Vernacular Selection: What to Say and When to Say It

Paul Neuman¹

Published online: 24 August 2018

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Abstract

The language of behavior analysis is precise in the sense that it focuses attention on functional relations between behavior and the environment that are extended in time. However, to non-behavior analysts, behavior-analytic terms and explanations are difficult to understand and awkward sounding. Evidence suggests that this has had deleterious effects on the acceptance of the field of behavior analysis and its explanations of behavior. The goal of this article is to assert that verbal behavior that describes behavior is functionally related to subsequent explanatory verbal behavior. In addition, it is argued that technical language is not a requirement of precision and logical formulation. Suggestions are made regarding how behavior analysts can generate evidence to better understand explanatory preferences of individuals with various amounts of exposure to behavior analysis. In addition, methods are suggested for introducing behavior analysis to others with vernacular descriptions of behavior and its causes that do not obscure critical distinctions by introducing mental/mediational explanations.

Keywords Behavior-analytic description · Explanatory preference · Presenting behavior analysis · Technical language · Verbal precision

The best approach to presenting behavior-analytic principles and theory to the broader community has yet to be identified. One approach stresses the importance of technical language that is precise in maintaining important distinctions regarding the causes (functional relations) of behavior (Field & Hinline, 2008; Hinline, 1980, 1983). However, behavior analysis terms and explanations may be misunderstood by those unfamiliar with the field. An alternative approach argues that there is a need to communicate more effectively with the community at large to better disseminate behavior analysis (Foxy, 1996; Hayes, Pistorello, & Walser, 1995) and that to avoid confusion, using simple

I would like to thank Bill Ahearn, Anne Castley Burdzy, Phil Hinline, and Pauline Guerin for their careful reviews of this manuscript.

✉ Paul Neuman
paul.blackscorpion@gmail.com

¹ Department of Psychology, Temple University, Weiss Hall, 1701 N. 13th Street, Philadelphia, PA 19122, USA

vernacular is the best way to introduce behavior analysis to those new to the field (Bailey, 1991; Friman, 2006; Lindsley, 1991). On the surface, the two strategies seem to be at odds, one appealing to precision and the other appealing to broader appeal and acceptance, with either one to be achieved to the detriment of the other.

The purpose of this article is to argue that these two alternative approaches are not necessarily at odds and that the objectives of each can be achieved simultaneously. Technical language is certainly appropriate for students of behavior analysis and, to a lesser degree, other professionals such as psychologists and educators, but not for the broader community, which is of particular interest. However, precision can and should be maintained due to listener effects, which are the discriminative functions that verbal descriptions have on nonverbal and verbal behavior. What follows is a review of the literature that advocates the advantages of technical language, followed by a review of the literature that advocates describing behavior analysis in simple everyday language to avoid misunderstanding by novice listeners. This article concludes the literature reviews by asserting that the avoidance of technical jargon should not be accompanied by an abandonment of precision. It is proposed that although technical language is parsimonious and precise, it is not necessary for explanatory accuracy. Finally, some suggestions are made on how to empirically identify what forms of causal speech promote explanations of behavior that do not obfuscate important distinctions and, at the same time, are palatable and not avoided by those new to behavior analysis.

Why a Language of Behavior Analysis?

To be certain, the role of specialized language is critical in the skill development of students of any discipline (Woodward-Kron, 2008). Like other scientific discourse, the technical language of behavior analysis is a distinct dialect primarily accessible only to those who are members of this verbal community (Hineline, 1980). It is inflexible to the extent that it assigns causal status to external events such as past history, current circumstances, and the evolutionary history of species (Wincour, 1976). Rather than appealing to internal events contiguous with behavior as causal, behavior-analytic language focuses on multiple environmental variables that sometimes involve temporally extended relations between behavior and environment.

Behavior-analytic explanations differ from vernacular explanations in the sense that covert events typically regarded as causal are viewed as behavior, and causal explanation invokes environmental events. For example, thinking, choosing, and knowing are behaviors that are not to be afforded special causal status (Ryle, 1949; Wolpe, 1978). In contrast, the typical vernacular converts verbs such as “knowing” into nouns (“knowledge”) and treats them as causes (Hineline, 1983) because these are events that are contiguous with behavior being explained. To this extent, behavior-analytic terminology opposes colloquial jargon.

Common language patterns suggest that actions have agents, and by convention, agency is within the individual rather than involving interaction with the environment (Hineline, 1980). Behavior-analytic language upholds Skinner’s (1945) operationism, which focuses on functional relations between behavior and the environment, avoiding treating the organism as agent. Rather than using mediating constructs, the language of behavior analysis stresses the role of the environment (i.e., the situation in which

behavior occurs and the consequences it produces; Skinner, 1969). However, ordinary language is mismatched with behavioral phenomena characterized by tripolar relations (those between an organism, its behavior, and the environment). These relations tend to produce causal talk that is either organism-as-cause, with respect to behavior where the environment is context, or environment-as-cause, with respect to behavior where the organism is context; the former is characteristic of conventional explanation, and the latter is characteristic of behavior-analytic explanation (Hineline, 1990).

