

PART 10

Verbal Behavior



Chapter 25 is devoted to verbal behavior, a distinguishing feature of the human behavioral repertoire. Verbal behavior is at once the phenomenon that makes humans particularly interesting and the vehicle with which we express that interest. Verbal behavior makes progress possible from one generation to the next and enhances the development of sciences, technologies, and the arts. Building on Skinner's (1957) conceptual analysis, Mark Sundberg presents verbal behavior in the context of typical human development, with an emphasis on language assessment and intervention programs for children with autism or other developmental disabilities.

CHAPTER 25

Verbal Behavior*



Key Terms

audience	generic (tact) extensions	private events
autoclitic	impure tact	solistic (tact) extension
automatic punishment	intraverbal	speaker
automatic reinforcement	listener	tact
convergent multiple control	mand	textual
copying a text	metaphorical (tact) extension	transcription
divergent multiple control	metonymical (tact) extension	verbal behavior
echoic	multiple control	verbal operant
formal similarity	point-to-point correspondence	

Behavior Analyst Certification Board® BCBA® & BCABA® Behavior Analyst Task List,® Third Edition

Content Area 3: Principles, Processes and Concepts.	
3-15	Define and provide examples of echoics and imitation.
3-16	Define and provide examples of mands.
3-17	Define and provide examples of tacts.
3-18	Define and provide examples of intraverbals.
Content Area 9: Behavior Change Procedures	
9-25	Use language acquisition programs that employ Skinner's analysis of verbal behavior (i.e., echoics, mands, tacts, intraverbals).
9-26	Use language acquisition and communication training procedures.

© 2006 The Behavior Analyst Certification Board, Inc.,® (BACB®) all rights reserved. A current version of this document may be found at www.bacb.com. Requests to reprint, copy, or distribute this document and questions about this document must be submitted directly to the BACB.

*This chapter was written by Mark L. Sundberg.



Why should applied behavior analysts be concerned with verbal behavior? A review of the definition of applied behavior analysis as presented in Chapter 1 can provide an answer to this question.

Applied behavior analysis is the science in which tactics derived from the principles of behavior are applied to improve socially significant behavior and experimentation is used to identify the variables responsible for behavior change (p. 20).

Note the point *to improve socially significant behavior*. The most socially significant aspects of human behavior involve verbal behavior. Language acquisition, social interaction, academics, intelligence, understanding, thinking, problem solving, knowledge, perception, history, science, politics, and religion are all directly relevant to verbal behavior. In addition, many human problems, such as autism, learning disabilities, illiteracy, antisocial behavior, marital conflicts, aggression, and wars, involve verbal behavior. In short, verbal behavior plays a central role in most of the major aspects of a person's life, and in the laws, conventions, archives, and activities of a society. These topics are the main subject topics of most introductory psychology textbooks. These are the socially significant behaviors that applied behavior analysts to address. However, the verbal analysis of these topics has just begun, and a substantial amount of work has yet to be accomplished.

Verbal Behavior and Properties of Language

Form and Function of Language

It is important in the study of language to distinguish between the formal and functional properties of language (Skinner, 1957). The *formal properties* involve the topography (i.e., form, structure) of the verbal response, whereas the *functional properties* involve the causes of the response. A complete account of language must consider both of these elements.

The field of structural linguistics specializes in the formal description of language. The topography of what is said can be measured by (a) phonemes: the individual speech sounds that comprise a word; (b) morphemes: the units with an individual piece of meaning; (c) lexicon: the total collection of words that make up a given language; (d) syntax: the organization of words, phrases, or clauses in sentences; (e) grammar: the adherence to established conventions of a given language; and (f) semantics: what words *mean* (Barry, 1998; Owens, 2001).

The formal description of a language can be accomplished also by classifying words as nouns, verbs, prepositions, adjectives, adverbs, pronouns, conjunctions, and

articles. Other aspects of a formal description of language include prepositional phrases, clauses, modifiers, gerunds, tense markers, particles, and predicates. Sentences then are made up of the syntactical arrangement of the lexical categories of speech with adherence to the grammatical conventions of a given verbal community. The formal properties of language also include articulation, prosody, intonation, pitch, and emphasis (Barry, 1998).

Language can be formally classified without the presence of a speaker or any knowledge about why the speaker said what he did. Sentences can be analyzed as grammatical or ungrammatical from a text or from a tape recorder. For example, incorrect use of word tense can be identified easily from a recording of a child saying, "Juice all gonod."

A common misconception about Skinner's analysis of verbal behavior is that he rejected the formal classifications of language. However, he did not find fault with classifications or descriptions of the response, but rather with the failure to account for the "causes" or functions of the classifications. The analysis of how and why one says words is typically relegated to the field of psychology combined with linguistics; hence the field of psycholinguistics.

Theories of Language

A wide variety of theories of language attempt to identify the causes of language. These theories can be classified into three separate, but often overlapping, views: biological, cognitive, and environmental. The basic orientation of the biological theory is that language is a function of physiological processes and functions. Chomsky (1965), for example, maintained that language is innate to humans.¹ That is, a human's language abilities are inherited and present at birth.

Perhaps the most widely accepted views of the causes of language are those derived from cognitive psychology (e.g., Bloom, 1970; Piaget, 1952). Proponents of the cognitive approach to language propose that language is controlled by internal processing systems that accept, classify, code, encode, and store verbal information. Spoken and written language is considered to be the structure of thought. Distinguishing between the biological and cognitive views is often difficult; many are mixed (e.g., Pinker, 1994) and invoke cognitive metaphors such as storage and processing as explanations of language behaviors, or interchange the words *brain* and *mind* (e.g., Chomsky, 1965).

¹For more detail see Mabry (1994, 1995) and Novak (1994).

Development of Verbal Behavior

Skinner began working on a behavioral analysis of language in 1934 as a result of a challenge from Alfred North Whitehead,² which Whitehead made when he was seated next to Skinner at a dinner at the Harvard Society of Fellows. Skinner (1957) described the interaction as follows:

We dropped into a discussion of behaviorism which was then still very much an “ism” and of which I was a zealous devotee. Here was an opportunity which I could not overlook to strike a blow for the cause . . . Whitehead . . . agreed that science might be successful in accounting for human behavior provided one made an exception of verbal behavior. Here, he insisted something else must be at work. He brought the discussion to a close with a friendly challenge: “Let me see you,” he said, “account for my behavior as I sit here saying ‘No black scorpion is falling upon this table.’” The next morning I drew up the outline of the present study. (p. 457)

It took Skinner 23 years to fill in the details of his outline, which he published in his book *Verbal Behavior* (1957). The end result was so significant to Skinner (1978) that he believed *Verbal Behavior* would prove to be his most important work. However, Skinner’s use of the phrase *prove to be* 20 years after the book was published indicated that his analysis of verbal behavior had not yet had the impact that he thought it would.

There are several reasons for the slow appreciation of *Verbal Behavior*. Soon after the book was published, it was met with immediate challenges from the field of linguistics and the emerging field of psycholinguistics. Most notably was a review by Noam Chomsky (1959), a young linguist from MIT who had published his own account of language (Chomsky, 1957) the same year *Verbal Behavior* was published. Chomsky maintained that Skinner’s analysis was void of any value. Chomsky criticized every aspect of the analysis, but more so, he criticized the philosophy of behaviorism in general. However, a reading of Chomsky’s review will reveal to those who comprehend *Verbal Behavior* that Chomsky, like many scholars, gravely misunderstood Skinner’s radical behaviorism, which provided the philosophical and epistemological foundations for *Verbal Behavior* (Catania, 1972; MacCorquodale, 1970).

Skinner never responded to Chomsky’s review, and many felt this lack of response was responsible for the

widely held conclusion that Chomsky’s review was unanswerable and that Chomsky made valid criticisms. MacCorquodale (1970) pointed out that the reason no one challenged Chomsky’s review was the condescending tone of the review, in addition to the clear misunderstandings of Skinner’s behaviorism.

Skinner was not at all surprised by this reaction from linguists because of their emphasis on the structure of language rather than its function. More recently however, a favorable review of Skinner’s book from within the field of linguistics was published, recognizing that Skinner has changed the history of linguistics (Andresen, 1991).

Although Skinner anticipated criticism from outside the field of behavior analysis, he probably did not expect the general disinterest and often outspoken negative reaction to *Verbal Behavior* from within the field. A number of behaviorists have examined this issue and have collectively provided a list of reasons behavior analysts did not immediately embrace *Verbal Behavior* (e.g., Eshleman, 1991; Michael, 1984; E. Vargas, 1986). Perhaps most troublesome to the behavior analysts of the time was that *Verbal Behavior* was speculative and did not contain experimental data (Salzinger, 1978).

The lack of research on verbal behavior continued to concern behavior analysts well into the 1980s (e.g., McPherson, Bonem, Green, & Osborne, 1984). However, this situation now appears to be changing, and a number of advances in research and applications directly relate to *Verbal Behavior* (Eshleman, 2004; Sundberg, 1991, 1998). Many of these advances are published in the journal, *The Analysis of Verbal Behavior*.

Defining Verbal Behavior

Skinner (1957) proposed that language is learned behavior, and that it is acquired, extended, and maintained by the same types of environmental variables and principles that control nonlanguage behavior (e.g., stimulus control, motivating operations, reinforcement, extinction). He defined **verbal behavior** as behavior that is reinforced through the mediation of another person’s behavior. For example, the verbal response “Open the door” can produce the reinforcer of an open door mediated through the behavior of a listener. This reinforcer is indirectly obtained, but is the same reinforcer that could be obtained nonverbally by opening the door.

Skinner defined verbal behavior by the function of the response, rather than by its form. Thus, any response form can become verbal based on Skinner’s functional definition. For example, the early differential crying of a 2-month-old infant may be verbal, as would other responses such as pointing, clapping for attention, gestures

²Whitehead was perhaps the most prominent philosopher of the time, known best for his landmark three-volume set coauthored with Bertrand Russell titled *Principia Mathematica* (1910, 1912, 1913).

such as waving one's arm for attention, writing, or typing. In other words, verbal behavior involves a social interaction between a speaker and a listener.

Speaker and Listener

The definition of verbal behavior makes a clear distinction between the behavior of the **speaker** and that of the **listener**. Verbal behavior involves social interactions between speakers and listeners, whereby speakers gain access to reinforcement and control their environment through the behavior of listeners. In contrast with most approaches to language, Skinner's verbal behavior is primarily concerned with the behavior of the speaker. He avoided terms such as *expressive language* and *receptive language* because of the implication that these are merely different manifestations of the same underlying cognitive processes.

