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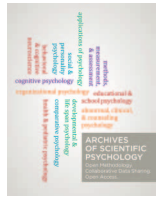

SPECIAL SECTION: HETERODOX ISSUES IN PSYCHOLOGY

Explaining Language: A Behavioral Critique of Skinner's Analysis of Verbal Behavior

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A B S T R A C T

In *Verbal Behavior* (1957), Skinner attempted to offer a functional account of human language and made a point of contrasting his approach with the more traditional accounts available at the time. Rather than focus on the structure or mechanics of language (formal aspects of language), Skinner attempted to identify the conditions that gave rise to those behaviors. Although Skinner's analysis of verbal behavior has been influential, particularly in treating language deficits for individuals with autism, there are conceptual problems with the way he defined and categorized verbal behavior. In this paper we argue that Skinner's analysis is in fact largely based on formal aspects (rather than functional) and that this has both created confusion and limited the utility of the analysis. Specifically, we argue that Skinner's formal account makes it difficult to distinguish verbal from nonverbal behavior and to distinguish the various types of verbal responses from one another. We then summarize and respond to some of the contemporary defenses and criticisms of Skinner's analysis of verbal behavior. Finally, we argue that although Skinner's analysis has had some practical utility, the conceptual benefits are questionable.

S C I E N T I F I C A B S T R A C T

Skinner (1957) offered a behavioral account of language in his book *Verbal Behavior*. Compared to more traditional, structural accounts of language at the time, Skinner's analysis attempted to identify the variables that control and maintain verbal behavior. This behavioral account of language has proven useful, especially in the area of treating language deficits for individuals with autism. However, there exist conceptual problems with Skinner's analysis. The definition of verbal behavior and subsequent taxonomy of verbal operants (or units) is based largely on formal properties. We suggest that these formal elements of Skinner's analysis result in arbitrary distinctions that emphasize the form of behavior or stimuli. This is problematic, at a conceptual level, as distinguishing between verbal and nonverbal behavior and distinguishing between the different verbal operants necessitates not only a functional account of stimuli but identification of the source and form of stimuli. In this paper, we examine some of the contemporary defenses and criticisms of Skinner's analysis. Lastly, we conclude that although Skinner's analysis of language has had practical utility, the conceptual benefits are limited.

Keywords: verbal behavior, functional analysis, formal analysis, language, Skinner

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In *Verbal Behavior*, B. F. Skinner (1957) took steps toward completing the ambitious task of explaining the phenomenon of human language. This undertaking was in part a response to critics of behaviorism who claimed that behavioral theory could not account for more complex forms of human behavior such as generative speech. In his book, Skinner cited an incident from 1934 in which Professor Alfred North Whitehead challenged him to account for Whitehead's behavior when saying, "No black scorpion is falling on this table." Taking this challenge to heart, Skinner set about over the next 2 decades crafting an account of what he termed *verbal behavior*. Language, Skinner argued, is learned operant behavior that is shaped and maintained like other (nonverbal) behavior. This idea was a central tenet of Skinner's analysis and his interest was in identifying the learning history and variables that control verbal behavior.

Skinner contrasted his approach with previous work on the topic, including work from the fields of linguistics, semantics, grammar, and literary criticism, in part because those disciplines approached language based on formal properties, rather than describing the conditions that gave rise to such behaviors. As suggested by the title of his first chapter, "A Functional Analysis of Verbal Behavior," Skinner proposed that his account would offer a functional, rather than a formal, analysis of the topic. By approaching language in this way, he was able to define his subject matter more broadly than others who had examined the topic, and to include responses other than vocal speech (e.g., gestures, sign language) as examples of verbal behavior. Skinner also criticized traditional explanations of human language that employed concepts such as "meaning" or "ideas." He argued that such formulations relied upon explanatory fictions that should be left out of a scientific account of verbal behavior. The notion that words are "representations" of other stimuli, he argued, could lead theorists to neglect the actual environmental relations that evoke verbal behavior. Skinner's approach and analysis has been highly influential, particularly within the discipline of behavior analysis and language development for individuals with autism. Various clinical tools have been developed on the basis of the analysis (e.g., The Verbal Behavior Milestones Assessment and Placement Program [VB-MAPP]; Sundberg, 2008) and the journal *Analysis of Verbal Behavior* is in its 33rd year of publication.

