A summarization of the study from JEIBI:

The Role of the Reflexive Conditioned Motivating Operation (CMO-R) During Discrete Trial Instruction of Children with Autism

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Background:

There has been strong scientific evidence to indicate that the implementation of the principles (Reinforcement, Extinction, Punishment, Stimulus Control and Motivating Operations) Applied Behavior Analysis (ABA) is an effective intervention for children with autism over that of other interventions. Results from such research has demonstrated that children who are taught intensively (25-40 hours per week) following the principles of behavior analysis (as listed above) can make substantial gains in cognitive abilities and developing age appropriate social skills, Lovaas (1987)

The purpose of the research:

Much of the research into the application of ABA for children with autism has emphasized the importance motivating these children to comply with and respond to teacher directed instructional tasks. According to Koegel, Carter and Koegel (1998) motivation is pivotal to the teaching of children with autism; its creation can lead to the development of a wide range of skills.

A fundamental component of intensive ABA programs for children with autism is the implementation of discrete trial instruction. Discrete trial instruction follows the three-term-contingency arrangement as proposed by Skinner (1968). This involves: the presentation of a stimulus by an instructor, the occurrence of the response, and a consequence which follows the response, in order to strengthen or weaken the likelihood of that response occurring under similar conditions. Although discrete trial instruction is highly beneficial in the acquisition of skills, the high demand requirements of this method are the same conditions that typically evoke problem behavior in the form of tantrumming, flopping, high rates of sterotypies, aggression, and self-injury.

Consequently, a thorough conceptual understanding and practical repertoire related to the modification of instructional variables that reduce escape and avoidance maintained problem behavior of children with autism appears essential. The purpose of this paper is to provide an overview of the behavioral analysis of motivation during discrete trial instruction and a re-interpretation of the effects of antecedent variables as motivation operations (MO), and more specifically, the reflexive motivating operation or CMO-R.

The Establishing Operation

The term Establishing Operation (EO) as defined by Michael (1993) describes an environmental event or stimulus condition that makes someone "want something" and leads to actions that can produce to what is wanted. A large amount of problem behaviors (as described earlier) in children with autism during discrete trial instruction may result from a motivation of something (EO), for example, attention, toy, removal of tasks and demands. An EO that increases the value of a conditioned negative reinforcement and evokes any behavior that has led to a decrease in the present aversive condition is known as a Reflexive Conditioned Motivating Operation or CMO-R.

The CMO-R and Teaching Children with Autism

Responding maintained by escape and avoidance of instructional demands accounts for up to 48% of self-injurious and aggressive behaviors of persons with developmental disabilities (Derby et al., 1992; Iwata et al., 1994). These types of escape and avoidance behaviors interfere with learning. This is further complicated when instructions and demands during discrete trial instructions act as a CMO-R (Sundberg, 1993).

Methods to Reduce the Effects of the CMO-R During Discrete Trial Instruction:

1. Programming Competing Reinforcers

Behaviors maintained by negative reinforcement (e.g. the removal of a demand or task to engage in a preferred activity) can be weakened by programming differential reinforcement of alternative behaviors (DRA) or delivering reinforcement non-contingently (via NCR procedures) during high demand situations. Studies investigating participants whose problem behaviors had been acquired and maintained by negative reinforcement, found that by programming concurrent schedules of reinforcement in which task demands were positively reinforced could lead to a decrease in problem behaviors without modifying maintaining contingencies or the use of extinction for problem behaviors. A study by DeLeon et al; (2002) investigated the effects of positive and negative reinforcement on problem behaviors maintained by negative reinforcement with a chained demand. A child with autism was provided the opportunity to choose a positive reinforcer (i.e., potato chip) or negative reinforcer (i.e., break) after completing a scheduled number of responses. When the number of demands was relatively low, the participant reliably chose the positive reinforcer. It appeared that the presence of the positive reinforcer decreased the value of task termination as a reinforcer. However, her preference switched to the break when the number of tasks required for reinforcement increased to more than 10. The authors concluded that the switch to the preference for a break when demands were increased indicated the demands had returned to their initial

status as a CMO-R and therefore increased the value of task removal and evoked the participant's choice behavior of a break.