The listener must learn how to reinforce the speaker's verbal behavior, meaning that listeners are taught to respond to words and interact with speakers. It is important to teach a child to react appropriately to the verbal stimuli provided by speakers, and to behave verbally as a speaker. These are different functions, however. In some cases learning one type of behavior (i.e., speaker or listener) facilitates learning another, but this must also be understood in terms of motivating operations, antecedent stimuli, responses, and consequences rather than in terms of learning the meanings of words as a listener and then using the words in various ways as a speaker.

Verbal Behavior: A Technical Term

In searching for what to call the subject matter of his analysis of language, Skinner wanted a term that (a) emphasized the individual speaker, (b) referred to behavior that was selected and maintained by consequences; and (c) was relatively unfamiliar in the professions of speech and language. He selected the term *verbal behavior*. However, in recent years *verbal behavior* has acquired a new meaning, independent from Skinner's usage. In the field of

speech pathology, *verbal* behavior has become synonymous with *vocal* behavior. Also, in psychology, the term *nonverbal communication*, which became popular in the 1970s, was contrasted with the term *verbal behavior*, implying that verbal behavior was vocal communication and nonverbal behavior was nonvocal communication. The term *verbal* has also been contrasted with *quantitative* as in GRE and SAT tests for college admissions. This distinction suggests that mathematical behavior is not verbal. However, according to Skinner's definition, much of mathematical behavior is verbal behavior. Noting that verbal behavior includes *vocal-verbal behavior* and *nonvocal-verbal behavior* is sometimes confusing for those learning to use Skinner's analysis.

Unit of Analysis

The unit of analysis of verbal behavior is the functional relation between a type of responding and the same independent variables that control nonverbal behavior, namely (a) motivating variables, (b) discriminative stimuli, and (c) consequences. Skinner (1957) referred to this unit as a **verbal operant**, with *operant* implying a type or class of behavior as distinct from a particular response instance; and he referred to a set of such units of a particular person as a *verbal repertoire*. The verbal repertoire can be contrasted with the units in linguistics that consists of words, phrases, sentences, and the mean length of utterances.

Elementary Verbal Operants

Skinner (1957) identified six elementary verbal operants: mand, tact, echoic, intraverbal, textual, and transcription. He also included audience relation and copying a text as separate relations, but in this discussion the audience (or the listener) will be treated independently and copying a text will be considered a type of echoic behavior. Table 25.1 presents plain English descriptions of

Table 25.1 Plain English Definitions of Skinner's Six Elementary Verbal Operants

Mand	Asking for reinforcers that you want. Saying <i>shoe</i> because you want a shoe.
Tact	Naming or identifying objects, actions, events, etc. Saying <i>shoe</i> because you see a shoe.
Echoic	Repeating what is heard. Saying <i>shoe</i> after someone else says <i>shoe</i> .
Intraverbal	Answering questions or having conversations in which your words are controlled by other words. Saying <i>shoe</i> when someone else says, <i>What do you wear on your feet?</i>
Textual	Reading written words. Saying <i>shoe</i> because you see the written word <i>shoe</i> .
Transcription	Writing and spelling words spoken to you. Writing <i>shoe</i> because you hear <i>shoe</i> spoken.

these terms. Technical definitions and examples of each elementary verbal operant are provided in the following sections.

Mand

The mand is a type of verbal operant in which a speaker asks for (or states, demands, implies, etc.) what he needs or wants. For example, the behavior of asking for directions when lost is a mand. Skinner (1957) selected the term *mand* for this type of verbal relation because the term is conveniently brief and is similar to the plain English words *command*, *demand*, and *countermand*. The **mand** is a verbal operant for which the form of the response is under the functional control of motivating operations (MOs) and specific reinforcement (see Table 25.2). For example, food deprivation will (a) make food effective as reinforcement and (b) evoke behavior such as the mand “cookie” if this behavior has produced cookies in the past.

The specific reinforcement that strengthens a mand is directly related to the relevant MO. For example, if there is an MO for physical contact with one’s mother, the specific reinforcement that is established is physical contact. The response form may occur in several topographical variations such as crying, pushing a sibling, reaching up, and saying “hug.” All of these behaviors could be mands for physical contact if functional relations exist among the MO, the response, and the specific reinforcement history. However, the response form alone is insufficient for the classification of a mand, or any other verbal operant. For example, crying could also be a respondent behavior if it were elicited by a conditioned or unconditioned stimulus.

Mands are very important for the early development of language and for the day-to-day verbal interactions of children and adults. Mands are the first verbal operant acquired by a human child (Bijou & Baer, 1965; Novak, 1996). These early mands usually occur in the form of differential crying when a child is hungry, tired, in pain, cold, or afraid; or wants toys, attention, help, movement of objects and people, directions, or the removal of aversive stimuli. Typically developing children soon learn to replace crying with words and signs or other standard forms of communication. Manding not only lets children control the delivery of reinforcers, but it begins to establish the speaker and listener roles that are essential for further verbal development.

Skinner (1957) pointed out that the mand is the only type of verbal behavior that directly benefits the speaker, meaning that the mand gets the speaker reinforcers such as edibles, toys, attention, or the removal of aversive stim-

uli. As a result, mands often become strong forms of verbal behavior because of specific reinforcement, and this reinforcement often satisfies an immediate deprivation condition or removes some aversive stimulus. For example, young children often engage in a very high rate of manding because of its effects on listeners. In addition, much of the problem behaviors of children who have weak, delayed, or defective verbal repertoires may be mands (e.g., Carr & Durand, 1985). Eventually, a child learns to mand for verbal information with *who*, *what*, and *where* questions, and the acquisition of new verbal behavior accelerates rapidly (Brown, Cazden, & Bellugi, 1969). Ultimately, mands become quite complex and play a critical role in social interaction, conversation, academic behavior, employment, and virtually every aspect of human behavior.

Tact

The tact is a type of verbal operant in which a speaker names things and actions that the speaker has direct contact with through any of the sense modes. For example, a child saying “car” because he sees a car is a tact. Skinner (1957) selected the term *tact* because it suggests making contact with the physical environment. The **tact** is a verbal operant under the functional control of a nonverbal discriminative stimulus, and it produces generalized conditioned reinforcement (see Table 25.2). A nonverbal stimulus becomes a discriminative stimulus (S^D) with the process of discrimination training. For example, a shoe may not function as an S^D for the verbal response “shoe” until after saying “shoe” in the presence of a shoe produces differential reinforcement.

A wide variety of nonverbal stimuli evoke tact relations. For example, a cake produces nonverbal visual, tactile, olfactory, and gustatory stimuli, any or all of which can become S^D s for the tact “cake.” Nonverbal stimuli can be, for example, static (nouns), transitory (verbs), relations between objects (prepositions), properties of objects (adjectives), or properties of actions (adverbs); that is, nonverbal stimuli can be as simple as a shoe, or as complex as a cancerous cell. A stimulus configuration may have multiple nonverbal properties, and a response may be under the control of those multiple properties, as in the tact “The red truck is on the little table.” Nonverbal stimuli may be observable or unobservable (e.g., pain), subtle or salient (e.g., neon lights), relational to other nonverbal stimuli (e.g., size), and so on. Given the variation and ubiquity of nonverbal stimuli, it is no surprise that the tact is a primary topic in the study of language.

Echoic

The echoic is a type of verbal operant that occurs when a speaker repeats the verbal behavior of another speaker. For example, a child saying “cookie” after hearing the word spoken by her mother is echoic. Repeating the words, phrases, and vocal behavior of others, which is common in day-to-day discourse, is echoic also. The **echoic** operant is controlled by a verbal discriminative stimulus that has point-to-point correspondence and formal similarity with the response (Michael, 1982) (see Table 25.2).

Point-to-point correspondence between the stimulus and the response or response product occurs when the beginning, middle, and end of the verbal stimulus matches the beginning, middle, and end of the response. **Formal similarity** occurs when the controlling antecedent stimulus and the response or response product (a) share the same sense mode (e.g., both stimulus and response are visual, auditory, or tactile) and (b) physically resemble each other (Michael, 1982). In the echoic relation the stimulus is auditory and the response produces an auditory product (echoing what one hears), and the stimulus and the response physically resemble each other.

Echoic behavior produces generalized conditioned reinforcement such as praise and attention. The ability to echo the phonemes and words of others is essential for learning to identify objects and actions. A parent might say, “That’s a bear, can you say bear?” If the child can respond “bear,” then the parent says “Right!” Eventually, the child learns to name a bear without the echoic prompt. This often occurs in a few trials. For example, if a child can say “bear” (or a reasonable approximation) after a parent says “bear,” then it becomes possible to teach the child to say “bear” in the presence of a picture of a bear or a bear at the zoo. The echoic repertoire is very important for teaching language to children with language delays, and it serves a critical role in the process of teaching more complex verbal skills (e.g., Lovaas, 1977; Sundberg & Partington, 1998).

Motor imitations can have the same verbal properties as echoic behavior as demonstrated by their role in the acquisition of sign language by children who are deaf. For example, a child may learn to imitate the sign for cookie first, and then mand for cookie without an imitative prompt. Imitation is also critical for teaching sign language to hearing children who are nonvocal. For the many children who do not have an adequate echoic repertoire for vocal language instruction, time is spent teaching echoic behavior rather than more useful types of verbal behavior. A strong imitative repertoire permits a teacher to use sign language immediately to

instruct more advanced forms of language (e.g., mands, tacts, and intraverbals). This allows a child to learn quickly to communicate with others without using inappropriate behavior (e.g., a tantrum) to get what he wants.

Skinner also presented **copying a text** as a type of verbal behavior in which a written verbal stimulus has point-to-point correspondence and formal similarity with a written verbal response. Because this relation has the same defining features as echoic and imitation as it relates to sign language, the three will be treated as one category, echoic.

Intraverbal

The intraverbal is a type of verbal operant in which a speaker differentially responds to the verbal behavior of others. For example, saying “the Buckeyes” as a result of hearing someone else say “Who won the game Saturday?” is intraverbal behavior. Typically developing children emit a high frequency of intraverbal responses in the form of singing songs, telling stories, describing activities, and explaining problems. Intraverbal responses are also important components of many normal intellectual repertoires, such as saying “Sacramento” as a result of hearing “What is the capital of California?”; saying “sixty-four” as a result of hearing “eight times eight”; or saying “antecedent, behavior, and consequence” when asked, “What is the three-term contingency?” The intraverbal repertoires of typical adult speakers include hundreds of thousands of such relations.

