Published in final edited form as:
J Dev Phys Disabil. 2010 April ; 22(2): 131–147. doi:10.1007/s10882-009-9181-5.

An Evaluation of Manding Across Functions Prior to Functional Communication Training

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Abstract

The purpose of this study was to evaluate whether destructive behavior and manding were maintained by the same social reinforcers. A summary of 10 participants that met criteria for differentiated functional analysis and mand analysis results were included in this study. All participants were preschool-aged children with developmental disabilities who engaged in destructive behavior. All procedures were conducted in the participants' homes by their parent with investigator coaching. Functional analyses (attention, escape, and tangible test conditions) of destructive behavior and manding were conducted within multielement designs and showed social functions. The functional analysis of destructive behavior and functional analysis of mands identified the same reinforcers for only 2 of the 10 participants. The analysis of mands identified a reinforcer that was not identified by the analysis of destructive behavior for 5 participants (over-identification), did not identify a reinforcer that was identified by the analysis of destructive behavior for 2 participants (under-identification), and identified mixed reinforcers (combination of over-identification and under-identification) for 1 participant. Results suggest that the analysis of destructive behavior and the analysis of mands identified different reinforcers and are not interchangeable.

Keywords

Functional analysis; Mand analysis; Functional communication training

Functional communication training (FCT; Carr and Durand 1985) was developed to replace destructive behavior with appropriate communicative behavior (mands) as a means of obtaining reinforcement. Thus, when implementing FCT, the mand produces reinforcement whereas reinforcement is withheld for destructive behavior. For example, if destructive behavior is determined to be maintained by negative reinforcement, then FCT is implemented by placing destructive behavior on extinction and providing negative reinforcement (e.g., a break from the work task) contingent on the targeted mand.

FCT is currently the most frequently published function-based intervention for problem behavior (Tiger et al. 2008) and has proven to be an effective intervention across both positive and negative reinforcement functions (Peterson et al. 2005; Shirley et al. 1997). It has been implemented successfully across distinct problem behaviors (Bowman et al. 1997; Durand and Carr 1991; Volkert et al. 2009), communication modalities (Carr and Durand 1985; Durand 1999; Shirley et al. 1997; Wacker et al. 1990), subgroups of children and adults with disabilities (Carr and Durand 1985; Durand and Carr 1991; Shirley et al. 1997), and across settings such as children's homes (Wacker et al. 2005), residential settings (Shirley et al. 1997), inpatient

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units (Bowman et al. 1997; Wacker et al. 2009), outpatient clinics (Brown et al. 2000), schools (Carr and Durand 1985; Durand and Carr 1991; Peterson et al. 2005), and community settings (Durand 1999).

One likely reason for the success of FCT is that most FCT treatments are based directly on the results of a functional analysis (Bowman et al. 1997; Shirley et al. 1997; Tiger et al. 2008; Volkert et al. 2009; Wacker et al. 1990). Identifying the function of problem behavior permits researchers to disrupt the response-reinforcer relations for problem behavior (e.g., via extinction) and to contingently provide the identified functional reinforcers for appropriate mands. Numerous studies (Durand and Carr 1992; Northup et al. 1991; Shirley et al. 1997; Volkert et al. 2009; Wacker et al. 1990) have shown that the display of mands and problem behavior covary when both are maintained by the same class of reinforcement.

Previous studies on mands in the FCT literature have evaluated factors that increase the probability that a mand will be selected over problem behavior in the relevant functional context. Evaluations have included analyses of individual preference for mands (Richman et al. 2001; Winborn-Kemmerer et al. 2009; Winborn et al. 2002), independent use of distinct mand topographies (Ringdahl et al. 2009), and identification of mands in the existing repertoire (Grow et al. 2008). Northup et al. (1991) directly evaluated the relation of mands with destructive behavior in an outpatient clinic by conducting a brief functional analysis of mands called a “contingency reversal.” After first conducting a brief functional analysis of destructive behavior, the researchers then evaluated if mands were maintained by the same reinforcers. The results showed that the reinforcers maintaining destructive behavior also served to reinforce mands. However, these researchers did not evaluate if the mands were also maintained by other functions.

