to improve the acquisition of a second language. The existing body of research is based on traditional linguistics and tends to focus on grammatical and syntactical development. Given the progress in other areas of verbal behavior research, it seems likely that several improvements could be made in this increasingly important area. For example, often second language instruction is provided in only one or two of the verbal operants, usually echoic and tacts, or simple intraverbal word translation from the native language, or textually as in reading passages from a book. Rarely are all verbal operants taught together, or specific training activities provided for the development of mands and complex intraverbals within a social context. As an example, I was recently contacted by an individual who is involved in teaching second languages to the U.S. Military. He said that during the Persian Gulf War there was some difficulty in communicating, especially with all the different languages involved. He wondered if there was any research, or second language programs based on Skinner's *Verbal Behavior*. Unfortunately, I could not identify any published work. Perhaps some day this increasingly important area will have several lines of research available.

Ten Suggestions for Research on Teaching a Second Language

Acquiring mands, tacts and intraverbals in a second language
 Developing complex social verbal behavior
 Acquiring codics (e.g., reading, writing, spelling) in a second language
 The effects of textual vs. vocal prompts on intraverbal behavior
 The effects of various prompt levels on VB acquisition and retention
 The transfer of stimulus control between operants

11. EARLY VERBAL DEVELOPMENT

Developmental psychology usually focuses on the acquisition of behavioral repertoires by human infants, toddlers, children, and young adults. Much of this acquired behavior is verbal. Surprisingly, there is very little behavioral work in this area. In fact, it is often difficult to find a developmental textbook which is even supportive of behavioral analyses, much less one that teaches students the essential features of a behavioral approach to human development. The work by Bijou and Baer stands out as an exception (especially 1965, chap. 8). It would have been reasonable to believe that this work would have generated an abundant amount of research. However, this has not occurred. Skinner's analysis of verbal behavior is rich with analyses of normal verbal development, and could lead to several new discoveries about human behavior. In addition, this line of research could be very beneficial to the human services.

Ten Suggestions for Research on Early Verbal Development

The study of verbal development from a VB perspective (like Piaget's)
 New verbal (developmental) assessment scales from a VB perspective
 The effects of direct and automatic reinforcement on daily behaviors
 Innate vocal behavior becoming learned vocal behavior (UR to CR)
 The transfer from respondent to operant control (US/CS to S^D)
 Parent-child interactions scored and measured with the verbal operants
 The effects of sign language training on vocal development
 The effects of early mand training on verbal development
 The effects of punishment and neglect on verbal development
 The point at which intraverbal behavior develops, procedures to facilitate the IV

12. VERBAL ASSESSMENT

Most of the language assessment programs currently used by schools are based on traditional theories of language development. These assessments typically focus on syntax and grammar while attempting to obtain an age equivalent score. They often fail to identify critical language repertoires such as mands and intraverbals. As a result interventions may, for example, involve mostly tact training for a student who really needs to learn to mand or emit intraverbal behaviors. Behavioral verbal assessments tend to look very different from traditional assessment packages (e.g., Spradlin, 1963; Sundberg, 1983). The focus is on all the verbal operants, along with the response form that occurs with each individual operant. Research on this type of assessment could be very beneficial, especially since more accurate assessments can lead to better interventions.

Ten Suggestions for Research on Verbal Assessments

- Assessment package for the early signs of verbal deficits
- Verbal behavior assessment scales (norms/criterion referenced data)
- Computer assessment package
- Validation of the assessment programs
- Implementation across a variety of populations
- Assessment systems which suggest intervention strategies
- Formal versus informal verbal assessment
- Contriving and capturing EOs for mand assessments
- Assessment procedure for sign language users, and second language learners
- Assessment of high level verbal deficits (e.g., excessive IV behavior)

