

Listening Is Behaving Verbally

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As we celebrate the 50th anniversary of the publication of B. F. Skinner's *Verbal Behavior*, it may be important to reconsider the role of the listener in the verbal episode. Although by Skinner's own admission, *Verbal Behavior* was primarily about the behavior of the speaker, his definition of verbal behavior as "behavior reinforced through the mediation of other persons" (1957, p. 2) focused on the behavior of the listener. But because many of the behaviors of the listener are fundamentally no different than other discriminated operants, they may not appropriately be termed *listening*. Even Skinner noted that the behavior of the listener often goes beyond simply mediating consequences for the speaker's behavior, implying that the listener engages in a repertoire of behaviors that is itself verbal. In the present article I suggest that listening involves subvocal verbal behavior. I then describe some of the forms and functions of the listener's verbal behavior (including echoic and intraverbal behavior) and conclude that there may be no functional distinction between speaking and listening.

Key words: listening, rule-governed behavior, speaking, subvocal behavior, *Verbal Behavior*, verbal behavior

2007 witnessed the 50th anniversary of the publication of *Verbal Behavior* by B. F. Skinner, a book that he considered his most important work (Skinner, 1977). Contrary to claims of its demise, along with the demise of behaviorism, *Verbal Behavior* has recently made somewhat of a comeback, selling at a brisk pace over the last several years. Part of the reason may be because the interpretation presented in the book has yielded important dividends in the applied arena, in particular with individuals diagnosed with autism (Schlinger, 2008c). Not coincidentally, there has been a concurrent, albeit slow, increase in the number of research articles, mostly on teaching basic verbal operants (Dymond, O'Hora, Whelan, & O'Donovan, 2006; Sautter & LeBlanc, 2006).

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However, most of the applications and research reports have focused on speaking. There has been scant mention of listening, perhaps because of the perception that *Verbal Behavior* was all about the speaker (but see Horne & Lowe, 1996; Miguel, Petursdottir, Carr, & Michael, 2008).

Despite Skinner's own admission that *Verbal Behavior* dealt primarily with the behavior of the speaker, he didn't neglect the behavior of the listener. In fact, the listener plays a crucial role in the development and maintenance of the speaker's behavior, as evidenced by Skinner's definition of verbal behavior as "behavior reinforced through the mediation of other persons" (1957, p. 2). Skinner noted, however, that the behavior of the listener often goes beyond simply mediating consequences for the speaker's behavior, implying that the listener engages in a repertoire of behavior that is itself verbal. But what does the listener actually do and why? In this article, I suggest that what we most often speak of as *listening* involves subvocal verbal behavior. I then describe some possible forms and functions of listening (including echoic and intraverbal behavior) and conclude that there may be no functional distinction between speaking and listening.

THE DEFINITION OF VERBAL BEHAVIOR

The hallmark of Skinner's (1957) book was his insistence that verbal behavior is fundamentally no different than nonverbal behavior; that is, it comprises forms of operant behavior under various types of stimulus and motivational control. For example, the mand is controlled by motivational operations (MOs), the tact is controlled by discriminative stimuli (S^D s) in the form of objects and events, other forms of verbal behavior (e.g., echoic, intraverbal, textual, and autoclitic behavior) are controlled by S^D s in the form of prior verbal stimuli, and, of course, all verbal behavior is under the discriminative control of an audience composed of listeners, including the speaker. Some behavior analysts (e.g., Hayes, 1994; Hayes, Barnes-Holmes, & Roche, 2001) have criticized Skinner's general definition of verbal behavior as not being functional because it is based on the source of reinforcement for the speaker's behavior (i.e., other persons) rather than the behavior itself (Leigland, 1997). The implication is that Skinner's definition doesn't appropriately distinguish verbal from nonverbal or typical social behavior (Parrott, 1986), despite Skinner's refinement to include the "provision that the 'listener' must be responding in ways which have been conditioned precisely in order to reinforce the behavior of the speaker" (1957, p. 225). Chase and Danforth (1991) added a further refinement—"the explicit conditioning of the listener involves conditioning to arbitrary stimulus relations ... such as those found in relational classes" (p. 206)—that Skinner would probably not have objected to.¹ Others (e.g., Hayes et al., 2001) have offered

¹ Skinner would probably not have objected to this addition, because he actually introduced the concept of relational framing and suggested the role of a history of multiple

different definitions of *verbal*, but as Leigland points out, any definition is provisional. From a functional analytic perspective, then, verbal behavior is what the behavior-analytic community ends up calling it; that is, there are no essential qualities of being verbal.

Defenders of Skinner's definition and conceptualization of verbal behavior, however, think that he got it just right:

According to Skinner, it is not a special type of behavior, nor does it obey qualitatively different rules. Rather, the special property of verbal behavior is its power, and it is powerful only insofar as it affects the conditioned behavior of other people in systematic ways. It is not a different type of behavior, but it has special characteristic effects, and it is these effects that define "the domain of interest." The characteristic effects depend on the presence of a verbal community whose members have all acquired a standard repertoire with respect to verbal stimuli. Skinner's definition was a way of operationalizing in behavioral terms the manipulation and interpretation of symbols. As with so many other things, he seems to have gotten it just right. (Palmer, 2004, p. 202)