In previous studies on mands in the FCT literature (e.g., Brown et al. 2000; Grow et al. 2008; Northup et al. 1991), the evaluation of mands has almost exclusively included only those functional conditions that were identified via a functional analysis of destructive behavior. Thus, it remains unclear if mands are maintained by the same reinforcers that maintain problem behavior prior to the implementation of FCT. If mands and destructive behavior were shown to be maintained by the same social functions, then perhaps analyses of mands could be substituted for functional analyses of destructive behavior prior to implementing FCT. In the current investigation, we evaluated whether mands and destructive behaviors were maintained by the same functional classes of reinforcers prior to implementing an FCT intervention.

Method

Participants and Settings

Ten children who were participants in a federally funded research project (Wacker et al. 2004) were included in this study (the functional analyses for 3 of the participants’, Ray, Andy and Tina, were previously published in Wacker et al. 2009, in press; Harding et al. 2009). All children had been referred to the project by the staff of the University of Iowa Children’s Hospital behavioral outpatient clinics. Criteria for inclusion in the project were that (a) the children were 6 years old or younger, resided within 150 miles one way of the University of Iowa Children’s Hospital, had developmental delays, and displayed destructive behavior maintained by negative reinforcement; and (b) parents provided informed consent. The criteria for inclusion in the current investigation were that (a) procedural integrity for both the functional and mand analyses was at least 80%, and (b) differentiated functions for destructive behavior in the functional analysis and independent manding in the mand analysis could be identified using the methods described by Hagopian et al. (1997).

The children ranged in age from 1 year 8 months to 4 years 6 months (Mean=3 years 3 months). During an initial interview for the project, parents were asked to indicate any formal medical diagnoses, level of their child's intellectual functioning, topographies of communication used by their child, and to rank order behavior topographies of concern. Table 1 shows the demographic characteristics of these children. Diagnoses included physical medical conditions (e.g., Peter's anomaly) and genetic syndromes (e.g., fragile X). The children's intellectual functioning ranged from developmental delay to moderate mental retardation. All children displayed destructive behavior (e.g., self-injury, aggression, property destruction) and some degree of communication (e.g., single words, signing, pointing). Table 2 (destructive behavior) and Table 3 (communication) provide specific topographies of behavior for each child.

All assessment sessions were conducted in the living room or bedroom of the children' homes. Home visits for all children were conducted for 1 h on a weekly basis throughout enrollment in the study. The children's mothers and Ray's father served as therapists with coaching from investigators during all sessions. All sessions were videotaped for subsequent data collection and analysis.

Materials

Preferred and non-preferred toys were used during all conditions based on both parent report and a free operant preference assessment (Roane et al. 1998). A non-preferred toy was used as the task item during the demand condition for all children. Table 4 shows the preferred, non-preferred, and task items used for each child.

For the purposes of reducing response effort and increasing response efficiency and recognizability (Durand and Merges 2009; Tiger et al. 2008), a BIGmack® microswitch with an attached picture card was used during the mand analysis conditions with all children. During test conditions of the mand analysis, a picture card with a word for the relevant reinforcer was taped to the top of the microswitch.

All picture cards were approximately 4 in. by 4 in. For the attention condition, a Polaroid picture was taken of the parent prior to the first attention condition in the mand analysis. The word for parent (e.g., "Mommy") was written at the bottom of the picture. For the tangible condition, a Boardmaker™ picture of the sign "more" was used. At the top of the picture, the word "more" was written. For the demand condition, a Boardmaker™ picture of a child playing with toys was used to indicate "play" (i.e., escape from the demand). At the top of the picture, the word "play" was written. The same pictures were used throughout the mand analysis.