13. RESEARCH METHODOLOGY

Frequently, the lack of a methodology has been cited as a reason for the slow development of verbal behavior research. This certainly has been the case, but as Eshleman (1991) has pointed out, research is now on the increase. Chapter 2 of *Verbal Behavior* provides the reader with the basic features of a research methodology for verbal behavior. The formal and functional properties of verbal behavior are identi-

fied, and the independent and dependent variables are clearly defined. Unfortunately, the independent variables are complex and often occur too fast, or are hard to control, especially establishing operations. Willard Day's contributions to methodology, specifically, his "radical methodology," have been very helpful. For example, in verbal behavior research the experimenter becomes part of the subject's verbal community, and as a result, much of his behavior is controlled by the subject. This aspect of research is typically not included in most reported behavioral research. The subject's behavior is almost always the primary dependent variable while the experimenter's behavior functions as the independent variable. Day proposed that the experimenter's behavior be analyzed as a dependent variable and the subject's behavior as an independent variable. Radical methodology can provide an important contribution to the development of a more standardized research methodology.

Ten Suggestions for Research on Methodology

- An examination of the functional unit of verbal behavior
- Methods for measuring and quantifying verbal relations
- Independent and dependent variables in VB research (VB Chapter Two)
- Latency as a dependent variable in VB research
- Energy level, frequency, and repetition as dependent variables
- Radical methodology and traditional behavioral methodology
- Advancing the prediction and control of verbal behavior
- Differences between measuring nonverbal behavior and verbal behavior
- Verbal behavior research methodology guidelines, handbook, etc.
- The establishing operation as an independent variable

14. THE DUPLIC RELATION: ECHOIC, IMITATION, AND COPYING A TEXT

There has been an extensive amount of research on imitation and echoic behavior (e.g., Lovass, Berberich, Perloff, & Schaeffer, 1966; Martin, England, Kaprowy, Kilgour, & Pilek, 1968). Much is known about this type of behavior, and

there are several applications which are easy to implement. This type of verbal behavior is very important to the establishment of more effective verbal behaviors such as mands, tacts, and intraverbals. New methods to establish this repertoire and transfer stimulus control to the other types of controlling variables still need to be explored.

Ten Suggestions for Research on the Dupic Relation

- Transferring stimulus control from dupic to mand, tact, intraverbal, etc.
- The use of the establishing operation in developing dupic control
- Automatic reinforcement procedures to develop echoic and imitative control
- Natural vs. contrived training trials
- Effects of punishment on echoic and imitative development
- Effects of extinction on echoic and imitative development
- Transfer from physical prompts to dupic prompts with a strong EO
- Procedures for developing a generalized imitative repertoire
- Procedures for teaching identigraphic (copying a text) behaviors
- Procedures for the reduction of excessively strong dupic behaviors

15. THE TACT RELATION: PART 1

This verbal operant has also received an extensive amount of research attention. Procedures for teaching nouns, verbs, adjectives, pronouns, etc. are easy to find in the literature. Many examples of tacting have been studied in a variety of ways, but few have examined tacting in relation to manding and the other types of verbal behavior. The variables of the mand may facilitate the acquisition of tacts (e.g., Carroll & Hesse, 1987). A tact repertoire can be very useful in establishing other types of verbal behavior such as intraverbal or autoclitic. There is still a substantial amount of research that needs to be conducted in this area. The list of tacting research projects contains two sets of ten. The first part involves basic issues relevant to tacts, while part two of the list contains more complex issues.

Ten Suggestions for Research on the Tact

Relation

- Use of the EO in tact training, effects on acquisition, generalization, etc.
- Breaking tacts free from control by EOs—developing pure tacts
- Procedures for establishing unprompted tacting
- Procedures for developing a generalized tact repertoire
- The effects of tacts on the other verbal operants and vice versa
- Procedures for establishing multiple tacts (e.g., adjective-noun-verb)
- The effects of the tact trial—echoic trial—tact trial transfer procedure
- The effects of contrived versus natural training trials—milieu training
- Procedures to expedite moving from multiple to single stimulus control
- Procedures for reducing inappropriate tacting