Behavior analysts and non-behavior analysts alike have criticized Skinner's definition and interpretation of

exemplar training when he wrote, "Something less than full-fledged relational autoclitic behavior is involved when partially conditioned autoclitic "frames" combine with responses appropriate to a specific situation. Having responded to many pairs of objects with behavior such as *the hat and the shoe* and *the gun and the hat*, the speaker may make the response *the boy and the bicycle* on a novel occasion. If he has acquired a series of responses such as *the boy's gun*, *the boy's shoe*, and *the boy's hat*, we may suppose that the partial frame *the boy's*—is available for recombination with other responses. The first time the boy acquires a bicycle, the speaker can compose a new unit *the boy's bicycle*. This is not simply the emission of two responses separately acquired. ... The *relational* [italics added] aspects of the situation strengthen a *frame*, [italics added] and specific features of the situation strengthen the responses fitted into it" (1957, p. 336). This does not mean, however, that Skinner would have suggested that such relational behavior is not mediated by other verbal behavior on the part of the speaker.

verbal behavior as not truly getting at the uniqueness of language. In particular, as already mentioned, some behavior analysts believe that the definition does not distinguish verbal from nonverbal behavior.² Ironically, however, Skinner's unique contribution to the study of language as verbal behavior was that it is not fundamentally different from other operant behavior. For Skinner, the same principles that parsimoniously account for nonverbal behavior also account for verbal behavior. Explaining the myriad forms verbal behavior takes, then, means discovering the contingencies in the verbal community responsible for those forms. Skinner's treatment was not an experimental analysis but rather an exercise in interpretation, like many others in the history of science. The only question for Skinner was whether the interpretation was adequate (Skinner, 1987).

THE LISTENER

According to Skinner (1957), verbal behavior is operant behavior under various sorts of stimulus (and motivational) control. The difference, if any, from nonverbal behavior is that verbal behavior acts indirectly on the environment "from which the ultimate consequences [of the behavior] ... emerge" (p. 1). He stated that a special treatment was justified because such behavior "has so many distinguishing dynamic and topographical properties" (p. 2). Although the main thrust of *Verbal Behavior* was on the behavior of the speaker, it would be inaccurate to

claim that Skinner neglected the listener. In fact, he made frequent mention of the listener throughout the book. For example, if sheer number of words is any indication of the importance Skinner placed on the listener, the word *listener* occurs 793 times compared to 893 instances of the word *speaker*.

Skinner acknowledged that, by definition, verbal behavior seems to omit the behavior of the listener. He justified this omission by pointing out that although listeners have acquired "special responses to the patterns of energy generated by speakers" (1957, p. 2), the behavior of the listener in mediating the consequences of the speaker's behavior is not verbal in any special sense. However, this raises the question of just what it means to call some instance of behavior verbal. At the beginning of *Verbal Behavior*, Skinner seemed to minimize the actions of the listener, as for example, when he wrote, "an adequate account of verbal behavior need cover only as much of the behavior of the listener as is needed to explain the behavior of the speaker" (p. 2). Just a few pages later, however, he suggested that the behavior of the listener was more complex and needed to be considered more fully:

Once a repertoire of verbal behavior has been set up, a host of new problems arise from the interaction of its parts. Verbal behavior is usually the effect of *multiple causes*. Separate variables combine to extend their functional control, and new forms of behavior emerge from the recombination of old fragments. All of this has appropriate effects upon the listener, whose behavior then calls for analysis.

Still another set of problems arises from the fact, often pointed out, that a speaker is normally also a listener. He reacts to his own behavior in several important ways. Part of what he says is under the control of other parts of his verbal behavior. We refer to this interaction when we say that the speaker qualifies, orders, or elaborates his behavior at the moment it is produced. The mere emission of responses is an incomplete characterization when behavior is *composed*. As another consequence of the fact that the speaker is

²The history of the study of language by philosophers, linguists, and psychologists suggests that language is special; many linguists and psychologists still hold a Cartesian view in which language as an innate capacity is a reflection of a rational human mind, which means that no nonhuman can ever be truly capable of human language. Skinner's error, then, according to these scholars, was to miss the uniqueness of human language by treating it no differently than the bar pressing of a rat.

also a listener, some of the behavior of listening resembles the behavior of speaking, particularly when the listener "understands" what is said.

The speaker and listener within the same skin engage in activities which are traditionally described as "thinking." The speaker manipulates his behavior; he reviews it, and may reject it or emit it in modified form. The extent to which he does so varies over a wide range, determined in part by the extent to which he serves as his own listener. The skillful speaker learns to tease out weak behavior and to manipulate variables that will generate and strengthen new responses in his repertoire. Such behavior is commonly observed in the verbal practices of literature as well as of science and logic. An analysis of these activities, together with their effects upon the listener, leads us in the end to the role of verbal behavior in the problem of knowledge. (pp. 10–11)

These brief paragraphs are remarkable, in part, because they reveal Skinner's belief that an analysis of the speaker qua listener can potentially solve such intractable problems as what it means to understand language as well as how an analysis of verbal behavior can illuminate epistemology.³ More simply, these paragraphs suggest that the behaviors of listening and speaking may be inseparable, especially when we say that the listener *listens*, *pays attention* to, or *understands* the speaker. Thus, any analysis of speaking also applies to listening.