Skinner's analysis, however, has not been without its critics (e.g., Hayes, Blackledge, & Barnes-Holmes, 2001b; Leigland, 1997). Perhaps the most widely disseminated criticism was articulated by Chomsky (1959) in his review of *Verbal Behavior*. One of Chomsky's major criticisms rested with Skinner's interpretation of language as a learned behavior that was shaped and maintained by the same principles of learning (e.g., reinforcement) identified through experimental research. Chomsky took issue with the application of these principles to human language, suggested that language was too complex to be explained using these principles, and launched a broader critique of the philosophy of behaviorism and the science that Skinner used to build his conceptual model. Chomsky's review was highly influential in the field of cognitive psychology (perhaps made more so by Skinner's decision not to respond) and is often cited in textbooks as a major refutation of Skinner's work (e.g., Hoff, 2005). Although a point-by-point discussion of Chomsky's argument is beyond the scope of the present article, ample discussion and rebuttal is available (e.g., MacCorquodale, 1970; Palmer, 2006; Wiest, 1967).

Despite Chomsky's influence in cognitive psychology, behavior analysis has largely dismissed his arguments and the influence of Skinner's analysis has continued to grow. There have, however, been criticisms of Skinner's analysis from within the discipline of behavior analysis. One criticism, for example, suggests that Skinner's definition of verbal behavior is incomplete or relies too heavily on formal characteristics (e.g., Hayes et al., 2001b). Although we agree with Skinner's contention that language is behaviors and is learned and controlled like all other behavior, the current article questions the extent to which Skinner succeeded in building a functional, rather than formal, account of verbal behavior. Finally, we outline benefits and problems inherent in Skinner's conceptualization, both from a conceptual and a clinical perspective.

Concerns With Skinner's Analysis

Categorization is an essential action in any field of study as it allows one to speak precisely about various related events. In explaining behavior, it is useful to categorize both the behavior and related stimuli. This categorization can be made along formal (i.e., physical dimensions) and/or functional (i.e., how that event effects other events) qualities. To the extent that behavior analysts categorize behavior, it is largely a functional categorization. Behavior may be described, for example, as being maintained by escape from, or avoidance of, aversive events. The label *escape maintained* conveys important information about a relation between the behavior and a particular set of environmental events. Behavior may be categorized based on form (e.g., aggressive or destructive behavior) but this is primarily for descriptive purposes and does not have the same (if any) explanatory power as do functional categories.

When categorizing stimuli that influence behavior, most behavior analysts opt for a functional categorization—that is, stimuli are classified based on what they do to behavior or other stimuli rather than physical properties. Stimuli that signal the availability of a reinforcer might be categorized as *cues* or *discriminative stimuli*. Stimuli that increase the future probability of whatever behavior they follow are categorized as *reinforcers*. It is seldom that a conceptual understanding of behavior is enhanced by describing the form of the stimuli involved in changing a behavior. The form of the stimulus, the roundness or greenness of the key, for example, is less important to understanding a pigeon's pecking behavior than are the circumstance (e.g., conditions of reinforcement) under which the particular key was present or absent during learning.

Thus, a behavioral approach largely categorizes both behavior and stimuli in functional terms. The analysis of verbal behavior set forth by Skinner, largely deviates from this tradition. In defining the parameters of the subject matter (i.e., verbal behavior), and in outlining the various types of verbal responses, Skinner appears to opt for a taxonomy of language based on formal properties of the environment or behavior. Although this categorization has practical utility, it creates arbitrary distinctions between behaviors and stimuli that we suggest muddy the analysis of language.

Problems With Defining Verbal Behavior

The concern that Skinner's definition of verbal behavior may be based on formal properties has been raised before (e.g., Hayes, Barnes-Holmes, & Roche, 2001a). A fundamental component of the definition of verbal behavior is that it is behavior maintained by socially mediated reinforcement, or reinforcement provided through the behavior of another person. Under Skinner's analysis, asking someone to open a door would be an example of verbal behavior because the reinforcer (i.e., an opened door) is provided by someone else. Opening the door for yourself would be an example of nonverbal behavior because the reinforcer is provided via direct action upon the environment. *Social-mediation* (i.e., the manner in which the reinforcer was delivered), however, is a formal property of a reinforcer. Thus, in determining whether a given behavior constitutes an instance of verbal behavior, it is first necessary to identify the form or source

of reinforcement. B. F. Skinner (1957) later expands on the definition by clarifying that only some types of socially reinforced behaviors constitute verbal behavior. His definition of verbal behavior evolves to "behavior reinforced through the mediation of other persons [who] must be responding in ways which have been conditioned precisely in order to reinforce the behavior of the speaker" (p. 225). Essentially, to be considered verbal behavior the reinforcement must be provided by another person and that person must have learned to provide that reinforcement for that behavior.

