

## Thirty Points About Motivation From Skinner's Book *Verbal Behavior*

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Skinner discussed the topic of motivation in every chapter of the book *Verbal Behavior* (1957), usually with his preferred terminology of “deprivation, satiation, and aversive stimulation.” In the current paper, direct quotations are used to systematically take the reader through 30 separate points made by Skinner in *Verbal Behavior* that collectively provide a comprehensive analysis of his position regarding the role of motivation in behavior analysis. In addition, various refinements and extensions of Skinner's analysis by Jack Michael and colleagues (Laraway, Snyckerski, Michael, & Poling, 2003; Michael, 1982, 1988, 1993, 2000, 2004, 2007) are incorporated, along with suggestions for research and applications for several of the points.

*Key words:* drive, Jack Michael, motivating operations, *Verbal Behavior* (1957)

In *Behavior of Organisms* (1938) Skinner argued that the causes of behaviors related to “drive” were environmental events, namely deprivation, satiation, and aversive stimulation, not internal states such as thirst or anger. He also maintained that these motivational variables were antecedent events and separate from all types of stimulus variables. Several years later, Keller and Schoenfeld (1950) elaborated on Skinner's position in the section titled, “A drive is not a stimulus” (p. 276), where they stated, “a drive has neither the status, nor the functions, nor the place in a reflex that a stimulus has ... it is not, in itself either eliciting, reinforcing, or discriminative” (p. 276). Keller and Schoenfeld also suggest that the term “establishing operation” be used to distinguish the effects of deprivation, satiation, and aversive stimulation from various stimulus effects. Skinner further developed this conceptualization of motivation with three chapters on the topic in *Science and Human Behavior* (1953, chapters 9–11), and throughout the book *Verbal Behavior* (1957).

Michael and colleagues provided a series of refinements and extensions of Skinner's basic analysis of motivation with a number of papers and book chapters (Laraway, Snyckerski, Michael, & Poling, 2003; Michael, 1982, 1988, 1993, 2000, 2004, 2007). Despite the focus that Skinner, Keller, and Schoenfeld placed on motivation and its distinction from stimulus effects, Michael (1993) noted that “the basic notion plays only a small role in the approach currently referred to as behavior analysis” (p. 191). Michael also pointed out that the neglect of motivation as a basic principle in behavior analysis “leaves a gap in our understanding of operant functional relations” (p. 191). The failure to address motivation makes our field vulnerable to claims that behavior analysis is impoverished, or incapable of addressing motivation as it relates to various conceptual and applied issues. The current paper pays tribute to Jack Michael and the 20th anniversary of his 1993 paper “Establishing Operations” by identifying, with direct quotations, 30 separate points that Skinner makes about motivation in his book *Verbal Behavior*. Many of these points can be found in Michael's 1993 paper, as well as throughout his other writings on the topic.

Michael (1993) began his discussion of establishing operations (EOs) by pointing out that motivation is a major topic in psychology, especially applied psychology. Most introductory psychology textbooks have a whole chapter on motivation, but it is typically disconnected from the chapter in the same textbook on learning that usually presents the work of Pavlov, Skinner, and others.

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This paper is dedicated to Jack Michael on the 20th anniversary of his 1993 paper titled “Establishing Operations” published in *The Behavior Analyst*.

I thank Cindy Sundberg and Dan Sundberg for their comments on an earlier version of this manuscript.

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Surprisingly, the same effect has occurred in our own literature. For example, the prestigious textbook by Honig (1966), the behavioral bible for many students in the 1960s and 1970s, contained a chapter on motivation (Teitelbaum, 1966). However, Teitelbaum made no use of Skinner's analysis of motivation, and focused primarily on the traditional physiological aspects of motivation. In addition, Teitelbaum was "critical of some of the assumptions about motivation in Skinner's earlier treatments" (Michael, 1993, p. 192). This inconsistency left the reader of Honig in a quandary about how to relate the basic principles of behavior to the topic of motivation.

Behaviorists are rarely credited for any positive contribution to the study of motivation. In fact, when others from outside of the field discuss a behavioral approach to motivation, it is often pejorative and presented in the context of the proposed problems of contrived extrinsic reinforcement. However, motivation is an important element of our daily lives, and is a major topic of interest and concern for many people. A search of "motivation" on Google produced 227 million hits. Motivational books and speakers generate millions of dollars motivating others. Detectives search for the motives of criminals, while educators often bemoan a student's lack of motivation. Motivation is seen as the cause for what goes right and what goes wrong with society and human behavior in general. Great accomplishments and deeds are attributed to various types of motivation, as well as the negative elements of society such as crime, predatory behavior, war, and terrorism.

The primary goal of Michael's work on motivation has been to provide behavior analysts with a clear and conceptually consistent behavioral account of all that goes under the rubric of motivation. While his work is based on a wide range of Skinner's writings, probably none of Skinner's works have influenced him more on this topic than the book *Verbal Behavior*. The topic of motivation was addressed frequently in *Verbal Behavior*, not only in its relation to the mand, but to other aspects of human behavior. In fact, nowhere else in Skinner's writings does he provide such extensive detail as to how motivation fits into behavior analysis.

Michael began teaching behavior analysis in 1955, primarily from Skinner's book

*Science and Human Behavior* (1953), but he also supplemented his classes with content from Skinner's early drafts of *Verbal Behavior*. He then taught a course using just Skinner's book *Verbal Behavior* (along with his own supplemental material) almost every academic year following its publication. Michael frequently stated (e.g., Wood & Michael, 1977) that his repeated efforts to teach from *Verbal Behavior* led to his reorganization and refinement of some of Skinner's concepts as presented in the book; motivation being one of them. In addition, it was Michael's interest in the communication difficulties faced by deaf individuals and others with developmental disabilities that gave him opportunities to apply and test Skinner's analysis of verbal behavior and motivation (e.g., Meyerson & Michael, 1964; Sundberg, Michael, & Peterson, 1977).

The 30 points presented in the current paper (Table 1) are not meant to be an exhaustive list. However, from this author's view, these points seem to be the most important aspects of Skinner's analysis. In general, one or two quotations are provided for each of Skinner's points, accompanied with some explanation, citations to related research, and in many cases, suggestions for possible research topics and applications (updating those suggested by Sundberg, 1991). At the end of each point, additional page numbers are provided where Skinner also discusses that point, or a closely related point. These page numbers also do not represent an exhaustive list, but are meant to give the reader a sample of how Skinner worked these points into other areas, or elaborated on them in various ways. All page numbers refer to *Verbal Behavior* unless otherwise noted, and the current author added most of the bracketed words in the Skinner quotations for clarity.

**Point #1: Skinner completes his replacement of the term "drive" and related conceptualization of motivation with "deprivation, satiation, and aversive stimulation" in *Verbal Behavior***

Beginning in *Behavior of Organisms* (1938) Skinner starts making the transition from the term *drive* and its related conceptual framework and experimental literature common at

Table 1  
Thirty Points About Motivation From Skinner's Book *Verbal Behavior*

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- Point #1: Skinner completes his replacement of the term “drive” and related conceptualization of motivation with “deprivation, satiation, and aversive stimulation” in *Verbal Behavior*
- Point #2: The term “motivation” has etymological sanctions that complicate its use as a technical term
- Point #3: MOs constitute a separate basic principle of behavior
- Point #4: MOs are typically private events
- Point #5: All types of MOs are separate from stimulus control
- Point #6: All types of MOs are separate from reinforcement
- Point #7: Aversive stimulation as an antecedent is different from punishment
- Point #8: Escape and avoidance are MO effects, not S<sup>D</sup> effects
- Point #9: MOs are separate from schedules of reinforcement
- Point #10: MOs may involve unconditioned or conditioned variables
- Point #11: MOs may generalize in the same way that stimuli generalize
- Point #12: Drugs, alcohol, sleep deprivation, illness, physical exhaustion, and aging can be MOs
- Point #13: Much of what is termed “emotion” involves an MO effect
- Point #14: Most behavioral relations involve a four-term contingency that includes MOs
- Point #15: There can be many different levels of any single MO
- Point #16: MOs can control large and long-lasting behavioral repertoires
- Point #17: The response requirement may alter the strength of an MO
- Point #18: Generalized conditioned reinforcement provides for a way to break a response free from MO control
- Point #19: MOs associated with specific reinforcement are different from those associated with generalized reinforcement
- Point #20: MOs control nonverbal behavior
- Point #21: MOs participate in many different ways in multiple causation
- Point #22: Convergent multiple control can involve MOs
- Point #23: Divergent multiple control can involve MOs
- Point #24: Different MOs may control the same behavior and be related to the same form of reinforcement (MO functional independence)
- Point #25: MOs can participate in conditional discriminations and in joint control
- Point #26: MOs can be multiple, and can compete with other MOs
- Point #27: MO control can block, overshadow, or distort stimulus control
- Point #28: MOs can be manipulated as an independent variable
- Point #29: Many of society's problems and individual negative behaviors are a result of MOs
- Point #30: MOs are responsible for the emergence of human language
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the time, to viewing motivational effects as a direct function of deprivation, satiation, and aversive stimulation. By the publication of *Verbal Behavior* (1957) the transition is complete with only one reference made to the term drive (p. 32). The specific details regarding Skinner's rejection of drive and its corresponding implication of mentalistic intervening variables can be found in chapter 9 of *Science and Human Behavior* (1953, pp. 141–159). A summary of Skinner's position on drive and his rationale for a new conceptualization of motivation appears early in *Verbal Behavior*.

Such operations [drives] are said by the layman to create or allay a “state of thirst.” Such a concept is only as valid or useful in prediction and control as the observations upon which it rests. The important events are the operations which are said to change the state of thirst. In predicting and controlling the verbal response *Water!* we do not change thirst directly; we engage in certain operations which are said to change it. It is simpler to omit any reference to a “drive” and say that the probability of the response *Water!* can be changed through these operations [deprivation, satiation, and aversive stimulation]. (p. 32)

It is of interest to note that Skinner (1938, 1953, 1957) frequently used the word “operations” when discussing motivation. Keller and Schoenfeld (1950) also used operations when discussing drive, but suggested expanding the term to “establishing operations” (p. 272). In addition, Keller and Schoenfeld (1950) suggested *establishing operations* be used as a replacement term for the more cumbersome phrase, deprivation, satiation, and aversive stimulation. Michael (1982) elaborated on the value of the term *establishing operation* and further developed its role as an antecedent variable, especially in learned forms of motivation with his analysis of the “establishing stimulus.” Skinner was not opposed to the terms *establishing operation* or *establishing stimulus* (Michael, personal communication, September 20, 2012), but he did not make use of them in his writings.