In the years since, Skinner seems to have moved away from listening as verbal behavior. Looking back many years later, he wrote,

Most of my book *Verbal Behavior* (1957) was about the speaker. It contained a few dia-

³Some may consider listening and understanding to be the same (see Parrott, 1984, and Schoneberger, 1990, 1991, for critiques). Even Skinner implied they were when he wrote, "As another consequence of the fact that the speaker is also a listener, some of the behavior of listening resembles the behavior of speaking, particularly when the listener 'understands' what is said" (1977, p. 198). In the present article, I am interested in what we speak of as *listening*, which, often, I would argue, is also what we speak of as *understanding*.

grams showing interactions between speakers and listeners, but little direct discussion of listening. I could justify that because, except when the listener was also to some extent speaking, listening was not verbal in the sense of being "effective only through the mediation of other persons." ... But if listeners are responsible for the behavior of speakers, we need to look more closely at what they do. (1989, p. 86)

He then described some of the effects of the speaker's behavior on the listener's behavior that shape and maintain the behavior of the speaker, including telling, advising, and directing the listener via rules, all of which he had previously described as S^Ds (Skinner, 1966). Many of these behaviors, however, seem no different than basic discriminated (or motivated) behavior except that the discriminative (or motivating) stimuli are generated by the speaker's verbal behavior. So, for example, when a teacher (speaker) tells a student (listener) to "sit down" and the student does so, at one level the behavior of the student is unremarkable. Instead of telling the student to sit down, the teacher could have simply reinforced sitting in the presence of a light and then turned the light on when he wanted the student to sit. To the extent that warnings, advice, directions, instructions, and rules evoke discriminated or motivated behavior and nothing else, a further analysis seems unnecessary, and such behavior probably should not warrant the label *listening*.⁴ Therefore, we may want to distinguish any unremarkable discriminated or motivated behavior in the listener from the behaviors we call *listening*. If the distinction is made,

⁴It seems highly unlikely that in competent listeners warnings, advice, directions, instructions, and rules would evoke only simple discriminated or motivated behavior. More likely is that such verbal events evoke compliance with the warning, advice, direction, instruction, or rule (and any other nonverbal respondent and operant behaviors), *only* if they evoke a cascade of verbal behaviors that I am describing as *listening* or *understanding*.

we then need to be cautious about using the term *listening* for all behaviors of the listener.

Skinner's refined definition of verbal behavior specified that other people (i.e., listeners) are specially trained by the verbal community to reinforce the behavior of speakers as, for example, when a listener provides objects or services following a speaker's mand, or when a listener provides "educational" reinforcement for a speaker's tact "primarily because it establishes and maintains a particular form of behavior in the speaker" (Skinner, 1957, p. 84). Although these listener behaviors are crucial for the behavior of the speaker and, in many ways, probably account for the variety of forms of the speaker's behavior, as Skinner noted, we should not consider them to be verbal. That does not mean that these consequent-mediating behaviors are unimportant or that we do not need to account for them. Nevertheless, listeners engage in other behaviors that are verbal and whose elucidation might shed some light on the structural regularities of a grammar or language (Palmer, 1998). That is the focus of the present article.

WHAT IS LISTENING?

For reasons that may partly have to do with Skinner's (1957) emphasis on the speaker, behavior analysts have not often considered the verbal behavior of the listener during the speech episode (but see Horne & Lowe, 1996; Lowenkron, 1998; Palmer, 1998; Parrott, 1984). This does not mean that Skinner totally neglected the listener. As already mentioned, the word *listener* occurs 793 times in *Verbal Behavior* (the word *listening*, however, occurs only 11 times). But perhaps in part as a reaction against linguists who were largely concerned with the listener, Skinner's analysis focused largely on the behavior of the

speaker. As Skinner (1977) noted, *Verbal Behavior*

has not been understood by linguists or psycholinguists ... in part because linguists and psycholinguists are primarily concerned with the listener—with what words mean to those who hear them, and with what kinds of sentences are judged grammatical or ungrammatical. The very concept of communication—whether of ideas, meanings, or information—emphasizes transmission to a *listener*. So far as I am concerned, however, very little of the behavior of the listener is worth distinguishing as verbal. (p. 379)

In accounting for the total verbal episode in all of its myriad concatenations, we must consider that the listener does more than simply provide an audience for, reinforce, or respond to the speaker's verbal behavior in nonverbal ways. (For a brief discussion of some of the roles of the listener in a behavioral account of verbal behavior, see Sundberg, 2007, p. 533.) In other words, the listener also behaves verbally when he or she is said to be listening. Because much of listening is covert, it is easy to believe that the listener really does passively receive and process information from the speaker. In a behavioral account, however, a listener is not the passive receptacle implied by such expressions as *receptive language*; a listener is constantly active, behaving verbally with respect to other speakers as well as to him- or herself as a speaker. This is especially apparent when we consider that as individuals become speakers they simultaneously become listeners to both others and to themselves. As Skinner pointed out, the speaker and listener reside in the same skin. This fact of verbal behavior means that, in this regard, distinguishing between speaking and listening may be specious.

Because the behaviors involved in listening are typically automatic and covert, it is almost impossible to do more than guess about their nature. But there is some evidence to support our guesses. For example, if someone gives you directions to a destination,

and you do not write them down but manage to successfully arrive at the destination, we can (and should) ask what you did while the directions were being given (and then again while you were driving). It is not very helpful to say that the information contained in the directions is decoded and mapped onto a stored mental lexicon of meaning, as cognitive psychologists might describe it. Such an account is less than parsimonious because we must assume the independent existence of the inferred structures (a mental lexicon) and processes (storage and decoding) used to describe or explain the phenomenon. Moreover, such an account can never be directly tested.