There are several problems that arise from this definition. First, this distinction does not necessarily aid in enhancing our understanding of the interaction between behavior and the environment. If, for example, a person purchased a soda from a vending machine, we would not generally conceptualize this as an instance of verbal behavior. The responses of inserting money and pressing a particular button were likely maintained as the actions directly produced the soda—social mediation of the reinforcement, as we typically define it, was not necessary. Now imagine another person goes to a seemingly identical soda machine. Inside this soda machine, however, is a man who has been specifically trained to select and deliver the chosen soda. The first person inserts money, selects a particular soda, and a soda comes sliding into the retrieval slot. In this instance, we might be inclined to say the person buying the soda (now the speaker in Skinner's terminology) had engaged in verbal behavior as reinforcement was socially mediated and the mediator (now the listener) had been specifically trained to do so. The problem, however, is that both individuals ordering sodas could have switched machines and there would be no impact on their behavior. Both would have purchased sodas and both would have received sodas. The precise benefit of categorizing one individual's behaviors as verbal and the other individual's behavior as nonverbal is unclear. In explaining the behavior of the person buying a soda, it would be more economical and conceptually systematic to simply say inserting money and pressing the button was shaped and maintained by reinforcement. In terms of providing a functional account of the soda purchased, the source of the reinforcement was largely unimportant.

A second problem with Skinner's refined definition of verbal behavior is that not only must we account for the speaker's behavior, but we must also know a great deal about the conditions under which the listener's behavior was acquired. Recall that in Skinner's analysis the listener must have specifically learned to provide the reinforcement for the speaker's behavior. Imagine a situation in which a child from France visited Germany to stay with a German family. A large bowl of lollipops resides in the kitchen, and each day the child points to and asks for a lollipop in French, whereupon a lollipop is delivered. In this situation, we could not definitively determine whether the child was engaging in verbal behavior without a great deal of information. Does the German family who provides the lollipops also speak French? If not, it is unlikely that the response was specifically trained to occur in the presence of the spoken word *sucette*. Perhaps it was the pointing that produced the lollipops as the Germans likely had experience providing things when people pointed. If that were the case, was the pointing verbal behavior and the speaking French not verbal behavior? The behavior of asking for lollipops may have been established under conditions of socially mediated reinforcement, but it would not meet the definition of verbal behavior during the child's stay with the German family because the family had not learned to provide lollipops when someone said *sucette*. In any case, our only method of determining whether a particular response is verbal or not requires a great deal of information about both the speaker and all listeners involved in establishing a behavior, and such detail about the history of reinforcement may be difficult, if not impossible, to determine.

It should be noted that many of the examples B. F. Skinner (1957) used to illustrate verbal behavior included controlling variables that shaped the response but were not always present at the time the response was emitted. In the example of the French speaker asking for a lollipop, the idea that a verbal response might be emitted under circumstances in which an appropriate audience was absent is entirely consistent with Skinner's discussion of the "extended mand" and other verbal responses. The contingencies operating upon the speaker and listener in the moment are only part of his account, which requires that we also consider the circumstances under which the response was initially acquired (in this case, a French verbal community that shaped the response *sucette*). In this regard, Skinner's inclusion of the listener's history of reinforcement may in fact bring his account better in line with traditional notions of function, as suggested by Passos (2012).

However, one problem that stems from this analysis is that it is unclear whether Skinner's argument applies equally to both verbal and nonverbal behavior. That is, according to Skinner a behavior that was established under conditions of socially mediated reinforcement (e.g., singing a song to a friend) can still be considered verbal behavior even if reinforcement is provided directly through the behavior (e.g., singing the same song when alone). The question, however, is whether a behavior that was initially established through automatic reinforcement (e.g., cracking one's knuckles for the sensation) would still be considered nonverbal behavior if it came under the control of socially mediated reinforcement (e.g., cracking knuckles to evoke a reaction from a friend). If not, and the knuckle cracking is now considered verbal behavior, then the argument seems to be one-sided in favor of verbal behavior. Given the apparent fluidity of the labels, it becomes unclear precisely how the distinction between verbal and nonverbal behavior aids in explaining or understanding such behavior.