In his most recent treatment of motivation, Michael (2007) uses the term “motivating operations” (MOs) as an omnibus term for establishing operations (EOs) and abolishing operations (AOs), and distinguishes between the EO and AO in terms of their respective value-altering and behavior-altering effects. Michael (2007) defines the MO as follows:

The **value-altering effect** is either (a) an increase in the reinforcing effectiveness of some stimulus, object, or event, in which case the MO is an **establishing operation (EO)**; or (b) a decrease in the reinforcing effectiveness, in which case the MO is an **abolishing operation (AO)**. The **behavior-altering effect** is either (a) an increase in the current frequency of the behavior that has been reinforced by some stimulus, object, or event called an **evocative effect**; or (b) a decrease in the current frequency of behavior that has been reinforced by some stimulus, object, or event called an **abative effect**. (p. 375)

Michael (2007) then goes on to distinguish between MOs that involve unconditioned value-altering effects (UMOs) from those that involve conditioned value-altering effects (CMOs). He further divides CMOs into three types: (1) surrogate (CMO-S), (2) reflexive (CMO-R), and (3) transitive (CMO-T). For more detail on these distinctions the reader is referred to Michael (2007). For a review of Michael’s progression

through the various stages of development of the MO concept the reader is referred to Miguel (2013). The term motivating operation, or its acronym MO, will be used throughout the rest of this paper. Use will also be made of the term motivation, but its usage will be consistent with that identified by Skinner (see point #2 below). (See also pp. 33–36.)

**Point #2: The term “motivation” has etymological sanctions that complicate its use as a technical term**

Skinner (1957) identifies several problems with the term motivation. However, he uses the term or variations of that term (e.g., motive, motivate, motivated, motivating, motivational) 26 times in *Verbal Behavior*, including 3 times as a section heading. In much of this content he identifies the specific nature of the problems of the term, but also on occasion he clearly uses the word motivation as a synonym for deprivation, satiation, and aversive stimulation (or one of those effects separately). The first section heading is “Motivation and Emotion” (pp. 31–33), the second is simply “Motivation” (pp. 212–214), and the third is “Changing Motivational and Emotional Variables” (p. 412). In the second section heading he identifies the problems of the term motivation, and then defines his usage of the term.

When an individual exhibits behavior in a sustained state of strength, it is common to describe him as “highly motivated.” But a condition of strength may be the result of many different kinds of variables, and the term motivation is not appropriately applied to all of them. As we have just seen, behavior may vary in strength between fairly wide extremes simply as the result of conditions of reinforcement, other variables remaining constant, but to classify this with the effect of changes in deprivation, for example, is unnecessary and confusing.... The term [motivation] will be used here as a convenient classification for such variables as satiation and deprivation, the aversive stimulation used in generating avoidance and escape behavior, the effects of certain drugs, and certain uncontrolled processes of maturation or of aging in general. (p. 212)

There are several advantages of keeping the term motivation (or specifically motivating operations) as a descriptor for the effects of deprivation, satiation, and aversive stimulation. Perhaps the most salient advantage is the immediate recognition of the term by the layperson, as well as by professionals that focus on human behavior (e.g., educators, business persons, clinical psychologists). In addition, most introductory psychology books contain a chapter on motivation, little of which contains any behavioral content. This common practice gives the student the impression that motivation is unrelated to the content on learning, and that the traditional analyses of drives is current and acceptable. However, a behavioral analysis of motivation has the potential to make significant contributions to many aspects of human behavior, and in this case unfamiliar terminology (i.e., deprivation, satiation, and aversive stimulation) may hamper our effort. (See also p. 204.)

**Point #3: MOs constitute a separate basic principle of behavior**

In *Science and Human Behavior* (1953, chapters 9–11) and *Verbal Behavior* (1957), Skinner clearly presents motive variables as separate from (but related to) the other principles of behavior. In *Verbal Behavior* he provides analyses and examples of the effects of motivation as an independent variable in several sections of the book. For example, in chapter 2 Skinner identifies the dependent and the independent variables relevant to a behavioral analysis of language. He follows his description of the dependent variables with the section titled “Independent variables and related processes.” This section contains four subheadings; “Conditioning [reinforcement] and extinction,” “Stimulus control,” “Motivation and emotion,” and “Aversive stimuli” (pp. 28–33). The following quotation provides an example of how Skinner considers motivation as an “independently manipulable” principle of behavior.

A functional relation is more than a mere connection. The stimuli which control a verbal response not only determine its form and thus supply an equivalent for meaning, they increase the probability that the response will be

emitted. Other variables having the same effect include reinforcement, deprivation, aversive stimulation, and certain emotional conditions [MOs]. These are all independently manipulable events. (p. 199)

An important and valuable aspect of behavior analysis is the identification of the relevant independent variables related to a particular behavior or class of behaviors. The success of applied behavior analysis is based on a behavior analyst’s ability to correctly identify the causes of behavior and manipulate variables that produce improvement in any number of important human conditions (Baer, Wolf, & Risley, 1968). Thus, it is important and often clinically valuable to distinguish between behaviors that are a function of MO variables, from those that are a function of the other principles of behavior. (See also pp. 33–36, p. 46, pp. 212–219.)

**Point #4: MOs are typically private events**

Skinner’s analysis of the role of private events constitutes the core of his philosophy of science known as “radical behaviorism” (Skinner, 1945, 1974). Skinner’s main point is that events occur within our body that are accessible only to the behavior, but these events affect our behavior, and must be accounted for if a functional analysis is to be complete. Motive variables are frequently private events, thus contributing to the complexity of isolating and empirically developing this principle of behavior. Yet, MOs play a role in virtually all aspects of human behavior. In the following quotation Skinner provides an example of how private aversive stimulation should be treated in a functional analysis.

The response *My tooth aches* is controlled by a state of affairs with which no one but the speaker can establish a certain kind of connection. A small but important part of the universe is enclosed within the skin of each individual and, so far as we know, is uniquely accessible to him. It does not follow that this private world is made of any different stuff—that it is in any way unlike the world outside the skin or inside another’s skin. Responses to

private stimuli do not appear to differ from responses to public events. (p. 130)

Skinner provides a 17-page section in *Verbal Behavior* (pp. 130–146) on how the verbal community can best handle the problem of privacy, despite certain obstacles that can never be overcome. The world within the skin cannot be ignored, as is common for those espousing methodological behaviorism (Skinner, 1974). Only the individual person knows his degree of pain, thirst, hunger, arousal, etc. However, despite the fact that an individual can experience a private MO, accurate quantification is extremely difficult and standard measurement is impossible. Learned motivators are even more complex to identify and quantify. A listener may never know the nature of the speaker's hidden agenda. An artist or musician's "intuitive feel" motivating their creations are inaccessible. A criminal's MOs are often unknown and complex. Despite these limitations, MOs are ubiquitous in human behavior and must be accounted for as best as possible in a functional analysis.

(See also p. 135, pp. 137–138, p. 151, p. 316.)

**Point #5: All types of MOs are separate from stimulus control**

Skinner (1938) and Keller and Schoenfeld (1950) made it clear that the type of antecedent control over behavior that occurs with motivation is not the same as the type of antecedent control exerted by unconditioned (US), conditioned (CS), or discriminative ( $S^D$ ) stimuli. Michael (1993) suggests that the defining distinction between MOs and  $S^D$ s is "Discriminative variables are related to the differential *availability* of an effective form of reinforcement given a particular type of behavior; motivative variables are related to the differential reinforcing *effectiveness* of environmental events" (p. 193) (*italics added*). Skinner's frequent discussions of the differences between the mand and the other verbal operants provide an excellent source of material for those wishing to master the distinction between the MO and the  $S^D$ .

A "mand," then, may be defined as a verbal operant in which the response is reinforced by a characteristic conse-

quence and is therefore under the functional control of relevant conditions of deprivation or aversive stimulation ... in contrast with other types of verbal operants ... the response has no specified relation to a prior stimulus. (p. 36)

The tact emerges as the most important of verbal operants because of the unique control exerted by the prior stimulus.... It contrasts sharply with the controlling relations in the mand, where the most efficient results are obtained by breaking down any connection with prior stimuli, thus leaving deprivation or aversive stimulation in control of the response. (p. 84)

In a very large part of verbal behavior a given form of response does not yield a specific reinforcement and hence is relatively independent of any special state of deprivation or aversive stimulation. Instead, the control is exercised by prior stimuli. (p. 53)

The "gap" in "our understanding of operant functional relations" identified by Michael (1993, p. 191) is perhaps most obvious by the tendency in behavior analysis to consider most antecedent variables in operant relations as stimulus variables (Michael, 1982). The identification of MOs as antecedent variables that are separate from stimulus control provides a powerful tool for the analysis of human behavior, and can lead to more effective intervention programs common to the field of applied behavior analysis. (See also pp. 31–33, p. 54, p. 83, p. 147, p. 154, p. 184, p. 199, pp. 212–219, p. 234, p. 468.)

**Point #6: All types of MOs are separate from reinforcement**

Motivating operations are antecedent variables that involve (1) a value-altering effect, and (2) a behavior-altering effect, while reinforcement is a consequential variable involving a behavior-strengthening effect (Michael, 2007; Skinner, 1957). (Aversive stimulation and its relation to punishment is presented in point #7 below, but aversive stimulation and its relation to negative reinforcement is relevant to the current point.) Beginning in the 1960s, it became common in behavior analysis to talk about motivation as a consequence. Michael (1993) points out that, "In applied behavior analysis

or behavior modification, the concept of reinforcement seems to have taken over much of the subject matter that was once considered a part of the topic of motivation” (p. 191). For example, token economies were presented as a “motivational system” by Ayllon and Azrin, (1968), and the first five research papers in *The Journal of Applied Behavior Analysis* that addressed motivation all treated it as a consequence, rather than as an antecedent variable (for more detail on this history see Sundberg, 2004). For example, food deprivation may evoke any number of behaviors (e.g., searching for food, going to a refrigerator, manding for food), but it is the consumption of the food that functions as reinforcement and strengthens behavior (e.g., opening a refrigerator door, manding), and brings behavior under the antecedent control of food deprivation (an EO).