A behavioral approach assumes that hearing the directions evokes a cascade of discriminated verbal behaviors (in both the listener and speaker as listener) that themselves have different functions. But before we ask about the function of behavior, we first need to know what behavior we are asking about. For present purposes, then, our question is: What is someone doing when he or she is said to be listening? The simplest answer is that the individual is engaging in subvocal verbal behavior. (Of course, the listener may also engage in other covert discriminated behaviors such as “seeing” or “hearing,” but even if we want to include them as listening, a discussion of their role is beyond the scope of this article.)

Listening as Subvocal Behavior

Skinner (1957) stated that we do not need to guess “about the muscular or neural substratum of verbal events” (p. 435), noting that it is the job of behavioral scientists to account for the probability of covert responding in the same way they would account for the probability of overt responding. He did, however, acknowledge that physiological processes mediate both overt and covert responses, although he maintained

throughout his career that we can talk about (i.e., analyze) all responses without identifying their physiological mediators. Nevertheless, identifying the physiological structures and processes that might mediate behavior, especially covert behavior, has several advantages. First, such an approach may help to dispel any suggestions about cognitive events and, as Skinner (1957) noted, focus on behavior as the primary datum. And, second, interpreting behavior according to more than one independent science (i.e., behavior analysis and neuroscience) strengthens the interpretation (Donahoe & Palmer, 1994). It is in this vein that I discuss listening as subvocal verbal behavior.

Historically, subvocal speech had been discussed mainly in the context of its relationship to thinking; and its role in thinking has had a long and controversial history. But according to Baars (2001), that controversy came to an end in 1993 when researchers, using positron emission tomography, published a study that showed selective activation in language regions of the cortex during silent speech.⁵ Baars wrote,

For the first time in history, observers could see directly what happened in the cortex when subjects were asked to speak to themselves. There was no fanfare; very quietly, a hotly debated, century-long controversy about the role of inner speech in thinking was laid to rest. Psychologists had long argued whether thought involves subvocalization. Although one could simply ask people at random moments during the day whether they were silently talking to themselves (they generally said yes), controversy continued for decades, for reasons that were perhaps not purely scientific. A single brain scan experiment in the 1990s put the matter beyond dispute. (p. 126)

⁵As Ed Morris (personal communication, April 10, 2008) pointed out, this study and others like it didn’t necessarily demonstrate selective activation of Broca’s area during silent speech because the researchers couldn’t verify that the subjects were in fact silently talking to themselves. All we can say is that there was brain activity in language regions of the cortex during putative silent or subvocal speech.

Baars is referring to an experiment by Paulesu, Frith, and Frackowiak (1993) demonstrating (according to the authors and to Baars) that the so-called subvocal rehearsal system (implicated in short-term memory) is mediated by Broca's area. Since then, numerous brain imaging studies have replicated and extended these findings, suggesting that silent (or inner) speech is more than just speculation. For example, two studies using transcranial magnetic stimulation demonstrated that during speech perception (listening) there is an increase in motor evoked potentials recorded from the tongue muscles (Fadiga, Craighero, Buccino, & Rizzolatti, 2002) and from the lip muscles (Watkins, Strafella, & Paus, 2002), suggesting that the listener is in a sense talking along with the speaker. Using functional magnetic resonance imaging, several other studies have hinted at the precise brain areas involved during auditory comprehension. When subjects listened "passively" to speech sounds or sentences, motor areas involved in speech production were activated (Schlosser, Aoyagi, Fulbright, Gore, & McCarthy, 1998; Wilson, Saygun, Sereno, & Iacoboni, 2004). (If listening passively to speech sounds evokes subvocal behavior, then the listener is acting by subvocally speaking, which, by definition, is not passive.) These studies and others like them support the motor theory of speech perception, which, in simple terms, holds that "we perceive speech by subvocally modeling speech, without producing any overt articulatory movements" (Lieberman, 2000, p. 48).⁶

The findings from brain imaging studies are important for a behavior

analysis of language for at least two reasons. First, they support the notion of behavioral continuity. Behavior analysts assume that behavior (and stimuli) occurs on a continuum from public to private. The primary difference is the methodological difficulty of observing private events. This view of behavioral continuity is analogous to Darwin's view of species continuity. Just as Darwin's assumption of species continuity flew in the face of the prevailing religious dogma that humans were created separately from all other animals, so too does the behavior-analytic view of behavioral continuity fly in the face of the assumption that cognitive events exist separately from behavior.

The second way in which results from brain imaging studies are important for a behavior analysis of language is that they support the suggestion that when someone listens they are at the very least engaging in subvocal behavior. And this is important because it lends support to the contention that listening is behaving verbally.

FORMS OF LISTENING

I previously suggested that verbal stimuli evoke a cascade of discriminated verbal behaviors in the listener. Accepting that those behaviors consist of, but may not be limited to, subvocal responses mediated by speech production and motor regions of the brain, we can now consider what types of verbal operants might be involved. Consider what you do when you are said to *listen* to someone. To answer, it might be easier to consider what you do when you do not listen to someone, for

⁶Brain imaging studies have also demonstrated that speech production and motor areas of the cortex are activated during music perception (e.g., Lahav, Saltzman, & Schlaug, 2007), suggesting that what we do when we listen to music is sing or hum along (either overtly or covertly) (Halpern & Zatorre, 1999), leading some researchers to comment

that this "makes sense for melodies, in which case we can subvocalize the tune as part of the process of retrieving the information" (Koslyn, Gannis, & Thompson, 2001, p. 637). Moreover, such studies also suggest that speech production and motor areas of the cortex are involved in auditory imagery (e.g., Reisberg, 1992).

example, during a boring lecture.⁷ When you are not listening to someone, you are most likely talking (and imagining) to yourself (covertly) about something completely different. We call this daydreaming. So, if talking to yourself about something completely different interferes with your ability to listen to a speaker, it seems reasonable to suggest that what you do when listening to someone is talk to yourself (covertly) about what the speaker is talking about. Such self-talk may have several possible functions.