The **intraverbal** operant occurs when a verbal discriminative stimulus evokes a verbal response that does not have point-to-point correspondence with the verbal stimulus (Skinner, 1957). That is, the verbal stimulus and the verbal response do not match each other, as they do in the echoic and textual relations. Like all verbal operants except the mand, the intraverbal produces generalized conditioned reinforcement. For example, in the educational context, the reinforcement for correct answers usually involves some form of generalized conditioned reinforcement such as “Right!” or points, or the opportunity to move to the next problem or item (see Table 25.2).

An intraverbal repertoire facilitates the acquisition of other verbal and nonverbal behavior. Intraverbal behavior prepares a speaker to respond rapidly and accurately with respect to further stimulation, and plays an important role in continuing a conversation. For example, a child hears an adult speaker say “farm” in some context. If the stimulus farm evokes several relevant intraverbal responses, such as “barn,” “cow,” “rooster,” or “horse,” then a child is better able to react to other parts

of an adult's verbal behavior that may be related to a recent trip to a farm. One might say that the child is now thinking about farms and now has relevant verbal responses at strength for further responses to the adult's verbal behavior. An intraverbal stimulus probes the listener's repertoire and gets it ready for further stimulation. Collectively, mands, tacts, and intraverbals contribute to a conversation in the following ways: (a) A mand repertoire allows a speaker to ask questions, (b) a tact repertoire permits verbal behavior about an object or event that is actually present, and (c) an intraverbal repertoire allows a speaker to answer questions and to talk about (and think about) objects and events that are not physically present.

Textual

Textual behavior (Skinner, 1957) is reading, without any implications that the reader understands what is being read. Understanding what is read usually involves other verbal and nonverbal operants such as intraverbal behavior and receptive language (e.g., following instructions, compliance). For example, saying "shoe" upon seeing the written word *shoe* is textual behavior. Understanding that shoes go on a person's feet is not textual. Understanding is typically identified as reading comprehension. Skinner chose the term *textual* because the term *reading* refers to many processes at the same time.

The **textual** operant has point-to-point correspondence, but not formal similarity, between the stimulus and the response product. For example, (a) the verbal stimuli are visual or tactual (i.e., in one modality) and the response is auditory (i.e., another modality) and (b) the auditory response matches the visual or tactual stimuli. Table 25.2 presents a diagram of the textual relation.

Textuals and echoics are similar in three respects: (a) They both produce generalized conditioned reinforcement, (b) both are controlled by antecedent verbal stimuli, and (c) there is point-to-point correspondence between the antecedent stimulus and the response. The important difference between textuals and echoics is that the response product of textual behavior (e.g., the spoken word) is not similar to its controlling stimulus (e.g., the written word evokes a spoken response or auditory response product). The textual operant does not have formal similarity, meaning that the S^D s are not in the same sense mode and do not physically resemble the textual response. Words are visual and comprised of individual letters, whereas the reading response produces an auditory response product (which often is covert) comprising phonemes. The echoic response product, however, does have formal similarity with its controlling verbal stimulus.

Transcription

Transcription consists of writing and spelling words that are spoken (Skinner, 1957). Skinner also referred to this behavior as *taking dictation*, with the key repertoires involving not only the manual production of letters, but also accurate spelling of the spoken word. In technical terms, transcription is a type of verbal behavior in which a spoken verbal stimulus controls a written, typed, or finger-spelled response. Like the textual operant, there is point-to-point correspondence between the stimulus and the response product, but no formal similarity (see Table 25.2). For example, when asked to spell the spoken word "hat," a response h-a-t is a transcription. The stimulus and the response product have point-to-point correspondence, but they are not in the same sense mode or do not physically resemble each other. Spelling English words

Table 25.2 Antecedent and Consequent Controlling Variables for Six Elementary Verbal Operants

<i>Antecedent Variables</i>	<i>Response</i>	<i>Consequence</i>
Motivating operations (4 hours without water)	Mand ("water, please")	Specific reinforcement (glass of water)
Nonverbal stimulus (see toy truck)	Tact ("truck")	Generalized conditioned reinforcement (GCSR) (praise and approval)
Verbal stimulus with point-to-point correspondence and formal similarity (hear "book")	Echoic (say "book")	GCSR
Verbal stimulus without point-to-point correspondence or formal similarity (hear "cats and . . .")	Intraverbal (say "dogs")	GCSR
Verbal stimulus with point-to-point correspondence, without formal similarity (see <i>apple</i> written)	Textual (say "apple")	GCSR
Verbal stimulus with point-to-point correspondence, without formal similarity (hear "apple")	Transcription (write <i>apple</i>)	GCSR

is a difficult repertoire to acquire. Because many words in the English language are not spelled the way they sound, shaping an appropriate discriminative repertoire is often difficult.

Role of the Listener

Skinner's analysis of verbal behavior focuses on the speaker, whereas most linguists and psycholinguistic accounts of language emphasize the listener. Skinner suggested that the listener's role is less significant than typically assumed because much of what is often described as listener behavior (e.g., thinking, understanding) is more correctly classified as speaker behavior. It is just that often the speaker and listener reside within the same skin (as we will see in the following discussion).

What role does the listener then play in Skinner's account of language? In his analysis of listener behavior, Skinner pointed out that a verbal episode requires a speaker and a listener. The listener not only plays a critical role as a mediator of reinforcement for the speaker's behavior, but also becomes a discriminative stimulus for the speaker's behavior. In functioning as a discriminative stimulus, the listener is an **audience** for verbal behavior. "An audience, then, is a discriminative stimulus in the presence of which verbal behavior is characteristically reinforced and in the presence of which, therefore, it is characteristically strong" (Skinner, 1957, p. 172). When Skinner (1978) wrote "very little of the behavior of the listener is worth distinguishing as verbal" (p. 122), he was referring to when the listener serves as a discriminative stimulus in the role of an audience.

A listener functions in additional roles, other than as a mediator of reinforcement and a discriminative stimulus. For example, verbal behavior functions as discriminative stimuli (i.e., stimulus control) when a speaker talks to a listener. The question is, What are the effects of verbal behavior on listener behavior? A verbal discriminative stimulus may evoke echoic, textual, transcription, or intraverbal operants of a listener. The listener becomes a speaker when this occurs. This is Skinner's point: The speaker and listener can and often do reside within the same skin, meaning that a listener behaves simultaneously as a speaker. The most significant and complex responses to verbal stimuli occur when they evoke covert intraverbal behavior from a listener who becomes a speaker and functions as her own audience. For example, a speaker's verbal discriminative stimuli related to Pavlov's work on respondent conditioning, such as, "What was Pavlov's technique?" may evoke a listener's covert intraverbal behavior such as

thinking, "He paired the sound of a metronome with meat powder."³

Verbal stimulus control may also evoke a listener's nonverbal behavior. For example, when someone says "Shut the door," the behavior of shutting a door is nonverbal, but shutting the door is evoked by verbal stimuli. Skinner (1957) identified this type of listener behavior as *understanding*. "The listener can be said to understand a speaker if he simply behaves in an appropriate fashion" (p. 277).

Verbal stimuli can become quite complex because separating the verbal and nonverbal behaviors of the listener is difficult (Parrott, 1984; Schoneberger, 1990, 1991). For example, in following a directive to buy a certain type and style of pipe fitting at the hardware store, success will involve both nonverbal behavior such as discriminating among pipe fittings and verbal behavior such as self-echoic prompts (e.g., "I need a three-quarter-inch fitting, three-quarter-inch"), tacts of the fittings (e.g., "This looks like three-quarter-inch"), and mands for information (e.g., "Can you tell me if this will fit a three-quarter-inch pipe?").

Identifying Verbal Operants

The same word (i.e., topography or form of the behavior) can appear in the definitions of all of the elementary verbal operants because controlling variables define verbal operants, not the form of the verbal stimuli. Verbal behavior is not classified or defined by its topography or form (i.e., by the words themselves). The classification of verbal operants can be accomplished by asking a series of questions regarding the relevant controlling variables that evoke a specific response form (see Figure 25.1). A sample of verbal behavior classification exercise is presented in Table 25.3

1. Does an MO control the response form? If yes, then the operant is at least part mand.
2. Does an S^D control the response form? If yes, then:
3. Is the S^D nonverbal? If yes, then the operant is at least part tact.
4. Is the S^D verbal? If yes, then:

³In three of his books, Skinner devoted a full chapter to the topic of thinking: *Science and Human Behavior* (1953, Chapter 16), *Verbal Behavior* (1957, Chapter 19), and *About Behaviorism* (1974, Chapter 7) with several sections dedicated to the topic of understanding (e.g., *Verbal Behavior*, pp. 277–280; *About Behaviorism*, pp. 141–142). A behavior analysis of thinking and understanding involves, in large part, situations in which both listener and speaker reside within the same skin.

