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The Establishing Operation and Teaching Verbal Behavior

Vincent J. Carbone, Carbone Clinic

Twenty years ago Michael (1993) refined and extended the concept of the conditioned establishing operation (CEO). With this paper he updated his previous treatment of the topic (Michael, 1982) by providing terminological refinements and conceptually clear descriptions of the reflexive and transitive CEOs. In the 20 years since the publication of that paper there has been an increase in the application of CEOs as independent variables in the teaching of verbal behavior in applied setting. The purpose of this paper is to provide a brief overview of clinical applications of the EO to the teaching of verbal behavior during the last 20 years.

Key words: applied, establishing operation, motivation, verbal behavior

In 1977, in the midst of W. Scott Wood's graduate course on Skinner's (1957) analysis of *Verbal Behavior* at Drake University, Jack Michael presented an invited colloquium on the relevance of the establishing operation (EO) to the development of a verbal repertoire. My fellow graduate students and I listened carefully to Jack's presentation. None of us could have predicted how the concepts embedded in the ''electrician'' example (Michael, 1982) would ultimately influence our clinical practices when teaching verbal behavior to persons who do not acquire it typically. It was not until the publication of Michael's 1993 paper on establishing operations (EOs) in *The Behavior Analyst* (TBA) that a broader audience of practitioners began to make use of the analysis of motivation as an antecedent variable. The purpose of this paper is to report on the applications of the EO to teaching verbal behavior in applied settings in the 20 years since the publication of that important article.

THE ESTABLISHING OPERATION AND TEACHING VERBAL BEHAVIOR

Michael (1993) provided the field of behavior analysis with a conceptually systematic description of motivation as an antecedent variable. He identified the mechanisms that establish or abolish stimuli, conditions, or events as reinforcers and punishers and behavior that may be subsequently evoked or abated. Since the publication of Michael's 1993 paper there have been three major published reviews of the applied literature on the establishing operation (McGill, 1999; Smith & Iwata, 1997; Wilder & Carr, 1998) and one tutorial (Langthorne & McGill, 2009). Each has focused primarily on the role of the EO in the reduction and replacement of problem behavior. Although teaching an extensive verbal repertoire was not the primary objective, researchers in this area have acknowledged that the replacement behavior taught during functional communication training (Carr & Durand, 1985) is a mand and therefore identification of relevant EOs plays an important role in this research and clinical practice (Brown et al., 2000).

Michael (1993) sharpened the distinctions between unconditioned establishing operations (UEOs) and conditioned establishing operations (CEOs) and therefore set the stage for increased application of the concept within clinical practice. Michael's refinement of the concept of motivation, especially as it relates to CEOs, made it possible for researchers and practitioners to develop methods to effectively teach the mand and other verbal skills to persons with developmental disabilities. At least three important papers (Shafer, 1994; Sundberg, 2004; Sundberg & Michael, 2001) and a book (Sundberg & Partington, 1998) followed the *TBA* paper. These materials provided comprehensive descriptions of how to capture

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Correspondence concerning this article may be addressed to: Vincent J. Carbone, Carbone Clinic, 614 Corporate Way, Suite 1, Valley Cottage, NY, 10989. (e-mail: drvjc@aol.com).

and contrive UEOs and CEOS in applied settings to teach manding to persons who do not acquire this repertoire typically. Beyond mand training the EO is frequently used by skilled language trainers as an independent variable in the initial teaching of echoic, tact, and intraverbal responses (Sundberg, 2004).

REFLEXIVE CONDITIONED ESTABLISHING OPERATION (CEO-R)

In his 1993 article Michael identified the role of the CEO-R in the reduction of problem behavior. Michael defined the CEO-R as:

> Any stimulus condition whose presence or absence has been positively correlated with the presence or absence of any form of worsening will function as a CEO-R in establishing its own termination as effective reinforcement and in evoking any behavior that has been so reinforced. (p. 203)

Iwata, Smith, and Michael (2000) suggested that prior to Michael's writings on the EO antecedent events were identified as setting events or contextual variables with the assumption that any observed change in behavior was due to the effects of stimulus control. Instructional demands are now recognized to function as CEO-Rs and not discriminative stimuli (McGill, 1999; Smith & Iwata, 1997) for problem behavior. The identification of the role of CEO-R in producing interfering problem behavior during instruction has led to greater adoption of antecedent interventions to abolish the CEO-R in applied settings (Langthorne & McGill, 2009; McGill, 1999; Smith & Iwata, 1997). A number of teaching methods to reduce problem behavior have been found to act as abolishing operations leading to increased learner cooperation during high demand instructional sessions. For example, teaching methods that include errorless instruction and task interspersal (Ebanks & Fisher, 2003), instructional choice, repeated tasks, and task difficulty (McComas, Hoch, Paone, & El-Roy, 2000), and fast-paced instruction (Roxburgh & Carbone, 2012) have all been demonstrated to reduce problem behavior by abolishing the value of the CEO-R. For a review of instructional methods that have been found to abolish the CEO-R within language training programs for children with autism see Carbone, Morgenstern, Zecchin-Tirri, and Kolberg, (2010).

