## Motivating Operations: An Introduction

### Motivation and Psychology

Motivation is an important variable to consider when evaluating the function of behavior. As educators, understanding what motivates children to engage in certain behaviors (or not), allows us to better arrange educational environments and opportunities to encourage the development of new skills.

Psychology offers many theories regarding motivation. Freud introduced the concept of the ID as a "person's instinctual drives; the first component of the personality to evolve" (Parke & Gauvain, 2009). According to Freud the ID works on the "pleasure principle" or the notion that the ID "wants whatever feels good at the time" ("Psychology 101: Chapter 3," 2004). Freud furthers this concept with his theory of "Eros," a life instinct, and a death drive, commonly called "Thanatos." (Kazlev, 2004) According to Freud, these two basic drives influence every motivation human beings experience. ("Psychology 101: Chapter 4," 2004).

Jean Piaget's constructionist view proposes that children are active in their search for knowledge, a viewpoint that rejects the behaviorism theory that children "wait for information (or stimuli) from their environments (Parke & Gauvain, 2009).

Albert Bandura's work on self-efficacy supposes that "most human motivation is cognitively generated" and that people "seek self-satisfaction from fulfilling valued goals and are prompted to intensify their efforts by discontent with substandard performances" (Bandura, 2004).

The concept of motivation, proposed by many psychologists, assumes that "motivation is an internal state or condition (sometimes described as a need, desire, or want) that serves to activate or energize behavior and give it direction" ("Motivation to Learn," 2001). Most traditional psychological theories on

motivation do not examine the role of environmental conditions and their impact on behavior.

## Applied Behavior Analysis

Applied behavior analysis (ABA) is a field of psychology that attempts to identify functional relationships between "the environment and a particular behavior" in order to determine why people engage in particular behaviors (Miltenberger, 2003).   ABA differs from many other branches of psychology in that it does not seek to explain behavior by "making reference to mental events or to internal psychological processes" ("Behaviorism," 2007).  Rather, ABA focuses on "sources of behavior [that] are external (in the environment), not internal (in the mind)" ("Behaviorism," 2007)

ABA utilizes a set of basic principles to analyze and explain human behaviors.  Of these principles, the concept of reinforcement is perhaps the most important in explaining increases in the rate behavior.  Reinforcement is a process that strengthens a behavior and can be either positive or negative in nature.  A positive reinforcer "is an event that, when presented immediately following a behavior, causes the behavior to increase in frequency" (Martin & Pear, 2003).  Negative reinforcement occurs when a behavior results in the removal of an event or stimulus and, consequently, increases the frequency of that behavior in the future (Pierce & Epling, 1999).

ABA attempts to explain the causality of behavior through a three-term contingency developed by B.F. Skinner (Skinner, 1953):

Three-term contingency:  $S^D \rightarrow R \rightarrow SR$

$S^D$ : discriminative stimulus
R : response
SR : reinforcing stimulus

In this contingency, a discriminative stimulus (sometimes referred to as an antecedent) is defined as an event or stimulus that "set the occasion for behavior," a response is the behavior itself, and the reinforcing stimulus is the event or stimulus that follows the behavior and increases the likelihood of the behavior occurring again in the presence of the $S^D$ (Pierce & Epling, 1999).   A

practical example of this contingency: A teacher presents a difficult in-class assignment to a student and the student screams.  The teacher presumes that the student is frustrated and tells him he can take a break.  In this example, the assignment ($S^D$) occasions the student's behavior of screaming (R).  The removal of the assignment and the break from work function as reinforcers for the behavior of screaming when a difficult assignment is presented (SR).

## Applied Behavior Analysis and Motivation

Many behavior analysts have proposed a "4th" term to the traditional three-term contingency, citing the importance of motivation in analyzing human behavior. Behavior analysts believe that motivation is influenced by observable, environmental conditions, rather than internal causal theories proposed by psychologists such as Freud and Piaget.

Skinner, in his, 1938 book *The Behavior of Organisms* devotes two chapters to "Drive" and "Drive and Conditions" (Sundberg & Michael, 2001).  In this work, Skinner argued against the concept of "a drive," proposing the analysis of relationships between environmental events and the behavior they produce, rather than using "internal causal variables" to explain behavior  (Sundberg & Michael, 2001).  Additionally, Skinner theorized that conditions of deprivation and satiation (i.e., being thirsty or full) had an evocative effect on behavior (Sundberg and Michael, 2001).