16. THE TACT RELATION: PART 2

Ten Suggestions for Research on Complex Tacts

- Procedures and experimentation on teaching tacts of private events
- Procedures and experimentation on teaching tacts of social behavior
- The development of tact extensions (generic, metaphoric, and metonymic)
- The process whereby a metaphorical tact becomes a standard tact
- Abstraction and its relation to tacting
- Tacts of emotion and introspection as tacts of private stimuli
- The development of tacts through other senses (tactile, gustatory, etc.)
- Procedures for teaching complex tacts as sentences
- Impure tacts and their effects on behavior
- Complex tacting in professionals of music, wine tasting, cytology, etc.

17. THE MAND RELATION: PART 1

There is relatively little research on the mand. This is partly due to its relation to the establishing operation, and the relative lack of research in that area. Mands are extremely critical in early language development, and are fundamental to normal language development. Mands benefit the speaker in a number of different ways (Skinner, 1957, chap. 3), and their presence is ubiquitous. There are potential applications for the mand in several areas. In the human services, for example, many of the

behavior problems that are emitted by individuals with developmental disabilities are mands for attention. Frequently these behaviors are treated with DRO and punishment. However, successful reduction of these negative behaviors must involve bringing some new verbal behavior (a mand) under the control of the existing establishing operation. There are also several basic issues concerning the mand which need investigation. The suggestions for research are broken into three parts. The first part will address mands in language training. The second part will focus on basic research, and the third part will focus on manding in different occupations and populations.

Ten Suggestions for Research on Manding and Language Training

- Effects of mand training on the rate of negative behavior
- Procedures to generate early manding in normal infants, and its effects on crying
- Mands for information, location, position, temperature, action, etc.
- Procedures for teaching the "Wh" questions as mands
- Procedures for teaching complex mands
- Procedures for teaching mands as sentences
- Manding replaced by more social (intraverbal) verbal behavior
- Procedures for teaching softened mands to high rate manders
- Procedures for reducing inappropriate manding
- Procedures for reducing excessive manding (the revolt of the listener)

18. THE MAND RELATION: PART 2

Ten Suggestions for Basic Research on the Mand

- Role of stimulus control in manding (Skinner's candy example, pp. 52-53)
- Skinner's different types of mands and the listener's behavior (pp. 38-42)
- Manding and intermittent reinforcement, resistance to extinction
- The effects of different mand rates on the behavior of the listener
- The effects of the mand in helping the development of other VB
- Manding under the right stimulus control (context, audience, etc.)
- An analysis and investigation of mand extensions
- The effects of delayed consequences on the mand

Contrived versus natural contingencies, mand acquisition and transfer

An analysis of nonvocal, nonstandard, forms of manding in human behavior

19. THE MAND RELATION: PART 3

Ten Suggestions for Research on Manding in Different Occupations and Populations

- Excessive manding and its relation to marital and other social problems
- Manding and the relation between different governments and the people
- Ways to soften mands, most effective variables, imparting the repertoire
- Manding and the behavior of the politician
- Manding and the U.S. Military, religion, cults, gangs, and other groups
- An analysis of the salesman's manding repertoire
- Manding and business and professional behavior
- Mands and their relation to physical problems (or hypochondriacs)
- The development of mand repertoires for sensory impaired individuals
- The development of mand repertoires for individuals with Cerebral Palsy (CP)