Echoic Behavior

One form of verbal behavior that is probably important in listening is echoic behavior. When we are said to listen or pay attention, it is likely that we covertly echo what we hear. Many people to whom I have made this assertion claim that they do not echo when they are listening, to which I reply that they are simply unable to detect that they are engaging in echoic behavior because it is so rapid, seamless, and subtle (i.e., subvocal). And yet it seems as if we echo at least in situations in which we learn new information. So, for example, if you meet someone for the first time who introduces himself as “Ed,” and then later when asked if you met anyone that day and you answer “Ed,” we can infer that at the very

least you echoed his name when he said it. How else would you be able to answer “Ed” to the question if you didn’t respond verbally in some way at the time? In fact, we are often told that to remember someone’s name whom we have just met we must repeat it either out loud or to ourselves. In essence, echoing the name has transformed the verbal stimulus into a verbal response (Palmer, 2007). The assumption that echoic behavior is involved in what we refer to as listening is supported, in part, by research and theories in cognitive psychology and neuroscience.

The most popular model of working memory is that there is a phonological loop that includes both a phonological store for the storage of phonological information and a rehearsal process, the function of which is to keep decaying representations in the phonological store (Baddeley, Gathercole, & Papagno, 1998). According to Baddeley et al., the most important function of the phonological loop “is not to remember familiar words, but to ... generate a longer lasting representation of a brief and novel speech event—a new word” (p. 158). Thus, the phonological loop seems to be the cognitive equivalent of echoic behavior in a behavioral account. I have already described how, using positron emission tomography, Paulesu et al. (1993) claimed that the phonological loop may involve subvocal behavior, suggesting that such behavior might be the critical component of short-term memory, in particular, the phonological (or articulatory) loop. Even though the verbal material in the Paulesu et al. study consisted of visually presented letters, the researchers noted that the letters were “transformed into a phonological code ... through the subvocal rehearsal system” (p. 342). In more parsimonious terms, seeing the letters evoked subvocal textual behavior just

⁷We can use the same scenario to talk about being conscious or aware of some ongoing event or of one’s self (Schlinger, 2008b), as well as verbal remembering. Thus, if someone tells you that B. F. Skinner wrote a book called *Verbal Behavior* and later you are able to answer “*Verbal Behavior*” to the question “What was the title of the book written by B. F. Skinner?” or “B. F. Skinner” to the question, “Who wrote the book *Verbal Behavior*?” we can say that you must have *listened* or paid attention to (or understood) the original statement, that you *remembered* what was said, and that you are *conscious* or *aware* of who wrote what book. Thus, what we normally call *listening*, *understanding*, *awareness*, and *verbal remembering* may involve the same behaviors.

as hearing words often evokes subvocal echoic behavior.

Joint Control

Echoic behavior is also involved when joint control is said to occur (Lowenkron, 1998). In its simplest form, joint control occurs when one verbal topography is evoked jointly by two sources of stimulus control. For example, suppose a very young child who has never been taught to point to a red square is instructed to point to the red square from among an array of colored shapes. According to a joint control account, the child echoes the instruction "red square" and then continues to self-echo ("red square," "red square," etc.) until he or she sees the red square, which immediately evokes the response "red square" as a tact. At that instant, under the joint control of "red square" as a self-echoic and the red square as a tact, the child points to the red square. As Lowenkron (1998) noted, this type of selection response may be considered a descriptive autoclitic because, by pointing, the child is in a sense reporting which colored square "enters into joint control with the topography currently under self-echoic rehearsal" (Lowenkron, 2006, p. 125).

A joint control account, as a form of mediated stimulus selection, has an advantage over unmediated accounts in that it is independent of the particular stimuli used (Palmer, 2006). In other words, what is important in most selection-based tasks are not the particular stimuli but rather the responses they evoke that ultimately lead to the correct selection response. Numerous studies with humans (e.g., Eikeseth & Smith, 1992; Horne, Lowe, & Randle, 2004; Lowenkron, 1984; Miguel et al., 2008; Parsons, Taylor, & Joyce, 1981; Pilgrim, Jackson, & Galizio, 2000; Randell & Remington, 2006; Wulfert, Dougher, & Greenway, 1991) and

nonhumans (e.g., Cohen, Looney, Brady, & Aucella, 1976; Eckerman, 1970; Kojima, 1980; Urcuioli & DeMarse, 1997) using different procedures, including matching to sample with and without interposed delays, suggest that mediated responding can foster acquisition and retention (i.e., remembering) of operant behavior. Thus, a joint control account of selection-based responding, including matching to sample, is a parsimonious explanation in that it appeals to the ongoing verbal behavior of the listener as a source of stimulus control over responding. Moreover, it has immediate practical applications in language training programs for children with language deficits (Sidener, 2006).