A final problem with Skinner's definition of verbal behavior is that it does little to explain behavior that occurs between humans and machines because socially mediated reinforcement is absent. Individuals familiar with an iPhone certainly have experience "speaking" with Siri the personal assistant application programmed into each phone. A person may ask for information, and a woman's voice (Siri) provides that information. In this interaction, there is no immediate socially mediated reinforcement, yet the responses the user engages in are presumably what we would consider verbal behavior—the person is speaking and requesting information. If a given voice command changes the actions of the phone, and these actions, in turn, shapes the voice command (e.g., saying "Call my wife" results in the phone doing so which reinforces the initial response), does this constitute an instance of verbal behavior? If so, where is the social mediation of the consequence? One could argue that the phone was programmed by another person to respond in this way, but such an argument would expand the notion of social mediation to a point where it might lose some of its meaning. An elevator is programmed to come when the call button is pressed, but presumably we wouldn't categorize this button pressing as verbal behavior—doing so would expand the category of verbal behavior to encompass any behavior that involved interaction with any device programmed or engineered to respond to input.

Although the problem with Siri might seem a trivial one, consider the amount of responding that now takes place between a human and a machine of some sorts. Artificial intelligences continue to increase in complexity, and our interactions with machines begin to look suspiciously like what we all "feel" is intended by the term verbal

behavior. Mitsuku Chatbot (Worswick, 2017) is a virtual artificial intelligence companion and a three-time winner of the Loebner Prize (a Turing Test) in 2013, 2016, 2017 as being the most human-like artificial intelligence. Mitsuku Chatbot is quite capable of carrying on conversations, asking questions, and learning from interacting with a user. Although social mediation is uninvolved in an interaction with Mitsuku Chatbot, the user's behavior is roughly identical to that of someone conversing with another human online, and the user's behavior is changed by interacting with the program. Adhering to Skinner's definition of verbal behavior, however, interaction with Mitsuku Chatbot, or the many intelligent technologies that continue to be created, would not necessarily be considered verbal. This is despite the fact that the individual responses, and the conditions under which they occur, would be nearly identical to much that we want to consider communicative behavior.

Problems With Defining Different Types of Verbal Responses

As with the definition of verbal behavior itself, the categories of verbal responses (i.e., *verbal operants*) are often distinguished by physical properties. In Skinner's original analysis, he described and differentiated different elementary verbal responses including *tacts* (similar to labeling), *textual responding* (similar to reading), *transcription* (similar to writing or finger spelling what is said), and *interverbals* (similar to answering questions, completing sentences, or generally holding conversation). Importantly, all of these verbal responses are largely defined by the form of their respective antecedents and consequences, as well as the form of the responses themselves.

A tact, for example, is controlled by a *nonverbal stimulus* (a description of the form of the antecedent as well as how it was produced) and maintained by generalized conditioned reinforcement. If a young boy saw a bird flying (nonverbal stimulus) and said *bird*, with the reinforcement being his mother saying, "You are right!", we could consider the initial *bird* response to be a tact. Intraverbals, on the other hand, are controlled by a verbal stimulus antecedent and maintained by generalized conditioned reinforcement. If the boy's mother asked, "What flies in the air?" (a verbal stimulus), the boy said *bird*, and the reinforcement was the mother saying "You are right!", we could consider the boy's response to be an intraverbal. Although the response (*bird*) and consequence (social praise) in both of these examples were identical, Skinner would categorize them differently because of the distinct antecedents (verbal vs. nonverbal stimuli).

Textual and transcription responses are controlled in a similar fashion as an intraverbal, but Skinner goes on to distinguish one response from the other based on formal aspects of the behavior—namely point-to-point correspondence (matching beginning, middle, and end of the verbal stimulus and the response) and formal similarity (matching modality between verbal stimulus and response; e.g., both are spoken or both are written). Thus, for nearly all of the major verbal responses, categorization is based on the form of the antecedent, the form of the response, or both.