The tendency to treat the organism as the initiator of action may function to bridge temporal gaps. Hume (1777/1975) proposed that notions of causality are based on “constant conjunction” where the primary cues to causality are spatial and temporal contiguity with what is caused. Evidence (Matute & Miller, 1998; Michotte, 1946/1963) suggests that experimental subjects’ causal inferences are primarily based on temporal contiguity and precedence, and this is also true when the subjects are children (Mendelson & Shultz, 1976; Shultz & Ravinsky, 1977; Siegler & Liebert, 1974). Studies have shown that experimental designs and manipulations are biased toward the identification of contiguous events (Buehner, 2005) and that temporal gaps tend to disrupt judgements of causality (Buehner, 2003).

The propensity to invoke proximal causes for temporally extended relations was characteristic of early explanations in the natural sciences (Field & Hineline, 2008), but Sambursky (1974, p. 438) noted that a medium invoked for filling voids (such as “ether”) was superfluous to an explanation. Proximal causes of behavior often take the form of personal attributes (instead of environmental attributes distributed across time), avoiding the problem of temporal gaps (Kaplan & Hearst, 1982; Read, 1992). Filling the space-time gap with invented causes when faced with temporally extended relations was a prominent feature of attribution theory in psychology. Heider (1958) spoke of causes in terms of their *dispositional properties*, both of the environment and of persons, with the emphasis on stable individual characteristics (pp. 147–160). Another example of filling temporal gaps is the fundamental attribution error (Nisbett & Ross, 1980; Ross, 1977), which is “the tendency for attributers to underestimate the impact of situational factors and to overestimate the role of dispositional factors in controlling behavior” (p. 183). Field and Hineline (2008) suggested that the term *internalization* is typically invoked when a person’s behavior is independent of immediate surroundings (as when a person is said to act on the basis of internalized values). *Dispositioning* is attributing personal characteristics or internal entities to individuals to explain action when there is no obvious contiguous causal event in the immediate situation. This is problematic because filling temporal gaps obscures temporally extended causal relations.

In contrast, the technical language of behavior analysis focuses on the effects consequences have on behavior rather than on mediational constructs that often take the form of mental phenomena (where vernacular language places cause). The technical language does not obscure relations that are temporally extended, such as motivating events. Behavior patterns and patterns of consequences tend to be orderly when analyzed across time. Finally, using technical language is critical not only to the development of professionals (Woodward-Kron, 2008) but also to the maintenance and cohesion of specialized cultures. The following section shows, however, that technical language can pose problems for behavior analysts when interacting with those new to the field.

Why not a Technical Language of Behavior Analysis?

Early anecdotal evidence suggests, and behavior analysts suspected, that technical language had problematic listener effects. Bailey (1991) noted that in the early 1970s, Aubrey Daniels made a minor terminological change, referring to performance rather than behavior, and the demand for his consulting immediately increased. This suggests that terminological changes, such as referring to “facilitating and nurturing” children’s skills and accomplishments rather than “managing children’s behavior,” might produce large marketing effects. Bailey (1991) advocated everyday terms such as “self-esteem,” “respect for others,” and “freedom and dignity” rather than the language of determinism and control. Along these lines, Lindsley (1991) chose “Studies in Behavior Therapy” over “Human Operant Laboratory” in 1953 as a clinic name.

Empirical evidence has since been generated suggesting that there is indeed a problem, and efforts have been made to identify the precise nature of the problem. For example, Woolfolk and Woolfolk (1979) found that describing behavior modification procedures as “humanistic education” produced more favorable evaluations and that the tendency to react to behavior modification unfavorably was lessened if behavior modification was described as a nonmechanistic, good educational practice and if any references to “conditioning” were said to be metaphors that were not truly accurate. Similarly, Kazdin and Cole (1981) found that undergraduate students rated behavior modification procedures less favorably than humanistic or neutral procedures, but interestingly, they did not find that labeling of the procedure as “behavior modification” contributed to the ratings. To the degree that it is the description of the procedures rather than the term “behavior modification” that produces less favorable responses, these results would be expected to also apply to the more contemporary term, *applied behavior analysis*.