To understand the importance and relevance of joint control to the behavior of listening, consider the difference between Lowenkron's (1998) concept of joint control and a nonverbal conditional discrimination. Suppose you ask a preverbal child "Where's the book?" whereupon the child immediately begins scanning the room until he or she sees the book to which he or she then points. This is a form of joint control that we call a conditional discrimination in the sense that reinforcement (whether socially mediated or automatic) for pointing is conditional on (i.e., jointly controlled by) both the question and the sight of the book (pointing to the book in the absence of the question is unlikely to garner praise or much in the way of automatic reinforcement). The difference between the conditional discrimination and Lowenkron's concept of joint control can be seen in the behavior of the respective listeners. In the joint control example, the listener, with already well-established echoic and tact repertoires, becomes a speaker first by engaging in echoic and then self-echoic behavior (evoked by the speaker's request) and then again when the red square evokes the tact "red square" while scanning the

colored shapes. When both verbal operants are evoked at the same time, responses resembling descriptive autoclitics are strengthened, including pointing or saying "I found it." A conditional discrimination similar to the above example of asking the child where the book is can be established in a nonhuman as, for example, when you say to your dog, "get the ball." Upon hearing the command, the dog scans the room until it sees the ball, whereupon it runs and picks it up and brings it to you. In this example, your praise or treats are contingent on the behavior of bringing the ball to you, but only given the command. We can safely infer that the dog did not echo "ball" and then self-echo the word until it saw the ball. I would argue that both examples are parsimoniously explained according to fairly straightforward operant principles. Although we may refer to responding to the simple conditional discrimination as *listener behavior* (e.g., Horne & Lowe, 1996), I suggest that the term *listening* is more appropriately applied to the joint control example because the listener is engaging in echoic (and tacting) behavior.⁸

Why Do We Echo?

Before leaving our discussion of echoic behavior, we should address one additional question: Why do we echo? Intuitively, echoic behavior must produce reinforcing consequences, but what? It seems reasonable to suggest that as children we are encouraged by our parents to repeat what they say to us as, for example,

⁸Joint control is important for another reason. Some behavior analysts have not only criticized Skinner's definition of verbal behavior, but have claimed that *Verbal Behavior* was sterile in that it did not generate "a progressive research program that raised a large set of new and important empirical questions about language" (Hayes et al., 2001, p. 11). But joint control *is* one such example (Schlinger, 2008c), along with the naming account of Horne and Lowe (1996).

when they ask us, "What did I say?" or "What did she say?" or "What did I tell you?" and then reinforce correct answers. Not only that, but as infants, before exposure to socially mediated reinforcement for echoing or repeating what others say, we have a history of automatic reinforcement for producing sounds that match those we've heard from our phonological environment (Schlinger, 1995). For example, once infants' vocal musculature changes such that they can produce consonantal sounds, they begin to systematically produce consonant-vowel sequences that linguists refer to as babbling. The role of automatic reinforcement can be inferred from the fact that the intonation and segmenting of babbling of hearing but not nonhearing infants begin to match the language of their phonological environment (Bates, O'Connell, & Shore, 1987). Palmer (1996) refers to this match between one's vocal response and phonological stimuli from the verbal community as achieving parity. There is reason to expect that as we mature and are exposed to a wider range of speakers, automatic reinforcement plays an even more important role in the acquisition and maintenance of echoic and other verbal behavior. But echoic behavior alone is not sufficient to account for the behavior of listening.

Intraverbal Behavior

I have stated that verbal stimuli evoke a cascade of verbal (and nonverbal) behavior in the listener, including echoic behavior. But listening most likely includes more than echoing. As Palmer (1998) noted, "We do not merely repeat what we have heard; we use the terms productively, in novel combinations" (p. 7). Thus, in addition to echoic behavior, listening probably also includes intraverbal behavior. In fact, our ongoing internal dialogue consists mostly of intraverbal chains to the degree that there is no point-to-point corre-

spondence between the responses and the stimuli that evoke them. To the extent that listening does not precisely match (i.e., maintain point-to-point correspondence) the verbal stimuli from a speaker, it is, by definition, intraverbal behavior. In addition, when listening to someone, some of our echoic responses may function as S^Ds for intraverbal responses that can both condition new verbal behavior (see below) and evoke other intraverbal responses either about what the speaker is saying or that have nothing to do with what the speaker is saying. When the latter occurs, listening to the speaker ceases (we are said not to be paying attention anymore), leaving us to be our own speaker and listener.

Intraverbal behavior is probably also important in more complex forms of listening, for example, those that go by such names as *abstraction*, *inference*, *comparison*, *evaluation*, *extrapolation*, and so on. However, because these are terms of common usage and not technical terms, it is important to identify the form of any behaviors that we speak of with these descriptors before suggesting any functions they might possess. Of course, the term *listening* is also a commonly used term, and although some may suggest that behavior analysts should abandon it for that reason, doing so might further isolate us from the community of scholars and researchers who are tackling such complex behavior. I suggest that most of the time when these terms are used, an individual is engaged in a self-dialogue consisting of intraverbal chains and frames (see below).

I previously suggested that perhaps *listening*, as I am using the term, is what we usually mean by understanding. Skinner (1957) listed a number of ways that a listener can be said to understand a speaker. For example, one might be said to *understand* Skinner's definition of verbal behavior not when one can recite it word

for word but when one can explain what the definition means using other words, that is, with chains of intraverbals. The individual might then *compare* Skinner's definition with others by discussing their similarities and differences, *evaluate* the definition by talking about its pros and cons, *abstract* common features of several definitions, and *infer* whether a novel instance of behavior qualifies as verbal based on *extrapolating* the definition. In all these instances, the individual's verbal behavior consists largely of intraverbal chains. (Although I have focused mainly on echoic and intraverbal behavior, I concede that listening very likely includes other verbal operants in complex combinations. The point of this article, however, is simply to suggest that listening is behaving verbally.)

