

# A Comprehensive Analysis of Mand Training

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## *Abstract*

Given the high prevalence of speech and language disorders in children, a comprehensive analysis of how one can predict and control verbal behavior related to such delays is warranted. Thus, the intent of this article is to expand upon Skinner's analysis of one specific form of verbal behavior, the mand, by synthesizing the current research and providing a detailed analysis (i.e., elucidating the variables) regarding the functional relations related to teaching individuals to mand. Several mand training approaches are reviewed including: single operant approaches (e.g., incidental teaching, choice making, and interrupted behavior chains) as well as facilitative operant approaches. Moreover, suggestions for effective mand training are provided along with avenues for future research.

Keywords: Verbal behavior, speech and language disorders, mand training

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## *Introduction*

In 1957, Skinner expanded the contention that individuals act on the environment and included the notion that individuals act in two distinct ways: namely on the environment and upon others. It is the action of individuals on others he considered under the umbrella of verbal behavior<sup>1</sup>. In his 1957 analysis, Skinner provided a framework for "understanding" verbal behavior. According to Skinner, one understands verbal behavior when we "can predict the occurrence of specific instances" and "can produce or control such behavior by altering the conditions under which it occurs" (pg. 3). It is this prediction and control of verbal behavior that will allow us to not only understand communication disorders but also inform the way in which treatments are developed and implemented to overcome such deficits.

Speech and language disorders (i.e., disorder related to verbal behavior) refer to problems in communication and related areas and are among the most common disabilities in the United States (US) (Van Dyke & Holte, 2003). Speech disorders are characterized as an impairment of the articulation of fluency, speech sounds, and/or voice; whereas language disorders are characterized as an impairment in comprehension and/or use of spoken, written, or other symbol systems involving either the form, content, or function (American Speech and Hearing Association, 1993). According to the U. S. Department of Education (2004) of the six million plus students served in the public schools' special education programs in 2002, over a million (21.6%) received services for speech and language disorders. However, this is likely to represent an underestimation of actual prevalence of speech and language disorders given that it does not include children who have speech and language delays secondary to other conditions or children who have not started formal education. Moreover, according to the National Institute of Mental Health (NIMH), one of the most concerning disorders faced by parents of children in America is Autism Spectrum Disorder, which is characterized by a significant impairment in social interactions and communication (Strock, 2004).

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<sup>1</sup> The reasons behind Skinner's use of the term verbal behavior rather than speech or language is beyond the purpose of the present article; however, in discussing issues related to speech and language we will use the terms interchangeably and will be working under Skinner's analysis of verbal behavior.

These delays not only represent an important area of human development (i.e., ability to communicate), but research has also documented that children with speech and language delays demonstrate persistent impairments in developmental and functional skills in school not limited to language (Fox, Dodd, & Howard, 2002). In addition, children with speech and language delays have also been shown to experience long-term problems affecting learning, school achievement, and behavior (Laing et al., 2002; Chaimay, Thinkhamrop, & Thinkhamrop, 2006). In fact, problem behaviors are more prevalent among children with language delays than typically developing children (Willinger et al., 2003). Given the prevalence of speech and language delays as well as the comorbid issues related to academic and behavioral achievement, it is not surprising that communication (i.e., verbal behavior) in and of itself is a pressing area in need of evaluation. More specially, a comprehensive analysis of how we can predict and control verbal behavior related to speech and language delays is warranted.

Skinner (1957) provided a theoretical analysis of verbal behavior wherein a number of different functional relations were described in terms of their controlling antecedent and consequent events (e.g., tacts, mands, intraverbals, autolithics, echoic, and textual) in an attempt to provide a framework for the predication and control of said behavior. Much research has been subsequently conducted to elucidate these relations. Thus, the intent of this article is to expand upon Skinner's analysis by synthesizing the current research and to provide a detailed analysis regarding the functional relations related to one specific form of verbal behavior, the mand. More specifically, to elucidate the variables related to teaching individuals to mand.

### *The Mand*

Skinner defined the mand as "...a verbal operant in which the response is reinforced by a characteristic consequence and is therefore under the functional control of relevant conditions of deprivation or aversive stimulation...and...the response has no specified relations to a prior stimulus" (1957, pp.35-36). Subsequently, Michael (1988) further refined the definition of the mand as "a type of verbal operant in which a particular response form is reinforced by a characteristic consequence and is therefore under the functional control of *the establishing operation relevant to that consequence*" and that "has no specified relation to a prior *discriminative stimulus*" (pp. 7). An example might be the response "cookie please." This response is likely to be reinforced by someone providing a cookie and is likely to occur following a period of time in which a child has not had something to eat (especially a sweet). It is important to understand that the response "cookie please" is classified as a mand based on the controlling variables (the establishing operation [EO], the deprivation from sweets, and the consequence or the reinforcer, the delivery of the cookie). Another example might be the response "Mom, where is the umbrella." This response is likely to be reinforced by the mom providing the location of the umbrella and is likely to occur following the child not being able to find the umbrella and needing to go outside while it is raining.