In 1941, Keller and Schoenfeld published *Principles of Psychology,* in which they expanded Skinner's theories on motivation, continuing to explore the interrelationship between deprivation, aversive stimulation, satiation, and response strength.  Keller and Schoenfeld, first used the term "establishing operations," noting that the term was "more precise than the term 'drive'" in part, because they theorized that conditions of deprivation, aversive stimulation, and satiation "established" a drive in humans. (Sundberg, and Michael, 2001).   The behavior analytic community embraced this term because it implied environmental conditions, not internal events, increase the occurrence of certain behaviors.

Jack Michael revised the theory of establishing operations in a series of papers (Michael, 1982a, 1982b, 1993, 2000).   Michael proposed using the term "establishing operation" (EO) for any environmental variable that: 1) alters the current reinforcing effectiveness of a stimulus, object, or event (establish includes the effect in the opposite direction, abolish) or, 2) alters the frequency of behavior that has been reinforced by the same stimulus, object, or event (and evoke includes an effect in the opposite direction, abate) (Pierce & Epling, 1999). Later, Michael proposed a larger term, "motivating operations," (MO's) to describe both the establishing operations (EO's) and abolishing operations (AO's) (Sundberg, 2001).

   To simplify, MO's momentarily increase or decrease both the effectiveness of a stimulus as a reinforcer, and the behaviors that have led to the acquisition of that reinforcer, depending on how deprived or satiated an individual is of that reinforcer.

Today, many ABA practitioners consider MO's to be antecedent stimuli that evoke behavior:

$$\text{Four-term contingency: } MO/S^D \rightarrow R \rightarrow SR$$

**Types of Motivating Operations**

There are two main MO's that are important to consider when analyzing the effectiveness of a reinforcer.  Deprivation is "the most common establishing operation for primary reinforcement" and increases the effectiveness of many reinforcers (Pierce, Epling p. 36).   For example, a child who has not received a good grade on an exam for some time may be more likely to engage in behaviors that have produced good grades in the past.  This example presupposes that good-grades function as a reinforcer for the child. Being deprived of a good grade establishes a good grade as a reinforcer.

Satiation can also serve as an MO during situations in which an individual has contacted a large amount of a reinforcer.  For example, a child who has just engaged in a large duration of computer play, may be less likely to engage in behaviors that have lead to computer time in the past.  In this scenario, an

extended computer session temporarily abolishes the effectiveness of the computer as a reinforcer.

**Unconditioned Motivating Operations & Conditioned Motivating Operations**

MO's can be unconditioned (UMO's) and conditioned (CMO). Unconditioned MO's are unlearned; for example, humans are born with the propensity to be more reinforced by food when we are hungry than when we are full.  In other words, food deprivation (MO) increases the reinforcing effectiveness of food, without learning.  Other UMO's include:

Being too warm: increases reinforcing value of cooling off

Being too cold: increases reinforcing value of warming up

Water deprivation: increases reinforcing value of water

Oxygen deprivation: increases reinforcing value of oxygen

Sleep deprivation: increases reinforcing value of sleep

UMO's can also have an abolishing affects as the individual becomes satiated:

Becoming warm: abolishes warmth as a reinforcer

Becoming cold: abolishes cooling off as a reinforcer

Drinking Water: abolishes water as a reinforcer

Breathing: abolishes oxygen as a reinforcer

Sleeping: abolishes sleep as a reinforcer

Conditioned motivating operations (CMO's) are learned.  For example, a child is presented with a number puzzle missing all of the number "4's" (CMO).  This increases the reinforcing value of obtaining the number 4.  The child responds by requesting the number 4 from a teacher (R).  The teacher presents the child with the number 4 puzzle piece (SR).   Receiving the puzzle piece abolishes the number 4 puzzle piece as a reinforcer.

In the 4 term contingency:

Puzzle (S$^D$)/Missing the Number 4 (MO: Increase Value of "4" Puzzle Piece) →Child Requests Number 4 (R) → Teacher Presents the Number 4 Piece to Child (SR)

Another example: You press play on your portable CD player and it doesn't work (CMO). This increases the reinforcing value of obtaining batteries. You go find batteries and put them in your CD player (R). Your CD player works again (SR). Placing the batteries in your CD player, abolishes batteries as a reinforcer.

In the 4 term contingency:

CD Player (S$^D$)/Doesn't Work When Play is Pressed (MO: Increases Value of Batteries) →Retrieve Batteries and Put Them In CD Player (R) → CD Player Works Again (SR)

## Motivating Operations and The Classroom

McGill 1999, notes that "the most immediately visible effect of the [MO] is the altered rate of behaviors associated with the relevant reinforcer" (McGill, 1999). In other words, MO's can dramatically and immediately influence behavior. One application of the MO concept is the modification of the behavior of students in a classroom environment.