2. Pairing and Embedding the Instructional Environment with Positive Reinforcement

McGill (1999) suggests paring and embedding the teaching context, materials and personnel with an "improving set of conditions" via the delivery of positive reinforcement. This would reduce the averseness of the teaching environment, thus making escape and avoidance behaviors (often associated with problem behaviors) less likely.

3. Errorless Instruction

Research has illustrated that when students make frequent errors during an instructional task, problem behaviors often occur at a high rate. Instructional methods that reduce the frequency of errors have been demonstrated to reduce the level of problem behavior. "An analysis of these results in terms of motivational variables suggests that errors may function as an MO and increase the reinforcing value of task removal or termination. If the instructor prevents or at least minimizes errors during instruction (i.e., errorless learning) the CMO-R is abolished and students engage in fewer problem behaviors." Errorless learning has been employed via the use of response prompts, antecedent prompts. "The reduction in errors probably functioned as an abolishing operation that reduced the effectiveness of escape as a reinforcing consequence and as a result reduced escape-motivated problem behavior."

4. Stimulus Demand Fading

Instructional demands are often associated with the CMO-R in a number of studies. Such findings have demonstrated that escape motivated problem behaviors can be dramatically reduced by removing demands. However, such an approach would also significantly reduce the number of learning opportunities. Several studies have highlighted that demand fading wherein the instructor delivers one instructional demand at about the midpoint of the session. Over successive sessions, more demands were faded into the session. The results suggested that the fading procedures accelerated the behavior reduction effects of extinction. These results were probably obtained because the original task demands functioned as a CMO-R that increased the value of escape-motivated problem behavior. Removal of demands weakened the MO and decreased escape-motivated problem behaviors. Their gradual re-introduction in some cases did not

create enough of a CMO-R to increase escape motivated problem behaviors. Modifying the rate, difficulty, and effort of responses during discrete trial instruction appears to reduce escape- and avoidance-motivated problem behaviors. Over time, instructors may be able to fade in the rate, difficulty, and effort of demands until high levels of instructional participation are reached without problem behavior.

5. Pace of Instruction

Studies have illustrated that short Inter-Trial-Intervals (ITI) are correlated with reduced stereotypic behaviors and higher correct rates of responding when compared to long ITI. Fast paced instruction has been correlated with less off-task behaviors and higher skill acquisition. "Pace of instruction probably functions as an abolishing operation, reducing the value of escape and avoidance as reinforcers. Specifically, during the ITI, reinforcement is not available and with longer, as compared to shorter intervals, the child receives a lower rate of reinforcement for instructional sessions of equal duration. A recent study by Roxburgh and Carbone (2007) investigated this issue directly and found that during instruction of children with autism, shorter ITIs produced a higher rate of reinforcement and therefore less problem behavior. During long ITIs, the learner likely receives automatic reinforcement for stereotypic behavior. In contrast, instructional demands delivered at a brisk pace reduce the rate of reinforcement available through automatic reinforcement and increases the rate of socially mediated positive reinforcement available."

6. Interspersal Instruction

A number of studies have illustrated that problem behaviors can be decreased by interspersing easy and difficult tasks. Problem behaviors can be reduced during this procedure as the interspersal of "easy tasks functions as a CMO-R because they are correlated with a worsening set of conditions related to low rates of reinforcement, high rates of errors, and higher rates of social disapproval. By interspersing easy tasks with more difficult tasks the value of the CMO-R is reduced. It is recommended to combine extinction with interspersal instruction to ensure its effectiveness (Zarcone, Iwata, Hughes, & Vollmer, 1993). It is also important to avoid presenting easy tasks immediately following problem behavior. If this were to occur, problem behavior would likely be strengthened by negative reinforcement."

Conclusion:

"A thorough understanding of the principle of motivation and an analysis of instructional methods as MOs can provide behavior analysts with a powerful technology for reducing problem behavior during discrete trial instruction. With knowledge of the concept of the CMO-R, behavior analysts may be better equipped to evaluate, select, and implement instructional methods that reduce escape and avoidance behavior exhibited by a large percentage of children with autism and related disabilities."

We hope that this has served as a useful introduction and summary into the concept of the CMO-R.

For a more comprehensive read and further information please download the paper from JEIBI:

www.jeibi.com/JEIBI-4-4.pdf

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