It is also common in discussions of motivation in other branches of psychology, education, business, etc., to treat motivation as a consequence. Perhaps most ubiquitous is the infamous argument regarding “intrinsic and extrinsic motivation” that contrasts contrived reinforcement with natural reinforcement. This argument typically confuses MOs with consequences, and direct reinforcement with automatic reinforcement, all framed in a convoluted view of the principle of reinforcement. For example, Dan Pink, in his TED presentation on motivation ([www.ted.com/talks/dan\\_pink\\_on\\_motivation.html](http://www.ted.com/talks/dan_pink_on_motivation.html)), states, “Contingent motivators don’t work or often do harm ... the mechanistic, reward-and-punishment approach doesn’t work.” This YouTube video has received almost 5 million hits in the past 3 years, and currently gets an additional 6,000 hits each day. (For a behavioral analysis of this argument see Dickinson, 1989.) Skinner distinguishes between MOs and reinforcement in the following quotations.

Although reinforcement provides for the control of a response, we do not use reinforcement as such when we later exercise control. By reinforcing with candy we strengthen the response *Candy!* but the response will be emitted only when the child is, as we say, hungry for candy. Subsequently we control the response, not by further reinforcement, but by depriving or satiating the child with candy. (p. 31)

The response *Quiet!* is reinforced through the reduction of an aversive condition, and we can increase the probability of its occurrence by creating such a condition—that is, by making a noise. (p. 35)

In these quotations Skinner makes the following points: (1) deprivation, satiation, and aversive stimulation are antecedent variables, and reinforcement is a consequent variable; (2) deprivation, satiation, and aversive stimulation involve a value-altering effect; (3) deprivation, satiation, and aversive stimulation produce a behavior-altering effect; (4) reinforcement provides a strengthening effect; and (5) these variables are separate, but all four (deprivation, satiation, aversive stimulation, and reinforcement) are inextricably related to each other, and of course, to behavior. These are important behavioral distinctions that have many implications, as well as potential applications. For example, MOs have been used to teach mands to children with severe communication disorders (e.g., Hall & Sundberg, 1987), reduce self-injurious behavior (e.g., Worsdell, Iwata, Conners, Kahng, & Thompson, 2000), assess adults with dementia (e.g., Gross, Fuqua, & Merritt, 2013), and improve performance in an organizational setting (e.g., Agnew, 1997).

(See also p. 44, p. 54, p. 166, p. 199, pp. 212–219.)

#### **Point #7: Aversive stimulation as an antecedent is different from punishment**

Aversive stimulation can occur as an antecedent variable or as a consequential variable. As an antecedent variable, it can function as an MO that involves (1) a value-altering effect, and (2) a behavior-altering effect. As a consequential variable, aversive stimulation can function as punishment that involves a behavior-weakening effect. In addition, aversive stimulation can set up the necessary conditions for negative reinforcement (the reduction of aversive stimulation) to strengthen behavior, similar to the way deprivation sets up the conditions for positive reinforcement to strengthen behavior as described above (point #6). Skinner makes these points in the following quotations.

Punishment is not to be confused with the use of aversive stimulation in generating avoidance or escape. The same kind of stimuli are used, but in punishment they are made contingent upon a response in the same temporal relation as positive reinforcement. (p. 166)

There are other types of consequences which alter the strength of a verbal response. Behavior may be reinforced by the reduction of aversive stimulation. (p. 33)

The distinction among the roles of aversive stimulation as an MO, as punishment, and as negative reinforcement is often confused in psychology and behavior analysis, but also confused by the lay community. For example, in the movie *Ghostbusters* Bill Murray, playing an unethical college professor, describes shocking his participant following an incorrect response as “studying the effects of negative reinforcement.” The classification of aversive stimulation as an MO is also not a common practice in behavior analysis (see point #8), despite its early identification as such by Skinner (1938), and Keller and Schoenfeld (1950) who state, “Aversions, like appetites, form a major class of drives” (p. 303). Keller and Schoenfeld also provided a detailed analysis of several types of aversive stimulation as MOs (pp. 303–307).

(See also pp. 40–42, p. 153, pp. 199–200, pp. 212–219, pp. 465–468.)

#### **Point #8: Escape and avoidance are MO effects, not S<sup>D</sup> effects**

Behavior analysis has a long history of basic research on escape and avoidance conceptualized as a stimulus effect rather than an MO effect (e.g., Anger, 1963; Sidman, 1954). However, Michael (1993) argues that, “In the traditional discriminated avoidance procedure, the warning stimulus as a CEO evokes the so-called avoidance response, just as the painful stimulation as a UEO evokes the escape response. In neither case is the relevant stimulus correlated with the availability of the response consequence, but rather with its reinforcing effectiveness” (p. 202). This position is supported by Skinner’s analysis throughout *Verbal Behavior* that aversive stimulation is a motivational variable not a stimulus variable, and escape

and avoidance behaviors are evoked by MOs, not by S<sup>D</sup>s.

When an aversive stimulus itself is reduced, we call the behavior *escape*. When some condition which characteristically precedes an aversive stimulus is reduced, we speak of *avoidance*. Thus, if the verbal response *Stop it!* is reinforced when it brings about the cessation of physical injury, the response is an example of escape. But *Don’t touch me!* may be reinforced when it brings about the cessation of the threat of such injury—of events which have previously been followed by such injury and which are therefore conditioned aversive stimuli—and the behavior is then called avoidance. When a speaker has had a history of such reinforcement, we control his verbal behavior by creating appropriate circumstances. We make him say *Stop it!* by pummeling him, or *Don’t touch me!* by threatening to do so. (p. 33)

Much of our day-to-day behavior is under the functional control of aversive stimulation, and often to our benefit. For example, one reaches for the alarm clock in the morning to terminate the aversive sound, covers his eyes to shield a bright light, turns up the thermostat to remove the cold air, grabs a towel to remove dripping water from his face, and so on. Michael’s (1993) conceptualization of the CMO-R provides clarity as to how aversive motivators are different from S<sup>D</sup>s, and how they affect our behavior throughout each day. There are numerous implications and applications of the CMO-R to many socially significant human behaviors such as problem behavior, social behavior, language acquisition, and self-care skills (e.g., Carbone, Morgenstern, Zecchin-Tirri, & Kolberg, 2007; Langthorne & McGill, 2009; McGill, 1999; Smith, Iwata, Goh, & Shore, 1995; Sundberg, 1993). (See also p. 28, pp. 38–40, pp. 54–55, p. 153, p. 256.)

#### **Point #9: MOs are separate from schedules of reinforcement**

A high rate of behavior can be generated by the manipulation of various schedules of reinforcement (Ferster & Skinner, 1957). For example, a variable ratio schedule of reinforcement for self-injury, aggression, or other



problem behaviors can generate strong and persistent patterns of behavior that may be difficult to reduce (e.g., Lerman, Iwata, Shore, & Kahng, 1996). Strong and persistent behavior can also be a function of powerful antecedent variables such as extreme deprivation, or painful aversive stimulation. In the following passage, Skinner stresses that MO control is not the same as consequential schedule control and should be distinguished as such in an operant analysis of behavior.

When reinforcements are abundant, the individual is likely to be called energetic, enthusiastic, interested, or, in the case of verbal behavior, voluble or talkative. When reinforcements are scarce, he is likely to be called phlegmatic, uninspired, lethargic, dull, discouraged, or, in the case of verbal behavior, taciturn or silent. These differences are often thought of as motivational, but insofar as they are due to differences in amounts or schedules of reinforcement, they may be distinguished from the effects of changes in the level of deprivation or aversive stimulation. (p. 204)

Behavior problems may be exacerbated when variables are combined such as a strong current EO and a history of intermittent reinforcement. For example, a child with a long history of intermittent reinforcement for self-injurious behavior may demonstrate a sharp increase in negative behavior when aversive stimulation is presented (e.g., demands). An effective intervention program may be achieved when both variables are identified and manipulated (e.g., Hagopian, Boelter, & Jarmolowicz, 2011; Hoch, McComas, Thompson, & Paone, 2002). (See also p. 380.)

**Point #10: MOs may involve unconditioned or conditioned variables**

Michael (1982, 1993, 2000, 2007) distinguished between unconditioned forms of motivation (UMOs) and conditioned forms of motivation (CMOs). Michael (2007) identified nine innate UMOs (deprivation related to food, water, sleep, activity, oxygen, and sex; hot and cold temperature regulation, and aversive stimulation). It's important to note that it is the reinforcer establishing effect that is innate, whereas the behavior that is evoked can be

learned or unlearned. For example, food deprivation establishes food as a form of reinforcement, but holding a spoon to eat is learned behavior, while sucking a breast is unlearned behavior. Learned motivators (CMOs) are “a result of an organism’s learning history” (Michael, 2007, p. 384), and are far more numerous, varied, individualized, and subject to constant change than are UMOs. Perhaps one of Michael’s most significant contributions in helping behavior analysts understand and use MOs is his extensive analysis and examples of learned forms of motivation. Skinner identified and distinguished between these two types of MOs throughout *Verbal Behavior*. The following quotation presents an example of a transitive CMO.

To strengthen a mand of this form (“pencil”), we could make sure that no pencil or writing instrument is available, then hand our subject a pad of paper appropriate to pencil sketching, and offer him a handsome reward for a recognizable picture of a cat.... Simultaneously we could strengthen other responses of the same form by providing echoic stimuli (a phonograph in the background occasionally says *pencil*) and textual stimuli (signs on the wall read *PENCIL*). We scatter other verbal stimuli among these to produce intraverbal responses: the phonograph occasionally says *pen and* ... and there are other signs reading *PEN AND*,... We set up an occasion for a tact with the form *pencil* by putting a very large or unusual pencil in an unusual place clearly in sight—say, half submerged in a large aquarium or floating freely in the air near the ceiling of the room.... Under such circumstances it is highly probable that our subject will say *pencil*. (pp. 253–254)

This procedure of manipulating CMOs, along with the use of the other established verbal operants to evoke a mand has led to a fruitful line of research and applications for children with language delays (e.g., Hall & Sundberg, 1987; Shafer, 1994; Twyman, 1996). There are endless applications of CMOs to a wide variety of socially significant human verbal and nonverbal behaviors, and the potential of these forms of motivative variables outside of language instruction for children with autism or other developmental disabilities is just beginning to be realized. (See also p. 45, p. 463.)