Various treatment descriptions can produce different predictions of treatment credibility and effectiveness by listeners. For instance, whether the method of treatment is said to be based on scientific research, clinically tested, novel rather than traditional, and accompanied by successful case examples affects the degree to which treatment rationales are judged as effective (Kazdin & Krouse, 1983). In fact, when each of these variables is part of a description of therapy, the predicted therapeutic change is higher. In addition, placebo and control descriptions that differed from standard therapy rationales such as systematic desensitization or implosive therapy tended to be viewed as less credible (Borkovec & Nau, 1972). Although these technical aspects of therapy descriptions tend to enhance their credibility with listeners, it is not clear that they are preferred and as well understood. Certainly, nontechnical jargon tends to be preferred relative to technical jargon (Kazdin & Cole, 1981; Woolfolk & Woolfolk, 1979), and this could influence both the degree to which listening is maintained and, ultimately, the effectiveness of practice. However, the evidence presented thus far does not show whether description preferences have an effect on implementation and whether any effect is the same across audiences.

Research addressing a preference for neuroscience explanations can provide a method for examining the degree to which behavior-analytic explanations are less preferred, why they are less preferred, and whether explanatory preferences can be changed. There is a clear preference for explanations that include irrelevant neuroscience information compared to those that do not (Weisberg, Keil, Goodstein, Rawson, &

Gray, 2008). To identify the reason for this, Weisberg, Taylor, and Hopkins (2015) conducted three experiments in which a combination of undergraduate students at the University of Pennsylvania and Mechanical Turk (mTurk) workers participated. MTurk is a crowdsourcing Internet marketplace where businesses have access to a human workforce (mTurk workers) to complete tasks that computers currently cannot. The mTurk workers were included to increase the generality of the effect to a population more representative of the general population relative to undergraduate students. In the first experiment, 322 subjects were divided into four conditions, described as neuroscience (with and without) and length (short and long), because previous research did not control for the varying length of explanation due to additional neuroscience information. All subjects read online descriptions of psychological phenomena characterized by the four aforementioned conditions and were asked to rate the quality of each description on a scale between -3 (*very unsatisfying*) and $+3$ (*very satisfying*). Similar to previous research (Weisberg et al., 2008), descriptions that included neuroscience information were preferred over those that did not. In addition, longer descriptions were preferred over shorter ones, and mTurk workers tended to rate descriptions higher than undergraduate students.

In a second experiment (Weisberg et al., 2015), 255 subjects were presented with “good” and “bad” descriptions of psychological phenomena. Some of the descriptions contained neuroscience information and some did not. There was also a mixed condition that included good descriptions without neuroscience information and bad descriptions with neuroscience information. Other than the conditions, the procedures were the same as in the first experiment. The good descriptions were preferred except when the bad descriptions contained neuroscience information and the good ones did not.

In a third experiment (Weisberg et al., 2015), 159 subjects were presented with descriptions that contained neuroscience information and another condition including neuroscience information and additional jargon. There was no difference in preference between the neuroscience-plus-jargon descriptions and the neuroscience-only (any brain reference) descriptions. Although behavior analysts typically use within-subject designs, these types of procedures may be useful to assess explanatory preferences on a large scale, whether reference to temporal gaps is problematic, and whether preference changes occur due to specific shaping of explanations.

To identify whether preferences are affected by particular words, Amazon mTurk workers provided online ratings of acceptability of treatments for 10 different clinical populations that behavior analysts typically treat (e.g., preschool children, adults with special needs) that were referred to by six technical terms paired with six translations (Becirevic, Critchfield, & Reed, 2016). The participants rated nontechnical terms as more socially acceptable than behavior-analytic terms, suggesting that technical terminology is less preferred with non-behavior-analytic audiences. A recent study shows that one factor that contributes to this preference is that English words characteristic of behavior-analytic jargon tend to be judged as more unpleasant than English words generally, as well as English words adopted by other disciplines (Critchfield et al., *in press*). Given a list of 14,000 English words for which there were emotion ratings provided by mTurk volunteers, words were assigned to the following groups—behavior analytic, general science, general clinical, and behavioral assessment terms—based on perceived usages. Words in the general science (67%), behavioral assessment (67%), and general clinical (53%) groups tended to be rated as more pleasant, which

is consistent with English words overall. However, the majority (60%) of behavior-analytic terms tended to be rated as more unpleasant. This suggests that English words typical of behavior analysis contribute to a preference for descriptions that are not behavior analytic.

We can conclude that words characteristic of behavior analysis are less preferred than other English words, but neuroscience explanations tend to be preferred over other forms of explanation. Therefore, it is not technical language per se but something characteristic of behavioral technical jargon that is less preferred. This is important when considering how to initially present behavior analysis. It is likely that less behavioral technical jargon will keep listeners' attention, yet it is not yet clear what impact increased attending might have on the implementation of behavioral procedures.