20. THE INTRAVERBAL RELATION: PART 1

The intraverbal relation has perhaps received the least amount of attention of all the elementary operants. Skinner (1957) points out that the intraverbal, along with the echoic and textual relations "are sometimes dismissed as 'spurious language.'...They are not important to the theorist of meaning because the responses and controlling variables do not raise important problems of reference" (pp. 79-80). Perhaps this is why so few language training programs for the developmentally disabled involve much intraverbal behavior. A related problem, frequently experienced by the current author, is the general reluctance on the part of teachers, speech pathologists, etc. to include intraverbal training in the language training programs of the autistic, deaf, and other individuals who are in need of specific language training. The focus is usually on receptive, duplic and tact relations, and both the mand and the intraverbal tend to be neglected. The rationale provided by individuals opposing intraverbal training usu-

ally involves the clients "low cognitive level," or inability to "understand" the connection between the words. As a result, specific intraverbal instruction is often not provided in many special education programs. There is, however, a growing body of research on the intraverbal, and thematic lines of research, as well as a methodology, are beginning to evolve (e.g., Braam & Poling, 1983; Luciano, 1986; Sundberg et al., 1990; Watkins, Pack-Teixeira, & Howard, 1989). The suggestions for research are broken into four parts. The first two parts will address intraverbal in language training. The third part will focus on basic research, and the fourth part will focus on intraverbals in different occupations and populations.

Ten Suggestions for Research on Intraverbals and Language Training

- An analysis of intraverbal (IV) development in normal children
- Point at which (verbal repertoire not age) transfer is optimal
- Effects of transfer to intraverbal from tact vs. duplic, vs. textual
- Effects of the establishing operation on the generation of intraverbals
- Conversational development as a function of intraverbal training
- Effects of intraverbal training on social behavior, shyness as defective IVs
- Point at which novel intraverbals develop, procedures to facilitate this
- Procedures for teaching multiple IV responses given a single verbal S^D
- Procedures for teaching a single IV response given a complex verbal S^D
- Procedures to teach social interaction between peers

**21. THE INTRAVERBAL RELATION:
PART 2**

Ten Suggestions for Research on more Complex Intraverbals

- The development of intraverbals through computer assisted instruction, errorless learning
- The transfer from textual to intraverbal contingencies in education
- The establishment of scientific intraverbal behavior
- The relationship of IV behavior to effective debating, negotiating, etc.
- The role of intraverbal behavior in counseling, psychotherapy, etc.

- Effects of intraverbal training on negative social behavior
- The reduction of excessive intraverbal behavior, self as a listener
- Development of academic intraverbal behavior
- The acquisition of complex intraverbal behavior (analysis, synthesis, etc.)
- Emergence of untrained IV responses controlled by adult conversation

**22. THE INTRAVERBAL RELATION:
PART 3**

Ten Suggestions for Basic Research on the Intraverbal

- Contiguous usage as a form of reinforcement in intraverbal behavior
- Effects of punishment on the acquisition of intraverbal behavior
- Effects of intermittent reinforcement on intraverbal behavior
- Effects of the verbal community on intraverbal development
- Intraverbal responding (and understanding) on the part of the listener
- Contrived vs. natural intraverbal training contingencies
- Concept formation and its relation to intraverbal behavior
- Intraverbal behavior and the formation of equivalence classes and rule-governed behavior
- Memory and its relation to intraverbal behavior
- The establishment of intraverbal chains, the intraverbal unit

**23. THE INTRAVERBAL RELATION:
PART 4**

Ten Suggestions for Research on Intraverbals in Different Occupations and Populations

- The effects of intraverbal training on the asocial behavior of the autistic
- Acquiring the IV repertoire necessary for theatrical performances
- Intraverbals and professional behavior, sales, business, politics, etc.
- Intraverbal behavior and public speaking, lecturing, preaching, etc.
- Intraverbal behavior and poets, novelists, song writers, storytellers, etc.
- Intraverbal behavior and its relation to effective teaching
- Intraverbal behavior and its relation to effective parenting
- Teaching intraverbal behavior to the sensory impaired
- Teaching intraverbal behavior to individuals with CP

Teaching intraverbal behavior to high school and college students

24. THE CODIC RELATION: PART 1

Illiteracy is frequently identified as a major problem in today's society. It is possible that the application of Skinner's (1957) analysis of textual and transcriptive behavior could dramatically change this situation. Behavior analysis, as a profession, could make substantial gains if the analysis leads to important and obvious gains in some aspect of society. Research involving Skinner's treatment of reading and writing could provide this opportunity (e.g., Goldiamond, 1962; Moxley, 1986). While there is an abundant amount of research on these topics little of it involves the concepts from *Verbal Behavior*. The suggestions for research are broken into two parts: textual behavior and transcriptive behavior.