Response Definitions

Destructive behavior was defined as self-injury, aggression, and property destruction with specific topographies shown in Table 2. *Problem behavior* was defined as crying, screaming, whining, task refusal, noncompliance, and elopement. *Independent manding* was defined as the child emitting mands for the relevant reinforcers without physical assistance and without a specific prompt. Independent manding included touching the picture on the microswitch, vocalizing (e.g., saying "Mom"), manual signing (e.g., signing "More"), or gesturing (e.g., pointing to an item) for the relevant reinforcer. Shown in Table 5 are observed independent mands emitted by each child across functions in both the functional and the mand analyses.

Procedural Integrity

Two trained data collectors independently analyzed procedural integrity on a trial-by-trial basis during both the functional and the mand analyses. Procedural integrity was determined to occur based on two criteria: (a) Reinforcement was provided contingently within 30 s of the occurrence of destructive behavior during the functional analysis or the occurrence of

independent manding during the mand analysis when the relevant establishing operation was in place, and (b) reinforcement was not provided for the occurrence of independent manding during the functional analysis or destructive behavior during the mand analysis when the relevant establishing operation was in place. Procedural integrity was analyzed for all conditions: free play, escape, attention, and tangible.

The beginning of a trial was defined as the presentation of the relevant establishing operation (e.g., request given during a demand trial, removal of parent attention during an attention session, removal of the highly preferred toy during a tangible session). Thus, target behavior (destructive behavior for the functional analysis or independent manding for the mand analysis) and non-targeted behavior (independent manding for the functional analysis or destructive behavior for the mand analysis) were determined to occur or not occur only in the relevant establishing operation. The end of a trial was defined as the end of reinforcement (e.g., re-presentation of the relevant establishing operation). If reinforcement was not provided for the occurrence of behavior in the relevant establishing operation, then a new trial began with the re-presentation of the relevant establishing operation (e.g., a new task was presented). During assessment sessions, the investigator timed the length of demand trials and reinforcement periods using a digital timer on the video camera viewscreen and cued the parent when the relevant time had elapsed (e.g., 30 s for presenting a demand, 20 s reinforcement for each demand trial) to help ensure procedural integrity. Procedural integrity was evaluated by examining the session data sheets and reviewing the videotapes. Potential errors included therapist (parent) error and coaching (investigator) error. If therapist or coaching errors were noted when reviewing the videotapes, these trials were scored as errors in procedural integrity. Procedural integrity for the functional analysis across children averaged 98% (range= 88% to 100%). Procedural integrity for the mand analysis across children averaged 98% (range=94% to 100%).

Interobserver Agreement

Interobserver agreement on the occurrence of procedural integrity was calculated based on exact trial-by-trial comparisons in which the number of agreements was divided by the number of agreements plus disagreements and multiplied by 100. An exact agreement was defined as both raters indicating that procedural integrity either occurred or did not occur on each of the two criteria within a trial. Interobserver agreement for the occurrence of procedural integrity in the functional analysis and mand analysis conditions was assessed for 30% of sessions and averaged 98% (range=92% to 100%).

Two trained data collectors independently scored the occurrence of all behaviors from videotapes using 6-s partial-interval recording. Interobserver agreement on occurrence of destructive behavior, problem behavior, and independent manding was calculated based on exact interval-by-interval comparisons in which the number of agreements was divided by the number of agreements plus disagreements and multiplied by 100. Interobserver agreement for destructive behavior, problem behavior, and independent manding was assessed during 30% of all sessions and averaged 97% (range=90% to 100%).

Two trained data collectors independently analyzed both the functional and mand analyses graphs using the methods described by Hagopian et al. (1997) to determine the maintaining functions for destructive behavior and independent manding on a function-by-function basis. Interobserver agreement on the identified functions of destructive behavior and independent manding was calculated based on exact function-by-function comparisons in which the number of agreements was divided by the number of agreements plus disagreements and multiplied by 100. An agreement was defined as both raters selecting the same function or functions for each analysis. Interobserver agreement for identified functions in both the functional and mand analyses was assessed for 100% of graphs and averaged 98% (range=67% to 100%).