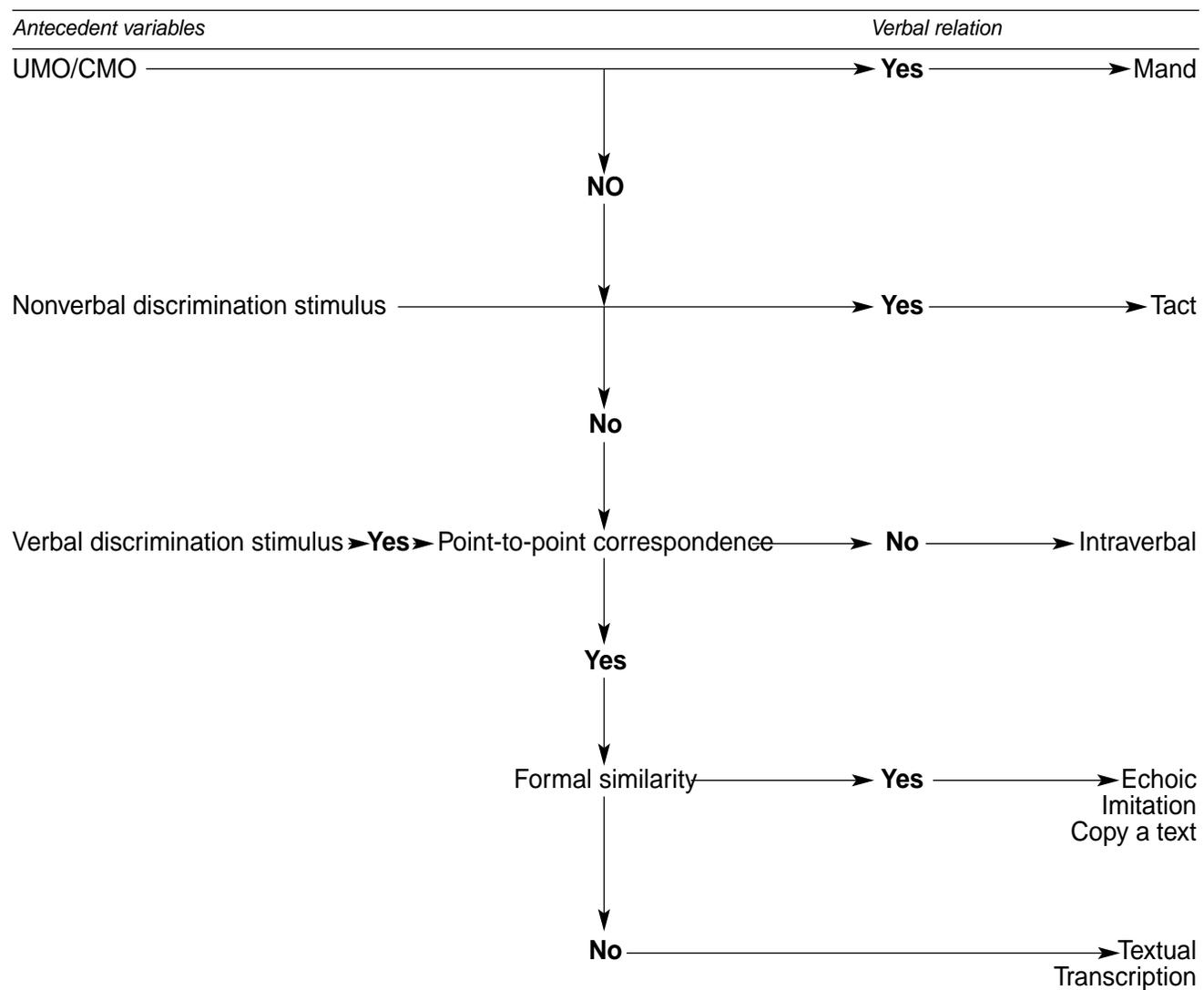


Figure 25.3 Verbal Behavior Classification Chart.

5. Is there point-to-point correspondence between the verbal S^D and the response? If not, then the operant is at least part intraverbal. If there is point-to-point correspondence, then:
6. Is there formal similarity between the verbal S^D and the response. If yes, then the operant must be echoic, imitative, or copying a text). If not, then the operant must be textual or transcription.

Analyzing Complex Verbal Behavior

Analysis of more complex verbal behavior includes automatic reinforcement, tact extensions (generalization), and private events. These topics are presented in the following sections.

Automatic Reinforcement

A common misconception about reinforcement in the context of verbal behavior is that it occurs only when the listener mediates the reinforcer. When behavior occurs without the apparent delivery of reinforcement, it is often assumed that higher mental processes are at work (e.g., Brown, 1973; Neisser, 1976). Intermittent reinforcement can explain some behavior that occurs in the absence of an observed consequence, but not all such behavior. Some behavior is strengthened or weakened, not by external consequences, but by its *response products*, which have reinforcing or punishing effects. Skinner used the terms **automatic reinforcement** and **automatic punishment** in a number of his writings simply to indicate that an effective consequence can occur without someone providing it (cf., Vaughan & Michael, 1982).

Table 25.3 Verbal Behavior Classification Exercises

<i>As a result of . . .</i>	<i>One has a tendency to . . .</i>	<i>This is a(n) . . .</i>
1. seeing a dog	say "dog"	_____
2. hearing an airplane	say "airplane"	_____
3. wanting a drink	say "water"	_____
4. hearing "How are you?"	say "I'm fine"	_____
5. smelling cookies baking	say "cookies"	_____
6. tasting soup	say "pass the salt"	_____
7. hearing "book"	write <i>book</i>	_____
8. hearing "book"	sign "book"	_____
9. hearing "book"	say "book"	_____
10. hearing "book"	say "read"	_____
11. hearing "book"	sign "read"	_____
12. hearing "book"	finger-spell "book"	_____
13. seeing a book	write <i>book</i>	_____
14. wanting a book	write <i>book</i>	_____
15. signing "book"	write <i>book</i>	_____
16. hearing "color"	say "red"	_____
17. seeing a dog on the table	say "get off"	_____
18. seeing <i>stop</i> written	hit the brakes	_____
19. hearing "Skinner"	write <i>behavior</i>	_____
20. smelling smoke	say "fire"	_____
21. being hungry	go to a store	_____
22. seeing <i>apple</i> written	sign "apple"	_____
23. seeing 5	say "five"	_____
24. wanting things	say "thanks"	_____
25. hearing "write your name"	write your name	_____
26. hearing "run"	finger-spell "run"	_____
27. seeing "home" signed	sign "Battle Creek"	_____
28. hearing a phone ring	say "phone"	_____
29. smelling a skunk	say "skunk"	_____
30. hearing "table"	say "mesa"	_____
31. being happy	smile	_____
32. hoping a pilot sees it	writing <i>SOS</i>	_____
33. wanting blue	say "blue"	_____
34. hearing "Red, white, and"	say "blue"	_____
35. tasting candy	say "mmmm"	_____

Provide examples of verbal behavior.

36. Give an example of a mand involving an adjective.
37. Give an example of a tact of a smell.
38. Give an example of a response that is part mand and part tact.
39. Give an example of a response that is part tact and part intraverbal.
40. Give an example of a tact involving multiple responses.
41. Give an example of an intraverbal using writing.
42. Give an example of receptive language using sign language.

Answers to verbal behavior classification exercises in Table 25.3:

1. T; 2. T; 3. M; 4. IV; 5. T/M; 6. M; 7. TX; 8. IV; 9. E; 10. IV; 11. IV; 12. TR; 13. T; 14. M; 15. IV; 16. IV/T; 17. M; 18. NV; 19. IV; 20. T/M; 21. NV; 22. IV; 23. IV; 24. M; 25. IV; 26. TX; 27. IV; 28. T/M; 29. T; 30. IV; 31. NV; 32. M; 33. M; 34. IV; 35. T; 36. "I want the red one."; 37. "Someone is smoking."; 38. "My throat is dry."; 39. "Macy's." When asked "Where did you buy that?"; 40. "That's a big burger!"; 41. A response to an e-mail; 42. Stopping when someone signs "stop."

Verbal behavior can produce automatic reinforcement, which has a significant role in the acquisition and maintenance of verbal behavior. For example, automatic reinforcement may explain why a typically developing infant engages in extensive babbling without the apparent delivery of reinforcement. Skinner (1957) pointed out that the exploratory vocal behavior of young children could produce automatic reinforcement when those exploratory sounds match the speech sounds of parents, caregivers, and others.

Skinner (1957) described a two-stage conditioning history in establishing vocal responses as automatic reinforcers. First, a neutral verbal stimulus is paired with an existing form of conditioned or unconditioned reinforcement. For example, a mother's voice is paired with conditions such as presenting food and warmth and removing aversive stimuli (e.g., medication on a diaper rash). As a result, the mother's voice, a previously neutral stimulus, becomes a conditioned reinforcer. The mother's voice will now strengthen whatever behavior precedes it. Second, a child's vocal response as either random muscle movement of the vocal cords or reflexive behavior produces an auditory response that on occasion may sound somewhat like the mother's words, intonations, and vocal pitches. Thus, a vocal response can function as reinforcement by automatically increasing the frequency of a child's vocal behavior.⁴

Automatic reinforcement also plays an important role in the development of more complex aspects of verbal behavior, such as the acquisition of syntax and grammatical conventions. For example, Donahoe and Palmer (1994) and Palmer (1996, 1998) suggested that a child's use of grammar produces automatic reinforcement when it sounds like the grammar used by others in the environment, but is automatically punished when it sounds odd or unusual. Palmer (1996) referred to this as *achieving parity*.

The stimulus conditions that evoke automatically reinforced behavior may be encountered everywhere because each time a response is automatically reinforced it may alter the evocative effect of any stimulus condition that might be present. For example, a person may persist in singing or humming a theme song from a movie while driving home from the movie because of the two-stage conditioning process described previously. However, the song may be periodically evoked several hours, or even days, after the movie because each time the song is re-

⁴Miller and Dollard (1941) were perhaps the first to suggest that a process like automatic reinforcement might be partially responsible for an infant's high rate of babbling. Since then, many others have discussed and researched the role of automatic reinforcement in language acquisition (e.g., Bijou & Baer, 1965; Braine, 1963; Miguel, Carr, & Michael, 2002; Mowrer, 1950; Novak, 1996; Osgood, 1953; Smith, Michael, & Sundberg, 1996; Spradlin, 1966; Staats & Staats, 1963; Sundberg, Michael, Partington, & Sundberg, 1996; Vaughan & Michael, 1982; Yoon & Bennett, 2000).

peated, a new stimulus such as a traffic light, a street corner, or a neon sign might acquire some degree of stimulus control. The next time the person comes in contact with, say, a red light, there could be some tendency to sing or hum the song. This effect might explain what is often termed *delayed echolalia* observed with children who have autism (Sundberg & Partington, 1998). At present, however, there have been no empirical investigations of the stimulus control involved in automatic consequences, although it certainly seems like an interesting and important area of study.

Tact Extensions

Contingencies that establish stimulus and response classes and generalization allow a variety of novel and different discriminative stimuli to evoke verbal behavior. Skinner (1957) said it this way:

[A] verbal repertoire is not like a passenger list on a ship or plane, in which one name corresponds to one person with no one omitted or named twice. Stimulus control is by no means so precise. If a response is reinforced upon a given occasion or class of occasions, any feature of that occasion or common to that class appears to gain some measure of control. A novel stimulus possessing one such feature may evoke a response. There are several ways in which a novel stimulus may resemble a stimulus previously present when a response was reinforced, and hence there are several types of what we may call "extended tacts" (p. 91).

Skinner (1957) distinguished four types of extended tacts: generic, metaphorical, metonymical, and solistic. The distinction is based on the degree to which a novel stimulus shares the relevant or irrelevant features of the original stimulus.

Generic Extension

In **generic extension**, the novel stimulus shares all of the relevant or defining features of the original stimulus. For example, a speaker who learns to tact "car" in the presence of a white Pontiac Grand Am emits the tact "car" in the presence of a novel blue Mazda RX-7. A generic tact extension is evoked by simple stimulus generalization.

Metaphorical Extension

In **metaphorical extension**, the novel stimulus shares some but not all of the relevant features associated with the original stimulus. For example, Romeo was experiencing a beautiful, sunny, warm day, and the exceptional weather elicited respondent behaviors (e.g., good feelings). When Romeo saw Juliet, whose presence elicited

similar respondent behaviors like the sunny day, he said, “Juliet is like the sun.” The sun and Juliet evoked a similar effect on Romeo, controlling the metaphorical tact extension “Juliet is like the sun.”