A notable exception to this formal categorization is the mand, which is akin to requesting. A *mand* is a verbal response that is evoked by some current motivation and maintained by a specific consequence directly related to the motivation. If a person wanted salt, and said "Give me the salt," we could consider this a mand. A mand is not defined by the form of the antecedent (verbal or nonverbal), but rather the function of the antecedent (some motivating situation; e.g., a baked potato without salt). Further, the mand is not defined by the form of the behavior. The mand does not need to match the antecedent stimulus in either form or modality. Skinner makes this point when, in providing an example of asking for water, he states, "the ultimate consequence, the receipt of water, bears no useful geometrical or mechanical relation to the form of the behavior of 'asking for water'" (B. F. Skinner, 1957, p. 1). Further, the response functions to produce a specific change in the environment that is directly tied to the antecedent motivation. Although the form of the mand might somewhat be controlled by some antecedent variables (e.g., a deaf vs. hearing community would evoke different responses), it is ultimately the motivation and specific antecedent condition that controls the likelihood that one member of the response class will be emitted. The community of listeners does not necessarily specify the form of the response, but it does select the form of the response.

The concern with Skinner's formal categorization of verbal responses is not merely a concern about breaking with the tradition of a functional approach. Just as the formal categorization made it difficult to distinguish verbal from nonverbal behavior, so does the formal categorization make it difficult to distinguish individual verbal responses from one another. One key distinction between a tact (labeling) and a textual response (reading), for example, is that the antecedent stimulus is nonverbal for a tact and verbal for a textual response. Surprisingly, although Skinner provides examples of nonverbal stimuli, such as "the whole of the physical environment—the world of things and events which a speaker is said to 'talk about'" (p. 81), and "a particular object or event or property of an object or event" (p. 81) he does not define a verbal stimulus.

The most straightforward definition of *verbal stimulus* is provided by Michael (2004) who describes it as "the product of someone's verbal behavior" (p. 204). If a speaker writes a memo or asks for a pen (both presumably verbal behavior), the memo or spoken word *pen* are verbal stimuli. These verbal stimuli, in turn, set the occasion for verbal behavior on the part of the listener which produces more verbal stimuli. Thus, it is generally understood that verbal stimuli are those stimuli directly produced through someone's verbal behavior, and nonverbal stimuli are all other stimuli. The problem with this definition, of course, is that it is formal and as such classifies stimuli as verbal based on how they are produced rather than what they do. Although everyone seems to have a sense of what is meant by verbal and nonverbal stimuli, the usefulness of the formal definitions breaks down in many instances. For example, imagine a person says the word *elephant* under two distinct conditions—once while seeing an elephant on safari and once while seeing the printed word *elephant* in a book. Seeing an elephant and saying *elephant* would likely be considered tacting (labeling), as an elephant is not the product of verbal behavior, so it is best conceptualized as a nonverbal stimulus. Seeing the written word in a book and saying *elephant* would likely be considered textual responding (reading) because writing is verbal behavior, so the response product (i.e., the written word) would be a verbal stimulus. These distinctions seem quite clear.

But what if someone was playing the game Pictionary and drew an elephant to evoke the spoken word *elephant* from a teammate? Would it be appropriate to call the response of saying *elephant* a tact? Probably not, because the drawing of the elephant was likely maintained by socially mediated reinforcement (the teammate saying *elephant*), and the teammate's behavior would have been precisely shaped to provide this reinforcement under these conditions. Thus, the act of drawing would be considered verbal behavior, and the drawing itself a verbal stimulus (being the product of verbal behavior). This would suggest some other verbal response besides a tact. Now imagine, however, that same drawn picture of an elephant is mixed with other drawn pictures and presented to a young child learning to label animals. The child looks at the drawn elephant and says *elephant*. In this case, we might be tempted to say this was a tact—at least this is how this particular verbal response is commonly investigated (for

recent examples of this usage see the procedures of Guzinski, Cihon, & Eshleman, 2012; Sidener et al., 2010; or Valentino & Shillingsburg, 2011). If the drawing of the elephant is still a verbal stimulus (having been drawn the previous evening during the game of Pictionary), the child's response cannot be a tact. If it is now a nonverbal stimulus, on what basis has this stimulus shifted from verbal to nonverbal? We might say it was the context or the time between drawing and presentation, but then again we are adding further formal distinctions which are likely to break down when applied to different examples. What we are left with is a vague idea of what we "mean" or "intend" when presenting a stimulus or a common sense identification wherein we cannot precisely define verbal and nonverbal stimuli but we know it when we see it. It could be argued, however, that a science should avoid "common sense" definitions, and it was the use of ethereal concepts such as "meaning" or "intent" in classification that Skinner was specifically attempting to rectify.