Agreement for identified functions in the mand analysis was lower for one participant (Tina) because the escape function was assessed in only one session.

Two trained data collectors independently analyzed the identified functions in the functional analysis and mand analysis to determine patterns of correspondence between the analyses. Interobserver agreement on the pattern analysis was calculated based on exact agreement comparisons in which the number of agreements was divided by the number of agreements plus disagreements and multiplied by 100. An agreement was defined as both raters selecting the same correspondence pattern from three possibilities: exact match, under-identified match, or over-identified match. An exact match was defined as the same function being identified in both the functional and the mand analyses. An under-identified match was defined as a function identified in the functional analysis that was not identified in the mand analysis. An over-identified match was defined as a function not identified in the functional analysis that was identified in the mand analysis. Interobserver agreement for the pattern analysis was assessed for 100% of participants and was 100%.

Procedure and Experimental Design

This study was conducted in three phases: (a) functional analysis, (b) mand analysis, and (c) correspondence between the functional and mand analyses.

Functional analysis—The functional analysis was conducted within a multielement design to evaluate the occurrence of destructive behavior and independent manding across free play, escape, attention, and tangible conditions. For all conditions, destructive behavior was ignored or neutrally blocked; the parent blocked the behavior as lightly as possible without reprimands or discussion and while looking away from the child. The microswitch with picture card was not provided during the functional analysis conditions. Assessment conditions were counterbalanced for each child, and all sessions were 5 min in duration.

During the free play (control) condition, the child was given access to toys, the parent provided non-contingent attention (e.g., play and social interaction), and no demands were placed on the child.

During the escape condition, the child was given access to only the task materials (less preferred toy). The parent approached the child and provided specific instructions (e.g., “Put the red block on top of the blue block”) and modeled how to complete a task with the less preferred toy every 30 s. The occurrence of destructive behavior resulted in 20 s of reinforcement (i.e., removal of the toy) and non-contingent attention. Manding and other problem behavior were ignored. If destructive behavior or task completion did not occur, the parent continued to present the task and repeated the specific instructions for completing the task. If the child did not attempt to complete the task nor display destructive behavior, the parent provided hand-over-hand assistance. If the child completed the task independently within 30 s, the parent provided brief praise.

During the attention condition, the child had access to highly preferred toys, but the parent ignored the child unless he or she engaged in destructive behavior. The occurrence of destructive behavior resulted in 20 s of reinforcement (i.e., reprimands and redirection). Occurrences of independent manding and other problem behavior were ignored.

During the tangible condition, the parent removed the highly preferred toy from the child’s possession and provided the child with a less preferred toy while the parent continued to provide non-contingent attention. The occurrence of destructive behavior resulted in 20 s of reinforcement (i.e., access to the highly preferred toy). Occurrences of independent manding and other problem behavior were ignored.

Mand analysis—The mand analysis was conducted within a multielement design to evaluate the occurrence of independent manding and destructive behavior across free play, escape, attention, and tangible conditions. A microswitch with a picture card was available during all conditions. Prior to each test condition, the parent showed the child how to obtain the relevant reinforcer. For example, the parent showed the child how to touch the microswtich, modeled saying more or making the manual sign for "more," and pointed to the highly preferred toy to gain access to the toy for the tangible condition. All conditions were conducted in the same fashion as the functional analysis except that independent manding resulted in reinforcement and destructive behavior was ignored or neutrally blocked; the parent blocked the behavior as lightly as possible without providing reprimands or discussion and while looking away from the child. Assessment conditions were counterbalanced for each child, and all sessions were 5 min in duration.