**Point #11: MOs may generalize in the same way that stimuli generalize**

Skinner (1953) states that, “induction (or generalization) ... is simply a term which describes the fact that the control acquired by a stimulus is shared with other stimuli with common properties” (p. 134). Generalization is an important topic and fundamental aspect of behavior analysis with a long history of experimental and applied research (e.g., Guttman & Kalish, 1956; Stokes & Baer, 1979). An extension of Skinner’s definition of stimulus generalization to MO generalization might be “control acquired by an MO is shared with other MOs with common properties.” For example, a child may be playing with an iPad and a peer attempts to take it from him. This produces a form of aversive stimulation that may evoke hitting the peer, who then may return the iPad. Later, another peer attempts to take Play Doh from the child, and again hitting behavior is evoked and reinforced. It is not uncommon to soon find that the child begins to hit others under a wide variety of situations where aversive stimulation is present, even minor forms such as not being able to get a straw into a juice box. In fact, hitting may become a generalized mand that transfers to many different states of aversive stimulation and to deprivation as well. This process of MO induction has all defining features of stimulus induction, which Skinner discusses in several sections in *Verbal Behavior*. In the following two examples he describes how mands for attention and self-mands may become generalized.

*Sol, Now!, Now, then!, and Here!* where the common consequence is the response of the listener in paying attention. Since the listener’s subsequent behavior may be relevant to many states of deprivation, these responses come under a rather broad control. Generalized mands reinforced by the attention of the listener are often used in conjunction with other types of verbal behavior. (p. 42)

A self-mand is not as useless as it may at first appear.... *Get up!*, for example, is easier to execute than getting out of bed and less likely to be followed by a cold shock. It may be strong by induction from instances in which we have induced other people to get up, and it may be effective if it increases the likelihood of our getting out of bed by induction from behavior

with respect to other speakers. It might be supposed that self-mands supported only by induction would eventually suffer extinction as the two audiences are more sharply discriminated, but there are continuing sources of reinforcement. (p. 440)

Skinner also suggests that response generalization can occur with MOs. Note his point in the first quotation below that MO evoked response generalization can involve either verbal or nonverbal behaviors.

Aversive conditions which generate verbal behavior as a form of avoidance or escape often generalize to all verbal behavior without respect to form and to nonverbal behavior as well. The characteristics of the compulsive or driven man change as a whole as the aversive stimulation changes. (pp. 212–213)

When a simple tact cannot be emitted, the generalized pressure from silence as an aversive condition may bring out a series of related responses. (p. 219)

Skinner presents many different variations of MO generalization in *Verbal Behavior*, including a detailed discussion on the “extended mand” (e.g., pp. 46–51). He also points out the role of MO generalization in a number of other important topics such as emotion (e.g., pp. 215–216) and the autoclitic mand (e.g., p. 321). In addition, he suggests in the following quotation that MOs can alter the evocative effects of stimuli through multiple control (see point #25) and stimulus induction.

The lone man dying of thirst gasps *Water!* An unattended king calls *A horse, a horse, my kingdom for a horse!* These responses are “unreasonable” in the sense that they can have no possible effect upon the momentary environment, but the underlying process is lawful. Through a process of stimulus induction situations which are similar to earlier situations come to control the behavior, and in the extreme case a very strong response is emitted when no comparable stimulus can be detected. (pp. 47–48)

The point that an MO can affect stimulus generalization is an important element of behavior analysis. Lotfizadeh, Edwards, Redner, & Poling (2012) conducted a review of the existing experimental literature on the effects of various MOs on stimulus control, and con-

firmed, among other things (see point #25), Skinner's suggestion that MOs can produce stimulus generalization in a graded fashion. Research on MO generalization is just beginning (e.g., Lechargo, Carr, Grow, Love, & Almason, 2010), and will undoubtedly produce many valuable applications.

(See also p. 41, p. 54, p. 171, p. 200.)

**Point #12: Drugs, alcohol, sleep deprivation, illness, physical exhaustion, and aging can be MOs**

Skinner identified several other variables that have effects similar to deprivation, satiation, and aversive stimulation, and thus should be classified as MOs. Throughout *Verbal Behavior* he provides a number of examples of these additional variables (e.g., drugs, alcohol aging, sleep deprivation) that can increase (EO) or decrease (AO) the reinforcing effectiveness of any number of previously established forms of reinforcement. In the following quotations Skinner identifies some of these additional types of MOs.

Verbal behavior in illness or great fatigue is less likely to be edited, not only because it is not clearly enough characterized, but because the editing function is also weakened. Something of the same effect is produced by various drugs, including alcohol and the so-called truth serums, which have in addition the effect of allaying the anxiety associated with punished behavior and therefore reducing the tendency to withhold responses. (p. 390)

There is a growing body of research on these other types of MOs (e.g., Laraway et al., 2003). Research has demonstrated that stimulant drugs reduce the reinforcing effectiveness of food (e.g., Julien, 2001; Northup, Fusilier, Swanson, Roane, & Borrero, 1997). Sleep deprivation can function as an MO that increases the value of food as a form of reinforcement, while simultaneously reducing the value of praise as a form of reinforcement (e.g., Horner, Day, & Day, 1997). It is of interest to note that in the Horner et al. study, that sleep deprivation produced multiple MO effects that combined with S<sup>D</sup> effects (see points #21–27). Specifically, these authors found that the probability of problem behaviors were highest when EOs and S<sup>D</sup>s were

combined, versus conditions where each variable was presented independently. However, staying consistent with Skinner's analysis of aversive stimulation as a type of MO, the "S<sup>D</sup>" presented in the Horner et al. study (i.e., physical interruption and waiting) would be classified as an MO; thus, it would be an MO + MO condition. It could be said that when one is sleep-deprived, previously neutral or even reinforcing events may become aversive events. This effect is often apparent in the sleep deprived baby who no longer wants to play, often referred to as being crabby or needing a nap. This is an important effect in that it suggests that one MO can affect another MO (see point #25). Horner et al. conclude that research on the establishing operation and its relation to problem behavior "will prove to be a fruitful research focus" (p. 612). (See also p. 64, p. 147, p. 154, p. 159, pp. 212–213, pp. 218–219, p. 295, pp. 371–372, pp. 381–382, p. 412, p. 441.)

**Point #13: Much of what is termed "emotion" involves an MO effect**

Skinner's treatment of emotion is much the same as his treatment of drive, motivation, feelings, intent, and other mentalistic explanations of behavior (see Skinner, 1974, chap. 10). Beyond its common mentalistic assignment of causality, Skinner suggests emotion, from a behavioral point of view, is not one single functional relation, but rather can involve a number of different respondent and/or operant relations. For example, USs, such as a charging bull can elicit URs such as an increased heart rate or sweating, that may be identified as an innate (respondent) emotion of fear. Neutral stimuli can also be paired with USs and elicit similar fear responses, but due to a specific conditioning history (CS-CR relation). Emotions can also involve operant relations. Michael (2004) noted, "Skinner's concept of emotional predisposition identifies an operant aspect of emotion, as a form of motivating operation (although he did not use this term)" (p. 59). Skinner distinguishes between respondent and operant emotion (see also Skinner, 1953, pp. 152–160), as well as combinations, in the following quotations. Note his analysis of operant emotion as a function of MOs in the second quotation.

Emotional stimuli not only elicit responses, they establish dispositions to behave which comprise a more practical part of the field of emotion. The result is a change in probability that the organism will behave in a given way, and this change may or may not be accompanied by the glandular and smooth muscle responses classically regarded as the emotion. Important cases are dispositions to react favorably or unfavorably toward the speaker or some other person. Verbal stimuli may generate not only the emotional reflex pattern of anger, but anger as a predisposition to attack someone. Verbal stimuli do not originally have such an effect; the effect is acquired according to the classical conditioning paradigm. (p. 158)

When we “arouse an emotion,” we alter the probabilities of certain types of responses. Thus, when we make a man angry we increase the probability of abusive, bitter, or other aggressive behavior and decrease the probability of generous or helpful behavior. The effect resembles that of a state of deprivation or satiation or a condition of aversive stimulation. The only difference is in the composition of the classes of responses affected. (p. 216)

Skinner (1953) dedicates an entire chapter of *Science and Human Behavior* to the topic of emotion (chap. 9), as do Keller and Schoenfeld (1950, chap. 10). And in *Verbal Behavior* Skinner uses the term emotion or some variation of that term 154 times. His discussion and multiple analyses and examples of emotion are spread throughout the book, much in the same manner as the other MOs. Operant emotions are complex, and like the other MOs, often involve multiple control and private events (see Skinner, 1974, chap. 10). In addition, any single emotional condition may involve a combination of respondent and operant relations, as pointed out above. (See also pp. 31–33, p. 39, p. 155, pp. 213–218, p. 316, p. 372.)

**Point #14: Most behavioral relations involve a four-term contingency that includes MOs**

Implicit throughout *Verbal Behavior*, and behavior analysis in general, is the fact that there must be an MO in effect in order for reinforcement to increase behavior and establish stimulus control. Thus, most functional relations involve both  $S^D$ s and MOs. For

example, in order for a blanket or warm fire to function as reinforcement and be effective in establishing stimulus control, a person must be deprived of warmth. This effect is different from multiple control in that these two separate antecedents do not combine to control the form of a particular response, although they could (e.g., a response that is part mand and part tact). The role of the MO in the four-term contingency involving stimulus control is to establish the reinforcement (positive or negative) as an effective consequence allowing behavior to be brought under the control of a stimulus. Skinner identifies the role of the MO in the establishment of stimulus control, but uses the more general terminology of “broad conditions.” Nonetheless, the fourth term, the MO, is given causal status in evoking behavior.

A given form is brought under stimulus control through the differential reinforcement of our three-term contingency. The result is simply the probability that the speaker will emit a response of a given form in the presence of a stimulus having specified properties under certain broad conditions of deprivation or aversive stimulation. (p. 115)

Michael (2004) provides a more precise definition of the four-term contingency involving the MO and the development of stimulus control.