In addition to difficulty stemming from formal categorizations of antecedents as verbal or nonverbal, to accurately distinguish one verbal response from another may require more background information than is practically feasible. As B. F. Skinner (1957) noted, to truly identify a verbal response "we have to know the history of a particular form of response and of all the variables which have acquired control of it" (p. 189) but this amount of information is not often available. Imagine, for example, a child who says *apple* when an apple is present and as a result is given an apple. We would naturally assume this to be a form of mand (request). However, this assumption would prove erroneous if we knew any of the following: (a) the child had a strong history of reinforcement in which saying *apple* in the presence of an apple led to some generalized conditioned reinforcement and never resulted in receiving the apple, (b) there was no current motivation with respect to the apple in place at the time, or (c) receiving the apple after saying *apple* did not function as a reinforcer (i.e., the future probability of the behavior did not increase). Knowing any of these three things about a real-world instance of verbal behavior may be difficult, if not impossible, making it quite hard to clearly delineate between these categories in a practical way. All of the problems outlined here largely stem from the formal categorization of verbal behavior, verbal and nonverbal stimuli, and the verbal responses themselves.

Defenders of Verbal Behavior

Two vocal defenders of the conceptual framework of verbal behavior are Palmer (2008) and Normand (2009). Palmer made a compelling argument that Skinner's definition of verbal behavior is acceptable because "the phenomena it embraces overlap considerably with those embraced by a traditional conception of the field . . . it identif[ies] behavior with certain unitary properties, and . . . [it is] useful" (p. 305).

On the first point there seems to be little disagreement—the way in which verbal behavior is conceptualized does overlap considerably with traditional concepts of language. Although Skinner may have developed new terms in his analysis and described behavior differently, the phenomena to which he referred largely map on to what most people of the traditional approach would consider language. One benefit of Skinner's conceptualization over the traditional approach, however, is that the former is far more inclusive and is able to treat vocal language as somewhat synonymous with sign language, gestures, writing, and many other behaviors that might be considered "language."

The unifying property of verbal behavior Palmer referred to is the idea that the listener's responses to the speaker must have been precisely conditioned to reinforce the speaker's behavior (for a detailed analysis of this point, see Passos, 2012). It is this property of verbal behavior that primarily distinguishes it from nonverbal behavior. As mentioned previously, however, this distinction causes significant problems in application as it requires that we account for the listener's learning history as well as the speaker's. Further, adhering to this distinction discounts much behavior that we would either want to consider verbal, or for which there appears to be no good reason for a separate analysis. A child learning to read entirely through the Headsprout software (a computer-based reading program), for example, would largely be emitting vocal behaviors that would not be considered verbal as the unifying property of verbal behavior is absent in this computer program. Given that the child was actually reading text, it seems odd to discount this as verbal behavior but it would not meet the criteria set forth in Skinner's analysis.

Finally, Palmer argued that Skinner's definition is useful. This may be true, but it is only useful to an extent, and it is a qualified usefulness. The definition of verbal behavior has been quite useful in clinical application largely because it represents a departure from traditional formalist and structuralist approaches to language. However, this usefulness has boundaries, as was seen in the previous example of an actual elephant, a written word *elephant*, and the drawn picture of an elephant. Further, most of the clinical utility has been with individuals with severe communication disorders (Sautter & LeBlanc, 2006), and then only with a handful of basic verbal responses. Little has been done to analyze or program for the rich complexity that characterizes human language. From a conceptual standpoint, the definition of verbal behavior has arguably been a mixed blessing. On one hand, Skinner's analysis of speaker as listener has opened conceptual analysis to less tangible topics such as speaking to oneself and other private events. On the other hand, it may have created some division in analysis with researchers attempting to study individual verbal response categories in isolation from one another.

Normand (2009) suggested that the definitions of the basic verbal responses represent a functional, rather than formal, taxonomy. He goes on to argue that "it is this functional taxonomy that is the essence of Skinner's analysis and the greatest contribution thereto" (Normand, 2009, p. 189). In making the case that the verbal responses are functionally defined, however, Normand provides only the example of the mand. Although the mand is functionally defined, it is the only verbal response that is defined this way. All of the other basic verbal responses (tact, intraverbal, etc.) are primarily defined by the form of the antecedent and response, and not by the consequence they produce.