During the free play (control) condition, touching the microswitch did not produce reinforcement. The microswitch did not play a message or have a picture card attached indicating the relevant reinforcer. If the child pressed the microswitch, it was ignored by the parent. The child was given access to toys, the parent provided non-contingent attention, no demands were placed on the child, and the microswitch and nearest toy were placed at an equal distance from the child.

During the escape condition, the child was given a break for 20 s contingent on independent manding (i.e, the manual sign for "play", pressing the microswitch, or saying "play"). The break consisted of non-contingent parent attention without toys. The parent presented the microswitch and the task materials to the child every 30 s and asked if he or she wanted to work or play. The occurrence of independent manding for play resulted in 20 s of reinforcement (i.e., removal of the task), and the occurrence of destructive behavior was neutrally blocked. If the child refused to make a choice between work and play, or selected the work task, then the parent presented a specific instruction (e.g., "Put the red block on top of the blue block") and modeled how to complete the task. If independent manding or task completion did not occur, the parent continued to present the task demand and repeated the specific instructions for completing the task. If the child did not independently display the target mand nor complete the task, the parent used hand-over-hand assistance. If the child independently displayed the target mand (play) at any time during the work period, he or she received 20 s of reinforcement (i.e., removal of the task). If the child completed the task independently within 30 s, the parent provided brief praise.

During the attention condition, the child had access to highly preferred toys and the microswitch. The parent told the child to let her or him know if he or she wanted the parent to play. The parent then ignored the child unless he or she independently displayed the target mand ("Mom" or "Dad"). The occurrence of independent manding resulted in 20 s of reinforcement (i.e., parent social interaction and play). The occurrence of destructive behavior was neutrally blocked.

During the tangible condition, the parent removed the highly preferred toy from the child's possession, presented the microswitch, and told the child to tell her or him if he or she wanted to play more with the highly preferred toy. The occurrence of independent manding resulted in 20 s of reinforcement (i.e., access to the highly preferred toy). If the child did not mand for a highly preferred toy, the parent provided the child with a less preferred toy while the parent continued to provide non-contingent attention. The occurrence of destructive behavior was neutrally blocked.

Correspondence between the functional and mand analyses—The correspondence between the results of the functional and mand analyses was computed based on the procedures

described by Hagopian et al. (1997). The free play condition in both the functional analysis and the mand analysis was used as the control condition. Destructive behavior in the free play condition for the functional analysis and independent manding in the free play condition for the mand analysis were averaged to determine the mean and one standard deviation from the mean for each relevant analysis. An upper criterion line (1 SD above the mean of the free play condition) was drawn, and differentiation was based on the number of data points for each test condition (e.g., escape, attention, tangible) that fell above this criterion line. For example, if three data points were collected in the escape condition, then at least two of three data points were required to fall above the criterion line to determine an escape function. These procedures were used to identify the maintaining variables for destructive behavior during functional analysis conditions and the maintaining variables for independent manding during mand analysis conditions.

Results

The individual results of the functional and mand analyses are shown in Figs. 1, 2 and 3, and are presented according to the correspondence achieved between the functional and mand analyses. For both the functional and the mand analyses, the results are depicted as the percentage of intervals of destructive behavior occurring in the top panel and the percentage of intervals of independent manding occurring in the bottom panel.

Two children (Rose and Art; Fig. 1) showed correspondence between the functional analysis and the mand analysis. For Rose (left) and Art (right), both the functional and the mand analyses showed that target (destructive or manding) behavior was maintained by all social functions (i.e., negative and positive reinforcement) based on the criteria proposed by Hagopian et al. (1997). For example, Rose's functional analysis showed that destructive behavior was maintained by all three social functions, and independent manding did not occur across all test conditions. Her mand analysis showed a decrease in destructive behavior across all test conditions, and independent manding increased across all test conditions, but remained at zero during the free play condition. Thus, for both Rose and Art, the results between the functional analysis for destructive behavior and the mand analysis for independent manding yielded the same results, an exact match.