The necessary conditions for the development of an  $S^D$  relation are as follows. With  $S^D$  present a type of R must have been followed by reinforcement relevant to some particular MO which was in effect at that time (otherwise the response consequence would not have been effective as reinforcement); with  $S^D$  absent (the S-delta condition) the response must have occurred without reinforcement, and the MO relevant to the unavailable reinforcement must also have been in effect during this extinction responding. (p. 59)

The concept of a four-term contingency has implications for a variety of teaching arrangements, especially those that focus on establishing various types of stimulus control in discrete trial teaching. If the relevant MO is not in effect for a targeted form of reinforcement, then it would be quite difficult to establish stimulus control. This problem occurs frequently in applied settings where what is assumed to be

a form of reinforcement may have little value for the learner (e.g., praise), thus making it hard to establish stimulus control. In addition, the demand (see point #17) may weaken any existing MO, thus exacerbating the problem. It is also possible that the lack of an MO for a putative form of reinforcement, combined with the high demand create a form of aversive stimulation that evokes avoidance or escape behavior, especially for a participant with a history of reinforcement for such behavior. Preference assessments and other ways of assuring specific EOs are at strength may be a critical component of any intervention program. However, there are no guarantees that any one of the items tested in a preference assessment will be effective at a later time when perhaps other competing MOs are in effect, or values have changed for other reasons.

(See also pp. 37–38, pp. 52–53, p. 147.)

**Point #15: There can be many different levels of any single MO**

Skinner (1938) demonstrated that different levels of deprivation and satiation affect behavior. For example, rats that had been food deprived for 24-hours were either given 0, 2, 4, or 6 grams of food immediately prior to sessions. The cumulative response rate during the session was the lowest for the rats receiving 6 grams of pre-session food, and increased systematically under conditions of less pre-session food. In a related experiment, Skinner (1938) showed similar differences in performance as a function of total hours of food deprivation. Skinner then replicated these effects across other forms of motivation, such as water deprivation and activity restrictions.

Skinner notes that, “deprivations and aversive stimulations ... vary from day to day or moment to moment” (p. 438). In fact, MOs can vary tremendously as a function of any number of variables. For example, the mere passage of time can increase the value of food and water, thus producing gradual EO effects. On the other hand, the reinforcer-establishing aspect can be instant as in the value of cold water after a touching a hot stove. The response requirement related to obtaining the reinforcement also plays a role in the changing level of the MO. For example, a person who is hungry may settle

for what they have at home rather than going out in the cold to a store or restaurant that is some distance away (see point #17). MOs may also compete with each other, such as the value of a vacation versus a new stereo when funds are limited. In the following quotation Skinner makes the point that many of the dynamic properties of our behavior (manding in this example) are a function of the level of the relevant MO.

The energy level of the mand may vary from very faint to very loud, and the speed with which it is emitted when the occasion arises may vary from very fast to very slow.... These properties vary as the result of many conditions in the past and present history of the speaker. Particularly relevant are level of deprivation and intensity of aversive stimulation and the extent to which a given listener or someone like him has reinforced similar responses in the past (or has refused to do so). (p. 43)

It is typically difficult to quantify the level of any specific MO, primarily due to privacy issues (see point # 4). Some unconditioned MOs such as those related to food, water, and temperature regulation may be easier to quantify than those related to conditioned MOs such as a the value of a video game, new furniture, or a piece of art. Nonetheless, given the important role that varying levels of MOs play in our everyday behaviors, any work in the direction of MO quantification could benefit applied behavior analysis. The four methods for learning to talk about private events that Skinner (1957) presents (pp. 131–138) may be a helpful start, especially those related to public accompaniment and collateral responses.

(See also pp. 31–33, p. 53, p. 106, pp. 147–148, p. 217, pp. 219–220, p. 234, pp. 254–255, pp. 273–274, p. 399, p. 402, pp. 438–439, p. 444)

**Point #16: MOs can control large and long-lasting behavioral repertoires**

A single MO can control large and complex behavioral repertoires that may last for long periods of time. For example, an MO to produce a movie can take years to satisfy. One may become “obsessed” with the project, often neglecting other aspects of his

life. It may require great financial support allocated to the project at the expense of basic needs. These types of MOs can permeate many aspects of one's life. Some people want children, others don't, some aspire to be a significant contributor to saving the planet from global warming, write a novel, build their own sailboat, or stop a piece of legislation from passing. These types of MOs are complicated, elusive, and difficult to measure, yet they are a common element of human behavior. Two examples are provided below, one related to emotion and one related to politics.

Emotional responses do not involve precise timing. They tend to be slow and long-lasting. The effect of a verbal stimulus in generating emotional behavior is relatively independent of time and seldom leads to fatigue. (p. 158)

Holding the floor is an example of behavior under aversive control. The reinforcement of a filibuster is the avoidance of legislative action by the opposition. (p. 200)

When compared to MOs, S<sup>D</sup>s characteristically evoke relatively smaller units of behavior. Often S<sup>D</sup>s have a much clearer and precise onset and offset, and occur with tight temporal contiguity in a discrete pattern, whereas MOs may last for hours, days, weeks, months, and years. While certainly stimulus control can become quite complex, a single antecedent variable does not typically control behaviors that are as complex as those related to many types of MOs.

(See also p. 42.)

**Point #17: The response requirement may alter the strength of an MO**

It has been demonstrated in the experimental literature that when deprivation and consequences are held constant, an increase in response effort affects performance. For example, Alling and Poling (1994) showed that "increasing the amount of force required to make a response decreased the rate of responding, increased the post reinforcement pause, and increased all IRTs in the ratio" (p. 340). It has also been demonstrated that there is a direct relation between response

effort and deprivation level. For example, Brackney, Cheung, Neisewander, and Sanabria (2011) showed that "Motivation is a function of both incentive (deprivation) and response. Response cost may influence operant motivation as shown by the effects of motoric manipulations.... Motivation ... may be raised by depriving the animal of food ... (or) ... by reducing the energetic cost of the activities that yield food" (p. 34). Skinner makes this point in *Verbal Behavior* where he identifies that resolutions may be hard to keep because of the changing nature of the relation between a target response and MO values.

A "resolution"... can be made now when appropriate contingencies, possibly involving aversive events, are powerful, whereas "not smoking for three months" requires three months for its execution, during which time the underlying deprivation or aversive stimulation may change. (p. 44)

A common problem faced by those working with individuals with special needs is balancing the response requirement with the MO value and its related consequences. Too much response effort or demand may quickly reduce the MO value. For example, a child may demonstrate behavior indicating the value of an iPad is strong by intensively playing with it smiling, laughing, and refusing to give it to anyone else when asked to do so. However, when asked to sit at a table and work on academic tasks in order to earn access to the iPad, the child no longer wants the iPad. It is not uncommon then, to observe that when the iPad is available noncontingently, the child immediately plays with it as before. Careful manipulation of the MO level in relation to the response effort is often a critical element of a successful intervention program.

(See also p. 412.)

**Point #18: Generalized conditioned reinforcement provides for a way to break a response free from MO control**

Motivative operations are ubiquitous in our everyday behavior. However, problems can arise when behavior is predominately under the control of MOs versus S<sup>D</sup>s. There are many examples of human behavior that demonstrate the dominating effect of MOs,

such as constant nagging, hidden agendas, being “self-centered,” and one who distorts the facts. In early language acquisition, much of a child’s verbal repertoire is under MO control and involves manding, however, excessive manding may be “likely to move the listener to revolt” (Skinner, 1957, p. 41). A person who is only concerned about his own MOs becomes a burden on listeners and is ultimately avoided by them. Thus, it becomes important to break some aspects of human behavior free from the primary control by MOs. Skinner suggests that one way of accomplishing this is through the use of generalized conditioned reinforcement.

But generalized reinforcement destroys the possibility of control *via* specific deprivations. (p. 212)

In the tact, however, [as well as in echoic, textual, and intraverbal behavior] we weaken the relation to any specific deprivation or aversive stimulation and set up a unique relation to a discriminative stimulus. We do this by reinforcing the response as consistently as possible in the presence of one stimulus with many different reinforcers or with a generalized reinforcer. The resulting control is through the stimulus. (p. 84)

We may use our generalized reinforcer to strengthen response *a* in the presence of stimulus *a*, response *b* in the presence of stimulus *b*, and so on. Whether the speaker emits response *a* or response *b* is no longer a question of deprivation but of the stimulus present. It is this controlling relation in verbal behavior which proves to be of great importance for the functioning of the group. (p. 54)

This procedure of transferring control from an MO to an S<sup>D</sup> by using a generalized conditioned reinforcer is a valuable component of a language intervention program for individuals with language delays (Sundberg & Partington, 1998). While it is important to establish manding early on in an intervention program, eventually the other verbal operants must be developed. Skinner also notes that control can be transferred from the MO to the S<sup>D</sup> “by reinforcing a single form of response in ways appropriate to many different states of deprivation. If we have reinforced a selected response with food when the organ-

ism is hungry, we may also reinforce it with water when the organism is thirsty” (p. 53). (See also p. 32, p. 79, p. 83, pp. 151–154, pp. 212–219.)

**Point #19: MOs associated with specific reinforcement are different from those associated with generalized reinforcement**

Skinner distinguished between the mand and the other types of verbal operants in terms of their different antecedents and consequences. As previously mentioned, MOs are the primary antecedent source of control for the form of the response in the mand relation, while S<sup>D</sup>s are the primary source of control for all the other verbal operants. There are different consequences related to this distinction as well. Skinner notes that, “a mand ‘specifies’ its reinforcement” (p. 36). By “specify” Skinner means that the reinforcement is related to a specific MO. For example, the mand form “I’m hungry” specifies an MO related to food deprivation and the effectiveness of food as a form of reinforcement. With the other verbal operants “we weaken the relation to any specific deprivation or aversive stimulation ... by reinforcing the response ... with many different reinforcers or with a generalized reinforcer” (p. 84). The type of consequences for these other verbal operants has been termed “nonspecific reinforcement” and contrasted with “specific reinforcement” (Saunders & Sailor, 1979; Stafford, Sundberg, & Braam, 1988). The underlying MOs related to each of these different types of reinforcement are different as identified by Skinner in the following quotation.