Implications of Skinner's Analysis

When a major advancement in theory is put forward, it may be judged (aside from concerns over the "truth" of the theory or advancement) by its utility both practically and conceptually. The advancement should allow us to solve problems and answer questions that we previously could not. The advancement should also expand our conceptual framework and enhance our understanding of specific phenomena. Applying these criteria to Skinner's analysis of verbal behavior appears to yield mixed results. Does the analysis of verbal behavior have practical utility (i.e., is the advancement clinically useful)? We would argue yes. Does the analysis have conceptual utility? We would argue perhaps not.

Practical Utility

One need only a cursory examination of any quality early intervention program for children with autism to see the practical impact of Skinner's analysis of language. Skinner's suggestion, for example, that topographically identical verbal responses could have different functions (e.g., saying "train" as a tact vs. saying "train" as a mand), along with subsequent empirical confirmation (e.g., Hall & Sundberg,

1987; Twyman, 1996) has had significant impact on the development and implementation of programs designed to teach language to individuals with communication disabilities, including autism. Skinner's analysis of verbal behavior has led to the development of communication systems (e.g., The Picture Exchange Communication System; Bondy & Frost, 2001), assessment tools (e.g., The Assessment of Basic Language and Learning Skills; Partington, 2008; VB-MAPP; Sundberg, 2008), skill programs designed to teach components of language (e.g., Halvey & Rehfeldt, 2005), and intervention procedures designed to decrease problem behavior (e.g., Carr & Durand, 1985). These treatments and interventions, stemming directly from Skinner's analysis of verbal behavior, have greatly improved the lives of countless individuals with communication problems. Whether these interventions would have been developed without Skinner's analysis is unknown, but presumably his analysis hastened their creation and application.

Conceptual Utility

Whereas Skinner's analysis has been largely successful in terms of practical utility, the conceptual benefits are less clear. On one hand, Skinner's analysis made possible the description of complex behavioral processes such as rule-governed behavior (behavior changed though the verbal statements of others) and thoughts (verbal behavior occurring at a private level which theoretically could create stimulus events to set the occasion for other behaviors). Extending Skinner's analysis to these two concepts alone allows for study of an enormous swath of behavior to which behavior analysis was previously seldom applied.

On the other hand, the formal categorization of verbal behavior arguably clouds a deeper understanding of communicative behavior and splinters research. Instead of researchers developing lines of inquiry around communicative behavior in general, focus is given to individual categories (tacts, intraverbals, textual responses etc.) that are largely based on formal rather than functional qualities. It is unclear whether such research brings us closer to understanding communication.

It is important to note here that although we find fault with Skinner's definitions of different verbal operant categories, and of verbal behavior in general, we do agree with his fundamental assertion that language is best understood as learned behavior. The assumption that language, like any other behavior, is largely a function of its effect on the environment has important implications for many areas of psychology. One popular intervention approach, for example, is cognitive-behavior therapy (CBT) which encompasses a multitude of different intervention modalities. Although there is much overlap between a purely behavioral approach to therapy and a cognitive approach, Skinner's analysis highlights some distinct differences in assumptions and understanding. One major goal of CBT, for example, is to change dysfunctional thinking that leads to suboptimal behavior (Gaudiano, 2008). The assumption here is that public behaviors are caused by private thoughts and that changing these thoughts can directly impact behavior. In contrast, Skinner's approach assumes public behaviors are not caused by private thoughts but rather that private thoughts are themselves behaviors (perhaps private verbal behavior) and are controlled by the environment just like public behavior. Rather than focus on changing thoughts to change behavior, the behavioral approach would be to identify the environmental sources of both thoughts and behavior.

Within behavior analysis there is an alternative conceptualization of language that relies on a primarily functional analysis of language. Relational frame theory (RFT; Hayes et al., 2001a) suggested that people learn to respond in a given context based on how different events related to one another (i.e., relational responding). Further, although some relational responding is directly taught, you can eventually derive relations between events. This derived relational responding allows a person to respond in ways that have not been directly reinforced and greatly expands language abilities. If someone is taught the equivalent relations A = B and A = C, he or she may derive that B = C without direct training. If the person then learns that A = D, he or she derives that D = B and C. This deriving of relations eventually becomes a generalized operant so the person is ultimately able to respond to a variety of stimuli in a variety of contexts in a variety of ways without training.