Metonymical Extension

Metonymical extensions are verbal responses to novel stimuli that share none of the relevant features of the original stimulus configuration, but some irrelevant but related feature has acquired stimulus control. Simply, one word substitutes for another in metonymical tact extensions, meaning that a part is used for a whole. As examples: Saying “car” when shown a picture of a garage, or saying “the White House requested” in place of “President Lincoln requested.”

Solistic Extension

Solistic extensions occur when a stimulus property that is only indirectly related to the tact relation evokes substandard verbal behavior such as malaprops. For instance, using the solistic tact extension, a person may say “You read good” instead of “You read well.” Saying “car” when referring to the driver of the car is a solistic tact extension.

Private Events

In 1945 Skinner first described radical behaviorism, his philosophy. At the core of radical behaviorism is the analysis of private stimuli (see also Skinner, 1953, 1974). Verbal behavior under the control of private stimuli has been a main topic of theoretical and philosophical analyses of behavior ever since. In 1957 Skinner stated, “A small but important part of the universe is enclosed within the skin of each individual. . . . It does not follow that . . . it is any way unlike the world outside the skin or inside another’s skin” (p. 130).

A significant amount of day-to-day verbal behavior is controlled in part by private events. What is commonly referred to as thinking involves overt stimulus control and private events (e.g., covert stimulus control). The analysis of private stimulation and how it acquires stimulus control is complex because of two problems: (a) The participant can directly observe the private stimuli, but the applied behavior analyst cannot (a limiting factor in the prediction and control of behavior), and (b) private stimulus control of verbal episodes in the natural environment will likely remain private, no matter how sensitive instruments will become in detecting private stimuli and behaviors. Skinner (1957) identified four ways that caregivers teach young persons to tact their private stim-

ulation: Public accompaniment, collateral responses, common properties, and response reduction.

Public Accompaniment

Public accompaniment occurs when an observable stimulus accompanies a private stimulus. For example, a father may observe a child bump his head on a table while chasing a ball. The public stimuli are available to the father, but not the private and more salient painful stimuli experienced by the child. The father can assume that the child is experiencing pain because of his own history of bumping objects, and may say “Ouch,” or “You hurt yourself.” In this way, the father is using the bump (observable stimulus) as an opportunity to develop verbal behavior under the stimulus control of a private stimulus. This may occur with an echoic to the private event; later, the stimulus control transfers to the private stimuli. Specifically, the child may echo the father’s “ouch” while the painful stimuli are present, and quickly (depending on the child’s history of echoic to tact transfer) the painful stimuli alone evokes the tact “ouch.”

Collateral Responses

Caregivers also teach young persons to tact their private stimuli by using collateral responses (i.e., observable behavior) that reliably occur with private stimuli. For example, the father may not observe the child bump his head, but may see the child holding his head and crying. These collateral behaviors inform the father that a painful stimulus is present. The same training procedures with public accompaniment can be used with collateral responses. Because the painful private stimuli are salient, only one trial may be needed for the private stimuli to acquire stimulus control of the tact relation.

Parents should use public accompaniment and collateral responses during the beginning stages of tact training. However, even after developing a repertoire of tacting private events, a parent or listener will have difficulty confirming the actual presence of the private event as in “My stomach hurts,” or “I have a headache now.”

Also, learning to tact private behaviors is acquired probably with public accompaniment and collateral responses; for example, private stimuli that evoke private emotions (behaviors) that we tact with words such as *happiness*, *sadness*, *fear*, and *being upset*. Learning to tact such private events is difficult if the private stimulation is not present during training. For example, procedures that use pictures of people smiling and frowning (i.e., public stimuli) for teaching children to tact emotions will be less effective than procedures that use variables to evoke pleasure or displeasure (i.e., private stimuli) during training.

Common Properties

The two procedures described earlier use public stimuli to establish tacting of private events. Common properties also involve public stimuli, but in a different way. A speaker may learn to tact temporal, geometrical, or descriptive properties of objects and then generalize those tact relations to private stimuli. As Skinner (1957) noted, “[M]ost of the vocabulary of emotion is metaphorical in nature. When we describe internal states as ‘agitated,’ ‘depressed,’ or ‘ebullient,’ certain geometrical, temporal, and intensive properties have produced a metaphorical extension of responses” (p. 132). Much of our verbal behavior regarding emotional events is acquired through this type of stimulus generalization.

Response Reduction

Most speakers learn to tact features of their own bodies such as movements and positions. The kinesthetic stimuli arising from the movement and positions can acquire control over the verbal responses. When movements shrink in size (become covert), the kinesthetic stimuli may remain sufficiently similar to those resulting from the overt movements that the learner’s tact occurs as an instance of stimulus generalization. For example, a child can report imagining swimming, or can report self-talk about a planned conversation with someone, or can report thinking of asking for a new toy (Michael & Sundberg, 2003). Responses produced by private covert verbal behavior can evoke other verbal behavior and will be discussed later in further detail.

Multiple Control

All verbal behavior contains multiple functional relations among antecedents, behavior, and consequences. “[A]ny sample of verbal behavior will be a function of many variables operating at the same time” (Skinner, 1957, p. 228). The functional units of mands, tacts, echoics, intraverbals, and textual relations form the foundation of a verbal behavior analysis. A working knowledge of these functional units is essential for understanding the analysis of multiple control and complex verbal behavior.

Convergent Multiple Control

Michael (2003) used the term **convergent multiple control** to identify when the occurrence of a single verbal response is a function of more than one variable. The task of an applied behavior analyst is to identify the relevant sources that control an instance of verbal behavior. For example, saying “Why did the United States enter World War II?” may be evoked by (a) MOs (making it part

mand), (b) verbal discriminative stimuli (making it part echoic, intraverbal, or textual), (c) nonverbal stimuli (making it part tact), or the presence of a specific audience. For example, it’s possible that an audience with contempt for war (i.e., the MO) evoked a mand, “Why did the United States enter World War II?” The question may be more a function of this variable than an intraverbal related to the ongoing conversation or the nonverbal or textual stimuli that may be present in the room. On the other hand, the speaker may have no strong MO for the answer, but asks the question because of its relation to MOs for social reinforcement related to political involvement.

Divergent Multiple Control

Multiple control also occurs when a single antecedent variable affects the strength of many responses. For example, a single word (e.g., *football*) will evoke a variety of intraverbal responses from different people, and from the same person at different times. Michael (2003) used the term **divergent multiple control** to identify this type of control. Divergent multiple control can occur also with mand and tact relations. A single MO may strengthen a variety of responses, such as food deprivation strengthening the response “I’m hungry,” or “Let’s go to a restaurant.” A single nonverbal stimulus can also strengthen several response forms, as when a picture of a car strengthens the responses “car,” “automobile,” or “Ford.”

Thematic and Formal Verbal Operants

Skinner (1957) identified thematic and formal verbal operants that function as sources of multiple control. The thematic verbal operants are mands, tacts, and intraverbals and involve different response topographies controlled by a common variable. For an intraverbal example, the S^D “blue” can evoke verbal responses such as “lake,” “ocean,” and “sky.” The formal verbal operants are echoic (imitation, copying a text) and textual (and transcription) and are controlled by a common variable, with point-to-point correspondence. For example, the S^D “ring” can evoke verbal responses such as “sing,” “wing,” and “spring.”

Multiple Audiences

The role of the audience raises the issue of multiple audiences. Different audiences may evoke different response forms. For example, two applied behavior analysts talking (i.e., a technical speaker and a technical audience) will likely use different response forms than will a behavior analyst speaking with a parent (i.e., a

technical speaker and a nontechnical audience). A *positive audience* has special effects, especially a large positive audience (e.g., as in a rally for a certain cause), as does a *negative audience*. When the two audiences are combined, the effects of the negative audience are most obvious: “[When a] seditious soapbox orator sees a policeman approaching from a distance, his behavior decreases in strength as the negative audience becomes more important” (Skinner, 1957, p. 231).

Elaborating Multiple Control

Convergent multiple control occurs in most instances of verbal behavior. An audience is always a source of stimulus control related to verbal behavior, even when a speaker serves as his own audience. In addition, it is also the case that more than one of the controlling variables related to the different verbal operants may be relevant to a specific instance of verbal behavior. Convergent control often occurs with MOs and nonverbal stimuli, resulting in a response that is part mand and part tact. For example, saying “You look great” may be partly controlled by the nonverbal stimuli in front of a speaker (a tact), but also by MOs related to wanting to leave soon or wanting to avoid potential aversive events (a mand). Skinner (1957) identified this particular blend of controlling variables as evoking **impure tacts** (i.e., impure because an MO affects the tact relation).

Verbal and nonverbal stimuli can also share control over a particular response. For example, a tendency to say “green car” may be evoked by the verbal stimulus “What color is the car?” and the nonverbal stimulus of the color green.

Multiple sources of control can be any combination of thematic or formal sources, even multiple sources from within a single verbal operant, such as multiple tacts or multiple intraverbals. Skinner pointed out that because these separate sources may be additive, the “multiple causation produces many interesting verbal effects, including those of verbal play, wit, style, the devices of poetry, formal distortions, slips, and many techniques of verbal thinking” (pp. 228–229). Additional sources of control often reveal themselves—for example, when a speaker in the presence of an obese friend who is wearing a new hat emits the “Freudian slip,” “I like that fat on you.” Multiple sources of control often provide the basis for verbal humor and listener enjoyment.

Autoclitic Relation

This chapter has emphasized that a speaker can, and often does, function as her own listener. The analysis of how and why a speaker becomes a listener of her own verbal behavior and then manipulates her verbal behavior with

additional verbal behavior addresses the topic of the autoclitic relation. Skinner (1957) introduced the term **autoclitic** to identify when a speaker’s own verbal behavior functions as an S^D or an MO for additional speaker verbal behavior. In other words, the autoclitic is verbal behavior about a speaker’s own verbal behavior. The consequences for this behavior involve differential reinforcement from the ultimate listener, meaning that the listener discriminates whether to serve or not serve as a mediator of reinforcement for those verbal stimuli. A speaker becomes a listener, and observer, of his own verbal behavior and its controlling variables, and then in turn becomes a speaker again. This effect can be very rapid and typically occurs in the emission of a single sentence composed of the two levels of responses.