Differential Listener Effects as a Function of the Audience

The nature of description has an effect on how well people understand, accept, and implement behavioral interventions. For the general public, conversational language facilitates better understanding and social acceptability of behavioral interventions, which is enhanced when accompanied by a description of the benefits to clients. To the contrary, experienced therapists find technical language to be understandable and socially acceptable, indicating that different descriptions are necessary for different audiences (Rolider, Axelrod, & Van Houton, 1998). Everyday conversational language not only enhances understanding but also increases the accuracy with which people new to behavior analysis implement interventions (Jarmolowicz et al., 2008). In an initial experiment, Jarmolowicz et al. (2008) found that inexperienced direct-care staff reported less understanding of interventions presented in technical language rather than conversational language relative to behavior analysts with a least one year of graduate training. In a second experiment, they found that the inexperienced direct-care staff from the first experiment provided more accurate implementation of an intervention when the intervention was described with conversational language rather than technical jargon. So, although technical language may increase the perceived credibility of an intervention (Kazdin & Krouse, 1983), it is not appropriate for those new to behavior analysis if one is to achieve better understanding, implementation, and social acceptability. The audience is critical; technical jargon is appropriate for experienced audiences but not those new to behavior analysis.

In education and nontherapeutic situations such as work settings, technical jargon also impacts the degree to which descriptions are preferred. For example, methods and leadership characteristics in a video of a performance appraisal interview tended to be preferred when described as involving humanistic rather than behavioral techniques (Barling & Wainstein, 1979). Teachers prefer pragmatic rather than humanistic or behavioral descriptions of pedagogical techniques, and this preference is enhanced when techniques are applied to relatively more severe cases and when the teachers evaluating the techniques are relatively inexperienced (Witt, Moe, Gutkin, & Andrews, 1984). When teachers are involved in providing interventions, they tend to prefer everyday-language descriptions over technical descriptions (Rhoades & Kratochwill, 1992). This is important to consider when presenting interventions to teachers because it is rarely, if ever, the case that highly trained behavior analysts are the only persons involved in treatment.

As noted earlier, it is not technical jargon per se but something about behavior-analytic language that is less preferred, as subjects prefer neuroscience explanations with technical jargon over other forms of explanation when accounting for behavior (Fernandez-Duque, Evans, Christian, & Hodges, 2015; Rhodes, Rodriguez, & Shah, 2014; Weisberg et al., 2015). The results of research on neuroscience explanations, along with the evidence by Critchfield et al. (in press), suggest that it is not all technical language but rather behavior-analytic jargon that is inconsistent with “commonsense” explanations of behavior that is less preferred. Although neuroscience research often includes both operant and Pavlovian learning procedures, the explanations differ significantly from behavior-analytic explanations. In neuroscience research, brain activity tends to be the dependent variable, but neuroscience explanations treat such activity as contiguous causes of behavior. It is a dispositional bias that avoids the problem of temporal gaps, and listeners have a long history of exposure to this sort of explanation. To the contrary, behavior-analytic explanations appeal to temporally extended environmental events and relations to explain behavior, suggesting that word selection, along with appeals to distal causal events, likely contributes to the problem.

To summarize, it is clear that the amount of experience listeners have with behavioral jargon affects how they respond to it. Although the novice may respond to jargon less favorably, the expert might view descriptions and explanations as more credible when presented more technically. As demonstrated by Jarmolowicz et al. (2008), less technical descriptions are not just preferred but result in better implementation of interventions by individuals with less experience. It is important to note that experience with technical jargon among the general population is a continuum, with the novice and the expert at the ends of the continuum and students, clients, other professionals including teachers, and mental health professionals often somewhere in between. Although people respond differently to technical language depending on their prior exposure, everyone is initially a novice. Therefore, the initial introduction to behavior-analytic procedures should not include technical jargon due to the effect language has on preferences for and implementation of behavioral procedures. Jargon should be faded in as individuals have more contact with the discipline. Given the existing evidence, this approach is likely to improve the acceptability of the science.

Subtle Listener Effects

Small variations in behavioral descriptions can produce dramatic effects on interpretations of behavior. For instance, descriptions of an individual's behavior that vary only with respect to the food that individual eats (e.g., fresh fruit vs. hamburgers) produce large variations in inferences about the individual's other behavior (Stein & Nemeroff, 1995). That is, the individual that regularly eats hamburgers rather than fresh fruit is more likely presumed to drink alcohol or date more than one person at a time, whereas the individual that regularly eats fresh fruit as opposed to hamburgers is more likely assumed to be conscientious. Consider a more subtle one-word deviation such as “reinforcing people” and “shaping people” versus “reinforcing behavior” and “shaping behavior.” The former implies vague personality changes, whereas the latter specifies an increase, maintenance, or development of particular responding. That a slight variation may produce quite different effects on listeners' behavior suggests that precision should be maintained even when explanations are colloquial.