Ten Suggestions for Research on Textual Behavior

The establishment and retention of basic textual behaviors, reading games
Textual training with words for known vs. unknown tacts and intraverbals
Separating comprehension (tacts, mands, IV, autoclitics) from textual behavior
Separating textual behavior from intraverbal behavior (e.g., see DOG say "cat")
Acquisition of Braille, Morse code (Keller's work) & written sign language
Effects of teaching written sign language, the Stokoe notation system
Effects of the EO on textual response acquisition, latency, choice, etc.
Effects of teaching reinforcing (strong EO) words first to early readers
The effects of reading rates and content on intraverbal development
The effects of aversive control on the tendency to read

25. THE CODIC RELATION: PART 2

Ten Suggestions for Research on Transcriptive Behavior

Skinner's three stages of writing (pp. 70-71) vs. speaking
The automatic shaping of writing, copying a text
The use of a computer pen on the acquisition of writing

Research methodology using the data obtained from a computer pen

Acquiring a transcriptive repertoire via a computer/typewriter vs. writing

Textual behaviors as duplicates, mands, tacts, intraverbals, autoclitics

Procedures for teaching writing to the developmentally disabled

Effects of the EO on spelling acquisition, retention, etc.

Use of the bigram (Lee & Sanderson, 1987) in measuring the acquisition of spelling

An analysis of rules in spelling

26. THE AUTOCLITIC RELATION

Skinner (1957, chaps. 12-14) identified autoclitic behaviors as secondary verbal behavior under the control of primary verbal behavior. The autoclitic relation is a class of verbal behavior which never stands on its own, that is, it is always dependent on other ongoing verbal responses, and is differentially reinforced by its effects on listeners. Peterson (1978) found it helpful to describe the autoclitic as "verbal behavior about verbal behavior" (p. 178). Skinner identified several different types of autoclitics (descriptive, qualifying, quantifying, manipulative, and relational), and identified their role in daily verbal behavior. Peterson (1978) recommended that in addition to Skinner's categories, autoclitics should be further classified as autoclitic mands or autoclitic tacts. For example the response "I'm sure the price will go up" contains the autoclitic tact "I'm sure." This response is a tact of the variables which control the response "The price will go up," and informs the listener of the strength of the verbal relation. The autoclitic easily becomes an autoclitic mand if some establishing operation is present such as the seller's immediate need to sell the property. "I'm sure" may not be a tact of strength, but rather a mand to buy the property. Note that the response "I'm sure" in this example cannot stand on its own, it must be accompanied with the primary response. While much has been written about the autoclitic (e.g., Catania, 1980), there has been very little research. One of the first empirical studies was conducted by Howard and Rice (1988). These researchers successfully taught autoclitic

tacts to preschool children. In addition this research provides a methodology for studying these relations. Research is important in this area because complex verbal behavior always involves autoclitic behavior.

Ten Suggestions for Research on the Autoclitic Relation

The acquisition of autoclitic behaviors
 Empirical distinctions between the types of autoclitics
 Autoclitic behavior and early language development
 The effects of autoclitic responses on listeners
 Development of autoclitic frames
 Methods to teach autoclitic behaviors
 Use of autoclitics as an assessment tool
 Sales/manipulation of listener's behavior with autoclitics
 Punctuation as autoclitic responses
 Development of grammar and syntax as autoclitic behaviors