In order to effectively utilize MO's teachers have to identify reinforcing items or activities that are pertinent to each student. Variability in reinforcers is common. For example, praise, a conditioned reinforcer, may serve as an effective reinforcer for one student but may not be valuable for another. Therefore, it is important, when examining motivating operations, to determine reinforcers that are valuable to the learner. Essentially, these reinforcing items are what will "motivate" the learner to engage in a certain behavior.

Teachers who develop and implement token economies in the classroom sometimes note a decrease in effectiveness as the year progresses. Many teachers anecdotally report that the "system isn't working anymore" or the "class has outgrown it." However, further analysis may indicate that learners are satiated on certain reinforcers and deprived of others. For example, a teacher might allow students to access the computer after earning an arbitrary amount of

tokens for "on task" behavior.  Initially, the reinforcing value of the computer may be high because the learner is not allowed access to the computer at regular intervals (deprivation).  Consequently, being deprived of the computer serves as an MO to comply with "on task" behaviors, since they earn tokens which can be exchanged for computer access (reinforcer).   However, over time the computer may lose it's reinforcing effectiveness through repeated exposures (satiation).  In this instance, being satiated (or "bored") of the computer abolishes the computer as a reinforcer and therefore can decrease behavior that has accessed the computer in the past (i.e., on-task behavior that has earned tokens).

Teachers can manipulate CMO's in order to increase the likelihood of appropriate behaviors in their students.  For example, a teacher might limit exposure to reinforcing items or activities.  This will help to maintain the reinforcing value of these items and the behaviors that are strengthened by their presentation.   In the case of the computer example, the learner's satiation temporarily abolishes the computer as a reinforcer.  However, if a teacher limits the student's access to the computer, either through changing the rate at which the student earns tokens, or offering equally reinforcing alternatives, the MO that evokes "on-task" behavior may remain strong.  Additionally, teachers may give learners a choice in what they can exchange their tokens for.   Providing access to a wide-range of reinforcers will help to create MO's when learners are satiated on specific reinforcers.

## MO's and Problem Behavior

Understanding the MO's that evoke problem behavior can be helpful when analyzing the function of problem behavior.  McGill, 1999, describes three categories of reinforcers for problem behavior: social-positive reinforcement (attention, tangible item), social-negative reinforcement (escape), and automatic reinforcement  (sensory stimulation) (McGill, 1999).  When looking at common classroom behavioral problems, it may be useful to consider these reinforcers as well as the MO's that evoke problem behavior.  For example, a child who continually disrupts during lessons (i.e. yelling out during a lesson, throwing

objects, etc…) may be deprived of attention (CMO) which evokes the problem behavior (R) that results in attention from other students, a teacher conference, or other interaction (SR).  A student who yells "I don't want to do this assignment, it's stupid" may be experiencing the presentation of a difficult assignment as an aversive event (CMO) that occasions the behavior of yelling out (R) that may result in escape from the task; extra time, modification to the work, not having to do it at all (SR).  Below is a modified table from McGill, 1999:

**Reinforcers and Establishing Operations for Problem Behavior**

| Class of Maintaining Consequences | Specific Consequence | Motivating Operation |
|---|---|---|
| Social-Positive Reinforcement | Attention (e.g. reprimand from teacher, a private meeting with teacher to discuss problem, peer attention) Tangible Item | Deprivation of Attention Deprivation of Tangible Items |
| Social-Negative Reinforcement | Removal of signs of worsening set of conditions (e.g. removal of demands, or task avoidance) | Aversive events (e.g., new task, difficult task, high-rate or non-preferred demands) |
| Automatic Reinforcement | Sensory Stimulation | Deprivation of Stimulation |

Examining reinforcers that strengthen and maintain problem behavior, as well as MO's that evoke such behavior, can help teachers arrange educational opportunities that reduce problem behavior.  For example, a teacher who recognizes that a learner is reinforced by attention can provide this learner with opportunities to contact attention for appropriate behavior when the MO for attention is strong.

**Conclusion**

Skinner notes that there "is nothing wrong with an inner explanation [for causes of action] but events located inside a system are likely difficult to observe" (Skinner, 1953).  Therefore, in considering the influence of motivating operations on behavior, as an alternative to motivation theories that focus on behavior "in terms of an inner agent which lacks physical dimension," educators may modify the behavior of their learners in observable, measurable, ways (Skinner, 1953).

An added benefit of considering motivation in terms of environmental rather than internal influences is that educators may be able to predict the behavior of their learners and "identify possible causes of…behavior" (Martin & Pear, 2003).   In addition, understanding MO's can help educators arrange learning opportunities for students that utilize items and events that are preferred by the learner.  This can help in the development of students who are excited and consistently active in their engagement of the learning process.