The mand is by far one of the most important of the verbal operants; however, the ubiquity of the mand tends to be underestimated during language training in favor of tacts and receptive language. The importance of the mand is easily pointed out if one only keeps a record of the verbal interactions one produces everyday. In fact, it has been suggested that half of an adult's daily verbal interactions consists of mands including mands for objects and actions as well as for information (Michael, 1988). Moreover, the lack of manding is one of the most common problems experienced by children with speech and language disorders. Thus, the practicality of understanding the controlling variables associated with the mand cannot be overlooked.

Understanding the functional variables associated with each verbal relation has both theoretical as well as practical implications. From a theoretical perspective, the distinction between verbal relations illustrates the importance of considering function in any treatment of language. From a practical

standpoint, it raises questions related to instructional procedures (i.e., speech and language services). For example, Skinner noted that verbal operants are independent response functions, such that the establishment of one form does not automatically result in the appearance of another (see Skinner, 1957 for exceptions such as the generalization of verbal frames). Thus, it is important to not only understand the most effective instructional procedures associated with teaching one relation (e.g., the mand), but to also understand whether instructional procedures designed to establish one relation (e.g., the tact) have any facilitative or inhibiting effect on the emergence of other relations (e.g., the mand). This is especially important since the tact is the most common form of verbal behavior taught in speech services, yet the mand is the most functional for the speaker (i.e., the child).

### *Mand Training*

First and foremost, when trying to teach manding, it is essential to make sure that an EO is in effect at the time of training by either capturing a naturally occurring EO or contriving one (Sundberg, 1993). To capture naturally occurring EOs, a trainer may take advantage of the fact that a child has not had anything to eat or drink in awhile, at which time either food or a drink would function as an effective form of reinforcement for the mand “eat, please” or “drink, please.” If the trainer is not as fortunate as in the above example, then the trainer must set up situations that establish events as an EO for manding.

Sundberg, Loeb, Hale, and Eigenheer (2002) were able to teach children with autism to mand for information by contriving EOs. In manding for information (i.e., asking questions), the relevant EO is an increase in value of the information provided. For example, a child who doesn’t know where their favorite stuffed toy is, might ask her mother “Where is bubala?” because at that precise moment the information regarding the location of the stuffed toy is valuable/or serves as a reinforcer. Sundberg et al. utilized this framework to contrive EOs and train three children to ask “Where” a toy was (experiment 1) in addition to “Who” had the toy (experiment 2). They contrived the EO for the child manding “Where” by telling the child “Get toy” and having already removed the toy from its typical location. They subsequently contrived the EO for the child manding “Who” by telling the child when the child asked “Where”, “I gave it to a teacher.”

Whether taking advantage of naturally occurring or contriving EOs, it is important to note that one should not base mand training on the assumption that an EO is present, but rather make sure to ensure its presence. In fact, several studies have illustrated that functional mands can only be established when relevant EOs are incorporated into the training situation (Bowman, Fisher, Thompson, & Piazza, 1997; Sundberg et al., 2002).

### *Single-Operant Training Approach*

Three broad approaches to train mands using *mand training* have appeared in the literature and rely on either capturing or contriving EOs to produce manding: incidental teaching, choice making, and interrupted behavior chains (see Shafer, 1994 for a review). Incidental teaching is characterized by conducting training trials throughout the day in an individual’s natural environment wherein trials are initiated by the learner instead of in structured teaching sessions in unrelated environments wherein training trials are initiated by an instructor (Warren & Gadzag, 1990). Hemmeter, Ault, Collins, and Meyer (1996), utilized incidental teaching within play activities to increase the use of spontaneous language in 4 elementary students with moderate – mild developmental disabilities. Although incidental teaching is mainly concerned with capturing EOs, trainers should, when need be, contrive EOs by arranging the environment to encourage requests for materials or assistance (e.g., placing preferred items in view but out of reach). Some recommendations for ensuring the success of incidental teaching programs are to capture and contrive EOs to increase manding opportunities throughout the day, take advantage of times during the day when EOs are likely to be in effect and make sure the corresponding

reinforcers are available, identify reinforcers and make them available throughout the day as well as vary them to prevent satiation, and finally, use prompting and provide specific reinforcement versus non-specific reinforcement (Braam & Sundberg, 1991; Stafford, Sundberg, & Braam, 1988).