Subtle listener effects are especially problematic with people lacking experience with behavior analysis because in the vernacular, dispositioning is the standard when explaining behavior. That is, the cause of behavior is construed as present at the time of behavior, within the individual, and typically takes the form of a mental or mediational event. For instance, suppose I tell a friend I am purchasing ice cream “because I like it.” The implication for those not familiar with behavior analysis is that purchasing of ice cream is caused by my “liking” and “wanting” of ice cream. However, it is clear to the behavior analyst that the purchasing of ice cream has been reinforced in the past by an external event (ice cream), the consumption of which produces reinforcing stimulation that is functionally related to purchasing of ice cream. Subtle changes in phrasing can focus listeners’ attention on external events without being technical. Consider the phrases “I purchase ice cream because I want it” versus “I haven’t had ice cream in a while and if I buy some, I can eat it.” Neither of these phrases involves technical language, but subtle distinctions focus the listener’s attention on different causal relations, internal/mediational in the first case and external/temporally extended in the second case. Practically, “liking” and “wanting” are difficult to manipulate directly, but what functions as a reinforcer, which reinforcers are delivered, and when reinforcers are delivered can be manipulated, so that is where attention should be directed. Those without behavior-analytic experience are sensitive to these subtle differences and, therefore, it is important to speak with precision even when not speaking technically.

Verbal Precision Without Technical Language

Miles (1994) asserted that the ordinary language prose of Gilbert Ryle and John Austin is similar to that of the more technical prose of Skinner with respect to the emphasis on a functional-analytic approach to verbal behavior. For both Ryle (1949) and Austin (1961), it is not the function of words like “know” and “feelings” to describe spiritual occurrences that make up the mind but to identify behavior (knowing, feeling). Like Skinner (1957), the primary focus of their efforts was not to identify the precise meaning of statements with respect to their referents but to identify the conditions under which such statements occur and their possible consequences. Unlike Skinner (1957), they did not develop a technical language to do this and their descriptions are excellent examples of verbal precision without jargon.

As an example of ordinary language that is precise, consider the distinction between a “recognition paradigm” and a “recall paradigm.” According to Miles (1994), these do not refer to “mental processes” but distinct conditions in the sense that “recognition” refers to responding appropriately in the presence of events that were previously encountered whereas “recall” refers to appropriate responding in the absence of such events. This is a precise distinction easily made without technical language. According to Miles (1994), problems arise when “misconstruction of ordinary language leads us to postulate entities for inappropriate reasons. . . generating conceptual fog” (p. 27). In the aforementioned example, “mental process” is the “conceptual fog” that accounts for the concepts of recognition and recall, providing a contiguous cause. His point is that careful description can focus listeners’ attention on distinct behavior that occurs in distinct situations rather than implying hypothetical causes that create confusion. Therefore, one could avoid the pitfalls of behavior-analytic jargon yet retain its benefits with careful descriptions.

Miles (1994) suggested there are situations when it is appropriate to speak with ordinary language because it can be effective for describing subtle combinations of events, noting an example of two donkeys from Austin (1961):

You have a donkey, so have I, and they graze in the same field. The day comes when I conceive a dislike for mine. I go to shoot it, draw a bead on it, fire: the brute falls in its tracks. I inspect the victim, and find to my horror that it is your donkey. I appear on your doorstep with the remains and say what? “I say, old sport, I’m awfully sorry, I’ve shot your donkey by accident?” Or “by mistake”? Then again, I go to shoot my donkey as before, draw a bead on it, fire but as I do so, the beasts move, and to my horror yours falls. Again the scene on the doorstep what do I say? “By mistake”? Or “by accident”? (p. 133)

The first scenario is clearly a mistake and the second is clearly an accident. According to Austin (1961, p. 132), the words “mistake” and “accident” may appear interchangeable, but the story of two donkeys shows they are completely different because they are articulated under different circumstances and occasion different responses from listeners. He stated that given our ancient, vast stock of words, it is possible to make all worthwhile distinctions and connections.