TRANSITIVE CONDITIONED MOTIVATING OPERATION (CEO-T)

The CEO-T refers to the arrangement of one EO and a context to condition previously neutral stimuli as reinforcers. As suggested by Michael (1993), most conditioned reinforcement in daily life is established by CEO-Ts. The CEO-T provides an effective mechanism for language trainers in applied settings to condition typically encountered items, activities, and actions as reinforcers through blocked access or interrupted chains and consequently increase the range and sophistication of the mand repertoire of persons with developmental disabilities. Hall and Sundberg (1987) demonstrated the benefit of using an interrupted-chain procedure to teach persons with developmental disabilities to mand for missing items needed to complete a chain of responses that ultimately resulted in access to a desirable item. For example, one participant was taught to mand ''hot water'' when that item was needed to complete a soup recipe but was not readily available. The relevance of the CEO-T to teaching verbal behavior in applied settings has been demonstrated by the fruitful line of applied research that followed Michael's 1993 paper. Two recent studies (Albert, Carbone, Murray, Hagerty, & Sweeney-Kerwin, in press; Sidener, Carr, Karsten, Severtson, Cornelius, & Heinicke, 2010) replicated and extended the work of Hall and Sundberg related to teaching mands for missing items to typical children and children with autism.

Many children with developmental disabilities fail to develop a question-asking repertoire (Sundberg, Loeb, Hale, & Eigenheer, 2002). To overcome this deficit Sundberg et al. contrived the CEO-T to condition information as a reinforcer and then provided information contingent on mands related to the relevant EO. By removing items from their previous locations Sundberg et al. established the reinforcing value of information related to location and taught the mand ''where.'' Once the mand ''where'' was taught these researchers conditioned the name of a specific teacher

as a reinforcer by responding to the ''where'' mand by saying ''I gave it to a teacher.'' The ambiguity of the instructor's response momentarily increased the value of a specific teacher's name as a reinforcer and established the conditions necessary to teach the mand ''who.'' Using a similar interrupted chain procedure, additional researchers have used Michael's (1993) concept of the CEO-T to teach mands for information with preschool children and children with autism (Endicott & Higbee, 2007; Shillingsburg & Valentino, 2011), assess the transfer of mands across EOs (Lechago, Carr, Grow, Love, & Almason, 2010) and settings (Betz, Higbee, & Pollard, 2010), establish derived manding skills for adults with developmental disabilities (Rosales & Rehfeldt, 2007), and test for transfer across verbal operant categories following manual sign and PECS training (Ziomek & Rehfeldt, 2008).

APPLICATION OF THE EO TO SOCIAL DEFICITS

Recently researchers and practitioners have recognized the value of the EO in the acquisition and teaching of social skills to children with autism (Carbone, O'Brien, Sweeney-Kerwin, & Albert, in press; Dube, MacDonald, Mansfield, Holcomb, & Ahearn, 2004; Holth, 2011; Isaksen & Holth, 2009; Taylor & Hoch, 2008). This line of research has grown out of the observation that children with autism often fail to share with others interesting items or events within their immediate social environment through verbal bids for joint attention. This important pragmatic skill appears to be critical in the development of social and language skills (Holth, 2011). Behavior analytic researchers have acknowledged that joint attention responses in typical children are acquired and maintained through the reinforcing effect of social reactions they produce (Carbone et al., in press; Dube et al., 2004; Holth, 2011; Isaksen & Holth, 2009). The failure of joint attention to occur for children with autism may be related to the limited reinforcing value of social attention for these individuals. The most effective demonstration of teaching joint attention with children with autism used a CEO-T arrangement and discrimination training to condition the social reactions of adults as reinforcers for bids for joint attention (Isaksen & Holth, 2009). To accomplish this, social attention was conditioned as a reinforcer by allowing access to preferred items only when an adult was smiling and nodding. Since smiling and nodding was the only condition under which reaching for a desirable toy was successful, smiling and nodding was conditionally conditioned as a reinforcer for any response that produced it and also discriminative for the availability of reinforcement for the reach response. In a related single case study by Carbone et al. (in press) only mands for preferred items that were accompanied by eye contact were reinforced. An increase in eye contact responses was observed. The authors suggested that this arrangement established the reinforcing value of sight of the eyes of the trainer as a reinforcer and evoked the eye contact response. Similar to Holth's (2011) analysis it appeared that the sight of the eyes of the listener not only acted as a reinforcer for the look response but also as a discriminative stimulus for the mand response. This recent line of research involving the EO may provide important solutions to establishing conditioned reinforcers and therefore will avoid teaching ''only mechanistic imitations of meaningful behavior'' (Dube, et al. 2004, p. 205) to persons who don't acquire these skills typically.

The clinical applications of the EO to teaching verbal behavior in applied settings have grown in number and sophistication since Michael's (1993) refinement of the concept 20 years ago. The promise for the future will include research using the establishing operation to develop conditioned reinforcers to teach complex language and social skills to persons with autism and developmental disabilities that are functionally approximate to those of their typical peers.

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