27. THE AUDIENCE RELATION AND THE LISTENER

Skinner has often been criticized for his treatment of the audience and listener in *Verbal Behavior* (e.g., Parrott, 1984, Place, 1981). Some have said that he completely neglects the listener, others say he has oversimplified the role the listener plays. Ferster (1974) felt quite different, in fact he maintained that the book was about the listener and "very convincingly directs our attention to the complexity of the listener's repertoire to account for the speaker's behavior" (p. 155). Skinner has pointed out several times that much of the complex behavior of a listener actually involves that listener becoming a speaker. This is almost always the case for complex understanding (Schoneberger, 1990). Perhaps some of the disagreement is related to the period in which the book was written. Traditional linguistics had placed such an overwhelming emphasis on the listener, that much of Skinner's effort was to turn the focus back to the speaker. In attempting to do this, the listener seemed relatively ignored in the book. However, the book does contain an extensive analysis of the listener, and the listener's role in verbal interactions (Sundberg & Michael, 1983). The listener was simply not the main focus of analysis,

and that may have seemed odd to those familiar with other analyses of language. In any event, this area is wide open for research. While there has been extensive research on the listener (historically almost excluding the speaker), there is very little work on the interaction between the two and Skinner's "verbal episode."

Ten Suggestions for Research on the Audience and the Listener

The role of the audience in the development of verbal behavior
 Procedures for developing effective audience/listener repertoires
 The role of the listener in autoclitic behavior
 Speaker-listener interactions, the verbal episode, expressive vs. receptive
 The establishment and effects of a verbal community
 History of the listener and their strengthening or weakening effects
 The listener as an SD for VB, the effects of a negative audience
 The speaker functioning as his own listener
 Understanding and the listener
 Procedures for improving a defective listener repertoire

28. MULTIPLE CONTROL

Skinner has stressed that most verbal behavior is multiply controlled. He spends three wonderfully entertaining Chapters on it in *Verbal Behavior* (chaps. 9, 10, & 11; one could also include chaps. 7 & 8). Multiple control occurs in normal discourse with duplic, mand, tact, and intraverbal controlling variables often present. These variables change continually, and vary in strength. Frequently the multiple sources of control are not obvious. The entertainment community capitalizes on those that are with songs, poems, literature, humor, etc. (It would seem reasonable to believe that Skinner's analysis of verbal behavior in general, and multiple control in particular, would be of great interest to that industry.) Multiple control has unique evocative effects which are only beginning to be studied behaviorally. Under some circumstances multiple control is necessary for verbal responses to occur (e.g., early language training with the DD), while at other times multiple control weakens verbal behavior (e.g., mixed

audiences). Research in this area could be very rewarding.

Ten Suggestions for Research on Multiple Control

- The use of multiple control in evoking and establishing verbal behavior
- Breaking free from multiple sources of control
- The effects of the audience on verbal behavior
- The role of the audience and its combination with other verbal operants
- Teaching one how to find, and use, multiple control in creative writing
- Teaching students how to use multiple control for poems, songs, puns, etc.
- An analysis of comedians and satirists repertoires
- An analysis of literature in terms of multiple control
- The effects of training on multiple control on writing literature
- The effects of training on multiple control on advertising

29. CONCEPTUAL AND OTHER COMPLEX ISSUES RELATED TO VERBAL BEHAVIOR: PART 1

There are a number of conceptual and complex issues in behavior analysis that could benefit from experimentation. In addition, there are also a number of topics which could be better understood by simply analyzing the problems from within the framework of *Verbal Behavior*. It is possible that these issues would look quite different from a verbal behavior standpoint, and perhaps research would result in new breakthroughs in the understanding of problems typically struggled with by students and professionals of psychology and linguistics. Many of these conceptual and complex behaviors require extensive lines of research, often occurring over decades. For example, long-term behavioral research has been conducted on topics such as rule-governed behavior (e.g., Catania, Shimoff, & Matthews, 1982; Hayes, 1989), stimulus equivalence (e.g., Catania, Horne, & Lowe, 1989; Sidman & Talib, 1982), verbal behavior and emotions (e.g., Burns & Staats, 1991), and correspondence training (Baer & Detrich, 1990; Risley & Hart, 1968). The answers to many of the questions raised by these issues are still not known, but experimentation has clearly resulted in a better understanding of the topics. There

are several other complex topics which have received virtually no attention from behaviorists, yet are frequently a primary topic for traditional psychology. For example, topics such as verbal behavior under the control of private events, thinking, problem solving, understanding, reasoning, creativity, and self-editing. Research in this area can be quite challenging, especially due to methodological problems, but the results could be very beneficial to our understanding of behavior.