The conceptual analysis of Austin (1961) and Ryle (1949) aimed to identify the conditions under which ordinary terms are uttered. However, according to Miles (1994), there are many situations that do require more precise wording to avoid confusion. In these situations, speaking carelessly may suggest or miss distinctions, risking misleading ourselves and others. For example, Ryle (1949) warned against making “category mistakes.” This involves attributing things or events to the same grouping when they are distinct or drawing distinctions when there are none. He illustrated this sort of breach of logic with a series of examples, the first of which was the following:

A foreigner visiting Oxford or Cambridge for the first time is shown a number of colleges, libraries, playing fields, museums, scientific departments and administrative offices. He then asks “But where is the University?” . . . His mistake lay in his innocent assumption that it was correct to speak of Christ Church, the Bodleian Library, the Ashmolean Museum and the University, to speak, that is, as if “the University” stood for an extra member of the class of which these other units are members. He was mistakenly allocating the University to the same category as that to which the other institutions belong. (Ryle, 1949, p. 6)

In my own teaching, phrases in student prose often constitute “category mistakes,” three of which follow: Consider the phrase “child understands” and its possible revision, “child is sensitive to.” Both involve ordinary language, but the former implies more behavior (a verbal repertoire from the child) than the latter, which implies only discriminating environmental events. Students often write “present” or “manifest” when they could write “engage in behavior.” The former terms imply underlying mediating causes, directing attention away from relevant behavior/environment functional relations. Finally, consider the example “reinforcing people” and “shaping people” versus “reinforcing behavior” and “shaping behavior.” One could argue that “reinforcing” and “shaping” are technical terms, but the problem with these two phrases

is the term “people” in place of the term “behavior.” To “reinforce people” and “shape people” is the type of breach of logic that Austin (1961) and Ryle (1949) warned against. To summarize, technical jargon is not necessary for maintaining precision, and slight variations in wording can avoid subtle influences that suggest inner causes and obscure environmental determinants of behavior.

Our interest as behavior analysts should be to introduce principles originally conceptualized with technical language to non-behavior analysts without jargon and without making logical errors to avoid the subtle influence lay terms may have on listener behavior. For example, Cooper, Heron, and Heward (2007) defined positive reinforcement as follows: “Positive reinforcement occurs when a behavior is followed immediately by the presentation of a stimulus and, as a result, occurs more often in the future” (p. 36). Although “positive,” “reinforcement,” and “stimulus” are specific terms to trained behavior analysts, they have a variety of meanings colloquially, which is likely to cause confusion. Instead of the term “positive reinforcement” and its technical definition, it could be said that “sometimes following an action or activity, something immediately happens in the situation that causes that type of activity to occur more.” This definition is not technical but precise in the sense that the emphasis is on the relation between behavior and the impact the environment has on that behavior without implicit reference to mediating constructs. Cooper et al. (2007) also stated that “when the frequency of a behavior increases because past responses have resulted in the withdrawal or termination of a stimulus, the operation is called negative reinforcement” (p. 36). Instead, one could say that “sometimes following an action or activity, something immediately stops or is prevented from happening in the situation, causing that type of activity to occur more.” Similar description could replace terms such as “extinction,” “maintenance,” and “punishment” that do not cause confusion or refer to implicit hypothetical causes.

Cooper et al. (2007) addressed motivating operations by stating “that the momentary effectiveness of an unconditioned reinforcer is a function of current motivating operations. For example, a certain level of food deprivation is necessary for the presentation of food to function as a reinforcer” (p. 39). Rephrasing this is a little bit more complex because temporal extension cannot be ignored, as the “current level of food deprivation” requires the passage of time. Instead of the term “motivating operation,” a description like “for something to increase an activity that it follows, it must be valuable because it has not been available for some time” could be substituted. Furthermore, the thing or event that is absent could be arranged by an individual or occur by circumstance. Similar descriptions could be introduced for other motivating operations.

Cooper et al. (2007) define conditioned reinforcers and punishers as

stimulus events or conditions that are present or that occur just before or simultaneous with the occurrence of other reinforcers (or punishers) may acquire the ability to reinforce (or punish) behavior when they later occur on their own as consequences. Called conditioned reinforcers and conditioned punishers, these stimulus changes function as reinforcers and punishers only because of their prior pairing with other reinforcers and punishers. (p. 40)

Instead, one might say that

some events follow an activity and affect the amount of that activity because, over a period of time, they were paired with important events. What initially had no

effect on the amount of activity now affects activity by signaling important events as a result of repeated pairing with those events.

Table 1 shows these attempts at translation of technical terms to vernacular language that are not characterized by logical errors and category mistakes. They are not suggested as replacements for technical terms but as examples of nonjargon descriptions of behavior-analytic principles that remain precise, and they may be useful for introducing the principles to those new to the discipline. Although the vernacular descriptions may seem vague, the goal is to specify relations between behavior and environment, as Skinner (1935) did when he defined the reflex as a correlation between stimuli and responses. Whether there are beneficial listener effects (i.e., reducing mediational explanations, and promoting understanding and effective practice) can only be determined by empirical investigation with naïve and other target audiences.