Intraverbal behavior, along with echoic behavior, is important in remembering as well. If we want to remember the name of someone we just met, or as cognitive psychologists would say, to transfer the information from short-term to long-term memory, in addition to repeating (i.e., echoing) the person's name (called rehearsal), we are encouraged "to make connections or associations between the new information and what we already know and understand ... by integrating the new data into our existing schemas of stored information" (Sternberg, 2003, p. 182). Unfortunately, such descriptions are entirely metaphorical and refer to processes that are not directly testable. But when it comes to suggestions for how to best remember a person's name, after repeating the name several times, we are told to use the name in conversation or to try to associate the name with a famous person or the person's physical characteristics. These tips are essentially encouragements to create, that is, to condition, new intraverbal relations.

CONDITIONING THE BEHAVIOR OF THE LISTENER

So far, I have suggested that what we typically speak of as *listening* consists of verbal behavior, although we can still use the term *listener* to refer to the individual who responds in any way to stimuli generated by a speaker's verbal behavior. Specifically, I have proposed that the behaviors of listening include at the very least subvocal echoic and intraverbal responses. But listening is more complex than these forms of discriminated operants. The listener's verbal and nonverbal behavior is often changed in a more permanent way by the speaker's behavior even when speaker and listener reside within the same body.

Skinner addressed this effect in a section in chapter 14 of *Verbal Behavior* ("Composition and Its Effects") titled "Conditioning the Behavior of the Listener":

The listener reacts to the verbal stimulus with conditioned reflexes, usually of an emotional sort, or by taking action appropriate to a given state of affairs. The autoclitic of assertion makes such action more probable. Relational autoclitics, especially when combined with assertion to compose predication, have a different and highly important effect. Since it does not involve any immediate activity on the part of the listener (although responses of the other sorts already noted may take place concurrently), we detect the change only in his *future* behavior. (1957, p. 357)

Here, Skinner points out that not only can verbal stimuli (e.g., relational autoclitics), like nonverbal stimuli, produce immediate conditioned reflexive or discriminative effects (as conditional stimuli and S^D s, respectively), they can produce a more complex effect that looks like operant and respondent conditioning. Blakely and I have termed such effects *function altering* (Schlinger & Blakely, 1987, 1994). In essence, relational autoclitics can produce changes in future behavioral relations that involve the listener. These altered

relations can be operant or respondent. For example, in a subsection of the aforementioned chapter in *Verbal Behavior* titled "The Conditioning of Discriminative Stimuli," Skinner (1957) wrote,

The verbal stimulus "When I say 'three,' go!" may have no immediate effect classifiable as a response, but it changes the subsequent behavior of the listener with respect to the stimulus "three." We are ... concerned ... with the operant behavior of "going" evoked by the discriminative stimulus "three." (pp. 358–359)

In addition to the relatively straightforward effects of this statement in evoking emotional responses or basic verbal operants (e.g., echoic or intraverbal responses), the statement "When I say 'three,' go!" conditions the behavior of going to the stimulus "three," much like a direct reinforcement history would. From a function-altering perspective, hearing the word "three" evokes going only as a function of the statement "When I say 'three,' go!" That is, the statement momentarily alters the evocative function of the stimulus "three" over the listener's behavior of going. We may or may not want to call "three" an S^D , because we cannot be sure whether it has directly participated in a four-term contingency (with a motivational operation, response, and reinforcer). Because "three" now functions like an S^D in that it evokes the behavior of going, perhaps we can call it an analogue S^D (or S^{DA}) (see Alessi, 1992). (Elsewhere, I have addressed the question of whether the process of altering the evocative functions of other events by verbal stimuli should be viewed as direct operant conditioning or as an analogue of conditioning; Schlinger, 2008a.)

Blakely and I adopted Skinner's term *contingency-specifying stimulus* as a formal descriptor of function-altering verbal operations, and although we suggested that at least two members of a contingency had to be

specified (Blakely & Schlinger, 1987; Schlinger & Blakely, 1987), I later pointed out that there are probably no formal requirements for function-altering verbal operations (Schlinger, 1993). Others have offered examples of verbal operations that can produce function-altering effects and condition the behavior of the listener without specifying contingencies (e.g., Palmer, 2007; Skinner, 1957). For example, Skinner pointed out that ostensive definition can condition the behavior of the listener as, for example, when in the presence of a particular kind of guitar, the speaker states, "This is a Fender Telecaster." Assuming a listener who engages in echoic (and perhaps intraverbal and imaginal) behavior at the time, the listener's future behavior with respect to Fender Telecasters is altered as evidenced by the fact that shown one of the guitars, the listener can tact "Fender Telecaster," or when someone utters "Telecaster," the intraverbal response "Fender" is momentarily strengthened or vice versa. In addition, if someone asks the listener to point to the Fender Telecaster, presumably he or she can do so. If it is among an array of other electric guitars, especially other Fenders, then the selection response is most likely controlled jointly by the self-echoic ("Fender Telecaster," "Fender Telecaster," etc.) and the tact "Fender Telecaster" when seeing the Fender Telecaster. Thus, a number of different verbal and nonverbal relations are altered by the ostensive definition. In addition, simply telling someone that "A Fender Telecaster is a kind of electric guitar" conditions verbal behavior such that the person can later report that one kind of electric guitar is called a Fender Telecaster, or when hearing someone utter "Fender Telecaster," he or she can report that it is an electric guitar.