Choice making procedures usually entail a procedure wherein two or more items are displayed and the learner is asked “What do you want?” and the learner indicates their choice or the learner is presented with an undesirable item and is taught to reject the item by saying “no” (Reichle, Rogers, & Barrett, 1984). Most choice making programs are implemented within an incidental teaching framework. Thus, successful choice making programs will correspond to the recommendations listed for incidental teaching. Namely, make sure to conduct preference assessments prior to training to ensure the relative EO associated with items as well as make sure to vary items so as to avoid satiation. For example, Reichle, Sigafos, and Piche (1989) demonstrated that children respond differentially to the choice making procedure dependent on whether two preferred items are utilized versus one preferred and one less preferred item. Specifically, Reichle et al. demonstrated that when two equally valued items were presented the correspondence of choosing and accepting decreased, whereas when two unequally valued items were presented (one highly preferred and one less preferred) the student showed a high percentage of correspondence of choosing and accepting the correct object.

The interrupted behavior chain is a procedure in which the learner is presented with the opportunity to complete a chain of behavior for which an essential item needed to complete the chain has been withheld (Hall & Sundberg, 1987). For example, in making a PB&J sandwich the learner needs, 2 slices of bread, peanut butter, jelly, and a knife; by withholding the knife, the EO for asking for the knife so that the PB&J can be made and subsequently eaten is established. In the Hall and Sundberg study two behavior chains were utilized: making instant coffee and instant soup. In the making instant coffee-chain the cup for the coffee was withheld, while in the making soup-chain the hot water for the soup was withheld. It is important to remember when utilizing the interrupted behavior chain that completion of the chain itself *must* be reinforcing rather than relying on conditioned-generalized reinforcement (i.e., praise) to maintain the completion of the chain (e.g., the child in the above example has to want to eat the PB&J sandwich in order to make making the PB&J sandwich reinforcing thereby making the absence of the knife an EO for requesting the knife). Moreover, it is recommended to make sure the trainer does not become paired with forms of worsening while manipulating the EO, which would have detrimental effects on the success of the training program.

### *Facilitative-Operant Training Approach*

Research has also been conducted in an attempt to understand whether instructional procedures designed to establish one verbal relation will have any facilitative or inhibiting effect on the emergence of another relation. For example, Drash, High, and Tudor (1999) utilized mand training to establish an echoic repertoire in children with autism. Similarly, Sundberg, Endicott, and Eigenheer (2000) used intraverbal prompts to promote tacts; while Finkel and Williams (2001) evaluated both the effects of textual prompts and echoic prompts on the acquisition of intraverbal behavior. Given the prevalence of teaching tacts to new language learners, it is important to elucidate the effects of such training on whether it facilitates or inhibits the emergence of mands.

Several studies have addressed this question by evaluating the effects of tact training on the emergence of mands. While some researchers have demonstrated a facilitative effect (e.g., Nuzzolo-Gomez & Greer 2004; Petursdottir, Carr, & Michael, 2006; Sigafos, Reichle, & Doss, 1990; Sundberg, San Juan, Dawdy, & Arguelles, 1990; Wallace, Iwata, & Hanley, 2006), others have presented data indicating the contrary (i.e., an inhibitory effect) (e.g., Hall & Sundberg, 1987, Lamarre & Holland, 1985; Sigafos, Doss, & Reichle, 1989; Twyman, 1995). In four of the 5 studies that demonstrated a facilitative effect, the participants had a mand repertoire prior to the tact training that led to the emergence of novel

mands. In the Petursdottire et al. and the Sigafoos et al. (1990) study the trainers were teaching the participants how to tact “new” items, but the participants had an intact manding repertoire for other items prior to the implementation of the study. Moreover, in the Nuzzolo-Gomez and Green study the emergence of novel manding only occurred after the participants were taught to tact and mand other items, thus they all had a functional manding repertoire prior to the emergence of “untrained” mands. In the Sundberg et al. study the participants had previously had an intact manding repertoire but had lost their ability to communicate due to a brain injury and were in fact “re-learning” to communicate. Based on these studies one can conclude that the emergence of novel mands is feasible with tact training if the individual has a functional manding repertoire prior to training.

Moreover, given the existence of a verbal repertoire other procedures may be used to facilitate rapid acquisition of a more extensive repertoire. Skinner (1957) suggested utilizing frames to promote transfer among verbal operant classes, in that a mand frame (e.g., “I want the \_\_\_”) may serve to bridge tacts and mands. In a recent study, Hernandez, Hanley, Ingvarsson, and Tiger (2007) evaluated the effects of differentially reinforcing single-word mands or framed mands on the emergence of novel mands. Their results suggest that training framed mands after the acquisition of single-word mands is likely to result in the emergence of novel mands and should be utilized in speech and language programs to promote such generalization. In addition, research has also supported the notion that the establishment of a mand repertoire can assist in the acquisition of other verbal operants. Carroll and Hesse (1987) demonstrated that alternating mand and tact training facilitated the acquisition of tacts when compared with tact training alone.