A verbal response may change the level of the appropriate deprivation. The reinforcement of a mand, for example, usually has this effect.... The states of deprivation associated with generalized reinforcement cannot be altered in this way. The listener may instantly reduce a threat or other form of aversive stimulation as the consequence of a single response, but a single instance of *positive* generalized reinforcement must have only a negligible satiating effect. (p. 220)

There are many advantages to behavior that is maintained by generalized forms of

reinforcement. Perhaps the most significant is that responding is not dependent on any single form of deprivation or aversive stimulation. If all one's behavior were related to food deprivation (e.g., a rat or pigeon), the development of stimulus control and other important functional relations would be difficult during periods of food satiation. In addition, behavioral patterns would be susceptible to spurious changes as a function of changes in MO levels in a single experimental session. An important point about generalized conditioned reinforcers made by Michael (2004) in the following quotation is that they are not totally free from control by MOs.

When a neutral stimulus is paired with several different kinds of reinforcement or punishment under several different relevant motivating operations, the stimulus will function as a conditioned reinforcer so long as any one of the original motivating operations is in effect. (p. 67)

Thus, if the phrase "good job" is targeted for use as generalized conditioned reinforcement it must be established as such under a variety of MOs and reinforcement deliveries (e.g., physical contact, toy play, attention), which is common practice. However, for "good job" to be effective in increasing behavior in any specific discrete trial, at least one of those MOs must be in effect. One must also consider the effects of the possible presence of an aversive MO (e.g., demand) on the reinforcing effectiveness of "good job." Research on MOs relevant to generalized reinforcement is quite limited, but could have a significant impact on many aspects of human behavior. (See also p. 53.)

#### **Point #20: MOs control nonverbal behavior**

Despite Skinner's (1957) primary focus on verbal behavior, he discusses nonverbal behavior throughout the book. In some cases he provides critical distinctions between the two as behaviors, but also as antecedents (i.e., verbal versus nonverbal stimulus control). These distinctions can be observed in his analysis of the separation of the elementary verbal operants, and his analysis of listener behavior. However, an important

element of Skinner's whole enterprise into the analysis of language is that the same principles of behavior initially developed with nonverbal behavior apply to verbal behavior. Michael (1984) noted that, "While Skinner was working on the basic methods and relations that would be presented in *The Behavior of Organisms* (1938) he was already convinced that these same principles were necessary and sufficient for understanding human language" (p. 364).

The MO represents an excellent example and academic exercise of how the same basic principle of behavior can evoke verbal as well as nonverbal behavior. In fact, much of what we do nonverbally throughout the course of a given day is a function of MOs. Skinner provides several examples of the functional similarities between verbal and nonverbal behaviors controlled by the same MO, such as the one presented in the following quotation.

We control the response, not by further reinforcement, but by depriving or satiating the child.... Nonverbal responses are controlled in the same way. Whether a door is opened with a "twist-and-push" or with an *Out!*, we make the response more or less likely by altering the deprivation associated with the reinforcement of getting through the door. (p. 32)

Our nonverbal behaviors make up a significant portion of our daily behaviors, and MOs are a primary source of control for many of them. For example, showering, getting dressed, preparing breakfast, looking for car keys, scraping ice off of a windshield, buying gas, exercising, and so on are all behaviors that are primarily a function of MOs. Although, more often than not, our daily nonverbal behaviors are multiply controlled by both MOs and S<sup>D</sup>s (see points #21–27). Consider the implications of the MO in teaching any number of nonverbal skills to individuals with autism or other intellectual disabilities. For example, in teaching self-care skills (e.g., brushing teeth, bathing, dressing), the MOs that control these behaviors for typically developing teenagers may have little effect on teenagers with disabilities (e.g., MOs related to positive social reinforcement for a stylish look, or MOs to avoid the social punishment of having body odor or bad breath). The



potential intervention program suggested by Skinner's analysis would be to manipulate the MO, that is, create an MO for self-care skills and bring behavior under the control of that MO, rather than solely under the control of S<sup>D</sup>s. Obvious social problems are probable for individuals who don't care how they look or smell. An empirical line of research guided by Skinner's analysis of the MO in nonverbal behavior could produce substantial improvements in attempts to develop these skills for individuals who need special help. (See also p. 33, p. 54, pp. 454–455.)

**Point #21: MOs participate in many different ways in multiple causation**

Skinner presents the “elementary verbal operants” in the first eight chapters of *Verbal Behavior*, along with a variety of additional important topics such as verbal extensions, automatic contingencies, and an analysis of private events. In these early chapters, Skinner identifies the building blocks for his conceptual analysis of language and complex human behavior that follows in the second half of the book. Beginning with chapter 9 and continuing throughout the rest of the book, he brings the elementary verbal operants back together and provides a detailed analysis of complex human behavior (essentially an expanded version of chapter 14 in *Science and Human Behavior* that is titled “An analysis of complex cases,” but with a focus on verbal behavior). In Skinner's three chapters in *Verbal Behavior* on multiple causation (chapters 9–11) he makes the case that it is rare that any particular behavior is controlled by a single antecedent variable. Skinner also notes that, “It is often difficult to prove the multiple sources, but examples are so common that anyone who has bothered to notice them can scarcely question the reality of the process” (p. 237). The task of a behavior analyst in predicting and controlling behavior is usually identifying these multiple sources of control that may participate in evoking behavior. Chapter 9 is titled “Multiple causation,” and Skinner begins it with:

Two facts emerge from our survey of the basic functional relations in verbal behavior: (1) the strength of a single response may be, and usually is, a function of more than one variable and

(2) a single variable usually affects more than one response. (p. 227)

These two types of multiple control have been termed “convergent and divergent multiple control” by Michael, Palmer, and Sundberg (2011) and often involve MOs as one or more of the sources of control. Skinner presents a number of ways that MOs combine with or compete with S<sup>D</sup>s, USs, and CSs, to evoke or suppress behavior. The following six points (#22–27) contain several of these different ways that MOs participate in the multiple causation of behavior.

(See also pp. 52–53, chapters 9–11.)

**Point #22: Convergent multiple control can involve MOs**

Convergent control involves two or more antecedent variables that combine to evoke a response or class of responses. Skinner provides a number of examples of multiple control involving MOs and S<sup>D</sup>s in the chapters on multiple causation, as well as in many other sections of the book. In the section titled “Multiple variables and the impure tact” (p. 234) Skinner describes how a tact that might be initially controlled by an S<sup>D</sup> may also come to be affected by an MO.

Under a carefully generalized reinforcement, the type of verbal operant called the tact approaches the condition in which its form is determined by only one variable. But insofar as the response is likely to have a special effect upon the listener, it varies in strength with the states of deprivation or aversive stimulation associated with that effect. Stimulus control is reduced ... and in pure fiction may be altogether lacking. ... The function of the mand in coercing the listener to react “with greater belief” to the tact may be carried by a more urgent form of the tact (*It's TRUE!*) which must be attributed to multiple sources. (p. 234)

Much of Skinner's early research on verbal behavior involved convergent multiple control. His work on the verbal summator (Skinner, 1936) involved presenting subjects with “a vague pattern of speech sounds at low intensity or against a noisy background” (p. 260), and then analyzing how these sounds combined with other types of antecedent variables to evoke responses. Some of the additional

antecedent variables he examined were nonverbal stimuli, verbal stimuli, and MOs. The following quotation provides examples of nonverbal stimuli and MOs that combined with the echoic stimuli in his experiments.

Some of the nonechoic variables entering into the determination of such behavior may be identified.... After watching the experimenter adjust two small knobs on the apparatus, one subject reported that the phonograph said *What wheels do you touch?* A distant clock striking the half hour led one subject to report *Half past*. Conditions of deprivation or aversive stimulation associated with such an experiment are also relevant and seem to account for responses such as *Call them louder, Make it closer, Force them harder, and Look out, you're going to sleep.* (p. 267)

One of Skinner's goals was to develop "a device [that] has clinical use as a 'projective test'" (p. 260). While this goal never materialized, a perhaps unforeseen outcome of this research was that it provided the foundation for language intervention procedures for individuals with autism or other developmental disabilities. Many of these procedures are based on Skinner's work on multiple control involving MOs and S<sup>D</sup>s. For example, the basic elements for early mand training for nonverbal children consists of combining an echoic or imitative prompt with strong MOs and salient nonverbal stimuli (Sundberg et al., 1977). (See also p. 46, pp. 52–53, pp. 151–154, pp. 185–186, p. 189, p. 208, p. 227, p. 256.)

**Point #23: Divergent multiple control can involve MOs**

Divergent control involves a single antecedent variable that evokes more than one response. Motivating operations can also produce this type of multiple control, and their effects are similar to those observed with stimulus control. For example, a shoe as a nonverbal stimulus can evoke the tact "shoe," "sneaker," "Nike," or any number of other response forms. A single MO can also evoke a number of different responses, including both verbal and nonverbal responses (Poling, 2001). And, like with S<sup>D</sup>s, the specific response configuration that is emitted usually depends on additional sources of

control that might be present (Michael et al., 2011). Skinner provides an example of divergent control involving MOs and verbal and nonverbal behavior in the following quotation.

When an operant is acquired it becomes a member of a group of responses which vary together with the relevant deprivation. A man gets a drink of water in many ways—by reaching for a glass of water, by opening a faucet, by pouring water from a pitcher, and so on. The verbal operant *Water!* becomes a member of this group when it is reinforced with water. (p. 32)

Divergent control plays an important role in establishing response variation in many different ways. While much of the focus of research on variability has been on stimulus control (e.g., Neuringer, 1986), this line of research could be extended to variability and MO control. For example, if a child has a strong MO to gain access to a dog, but cannot open the door that leads to the dog, this MO may evoke a number of other behaviors. The child may mand for the dog (e.g., "Maggie"), push the door, turn the doorknob, knock on the door, mand "open," and if all fails, mand for help from a parent (problem solving). One MO involving blocked access to the dog can control all these different behaviors.