As an example, imagine a situation in which a young child is told that wasps sting (wasp is related to sting) and that stings are painful (stings are related to pain). Without being taught, the child may derive that wasps produce pain (wasps are related to pain). Imagine the child is now playing outside and a scorpion approaches. The parent says, "Watch out for the scorpion; it will sting you." This now relates scorpion to both "watch out" and sting, and as a result the child may say "watch out" to wasps (untrained) because of the common relation between stings, wasps, and scorpions. Given that humans constantly talk about events and how events relate to one another, it is easy to see how language could increase exponentially into a vast web of relations between events.

In contrast to Skinner's analysis of verbal behavior, RFT primarily provides a functional account of language. Two important types of contextual control in relational responding, for example, are contextual cues that determine how two events are related (C_{rel}) and contextual cues that transform stimulus functions within the relation (C_{func}). Imagine someone says "a scorpion will try to sting you, and those stings hurt a lot!" If the listener thereafter avoids scorpions, we might say the listener "understood" what the sentence meant. In analyzing the sentence, RFT would break the sentence down into the contextual cues that controlled the person's behavior to explain this understanding. For example, in the person's warning about scorpions, the sentence fragment "will try to" is a C_{rel} that relates scorpion and sting in a specific way—there is a causal relation between these two stimuli wherein one leads to the other. Further, the sentence fragments "those stings hurt a lot" is a C_{func} with the effect being that the sting, and thus the related scorpion, are now aversive even though the person may never have experienced either stimulus or received reinforcement for acting or speaking in any specific way. Although this is not a complete account of the complexity of RFT, this example does illustrate how important concepts in the analysis of language may be defined functionally. Both the C_{rel} and C_{func} are defined by the effect they have on behavior rather than what they look like.

Although RFT is a relatively controversial theory in behavior analysis, there is emerging research providing support for the predictions of behavior made by RFT (Dymond, May, Munnelly, & Hoon, 2010). Further, this functional account of language has led to the development of promising interventions, such as acceptance and commitment therapy (Hayes, Strosahl, & Wilson, 2016), that broadly intervene on thoughts, language, and behavior. This RFT-based therapy has been used to treat a variety of behavior problems including anxiety and depression (Twohig & Levin, 2017), eating disorders (Manlick, Cochran, & Koon, 2013), and posttraumatic stress disorder (Bean, Ong, Lee, & Twohig, 2017). Taken together, this rapid increase in research and interest highlights the contributions a primarily functional account of language can have.

Conclusion

B. F. Skinner (1953) correctly stated that "confusion in theory means confusion in practice" (p. 9). The scientific analysis of com-

munication is best achieved through conceptual precision. Although the analysis of verbal behavior has positively influenced the realm of practice and, in turn, improved a great many lives, some have argued that the impact of Skinner's analysis on research and practice has been underwhelming (e.g., Gross & Fox, 2009). Perhaps it is that confusion in theory has limited the efforts to tackle the vast array and forms of communication that are not mands and tacts. To fully realize the potential of a behavioral science to account for language it is necessary to develop a conceptual foundation and taxonomy that holds up better to scrutiny. By identifying the places where the current behavioral theory breaks down a more robust behavioral account of language is possible. The question of "why we say what we say" is as important now as it was when Skinner posed it in 1957. However, that effort may be better served by a functional classification system than by one that is largely formal.

When we encounter complex behavior, such as communicative behavior, we have two options at our disposal—we may either apply the well-established principles of behavior currently at our disposal, or we may attempt to explain the complex behavior by developing an entirely new taxonomy. Although the latter may be appealing, and arguably simpler in the beginning, it is stepping onto shaky grounds that may ultimately prove unsupportive. Skinner's analysis of verbal behavior formally outlined large general classes of behavior. Labeling became tacting; reading became textual responding. Although these formal categories often prove untenable when applied to individual responses, there may be some practical utility when applied to classes as a whole just as it may be useful to have a formal description of aggression or self-injurious behavior. It is important, however, that we recognize that just as the category aggression does not explain hitting, neither does the category tact explain labeling. Skinner's analysis is commonly interpreted as a functional account language. Upon closer inspection this appears to be inaccurate and we risk conceptual confusion when we neglect this point.

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