For 3 children (Earl, Ray, and Jose; Fig. 2), partial correspondence was obtained in that the functional analysis of destructive behavior identified one social reinforcer that was not identified during the analysis of mands (under-identified match). For example, the results of Earl's (Fig. 2, top left) functional analysis showed that destructive behavior was maintained by negative and positive (i.e., access to tangibles) reinforcement. Independent manding occurred at low levels. During the analysis of mands, destructive behavior decreased to zero and independent mands occurred across all conditions, including free play. Using the criteria described in Hagopian et al. (1997), escape was the only consequence to be identified as a reinforcer for independent mands. Thus, his functional analysis results identified escape and tangible functions, and the mand analysis results identified only an escape function, resulting in partial correspondence, an under-identified match. Similar results occurred for Ray (top right) except that his mand analysis identified only the tangible function.

For Jose (bottom left), the functional analysis of destructive behavior showed that destructive behavior was maintained by negative and positive (i.e., access to attention) reinforcement, and independent manding occurred at low levels. His mand analysis also showed that destructive behavior decreased to low levels, and independent manding was maintained by negative and positive (i.e., access to tangibles) reinforcement. However, his analyses resulted in only partial correspondence because the functional analysis identified escape and attention functions

whereas the mand analysis identified escape and tangible functions, an under-identified and over-identified match.

For 6 children (Jose and Andy; Fig. 2, and Kevin, Jasper, Kurt, and Tina; Fig. 3), partial correspondence was obtained because an additional positive reinforcement function was identified in the mand analysis (over-identified match). For example, Andy's (Fig. 2; bottom right) functional analysis of destructive behavior showed that destructive behavior was maintained by negative reinforcement and independent manding rarely occurred. His mand analysis showed that destructive behavior decreased to low levels and independent manding was maintained by all three social functions, resulting in partial correspondence because an additional social function was identified. Similar results occurred for Kevin (Fig. 3; top left), Jasper (Fig. 3; top right), Kurt (Fig. 3; bottom left), and Tina (Fig. 3; bottom right) except that Kevin's, Jasper's, and Tina's functional analyses showed that destructive behavior was maintained by negative and positive (i.e., access to tangibles) reinforcement.

Manding did not occur or rarely occurred during the functional analysis for all children except Art (manding continued to occur in the escape condition), and destructive behavior decreased substantially during the mand analysis for 6 of 10 children. Jose, Kurt, and Tina continued to display destructive behavior during the escape condition, and Kevin and Tina continued to display destructive behavior during the tangible condition.

The overall results (Table 6) demonstrated that free play served as a control condition for both the functional analysis of destructive behavior and functional analysis of mands because a social function was identified for all children in both analyses. All participants had an identified escape function in the functional analysis, which was a criterion for continued enrollment in the research project. The functional analysis showed only an escape function for 2 participants, an additional positive reinforcement function for 6 participants, and all three social functions for 2 participants. The mand analysis showed only the escape function for 1 participant, an additional positive reinforcement function for 2 participants, and all three social functions for 7 participants. The results of the functional and mand analyses yielded corresponding results for 2 participants and a lack of correspondence occurred for 8 participants. Thus, the mand analysis over-identified functions for 5 participants, under-identified functions for 2 participants, and identified mixed functions (combination of over-identification and under-identification) for 1 participant.

Discussion

Although previous studies have shown that manding often covaries with destructive behavior in FCT (Durand and Carr 1992; Northup et al. 1991; Shirley et al. 1997; Volkert et al. 2009; Wacker et al. 1990), the current results suggest that researchers should not interpret those results as suggesting that mands and destructive behavior are maintained by the same social reinforcers. The results of the present study showed that a one-to-one correspondence between the results of an analysis of destructive behavior and an analysis of mands occurred for only 2 of 10 participants. Therefore, the results of a functional analysis of independent mands are not interchangeable with the results of a functional analysis of destructive behavior.