Future Investigation

Although precision does not require technical language, it is not clear that there are benefits to precise speaking. It has been shown that those new to behavior analysis prefer ordinary language, but it is possible that a lack of precision promotes poor understanding and implementation of behavior-analytic procedures. To address whether there are beneficial listener effects, it is necessary to show that precise explanations of behavior aid in understanding and implementation of interventions by those new to behavior analysis. It must be determined if precise vernacular descriptions are preferred relative to mediational vernacular descriptions, and are viewed as more credible, and if preferences for precision can be developed in the general population. Finally, it should be demonstrated that exposure to different forms of explanation has long-term listener effects when at a later time listeners function as speakers.

There are two aspects of precise vernacular descriptions that require investigation: word selection and temporal extension. Research has shown that English words common in behavior-analytic explanations tend to be rated as more unpleasant than English words generally and words common in psychology (Critchfield et al., *in press*). Future research could compare the pleasantness of different precise vernacular terms to assess whether variations in word appeal also affect understanding, credibility, and preference. Explanations that include hypothetical entities as temporal gap-fillers are common in colloquial explanations of behavior. Descriptions with and without terms that fill temporal gaps, such as mediational and neurophysiological constructs, can be compared with behavior-analytic descriptions to identify their effects on perceived credibility, understanding, implementation, and preference. It may be that perceived credibility, understanding, implementation, and preference are not affected equally or in the same way as descriptions are varied. For instance, precise vernacular descriptions may be viewed as more credible and produce better understanding and implementation, whereas mediational descriptions are preferred.

It is possible that the technical nature of neuroscience descriptions alone is what makes neuroscience descriptions preferred over nonneuroscience descriptions, but this is unlikely given the existing evidence that behavior-analytic descriptions are less preferred than nontechnical explanations. Using similar procedures to those that

Table 1 Terms with standard and revised definitions

Term	Standard definition	Revised definition
Positive reinforcement	Positive reinforcement occurs when a behavior is followed immediately by the presentation of a stimulus and, as a result, occurs more often in the future.	Sometimes following an action or activity, something immediately happens in the situation that causes that type of activity to occur more.
Negative reinforcement	When the frequency of a behavior increases because past responses have resulted in the withdrawal or termination of a stimulus.	Something immediately stops or is prevented from happening in the situation, causing that type of activity to occur more.
Motivating operations	The momentary effectiveness of an unconditioned reinforcer is a function of current motivating operations. For example, a certain level of food deprivation is necessary for the presentation of food to function as a reinforcer.	For something to increase an activity that it follows, it must be valuable because it has not been available for some time.
Conditioned reinforcers and punishers	Stimulus events or conditions that are present or that occur just before or simultaneous with the occurrence of other reinforcers (or punishers) may acquire the ability to reinforce (or punish) behavior when they later occur on their own as consequences. These stimulus changes function as reinforcers and punishers only because of their prior pairing with other reinforcers and punishers.	Some events follow an activity and affect the amount of that activity because, over a period of time, they were paired with important events.

identified a preference for neuroscience explanations (Fernandez-Duque et al., 2015; Rhodes et al., 2014; Weisberg et al., 2015), one might compare preferences for vernacular descriptions and neuroscience descriptions of psychological phenomena, which are mediational, with precise vernacular descriptions (nonmediational) of the same phenomena. In addition, it would be useful to assess the degree to which preferences for descriptions with neuroscience information remain when the alternative description is nontechnical but consistent with behavior analysis. Most importantly, the nontechnical descriptions can be varied to determine which forms are most preferred. Finally, subjects could be grouped based on whether they had prior contact with behavior-analytic services or not to determine if explanatory preferences differ depending on level of exposure. Different audiences should be included in research when assessing the importance of precision with nontechnical descriptions, as variations in descriptions are likely to have differential effects on listeners as a function of level of experience.

Assuming that behavior-analytic explanations are less preferred than mediational descriptions by those new to the discipline, a functional analysis could identify the circumstances maintaining listeners' preferences for mediational descriptions. Leigland (1996) defended a research program proposed early in 1945 by Skinner, in which psychological terms were to be analyzed through functional analysis to identify the conditions under which the terms were uttered and the contingencies that maintained such utterances. He suggested that this would serve dual purposes: to identify the functions of behavior of central importance to the broader culture and more generally (i.e., mind), and to extend functional analysis techniques to this sort of verbal behavior. Further, the philosophical issues of mental life could be analyzed as problems of verbal behavior, and introducing behavior analysis could also be treated as a verbal behavior problem with respect to listeners.

The technique promoted by Leigland (1996) was developed by Willard Day and was described in an earlier paper (Leigland, 1989), referred to as the "Reno methodology." The technique was specifically developed to analyze explanatory verbal behavior. Using a within-subject design (Leigland, 1989), participants observed a pigeon pecking a key in an operant chamber and were asked to explain (as opposed to describe) what they saw. They could write down their observations at any time but were asked to number them and hold closed a hand switch when writing. The switch controlled the event pen of a cumulative recorder that also recorded the pigeon's response patterns. This allowed for written entries to be correlated with hand switch "events" on the cumulative record, and for the subjects' verbal behavior with the pigeon's behavior.