Palmer (2007) has written that almost any salient verbalization can bring about conditioning in a listener and elsewhere (Palmer, 1998) has

suggested that intraverbal frames are continuously being conditioned, often by only a single example of such a frame. Ostensive definitions in the form of "This is a —" qualify as an intraverbal frame as do statements such as, "A Fender Telecaster is an electric guitar" ("A — is a —"). Skinner (1957) referred to such frames as autoclitic frames. What this means is that in verbally sophisticated humans, any verbal stimulus, event, or operation can alter the behavioral functions of other objects, events, or verbal stimuli. In the example I used earlier, saying that someone's name is "Ed" alters several behavioral functions for the listener with respect to his name. For example, the listener can now answer "Ed" to the question, "Who did you meet today?" Or, when given the name "Ed," the listener can say something like, "Oh, I met a guy named Ed today." In fact, providing any information in the form of verbal stimuli to someone who is listening (i.e., someone in whom echoic or intraverbal behavior is evoked) can alter the functions of numerous verbal and nonverbal relations.

Listener Behavior at the Time of Verbal Conditioning

Given that almost any salient verbalization can condition verbal relations in a competent listener, we can ask how this happens. Although a complete account awaits further study, I suggest that the listener has to listen as I have used the term in this article. Consider the intraverbal frame, "tomatoes are a fruit." If you do not know already that tomatoes are technically considered a fruit, then the frame probably evokes an echoic response ("tomatoes are a fruit") and also intraverbal responses such as "orange," "banana," "apple," as well as imaginal responses (e.g., "seeing" a tomato, orange, or banana). By echoing the frame "tomatoes are a fruit," the verbal

stimulus is converted into a response. As a new response form (but not a frame) in your repertoire, the variable terms in the frame (e.g., "tomato" and "fruit") evoke other (either echoic or intraverbal) responses. For example, at the time the listener may say to him- or herself, "Apples are also a fruit." In the future, when someone mentions tomatoes, the listener may find him- or herself saying, "Did you know that tomatoes are a fruit?" For a more extensive discussion of the role of intraverbal frames, see Palmer (1998).

The point of this brief speculative analysis is that appealing to the ongoing discriminated verbal behavior of the listener represents a parsimonious approach to explaining how verbal stimuli condition the behavior of the listener without resorting to analyses at other levels.

RULES AND RULE-GOVERNED BEHAVIOR

I have suggested that verbal stimuli generated by speakers frequently serve to condition the behavior of listeners in that they alter the evocative functions of antecedent events. Before concluding, however, I want to briefly address the implications of this thesis for the concept of rule-governed behavior. Although behavior analysts have taken various approaches to understanding rules and rule-governed behavior (e.g., Catania, 1989; Cerutti, 1989; Glenn, 1987; Hayes & Hayes, 1989; Skinner, 1969, pp. 133–171), Blakely and I have argued that if behavior analysts use the term *rule*, then it should be reserved for events that do something more than evoke behavior as S^D s (or MOs) (see also Vaughan, 1987). To wit, we argued that the term should be used only for verbal stimuli that are function altering (Blakely & Schlinger, 1987; but see Hayes & Hayes). Thus, a statement such as, "Please pick up your toys," although formally an instruction or a request,

would not be considered a rule if its only effect was to evoke picking up toys because such behavior has been reinforced in the past when the instruction was given. We could condition such behavior to a light onset in the very same way. Conversely, saying "that is delicious" in the presence of a novel food, although not formally an instruction or rule, should be considered a rule if it alters the function of the food such that its presence evokes eating in the listener. On this view, a rule is any verbal stimulus, irrespective of who utters it, that functions to condition the behavior of the listener. Because of the ubiquity of verbal stimuli that condition a listener's behavior and the different approaches to rule-governed behavior by behavior analysts, we might want to consider dispensing with the concept altogether.

CONCLUSION

In his magnum opus, *Verbal Behavior* (1957), B. F. Skinner offered a detailed and thorough interpretation of the behavior of speakers conditioned by listeners who are specially trained to respond to such behavior. Because listeners also become speakers, then it is not far fetched to assume that, by definition, they engage in verbal behavior when they are listening. Hayes and Hayes (1989) faulted Skinner for denying that basic linguistic processes are common to both speaker and listener. They argued that speakers and listeners share a history of training with "arbitrarily applicable relations sustained by social convention" (p. 182). Following Skinner's lead in *Verbal Behavior*, in the present article I have also suggested that there are linguistic features common to both speaker and listener, but the commonality is that both individuals engage in verbal behavior.

As I previously acknowledged, although listeners engage in numer-

ous behaviors, including mediating the verbal behavior of speakers and responding nonverbally (both operantly and respondently), I am suggesting that it is only when they are also speaking (mostly echoically or intraverbally) that they are said to be *listening* (or *paying attention*, or *understanding*). In other words, listening is behaving verbally. That the listener is also a speaker at these times seems to solve the problem of attempting to identify separate repertoires or characteristics that distinguish speaking and listening functionally. From a behavior-analytic perspective, then, it remains useful to speak of them separately only with respect to social custom.

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