Of the research studies that did not demonstrate the emergence of a mand repertoire given the establishment of a tact repertoire, it is unclear whether the mand conditions were optimally designed to facilitate that response function. In the Lamarre and Holland (1985) study, the essential EO was not identified in that the reinforcing nature of the experimenter placing an object on the left or the right was not known. Similarly, in both the Hall and Sundberg (1987) and the Sigafoos et al. (1989) study the reinforcing nature of completing the chain was unknown (e.g., was it reinforcing to ask for the can opener to open the can of soup?, was eating soup reinforcing?). In the Twyman study, given the abstract property of the taught tact (e.g., *whole* crayon), it is unclear whether the abstract property of the object functioned as a reinforcer in and of itself (i.e., the *whole* crayon vs. a piece of a crayon). Given that these studies did not provide evidence that the consequence delivered during the mand condition actually served as a specific reinforcer, it is possible that the influence of tact training on the emergence of the mand went undetected because the relevant EO was not established.

In one of the only studies to date that evaluated the effects of tact training on the emergence of a mand repertoire while ensuring a relevant EO was present, Wallace, Iwata, and Hanley (2006) further support the necessity of either capturing or contriving an EO for the emergence of mands. They taught 3 participants to tact items ranked either highest or lowest in a preference assessment and subsequently tested for the emergence of mands. All participants manded for the highly preferred items (an example of capturing a natural EO) but rarely manded for the nonpreferred item (an example of not capturing or contriving a functional EO). These data suggest that it is possible to utilize tact training to teach a novel manding repertoire, which is in direct opposite of the other reviewed studies and points out the importance of analyzing the relevant variables in effect during training and testing trials.

Taken together these studies suggest that if one wishes to have manding emerge with the use of tact training care must be taken to make sure either the individual has an existing functional mand repertoire (e.g., Petursdottir et al., 2006), or make sure the item used in tact training functions as a reinforcer (e.g., a preferred toy vs. a cup) (Wallace et al., 2006). Other considerations that should be addressed are the mand forms (e.g., single word versus frames) as well as prompting procedures utilized. Moreover, future research needs to address the differences obtained between these studies to elucidate the

various effects of all the relevant variables (e.g., prior verbal behavior repertoires, preferences, and training procedures).

### *Conclusion and Suggestions for Further Research*

The common thread among all of the studies reviewed regarding mand training is the vital nature of the EO. Successful mand training depends upon the ability to capture or contrive EOs. Thus, it is important that this knowledge be disseminated among clinicians that provide services to individuals with speech and language delays and incorporated into training programs (regardless of the specific training approach). The day of teaching a child to label (tact) a picture of a generic book needs to be replaced with teaching the child to tact a preferred toy (e.g., the *Cat in the Hat* book) to facilitate the emergence of multiple verbal operants (e.g., tacts and mands).

Additionally, more research is need with respect to understanding Skinner's notion of functional independence. Research must continue to investigate the conditions under which training in one verbal operant facilitates or inhibits the emergence of additional verbal operants so that clinicians can best use this information to facilitate acquisition of functional language in individuals with communication disorders.

Moreover, given the implications of being able to predict and control verbal behavior on overcoming communication disorders, it is crucial for research to further elucidate the variables that affect the acquisition of verbal relations as well as develop assessment methodologies that account for such functional variations in language. In fact, previous research on assessment-based instruction have demonstrated the link between conducting assessments of individual's relevant repertoires prior to the implementation of treatment as promoting acquisition of, or improvement in, deficient skills (Daly, Martens, Dool, & Hintze, 1998; McComas et al., 1996). To date, only two studies have evaluated function versus form in the assessment of language, namely Bourret, Vollmer, and Rapp (2005) and Lerman et al., (2005). In addition, only one formal assessment methodology has been published and made available to the public for the assessment of functional language with a guide toward intervention (Partington & Sundberg, 1998). It is evident by the lack of information that if practitioners are to advance their knowledge in the predication and control of verbal behavior, research must further develop a functional approach to language assessment that can then inform teaching methodologies. It is time for all practitioners as well as researchers to move away from form and concentrate on function with respect to verbal behavior deficiencies. In fact, such an approach is viewed by many as a valuable alternative to the traditional linguistic conceptualization of language, which focuses on a receptive-expressive distinction rather than a functional distinction (Carr & Firth, 2005; Sundberg & Michael, 2001).

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