Primary and Secondary Verbal Operants

Michael (1991, 1992) suggested that applied behavior analysts classify verbal behavior about a speaker’s own verbal behavior as *primary* (Level 1) and *secondary* (Level 2) verbal operants. In Level 1, MOs and/or S^D s are present and affect the primary verbal operant. The speaker has something to say. In Level 2, the speaker observes the primary controlling variables of her own verbal behavior and her disposition to emit the primary verbal behavior. The speaker discriminates these controlling variables and describes them to the listener. A secondary verbal operant enables the listener’s behavior as a mediator of reinforcement. For example, an MO or S^D evokes the response, “She is in Columbus, Ohio.” It is important for listeners as reinforcement mediators to discriminate the primary variables controlling the speaker’s behavior. The verbal operant “She is in Columbus, Ohio,” does not inform the listener as to why the speaker said it. “I read in the *Columbus Dispatch* that she is in Columbus, Ohio,” informs the listener of the primary controlling variable. The first level is “She is in Columbus, Ohio” (the primary verbal operant), and the second level is “I read in the *Columbus Dispatch*” (the autoclitic).

Autoclitic Tact Relations

Some autoclitics inform the listener of the type of primary verbal operant the autoclitic accompanies (Peterson, 1978). The *autoclitic tact* informs the listener of some nonverbal aspect of the primary verbal operant and is therefore controlled by nonverbal stimuli. For example, a child’s statement, “I see Mommy” may contain an autoclitic tact. The primary verbal operant (i.e., the tact) is the nonverbal S^D of (a) the child’s mother; (b) the response, “Mommy”; and (c) the associated reinforcement

history. The secondary verbal operant (i.e., the autoclitic tact) is the speaker's tact informing that a nonverbal S^D evoked the primary verbal operant. In this case, the nonverbal S^D was the visual stimulus of the child's mother, and the response "I see" informs the listener of the source of control that evoked the primary tact. If the child heard his mother, but did not see his mother, the autoclitic tact "I hear" would be appropriate.

The listener may challenge the existence and nature of the autoclitic tact—for example, "How do you know it's mommy?" The challenge is one way that effective autoclitic behavior is shaped and brought under appropriate stimulus control.

Autoclitic tacts also inform the listener of the strength of the primary operant. In the examples of the verbal stimuli, "I think it is Mommy" and "I know it is Mommy," "I think" informs the listener that the source of control for the primary tact "Mommy" is weak; "I know" is strong.

Autoclitic Mand Relations

Speakers use autoclitic mands frequently to help the listener present effective reinforcers (Peterson, 1978). A specific MO controls the *autoclitic mand*, and its role is to mand the listener to react in some specific way to the primary verbal operant. "I know it is Mommy" may contain an autoclitic mand. For example, if "I know" is not a tact of response strength, it may be an MO in the same sense as "Hurry up."

Autoclitic mands occur everywhere, but listeners have difficulty recognizing the MO controlling the autoclitic mand because the sources of control are private. For example, hidden agendas as autoclitic mands often reveal themselves only to the careful observer. For example, a primary intraverbal such as an answer to a question about the sale of a product may contain autoclitic mands, as in "I'm sure you will be pleased with the sale," in which "I'm sure you will be pleased" is controlled by the same MO that might control the response "Don't ask me for any details about the sale."

Developing Autoclitic Relations

Speakers develop autoclitic relations in several ways. For example, a father is wrapping a gift for his child's mother, and the child nearby says, "Mommy." The father may ask the child to identify the primary variables controlling the response by asking, "Did you see her?" The father may differentially respond to "I see" indicating that clearly "Mommy" is a tact and hide the gift; rather than a mand for "Mommy," in which case, he keeps wrapping the gift. The source of control for the response "Mommy" could be the gift, as in, "That is for Mommy." "That is for" (i.e., the autoclitic) informs the father that the gift is a nonver-

bal stimulus controlling the primary tact, "Mommy," and the father continues wrapping the gift. As Skinner (1957) pointed out, "[A]n autoclitic affects the listener by indicating either a property of the speaker's behavior or the circumstances responsible for that property" (p. 329).

Early language learners seldom emit autoclitic responses. Skinner was clear on this point: "In the absence of any other verbal behavior whatsoever autoclitics cannot occur. . . . It is only when [the elementary] verbal operants have been established in strength that the speaker finds himself subject to the additional contingencies which establish autoclitic behavior" (p. 330). Thus, early language intervention program should not include autoclitic training.

Applications of Verbal Behavior

Skinner's analysis of verbal behavior provides a conceptual framework of language that can be quite beneficial for applied behavior analysts. Viewing language as learned behavior involving a social interaction between speakers and listeners, with the verbal operants as the basic units, changes how clinicians and researchers approach and ameliorate problems related to language. Skinner's theory of language has been successfully applied to an increasing number of human areas. For example, the analysis has been used for typical language and child development (e.g., Bijou & Baer, 1965), elementary and high school education (e.g., Johnson & Layng, 1994), college education (e.g., Chase, Johnson, & Sulzar-Azaroff, 1985), literacy (e.g., Moxley, 1990), composition (e.g., J. Vargas, 1978), memory (e.g., Palmer, 1991), second language acquisition (e.g., Shimamura & Jitsumori, 1999), clinical interventions (e.g., Layng & Andronis, 1984), behavior problems (e.g., McGill, 1999), traumatic brain injury (e.g., Sundberg, San Juan, Dawdy, & Arguelles, 1990), artificial intelligence (e.g., Stephens & Hutchison, 1992), ape language acquisition (e.g., Savage-Rumbaugh, 1984), and behavioral pharmacology (e.g., Critchfield, 1993). The most prolific application of Skinner's analysis of verbal behavior has been to language assessment and intervention programs for children with autism or other developmental disabilities. This area of application will be presented in more detail in the following sections.

Language Assessment

Most standardized language assessments designed for children with language delays seek to obtain an age equivalent score by testing a child's receptive and expressive language abilities (e.g., Peabody Picture

Vocabulary Test III [Dunn & Dunn, 1997], Comprehensive Receptive and Expressive Vocabulary Test [Hammill & Newcomer, 1997]). Although this information is helpful in many ways, the tests do not distinguish among the mand, tact, and intraverbal repertoires, and important language deficits cannot be identified. For example, these tests assess language skills under the control of discriminative stimuli (e.g., pictures, words, questions); however, a substantial percentage of verbal behavior is under the functional control of MOs. Manding is a dominating type of verbal behavior, yet rarely is this repertoire assessed in standardized testing. It is quite common to find children with autism or other developmental disabilities who are unable to mand, but have extensive tact and receptive repertoires. If a language assessment fails to identify delayed or defective language skills that are related to MO control, an appropriate intervention program may be difficult to establish. A similar problem is the failure to adequately assess the intraverbal repertoire with most standardized assessments.

If a child with language delays is referred for a language assessment, the behavior analyst should examine the current effectiveness of each verbal operant in addition to obtaining a standardized test from a speech and language pathologist. The behavior analyst would start by obtaining information about the child's mand repertoire. When known motivating operations are at strength, what behavior does the child engage in to obtain the reinforcer? When the reinforcer is provided, does the mand behavior cease? What is the frequency and complexity of the various mand units? Information regarding the quality and strength of the echoic repertoire can reveal potential problems in producing response topographies that are essential for other verbal interactions. A thorough examination of the tact repertoire will show the nature and extent of nonverbal stimulus control over verbal responses, and a systematic examination of the receptive and intraverbal repertoires will show the control by verbal stimuli. Thus, a more complete understanding of a language deficit, and hence a more effective language intervention program, can be obtained by determining the strengths and weaknesses of each of the verbal operants, as well as a number of other related skills (e.g., Partington & Sundberg, 1998; Sundberg, 1983; Sundberg & Partington, 1998).

Language Intervention

Skinner's analysis suggests that a complete verbal repertoire is composed of each of the different elementary operants, and separate speaker and listener repertoires. The individual verbal operants are then seen as the bases for building more advanced language behavior. Therefore, a language intervention program may need to firmly es-

tablish each of these repertoires before moving on to more complex verbal relations such as autoclitics or multiply controlled responses. Procedures for teaching mand, echoic, tact, and intraverbal repertoires will be presented briefly in the following sections, which will also include, some discussion of the relevant research.

Mand Training

As previously stated, mands are very important to early language learners. They allow a child to control the delivery of reinforcers when those reinforcers are most valuable. As a result, a parent or language trainer's behavior (especially vocal behavior) can be paired with the reinforcer at the right time (i.e., when the relevant MO for an item is strong). Mands also begin to establish a child's role as a speaker, rather than just a listener, thus giving the child some control of the social environment. If mands fail to develop in a typical manner, negative behaviors such as tantrums, aggression, social withdrawal, or self-injury that serve the mand function (and thereby control the social environment) commonly emerge. Therefore, a language intervention program for a nonverbal child must include procedures to teach appropriate manding. The other types of verbal behavior should not be neglected, but the mand allows a child to get what he wants, when he wants it.

The most complicated aspect of mand training is the fact that the response needs to be under the functional control of the relevant MO. Therefore, mand training can only occur when the relevant MO is strong, and ultimately the response should be free from additional sources of control (e.g., nonverbal stimuli). Another complication of mand training is that different response forms need to be established and brought under the control of each MO. Vocal words are of course the most common response form, but sign language, pictures, or written words can also be used.

The basic procedure for establishing mands consists of using prompting, fading, and differential reinforcement to transfer control from stimulus variables to motive variables (Sundberg & Partington, 1998). For example, if a child demonstrates an MO for watching bubbles by reaching for the bottle of bubbles, then smiling and laughing as he watches the bubbles in the air, the timing is probably right to conduct mand training. If the child can echo the word "bubbles" or an approximation such as "ba," teaching a mand can be easy (see Table 25.4). The trainer should first present the bottle of bubbles (a nonverbal stimulus) along with an echoic prompt (a verbal stimulus) and differentially reinforce successive approximations to "bubble" with blowing bubbles (specific reinforcement). The next step is to fade the echoic prompt to establish the response "bubble" under

Table 25.4 Teaching a Mand by Transferring Stimulus Control to MO Control

<i>Antecedent</i>	<i>Behavior</i>	<i>Consequences</i>
Motivating operation	"Bubbles"	Blow bubbles
Nonverbal stimulus		
Echoic prompt		
Motivating operation	"Bubbles"	Blow bubbles
Nonverbal stimulus		
Motivating operation	"Bubbles"	Blow bubbles

the multiple control of the MO and the nonverbal stimulus (the bottle of bubbles). The final step is to fade the nonverbal stimulus to bring the response form under the sole control of the MO.