(See also pp. 151–152, p. 186, p. 227, pp. 234–235)

**Point #24: Different MOs may control the same behavior and be related to the same form of reinforcement (MO functional independence)**

Two different S<sup>D</sup>s can independently control the same response form, and be related to the same form of consequence. For example, the response "book" can be evoked by an actual book (a tact), or the verbal stimulus "you read a ..." (an intraverbal), and result in the same consequence such as generalized praise. There is a growing body of empirical research on the functional independence of operant relations such as those identified in the literature review by Sautter & LeBlanc (2006). The same effect can occur with MOs where two different MOs control the same response

form and obtain the same consequence. In the following quotation, Skinner makes the case that this type of functional independence can occur with MO relations as well.

Suppose, however, that in addition to drinking water our speaker has also used water to extinguish fires. Until we have tested the point, we cannot be sure that a response acquired when he has been reinforced with water while thirsty will be emitted when the wastebasket catches fire. If there is any functional connection, it must be found in certain events common to drinking water and extinguishing a fire. (p. 32)

An important aspect of Skinner's point here is that (1) we cannot assume automatic transfer across MOs, and (2) when transfer does "emerge" without training from an existing operant relation, the "functional connection ... must be found in certain events common" (p. 32). In the water example, both operant relations involve the common nonverbal stimulus of water as a consequence, and also water as an  $S^D$  for the tact "water." A test for emergence might involve an MO for water created by dry joint compound and drywall that needs to be patched. However, for an experimental preparation that might empirically demonstrate independence and emergence, the MOs would need to be developmentally balanced, and probably with an early language learner. (See also p. 187, chap. 11, pp. 361–362.)

**Point #25: MOs can participate in conditional discriminations and in joint control**

Conditional discriminations and joint control represent two special cases of convergent multiple control (Michael et al., 2011). Michael (2004) defined a conditional discrimination as a type of convergent multiple control where "the nature or extent of operant control by a stimulus condition depends on some other stimulus condition" (p. 64). That is, one discriminative stimulus ( $S^D$ ) alters the evocative effect of a second stimulus in the same antecedent event (or vice versa), and they collectively evoke a response. Conditional discriminations have been extensively studied in the experimental literature (e.g., Saunders & Spradlin, 1989; Sidman & Tailby, 1982), but less so in the

applied literature (e.g., Axe, 2008; Sundberg & Sundberg, 2011). Nonetheless, they play an important role in day-to-day human behavior.

Most of the existing research on conditional discriminations involves multiple  $S^D$  relations, but MOs can participate in conditional discriminations as well. For example, food deprivation (UEO) can alter the evocative effect of a refrigerator door handle by establishing it as an  $S^D$  for reaching and pulling, while making the outside door handle an  $S$ -delta for such behavior. A different MO, such as a CEO for the morning newspaper, can establish the outside door handle as an  $S^D$  for reaching and turning, and the refrigerator door handle as an  $S$ -delta for such behavior. In their review of the literature on the effects of various MOs on stimulus control, Lotfizadeh et al. (2012) identified several ways that MOs affect stimulus control and summarized their findings as follows:

Motivating operations influence stimulus control (a) by changing the evocative strength of not just an established discriminative stimulus, but also of stimuli that are physically similar to it; (b) by changing the range of stimuli that evoke the operant in question; and (c) by exerting those effects in a graded fashion. (p. 89)

However, these authors also pointed out that this body of literature is over 20 years old and "the effect of motivation on stimulus control has garnered no recent conceptual and experimental attention" (p. 98). They then suggest several excellent basic and applied lines of research on this important, but "overlooked phenomenon."

It is also possible that a conditional discrimination could occur between two separate MO variables, in that one MO could alter the value-establishing effect of a second MO. For example, an aversive stimulus such as an audit letter from the IRS could increase the value of an accountant's phone number and evoke the relevant locating behavior. The second effect would not be an  $S^D$  effect in that the phone number had been available, but not valuable until the letter arrived (Michael, 1982). In the refrigerator example above, food deprivation establishes a new MO for opening the refrigerator door, and

establishes the handle as an  $S^D$  for reaching and pulling, thus demonstrating the multiple effects of a single environmental event (Michael, 1995).

Joint control is a type of convergent multiple control where two separate antecedent events simultaneously control the same response form, and establish a new  $S^D$  (Lowenkron, 1991; Michael et al., 2011). For example, when looking for a particular video at a video store, one might be covertly engaging in repeated self-echoics stating the name of the video while scanning the array of options. When one of the video titles evokes the same response form as the self-echoic, a new  $S^D$  emerges and evokes video selection behavior. The existing body of experimental research on joint control involves  $S^D$  effects (e.g., Lowenkron, 1991; Tu, 2006), but as with all other types of multiple control, MOs can participate as well. In the following quotations, Skinner provides two examples of joint control involving MOs. One example demonstrates how a CMO-T and textual stimuli combine to evoke a behavior, while the other demonstrates how a CMO-R and textual stimuli combine to evoke a behavior.

We use a self-echoic prompt to strengthen textual behavior when, in looking for a name in a telephone directory [CMO-T], we keep repeating the name as we run down the list. This may have the collateral effect of preventing textual responses to other names which might cause confusion, but it is primarily effective in making it more likely that we will read the appropriate name, possibly “out of the corner of our eye.” (p. 406)

A textual example is supplied by a man who forgot to turn off an electric soldering iron [CMO-R] in his basement workshop and who, thirty-four hours later, upon reading the word *solder*, immediately jumped up, went to the basement, and turned off the iron. “Remembering the iron” was not necessarily verbal, but the effect of the textual stimulus suggests that some response such as *The soldering iron! I forgot to turn it off!* was strengthened. The response might have occurred at any time during the thirty-four hours, but the textual prompt supplied by the printed text proved to be a necessary supplement. (p. 244)

Conditional discriminations and joint control are common in our everyday behavior, yet they have not received the experimental and applied focus they deserve, especially those types involving MOs. Skinner didn’t provide any specific examples of conditional discriminations involving MOs in *Verbal Behavior*, but he came close with “We have seen that the strength of a tact may vary with the clarity or unusualness of the stimulus and with momentary motivational conditions of the speaker” (p. 106). Also, his examples of “conditional mands” provide some direction in this area (e.g., p. 359). There are many potential applications of MOs in these types of complex forms of antecedent control, and several thematic lines of research are possible. (See also pp. 47–48, p. 105, p. 200, p. 234, p. 256.)

#### **Point #26: MOs can be multiple, and can compete with other MOs**

It is quite common to be affected by more than one MO at the same time, and any type of MO can participate. For example, one who has been driving for a long distance may have body pains, be hungry, late for an appointment, have to urinate, and want to smoke a cigarette, but cannot do so due to a passenger’s objection. It is not uncommon for these multiple MOs to evoke emotional behavior that might be described as irritated, cranky, or angry. These variables can also combine with various stimuli in the manner discussed previously. For example, as a function of the driver’s MOs, the evocative effect of the sign “Rest stop” is altered (in the same manner as a typical conditional discrimination), and functions as an  $S^D$  to pull off the highway. Joint control could also occur where a self-mand such as “I need to rest” may be emitted at the same time the driver sees the sign “Rest stop,” and a new  $S^D$  instantly emerges and evokes other behavioral relations, possibly including immediately establishing new MOs (e.g., the value of a cigarette lighter instantly increases). These various complex combinations of MOs and discriminative stimuli occur for all humans, everyday, and in an unlimited number of arrangements, and may have other behavioral effects as well (Michael, 1995).

Motivators may also compete with each other causing other forms of emotional or problematic behaviors. For example, the MO related to climbing the many stairs to the dome at the top of St. Peter's Basilica in Rome may be affected by fatigue or muscle cramps. Some people may turn around despite their strong "desire" to see the beautiful views from the dome. Competing MOs can cause any number of difficulties for people, especially those where the relevant behaviors are completely incompatible with each other. We all experience wanting to do one activity, but at the same time are required to do another. A theme throughout *Verbal Behavior*, especially in the second half of the book, is that human behavior is typically a function of multiple variables that interact with each other, often appearing in novel configurations that consist of multiple MOs, S<sup>D</sup>s, and other related contingencies of reinforcement and respondent relations. In the following quotation Skinner gives an example of the competing MOs that might affect a speaker who is faced with multiple audiences that if encountered individually evoke different repertoires.

Multiple audiences which control different responses or the same response in different ways produce more interesting effects.... For example, it is "hard" to discuss a topic before technical and nontechnical audiences at the same time....the speaker is subject to criticism from the technical audience if his responses are inaccurate or inefficient and from the nontechnical audience if his responses are obscure or unintelligible.... The presence of a negative audience can be detected only in combination with a positive audience, since its effect is felt as a reduction in the strength of behavior appropriate to the latter. (p. 230)

This effect is common for practitioners who may be working with children with autism or other developmental disabilities, and are participating in an Individual Planning Meeting involving both the parents and other professional staff. There may be strong EOs for a consultant to explain the functions of a child's negative behaviors both technically and in lay terms. However, MOs may compete in the manner that Skinner suggested above, and one learns that he can be more

effective by explaining the situation to each audience individually before the meeting in order to prepare them for the joint presentation, thus balancing out the positive and negative.

It is also possible that multiple MOs could control the same response form, but have different consequences. For example, while a couple is shopping one person stops at a shoe store window and says, "I am going to go in and find out how much those shoes cost." There could be at least three possible MOs involving different consequences controlling this response: (1) an MO for information, (2) an MO for money from the other person, and (3) an MO to be left alone to go shopping. There certainly may be others as well (all private events of course), along with various S<sup>D</sup>s that may be involved in any number of ways. As Skinner points out, "the strength of a single response may be, and usually is, a function of more than one variable" (p. 227). (See also p. 444.)

**Point #27: MO control can block, overshadow, or distort stimulus control**

Motivative variables are powerful independent variables and can affect the control previously established by other variables. For example, a strong EO to urinate can dominate a person's complete behavioral repertoire at the expense of all other sources of control. Bathroom seeking behavior is evoked along with establishing new S<sup>D</sup>s (e.g., restroom signs) through the process of conditional discrimination described in point #25. If the EO is extremely strong it may even evoke socially unacceptable behavior such as urinating in public, despite the potential for such behavior to result in strong forms of punishment. At the moment, escaping from aversive stimulation makes nothing else matter. It is not difficult to identify other strong EOs in the day-to-day life of any given individual. Emotional MOs such as those related to love and anger provide additional examples of MOs that can block or distort stimulus control. Skinner notes that a speaker who is affected by strong emotional MOs may not exhibit effective behavior.