Leigland (1989) described two experiments using this procedure that varied with respect to the schedule of reinforcement to which the pigeon was exposed. In Experiment 1, the pigeon was exposed to a fixed-interval (FI) 4-min schedule of reinforcement in the presence of a red illuminated response key. It was thought that this would result in differentiated responding by the pigeon over time (i.e., produce temporal control of responding) with unchanging stimulus conditions that might produce "mentalistic explanations" (i.e., anticipation) by observers. In Experiment 2, pecks continued to be reinforced according to a FI 4-min schedule of reinforcement in the presence of the red key, but the response key switched from red to green according to a variable-time 1.5-min schedule, and food was delivered according to a fixed-ratio 12 when the response key was illuminated green. This produced precise discriminative control over

key pecking. The participants provided more terms defined as “mentalistic” in their explanations in Experiment 1 than in Experiment 2, and this differentiated verbal responding was shown to be a function of the stimulus conditions, responses, and consequences in the operant chamber. This finding demonstrates that typical observations of behavior/environment interactions can prompt explanations including unobserved hypothetical events when environmental determinants are not clear.

Leigland’s (1989) protocol provides useful methods for conducting functional analyses of explanatory verbal behavior. In addition, the general design could be used to evaluate several manipulations that might produce more differentiated explanations and a better understanding of the variables producing such differences. For instance, explanations may vary when subjects observe human behavior rather than when they observe behavior of laboratory animals, or behavior of children rather than adults. Extended observation periods may produce different explanations compared to brief observation periods. Differing verbal prompts (instructions) would likely have an effect on the nature of explanations and reflect listener, rather than speaker, effects. For instance, when telling participants to explain rather than to describe what they see, simply telling them to attend closely to the pigeon’s behavior, as well as other aspects of the situation, could produce different (nonmentalistic) explanations. The stimulus conditions and consequences for the pigeon could be varied to a greater extent to determine if that produces greater variation in observed responding. Such manipulations might better reveal variables influencing different explanations. Finally, these techniques could be quite useful in evaluating the effectiveness of explicit shaping of explanatory verbal behavior with novices. As mentioned earlier, the methods used by Weisberg et al. (2008, 2015) where participants evaluate preferences for various descriptions of psychological phenomena would be useful in determining the effects of shaping of explanations on preferences of groups of people. This kind of functional analysis of explanatory verbal behavior and listener behavior is necessary for behavior analysts to gain a better understanding of how to facilitate acceptance of behavior-analytic explanations while maintaining precision. Clearly, the form of explanation should vary depending on how much experience listeners have with behavior analysis (Jarmolowicz et al., 2008), and this sort of analysis would be useful in determining the best way to present behavior analysis to those new to the discipline.

Conclusion

Like all discourse, the language of behavior analysis will evolve, as will the language that disseminates its principles. The problem of hypothetical entities as “gap-fillers” (between behavior and temporally extended, functionally related environmental events) can be addressed by adopting terms that occasion multiscaled descriptions (Hineline, 2001). Conceptions of some aspects of behavioral phenomena that include temporally extended historical relations are not new (Moore, 1983), and early research within our field can best be understood with such interpretations (Baum, 1973; Herrnstein, 1970; Herrnstein & Hineline, 1966). Preferred explanations do not match the evidence they are to address, and descriptive deviations from behavior-analytic and vernacular language should reflect conceptual shifts within a given field (Baum, 2012).

With vernacular language, attention tends to be focused on discrete events with the organism as agent. Hypothetical entities are assumed to bridge gaps in time, and attention is focused on organisms' contribution to behavior. Everyday language is not necessarily simpler or less confusing, just more familiar, and there may be disadvantages to describing behavior colloquially (Skinner, 1953). However, we can speak in familiar ways without making logical errors and category mistakes, such as dispositioning. We must speak in familiar terms while maintaining these important theoretical distinctions when introducing behavior analysis to those new to the field. That is, we must speak such that listeners' behavior is brought under control of relevant functional relations and temporally extended patterns of events and activities rather than discrete topographies of behavior accounted for by unobserved mediational constructs. As behavior analysts with a technology for empirical investigation and shaping nonverbal and verbal behavior, we are in an optimal position to identify the best methods for presenting our discipline.

Funding This researched received no funding.

Compliance with Ethical Standards

Conflict of Interest The author reports no conflict of interest.

Ethical Approval This article does not contain any studies with human participants performed by any of the authors.

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