The easiest mands to teach in an early language intervention program are usually mands for items for which the MO is frequently strong for the child and satiation is slow to occur (e.g., food, toys, videos). It is always important to assess the current strength of a supposed MO by using choice procedures, observation of a child's behavior in a free operant situation (i.e., no demands), latency to contacting the reinforcer, immediate consumption, and so forth. The goal of early mand training is to establish several different mands by bringing different response forms (i.e., words) under the functional control of different MOs. It is important to note that MOs vary in strength across time, and the effects may be momentary. In addition, the response requirement placed on a child may weaken the strength of an MO, making mand training more difficult. Many additional strategies exist for teaching early mands to more difficult learners, such as augmentative communication, physical prompts, verbal prompts, and more careful fading and differential reinforcement procedures (see Sundberg & Partington, 1998).

Manding continues to be an important part of a verbal repertoire as other verbal operants are acquired. Soon after mands for edible and tangible reinforcers are acquired, a typical child learns to mand for actions (verbs), attention, removal of aversive stimuli, movement to certain locations (prepositions), certain properties of items (adjectives) and actions (adverbs), verbal information (WH-questions), and so on. These mands are often more difficult to teach to a child with language delays because the relevant MO often must be captured or contrived for training purposes (Sundberg, 1993, 2004). Fortunately, Michael's (1993) classification of the different types of MOs provides a useful guide for capturing or contriving MOs. For example, capturing a transitive conditioned motivating operation (CMO-T) in the natural environ-

ment involves capitalizing on a situation in which one stimulus increases the value of a second stimulus. A child who likes fire trucks may see a fire truck parked outside the window. This stimulus condition increases the value of a second stimulus condition, an opened door, and will evoke behavior that has resulted in doors opening in the past. A skilled trainer would be watchful for these events and would be quick to conduct a mand trial for the word "open" or "out." The work of Hart and Risley (1975) and their incidental teaching model exemplify this teaching strategy.

Transitive CMOs can also be contrived to conduct mand training (e.g., Hall & Sundberg, 1987; Sigafos, Doss, & Reichele, 1989; Sundberg, Loeb, Hale, & Eigenheer, 2002). For example, Hall and Sundberg (1987) used a contrived CMO-T procedure with a deaf teenager with autism by presenting highly desired instant coffee without hot water. The coffee altered the value of hot water and thereby evoked behavior that had been followed by hot water in the past. During baseline this behavior consisted of tantrums. Appropriate mands (i.e., signing "hot water") were easy to teach when this CMO-T was in effect by using the transfer of control procedure described earlier. In fact, a number of mands were taught by using this procedure, and often the procedure led to the emission of untrained mands and a substantial reduction in negative behavior.

Mand training should be a significant part of any intervention program designed for children with autism or other severe language delays. Without an appropriate mand repertoire, a child cannot obtain reinforcement when MOs are strong, or have much control of the social environment. As a result, people who interact with the child may become conditioned aversive stimuli, and/or problem behaviors may be acquired that serve the mand function. These behaviors and social relationships can become hard to change until replacement mands are established. Teaching mands early in a language intervention program may help to prevent the acquisition of negative behaviors as mands. In addition, parents and

teachers are paired with successful manding and can become conditioned reinforcers. If people become more reinforcing to a child, social withdrawal, escape and avoidance, and noncompliance may be reduced.

Echoic Training

For an early language learner the ability to repeat words when asked to do so plays a major role in the development of other verbal operants (as in the bubbles example earlier). If a child can emit a word under echoic stimulus control, then transfer of stimulus control procedures can be used to bring that same response form under the control of not only MOs, but also stimuli such as objects (tacts) and questions (intraverbal). Because many children with autism and other language delays are unable to emit echoic behavior, special training procedures are required to develop the echoic repertoire.

The first goal of echoic training is to teach the child to repeat the words and phrases emitted by parents and teachers when asked to do so. Once echoic control is initially established, the goal becomes to establish a generalized repertoire in which the child can repeat novel words and combinations. But the ultimate goal with the echoic repertoire is to transfer the response form to other verbal operants. This transfer process can begin immediately and is not dependent on the acquisition of a generalized repertoire. Several procedures will be described to achieve the first goal of establishing initial echoic stimulus control.

The most common form of echoic training is direct echoic training in which a vocal stimulus is presented and successive approximations to the target response are differentially reinforced. This procedure involves a combination of prompting, fading, shaping, extinction, and reinforcement techniques. Speech therapists commonly use prompts such as pointing to the mouth, exaggerated movements, physical lip prompting, and mirrors to watch lip movement. Successive approximations to a target vocalization are reinforced, and others are ignored. The prompts are then faded, and pure echoic responses are

reinforced. For many children these procedures are effective in establishing and strengthening echoic control and improving articulation. However, for some children the procedures are ineffective, and additional measures are necessary.

Placing an echoic trial within a mand frame can often be a more effective procedure for establishing echoic stimulus control. The MO is a powerful independent variable in language training and can be temporally used to establish other verbal operants (e.g., Carroll & Hesse, 1987; Drash, High, & Tudor, 1999; Sundberg, 2004; Sundberg & Partington, 1998). For echoic training, an MO and nonverbal stimulus can be added to the target echoic antecedent as a way to evoke the behavior (see Table 25.5). For example, if a child demonstrates a strong MO for bubbles, an echoic trial can be conducted while that MO is strong, and in the presence of the nonverbal stimulus of the bottle of bubbles. These additional sources of control can help to evoke the vocal response along with the echoic prompt "Say bubbles." The specific reinforcement of blowing bubbles is then contingent on any successive approximation to "bubbles." These additional antecedent variables must be faded out, and the reinforcement changed from the specific reinforcement to generalized conditioned reinforcement. For some learners, the transfer from MO to echoic control may occur more quickly if a picture of the object is used rather than the actual object (this reduces the MO evocative effect).

Children with a low frequency of vocal behaviors may have difficulty establishing echoic control. For these children procedures to simply increase any vocal behavior may facilitate the ultimate establishment of echoic control. One method is to directly reinforce all vocal behaviors. Taking this procedure one step further, if a child randomly emits a particular sound, the behavior analyst can reinforce this behavior and conduct an echoic trial with that sound immediately after the delivery of reinforcement. Some children will repeat what they initially emitted, and this interaction sets up some of the basic variables that may facilitate echoic control.

Table 25.5 Teaching Echoics by Using a Mand Frame and Transferring Control from Multiple Control to Echoic Control

<i>Antecedent</i>	<i>Behavior</i>	<i>Consequences</i>
Motivating operation	"Bubbles"	Blow bubbles
Nonverbal prompt		
Echoic stimulus		
Nonverbal prompt	"Bubbles"	Praise (GCR)
Echoic stimulus		
Echoic stimulus	"Bubbles"	Praise (GCR)

Automatic reinforcement procedures can also be used to increase the frequency of vocal behavior. By pairing a neutral stimulus with an established form of reinforcement, the neutral stimulus can become a conditioned reinforcer. For example, if just prior to blowing bubbles the trainer emits the word bubbles, bubbles can become a reinforcer. Research has shown that this pairing procedure can increase the rate of a child's vocal play and result in the emission of targeted sounds and words that had never occurred echoically (Miguel, Carr, & Michael, 2002; Sundberg, Michael, Partington, & Sundberg, 1996; Smith, Michael, & Sundberg, 1996; Yoon & Bennett, 2000). For example, Yoon and Bennett (2000) demonstrated that this pairing procedure was more successful than direct echoic training in producing targeted sounds. Individual children who have difficulty acquiring an echoic repertoire may benefit from this procedure or a combination of all the procedures described in this section.

Tact Training

The tact repertoire is extensive and often the primary focus of many language intervention programs. A child must learn to tact objects, actions, properties of objects and actions, prepositional relations, abstractions, private events, and so on. The goal of the teaching procedures is to bring a verbal response under nonverbal stimulus control. If a child has a strong echoic repertoire, then tact training can be quite simple. A language trainer can present a nonverbal stimulus along with an echoic prompt, differentially reinforce a correct response, and then fade the echoic prompt. However, for some children tact training is more difficult, and special procedures may be required.

A mand frame can also be used to establish tacting (Carroll & Hesse, 1987). The procedure is similar to that described for teaching an echoic response. Training begins with an MO for a desired object, the nonverbal object, and an echoic prompt (see Table 25.6). Using the

bubbles example, the first and second steps are the same, with the goal being to free the response from motivational control by providing generalized conditioned reinforcement rather than specific reinforcement. As with echoic training, at this point in the procedure the transfer may occur more quickly if a picture of the object is used rather than the actual object. Also, with some children it may be more effective to fade the echoic prompt before the MO is faded. The third step in the procedure involves fading out the echoic prompt and bringing the response under the sole control of the nonverbal stimulus, thus a tact. Additional nonechoic verbal prompts may also be helpful, such as "What is that?," but these too are verbal prompts that are additional sources of control that need to be accounted for in the analysis of tact acquisition (Sundberg & Partington, 1998).

Methods for teaching more complex tacts can also make use of the transfer of stimulus control procedure. For example, teaching tacts of actions requires that the nonverbal stimulus of movement be present and a response such as "jump" be brought under the control of the action of jumping. Teaching tacts involving prepositions, adjectives, pronouns, adverbs, and so on, also involves the establishment of nonverbal stimulus control. However, these advanced tacts are often more complex than they appear, and frequently the type of stimulus control established in formal training may not be the same type of stimulus control that evokes similar tacts for typically developing children (Sundberg & Michael, 2001). For example, some training programs with early learners attempt to bring verbal behavior under the control of private stimuli, such as those involved in emotional states (sad, happy, afraid), pains, itches, a full bladder, hunger pangs, nausea, and so forth. Such verbal behavior is an important part of any person's repertoire, but because the controlling variables that are affecting the learner cannot be directly contacted by the teacher or parent, accurate tact relations are difficult to develop. An instructor cannot present the relevant private stimulus that is inside a

Table 25.6 Teaching Tacts by Using a Mand Frame and Transferring Control from Multiple Control to Nonverbal Control

<i>Antecedent</i>	<i>Behavior</i>	<i>Consequences</i>
Motivating operation	"Bubbles"	Blow bubbles
Nonverbal prompt		
Echoic stimulus		
Nonverbal prompt	"Bubbles"	Praise (GCR)
Echoic stimulus		
Nonverbal stimulus	"Bubbles"	Praise (GCR)

person's body, and therefore cannot differentially reinforce correct tact responses in the same way that correct tacts to objects and actions can be reinforced. Teaching a child to correctly say "itch" with respect to a stimulus coming from a portion of the child's arm is trained indirectly as the teacher reacts to common public accompaniments of such stimuli (observing a skin rash) and collateral responses by the learner (observing the child's scratching). However, this method is fraught with difficulties (the rash may not itch, the scratching may be imitated), and such repertoires even in typical adults are often quite imprecise.