The *manner* in which behavior is executed depends upon its strength.

Some emotions, like extreme conditions of deprivation or aversive stimulation, are characterized by uncoordinated behavior. The speaker may stammer, mispronounce, make mistakes in grammar, show solecistic extensions of the tact, and exhibit other signs of being “flustered.” (p. 217)

Many aspects of clinical psychology involve the assessment and development of intervention strategies to help those who suffer from overpowering MOs, such as those related to depression, anxiety, phobias, and the like. Other clinical areas such as helping those with marital, social, or workplace problems can also be related to strong and competing MOs (e.g., infidelity, alcoholism, insomnia). Socially deviant behaviors such as criminal and predatory behaviors, pyromania, kleptomania, and antisocial personality disorders are usually a function of strong and uncontrolled MOs, as are less socially threatening problematic behaviors such as hoarding, agoraphobia, and obsessive behaviors. An analysis of these and other clinical issues in terms of MOs could have a positive impact on assessment and intervention programs.

(See also pp. 41–42, p. 153, p. 220.)

**Point #28: MOs can be manipulated as independent variables in any intervention program**

A hallmark of applied behavior analysis is the manipulation of various independent variables to produce socially significant behavior change on the part of the client or participant (Baer et al., 1968). It is well established that changes in reinforcement, extinction, and punishment can be effective in increasing desired behaviors and decreasing undesirable behaviors. In addition, there are a number of other evidence-based intervention procedures such as stimulus discrimination training, prompting, fading, shaping, chaining, generalization, and so on that make up the field of applied behavior analysis (e.g., Cooper, Heron, & Heward, 2007). Given the status of the MO as a basic principle of behavior and independent variable in behavior analysis (Michael, 2007; Skinner, 1938, 1953, 1957), it should be added to the list of assessment and intervention tools that are available to applied

behavior analysts for producing behavior change (e.g., Carbone et al., 2008; Michael, 1988; Sundberg, 1993; Sundberg & Michael, 2001). In the section titled “Changing motivational and emotional variables” Skinner describes how motivation can be manipulated as an independent variable.

Levels of deprivation and satiation are occasionally manipulated by the speaker in order to strengthen his own verbal behavior. He may use any of the controlling relations of Chapter 8... . A man may also generate aversive conditions from which he can escape only by engaging in verbal behavior, as by accepting an invitation to speak or an advance royalty... . Somewhat less specific is the aversive self-stimulation of shame or guilt, from which the speaker escapes only by responding verbally. The speaker may force his own verbal behavior by plunging into a conversation although he has nothing to say and thus submitting himself to the threat of punishment contingent upon an incomplete remark. (p. 412)

There are many examples throughout *Verbal Behavior* where Skinner describes ways to capture or create MOs for various purposes. These procedures have become the basis for many of the mand training procedures used with children with language delays (e.g., Shafer, 1994). For example, in the following quotation Skinner describes how using an MO and multiple control to establish a mand may facilitate the development of a tact.

One connection may arise from the fact that the events which reinforce a mand often resemble the discriminative stimuli which control a tact. The milk which a child gets with the mand *Milk!* resembles the milk which controls the tact *milk* in response to the question *What is that?* This may facilitate the acquisition of whichever operant is acquired second. (p. 189)

This general procedure of using MOs and multiple control has become a core component in the development of early language skills for children with language delays (e.g., Sundberg & Partington, 1998). Responses are brought under the control of MOs, nonverbal stimuli, echoic prompts and so on, then with transfer of stimulus control procedures (e.g., Terrace, 1963; Touchette, 1971) any one of the controlling antecedents can be faded, and

a response brought under the control of a new type of antecedent. The MO can also be used to help establish any of the verbal operants (e.g., intraverbal, textual, transcription) as well as nonverbal behavior (e.g., self-help, banking) in a similar manner (e.g., Carroll & Hesse, 1987; Drash, High, & Tutor, 1999; McGreevy, 2012; Sundberg & Michael, 2001).

(See also pp. 31–33, pp. 52–54, p. 199, pp. 212–213.)

**Point #29: Many of society’s problems and individual negative behaviors are a result of MOs**

It has been well established that many of the problem behaviors experienced by individuals with intellectual disabilities are a function of various types of MOs (e.g., Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1996). This research could set the stage for the study of a wide variety of problems experienced by humans that are related to MOs. Consider issues such as terrorism, racism, gang violence, marriage infidelity, corporate corruption, and so on. Motivation, in any of its many forms, is undoubtedly at the root of these and a multitude of other human problems. Skinner notes how a simple lie can be a function of an MO overtaking the control of the stimulus (i.e., the facts).

When special consequences produce a complete break with the stimulus, we say that the response is invented or “made up.” Let us suppose that a small child has lost a penny, that he emits the response *I lost my penny*, and that, as a result, a listener gives him a penny. This special action strengthens the response, possibly to such an extent that it will be emitted again when no penny has been lost.... The usefulness of the distorted tact is only temporary, however, because the social system composed of speaker and listener rapidly deteriorates. The community stops giving the child a penny and may even punish him for lying. (p. 153)

Motivation plays a role in the wide range of complex and negative behaviors demonstrated by humans. A behavioral analysis can only contribute to improvements with these issues, much in the same way that it has helped ameliorate the behavior problems

experienced by those with various disabilities. Research on the effects of MOs on the development of various negative behaviors with nondisabled individuals could be of great benefit to society.

(See also p. 217.)

**Point #30: MOs are responsible for the emergence of human language**

Skinner includes an Appendix in *Verbal Behavior* titled “The verbal community.” In this section of the book Skinner addresses, among other topics, “the old question of the origin of language” (p. 461). He asks, “How could a verbal environment have arisen out of nonverbal sources? ... How do new forms of response and new controlling relations evolve, so that a language becomes more complex, more sensitive, more embracing, and more effective?” (p. 461). His answers to these questions are quite interesting and begin with his analysis of how a nonverbal environment can generate verbal behavior, and may have done so as the origin of human verbal behavior. He acknowledges that his analysis is speculation of course, but he suggests several ways that MOs could have produced manding as the first form of verbal behavior. For example, one way is that a mand may begin as a function of USs such as painful stimulation from food deprivation on the part of the infant and a full breast on the part of the mother. These antecedents elicit innate URs such as rooting and sucking. He then suggests that these respondent relations gradually become operant relations through the following process.

We can account for the origin of a verbal response in the form of a mand if any behavior associated with a state of deprivation is an important stimulus for a “listener” who is disposed to reinforce the “speaker” with respect to that state of deprivation. Consider, for example, a nursing mother and her baby. It is possible that there is an innate response of the human female to innate cries of the hungry human infant.... If a hungry infant behaves in some distinctive fashion—let us say, by crying or squirming in response to painful stimulation of the stomach—and if a mother is inclined to nurse her child, perhaps to escape from the aversive stimulation of a full breast, then the baby’s cry

(correlated, as it is, with a tendency to suck) will eventually control the mother's behavior of putting the baby to her breast. . . . Where the baby first cried as a reflex response to painful stimulation, it may now cry as an operant. It is probably not the reflex response which is reinforced but behavior resembling it. . . . The controlling relation which survives is characteristic of a full-fledged mand. (p. 464)

Skinner goes on (pp. 464–470) to suggest several other ways that MOs could have led to the establishment of verbal behavior for early human beings. For example:

A nonverbal environment may produce another kind of mand concerned with the "attention of the listener." Let us say that A is pouring drinks for a group, but has overlooked B. Any conspicuous movement by B, particularly if this produces a noise, will get the attention of A who may then reinforce B with a drink. Once this has happened, the behavior becomes verbal, similar to explicit mands of the form *Look here!* (p. 465)

Skinner also includes examples of how early tacting may have occurred and provides several examples in the Appendix of this verbal operant as well (e.g., p. 467). While the content that Skinner presents in the Appendix is speculation, it does provide guidance on how one might go about establishing a verbal repertoire for a person who has failed to acquire verbal behavior. If manding was the first form of verbal behavior acquired for both our species and individual infants, it seems quite reasonable to target that verbal operant early in an intervention program for a child who is nonverbal. Empirical research is accumulating on this and other points made by Skinner in his "exercise in interpretation" (p. 11). The evidence gathered thus far suggests it was a very fruitful exercise (e.g., Oah & Dickinson, 1989; Sautter & LeBlanc, 2006; Shafer, 1994). (See also p. 45)

## CONCLUSIONS

Motivation, from Skinner's point of view, is a basic principle of behavior that has the same causal status as the other principles such as stimulus control, reinforcement, punishment, and extinction (Keller &

Schoenfeld, 1950; Michael, 1982, 2004; Skinner, 1938, 1953, 1957). However, for a number of reasons the topic of motivation has not received the basic and applied foundation of empirical research enjoyed by the other principles of behavior (Lotfizadeh et al., 2012; Sundberg, 1991, 2004). The topic of motivation is gradually gaining traction in behavior analysis, primarily due to the long-term efforts of Jack Michael. The current paper suggests that it was Michael's strong interest in language and his extended contact with the content from Skinner's book *Verbal Behavior* that provided the source of information and inspiration for his systematic extension and refinement of motivative variables. Most of the 30 points about motivation abstracted from *Verbal Behavior* were regular topics of discussion in Michael's classes, presentations, and writings.

Skinner's book *Verbal Behavior* accomplishes many things, which is probably why it has stood the test of time (Schlinger, 2008). Certainly the behavioral account of human language and its applications to language assessment and intervention programs for children with autism have proven valuable, but there are other less appreciated contributions. The book can be used to teach the reader how to be a more thorough behavior analyst. In *Verbal Behavior*, Skinner took the basic principles of behavior and demonstrated how to apply them to the analysis of virtually any aspect of complex human behavior (e.g., thinking, scientific behavior, epistemology, literature, creativity, emerging relations). He described his book as presenting "an exercise in interpretation" (p. 11) based on "an orderly arrangement of well-known facts" (p. 11). Nowhere else in his writings does he more thoroughly demonstrate how the principles of behavior work. Paramount in this process is his comprehensive treatment of how motivation affects behavior. It is perhaps for these reasons why Skinner (1978) stated, "*Verbal Behavior* ... will, I believe, prove to be my most important work" (p. 122).

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