Ten Suggestions for Research on Conceptual Issues

- The origins of language, for both the species and the individual
- Traditional linguistics and verbal behavior
- Parallels of Skinner's analysis of verbal behavior to pragmatics
- Verbal and nonverbal correspondence
- Verbal behavior and its relation to rule-governed behavior
- Verbal behavior and its relation to stimulus equivalence
- The effects of verbal behavior on reinforcement schedules
- Methods for self-editing and self-strengthening of VB (self-improvement)
- Procedures for teaching self-prompts, probes, and supplemental stimuli
- Effects of punishment on editing

30. CONCEPTUAL AND OTHER ISSUES RELATED TO VERBAL BEHAVIOR: PART 2

Ten More Suggestions for Research on Conceptual Issues

- The effects of verbal behavior on emotions and vice versa
- Further examination of the verbal summator
- Defective stimulus control
- Techniques for training the effective use of mnemonic devices
- Extensively long and controlled verbal history
- Precurrent verbal behavior
- Interrogation, the correctional system, and verbal behavior
- Verbal problem solving, creativity, understanding, and reasoning
- Scientific verbal behavior, the scientific verbal community
- The four levels of thinking (VB Chapter 19)

RESEARCH TOPIC NUMBER 301: EDUCATION

A final topic, education, is presented as a single suggestion, but could easily be developed into hundreds of specific topics. Most of education involves the establishment of verbal behavior, however there is very little research on the applications of the concepts from *Verbal Behavior* to education. Current educational practices are ineffective, in part, due to a failure to correctly analyze and appreciate the relevant verbal repertoires. For example, in teaching political science much of the instruction involves textual and receptive (listening to lectures) activities, yet, the repertoire needed in the "real world" is often intraverbal. That is, the student must be able to emit the verbal responses intraverbally and in the absence of textbooks. However, the instructional methods used often fail to directly establish the relevant intraverbal behaviors which are necessary for demonstrating competence in a particular subject. This was perhaps one of the main thrusts of Keller's Personalized Systems of Instruction (PSI). Students had several opportunities to respond intraverbally, and it was that repertoire which was directly shaped by the teaching machines and proctors.

A recent issue of the *Journal of Applied Behavior Analysis* (Spring, 1992), was dedicated entirely to the topic of education. While the material was excellent and raised several important points, there was a startling absence of the role of verbal behavior in the author's analyses and research. Only one of the 27 papers in this special issue cited *Verbal Behavior*, or made any substantial use of the concepts from the book. It should be noted however, that if the subject matter in question involves verbal behavior, and the concepts from Skinner's book are not used in the analysis, then some other analysis of language, usually cognitive, is underlying the research or the analysis. This final topic is presented to the field of behavior analysis as a challenge to undertake the problems of education, but with the tools available from *Verbal Behavior*.

CONCLUSIONS

It is proposed that substantial advancements in our understanding of behavior could occur by conducting research involving Skinner's book *Verbal Behavior*. There are a number of possible research topics available, and it is hoped that this list will provide a starting point for potential researchers. It should be noted that these suggestions probably reflect the author's own interest areas. Those with other interests could probably generate similar lists, but more focused on their areas. Also, it may be the case that several of the projects have already been conducted, or are currently in progress. And finally as many researchers in this area know, serious involvement with any of these research topics will typically generate a number of thematically related projects.

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