Intraverbal Training

Many children with autism, developmental disabilities, or other language delays suffer from defective or nonexistent intraverbal repertoires, even though some can emit hundreds of mands, tacts, and receptive responses. For example, a child may (a) say "bed" when hearing "bed" spoken by another person (echoic), (b) say "bed" when he sees a bed (tact), and even (c) ask for bed when he is tired (mand), but (d) may not say "bed" when someone asks, "Where do you sleep?" or says, "You sleep in a . . ." In cognitive terms, this type of language disorder may be described as a child's failure to process the auditory stimulus, or explained in terms of other hypothesized internal processes. However, verbal stimulus control is not the same as nonverbal stimulus control, and a response acquired as a tact for an early language learner may not automatically occur as an intraverbal without special training (e.g., Braam & Poling, 1982; Luciano, 1986; Partington & Bailey, 1993; Watkins, Pack-Teixeira, & Howard, 1989).

In general, verbal stimulus control over verbal responding is more difficult to establish than nonverbal control. This does not mean that all intraverbals are harder than all tacts. Some intraverbal behavior is simple and easy to acquire. However, formal training on intraverbal

behavior for a language-delayed child should not occur until the child has well-established mand, tact, echoic, imitation, receptive, and matching-to-sample repertoires (Sundberg & Partington, 1998). A common mistake in early intraverbal training is to attempt to teach intraverbal relations too early, or intraverbals that are too complex and out of developmental sequence such as personal information (e.g., "What is your name and phone number?"). Some of the easiest intraverbal relations are fill-in-the-blanks with songs (e.g., "The wheels on the . . .") and other fun activities (e.g., Peek-a-). The goal of early intraverbal training is to begin to break verbal responding free from mand, echoic, and tact sources of control. That is, no new response topographies are taught; rather, known words are brought under a new type of stimulus control.

MOs can be helpful independent variables in facilitating the transfer of stimulus control, as in the Peek-a-Boo example, and the mand frame procedures described earlier for the echoic and tact. However, ultimately, a child needs to learn to emit intraverbal responses that are free from MO control. For example, if a child likes bubbles and the target intraverbal is for the verbal stimulus "You blow. . ." to evoke the verbal response "bubbles," then intraverbal training should involve the transfer of control from MOs and nonverbal stimuli to verbal stimuli (echoic prompts can also be used). The language trainer can present the verbal stimulus (e.g., "You blow . . .") when the MO is strong along with the nonverbal stimulus (e.g., a bottle of bubbles). Then, the trainer can begin providing generalized conditioned reinforcement rather than specific reinforcement, use a picture of the item rather than the actual item, and finally, fade the nonverbal prompt (see Table 25.7)

The intraverbal repertoire becomes increasing more valuable to a child as the verbal stimuli and related responses become more varied and complex. Common associations (e.g., "Mommy and . . ."), fill-in-the-blanks (e.g., "You bounce a . . ."), animal sounds (e.g., "A kitty goes . . ."), and eventually *what* questions (e.g., "What

Table 25.7 Teaching Intraverbals by Using a Mand Frame and Transferring Control from Multiple Control to a Verbal Stimulus

<i>Antecedent</i>	<i>Behavior</i>	<i>Consequences</i>
Motivating operation	"Bubbles"	Blow bubbles
Nonverbal prompt		
Verbal stimulus		
Nonverbal prompt	"Bubbles"	Praise (GCR)
Verbal stimulus		
Verbal stimulus	"Bubbles"	Praise (GCR)

do you eat?") will help to strengthen intraverbal behavior by expanding the content and variation of the verbal stimuli and the verbal responses. In addition, these procedures can help to develop verbal stimulus and response classes and more fluent intraverbal responding that is free from tact and echoic sources of stimulus control. More advanced intraverbal training can be accomplished in a variety of ways (Sundberg & Partington, 1998). For example, the verbal stimulus can have multiple components involving conditional discriminations in which one verbal stimulus alters the evocative effect of another, as in "What do you eat for breakfast?" versus "What do you eat for dinner?" Expansion prompts can also be used, such as "What else do you eat for lunch?," as well as additional WH-questions, such as "Where do you eat lunch?," and "When do you eat lunch?" As with the other verbal repertoires, typical developmental sequences can be a helpful guide to the progression of increasingly complex intraverbal behavior, as can the task analysis of the verbal

operants presented in the *Assessment of Basic Learning and Language Skills: The ABLLS* (Partington & Sundberg, 1998).

Additional Aspects of Language Training

In addition to these four basic repertoires, there are several other components of a verbal behavior program and curriculum, such as receptive language training, matching-to-sample, mixing and varying trials, multiple response training, sentence construction, conversational skills, peer interaction, reading, and writing (Sundberg & Partington, 1998). Although a description of these programs is beyond the scope of this chapter, many of the procedures for teaching these skills involve the same basic elements of the transfer of stimulus control methods described here.

Summary

Verbal Behavior and Properties of Language

1. Verbal behavior is defined as behavior that is reinforced through the mediation of another person's behavior.
2. The formal properties of verbal behavior involve the topography (i.e., form, structure) of the verbal response.
3. The functional properties of verbal behavior involve the causes (i.e., antecedents and consequences) of the response.
4. Skinner's analysis of verbal behavior was met with strong opposition from the field of linguistics, and with indifference within the field of behavior analysis. However, Skinner predicted in 1978 that *Verbal Behavior* would prove to be his most important work.

Defining Verbal Behavior

5. Verbal behavior involves a social interaction between speakers and listeners, whereby speakers gain access to reinforcement and control their environment through the behavior of listeners.
6. The verbal operant is the unit of analysis of verbal behavior and is the functional relation between a type of responding and (a) motivating variables, (b) discriminative stimuli, and (c) consequences.
7. A verbal repertoire is a set of verbal operants emitted by a particular person.

Elementary Verbal Operants

8. The mand is a verbal operant in which the form of the response is under the functional control of motivating operations (MOs) and specific reinforcement.

9. The tact is a verbal operant under the functional control of nonverbal discriminative stimulus, and it produces generalized conditioned reinforcement.
10. The echoic is a verbal operant that consists of a verbal discriminative stimulus that has point-to-point correspondence and formal similarity with a verbal response.
11. Point-to-point correspondence between the stimulus and the response or response product occurs when the beginning, middle, and end of the verbal stimulus matches the beginning, middle, and end of the verbal response.
12. Formal similarity occurs when the controlling antecedent stimulus and the response or response product (a) share the same sense mode (e.g., both stimulus and response are visual, auditory, or tactile) and (b) physically resemble each other.
13. The intraverbal is a verbal operant that consists of a verbal discriminative stimulus that evokes a verbal response that does not have point-to-point correspondence.
14. The textual relation is a verbal operant that consists of a verbal discriminative stimulus that has point-to-point correspondence between the stimulus and the response product, but does not have formal similarity.
15. The transcription relation is a verbal operant that consists of a verbal discriminative stimulus that controls a written, typed, or finger-spelled response. Like the textual relation, there is point-to-point correspondence between the stimulus and the response product, but no formal similarity.

Role of the Listener

16. The listener not only mediates reinforcement, but functions as a discriminative stimulus for verbal behavior. Often, much of the behavior of a listener is covert verbal behavior.
17. An audience is a discriminative stimulus in the presence of which verbal behavior is characteristically reinforced.
18. Classifying verbal responses as mands, tacts, intraverbals, etc., can be accomplished by an analysis of the relevant controlling variables.

Analyzing Complex Verbal Behavior

19. Automatic reinforcement is a type of conditioned reinforcement in which a response product has reinforcing properties as a result of a specific conditioning history.
20. Automatic punishment is a type of conditioned punishment in which a response product has punishing properties as a result of a specific conditioning history.
21. In generic tact extension, the novel stimulus shares all of the relevant or defining features associated with the original stimulus.
22. In metaphorical tact extension, the novel stimulus shares some, but not all, of the relevant features of the original stimulus.
23. In metonymical tact extension, the novel stimulus shares none of the relevant features of the original stimulus configuration, but some irrelevant but related feature has acquired stimulus control.
24. In solistic tact extension, a stimulus property that is only indirectly related to the tact relation evokes substandard verbal behavior.
25. Private events are stimuli that arise from within someone's body.
26. Public accompaniment occurs when publicly observable stimulus accompanies a private stimulus.
27. Collateral responses are publicly observable behaviors that reliably occur with private stimuli.
28. Common properties involve a type of generalization in which private stimuli share some of the features of public stimuli.
29. Response reduction is also a type of generalization in which kinesthetic stimuli arising from movement and positions acquire control over the verbal responses. When movements shrink in size (become covert), the kinesthetic stimuli may remain sufficiently similar to those resulting from the overt movements.

Multiple Control

30. Convergent multiple control occurs when a single verbal response is a function of more than one controlling variable.

31. Divergent multiple control occurs when a single antecedent variable affects the strength of many responses.
32. The thematic verbal operants are mand, tact, and intraverbal, and involve different response topographies controlled by a common variable.
33. The formal verbal operants are echoic (and imitation as it relates to sign language and copying a text), textual, and transcription, and involve control by a common variable with point-to-point correspondence.
34. Multiple audiences consist of two or more different audiences that may evoke different response forms.
35. Impure tacts occur when an MO shares control with a nonverbal stimulus.

Autoclitic Relation

36. The autoclitic relation involves two related but separate three-term contingencies in which some aspect of a speaker's own verbal behavior functions as an SD or an MO for additional speaker verbal behavior.
37. Primary verbal behavior involves the elementary verbal operants emitted by a speaker.
38. Secondary verbal behavior involves verbal responses controlled by some aspect of the speaker's own ongoing verbal behavior.
39. The autoclitic tact informs the listener of some nonverbal aspect of the primary verbal operant and is therefore controlled by nonverbal stimuli.
40. The autoclitic mand is controlled by an MO and enjoins the listener to react in some specific way to the primary verbal operant.

Applications of Verbal Behavior

41. The verbal operants can be used to assess a wide variety of language deficits.
42. Mand training involves bringing verbal responses under the functional control of MOs.
43. Echoic training involves bringing verbal responses under the functional control of verbal discriminative stimuli that have point-to-point correspondence and formal similarity with the response.
44. Tact training involves bringing verbal responses under the functional control of nonverbal discriminative stimuli.
45. Intraverbal training involves bringing verbal responses under the functional control of verbal discriminative stimuli that lack point-to-point correspondence with the response.