Of particular concern is that six of the children's mand analyses over-identified a positive reinforcement function (i.e., attention for 5 children, tangible for 1 child). Thus, if treatment for destructive behavior had been based on the identified positive reinforcement function, destructive behavior may not have been treated effectively. There are at least two possible reasons for this finding. First, the presence of the microswitch during the mand analysis may have served as a discriminative stimulus that biased responding to manding across all social conditions. Thus, the children manded whenever the microswitch was presented. However,

this explanation is unlikely for two reasons: (a) Manding occurred at lower levels during the free play condition, which served as a control condition for the mand analysis; and (b) the mand analysis under-identified one function for 3 children suggesting that the microswitch did not serve as a discriminative stimulus for manding for those children.

Second, the relevant motivating operation may have been present for communicative behavior but was not sufficient to evoke destructive behavior. For example, the children may have had a preference for parental attention and a long history of obtaining attention following their requests. When ignored, the children manded when the availability of attention was signaled via the microswitch, but did not engage in destructive behavior when attention was withheld during the functional analysis of destructive behavior. The mand analysis showed that the children found attention to be reinforcing, but this result was not suggestive that attention maintained destructive behavior.

The present study suggests that communicative behavior may serve more functions than are identified for destructive behavior. This explanation is supported by the results obtained from Brown et al. (2000) in which specific topographies of manding were maintained by social reinforcers not identified in the functional analysis as maintaining problem behavior. For example, for 1 participant, manding (signing “more”) occurred when the relevant establishing operation was absent, which suggested that this specific mand may have been maintained by positive reinforcement (access to tangibles) even though a tangible function was not identified in the functional analysis as maintaining destructive behavior.

For 6 of 10 children, substantial reductions in destructive behavior were achieved during the mand analysis across all functions, even when the motivating operations for destructive behavior were present. If the mand analysis demonstrates a decrease in destructive behavior and an increase in the alternative manding response when the relevant motivating operation is in place, then evidence is provided in support of a possible effective treatment package. Thus, a mand analysis may be useful as a first step in treatment because the communicative alternative chosen for use in FCT should replace destructive behavior, resulting in a decrease in destructive behavior. Overall, the mand analysis may be of value because the results demonstrate that (a) the child will use an appropriate form of communication (mand), (b) the child discriminates when to mand, and (c) reductions in destructive behavior can be obtained via manding.

One area lacking in the FCT literature is a methodology for assessing the functions of mands. Lerman et al. (2005) developed a methodology to assess the functions of emerging speech. To assess the function(s) of emerging speech, echoic, mand, tact, and intraverbal conditions were conducted similarly to a functional analysis. These conditions assessed whether the individual used a vocal response to obtain generalized reinforcement (echoic, tact, intraverbal) or to obtain access to the specific reinforcer (mand). Results suggested an identified function(s) for all 4 participants. A similar analysis has not been conducted with the communicative responses used in FCT. However, the present study may demonstrate a similar methodology for assessing these responses.

In summary, the present study showed that although there is often overlap between the reinforcers that maintain destructive and manding behaviors, there may not be a one-to-one correspondence. This limits the clinical value of using mand analyses to replace functional analyses as a method for identifying the functional reinforcers for destructive behavior. However, because of the overlap, reinforcement of mands will often reduce destructive behavior, which may be a good first step in treatment. In addition, mand analyses may assist in identifying discriminative stimuli and motivating operations related to adaptive behavior.

Acknowledgments

This research was supported by Grant RO1-HD029402 from the National Institute of Child Health and Human Development of the National Institutes of Health. The opinions expressed herein do not necessarily reflect the position of policy of that agency. The authors express our appreciation to Agnes DeRaad for assistance with manuscript preparation. The first author completed an earlier version of this manuscript to fulfill University of Iowa Ed.S. requirements for a Ph.D. degree in School Psychology.

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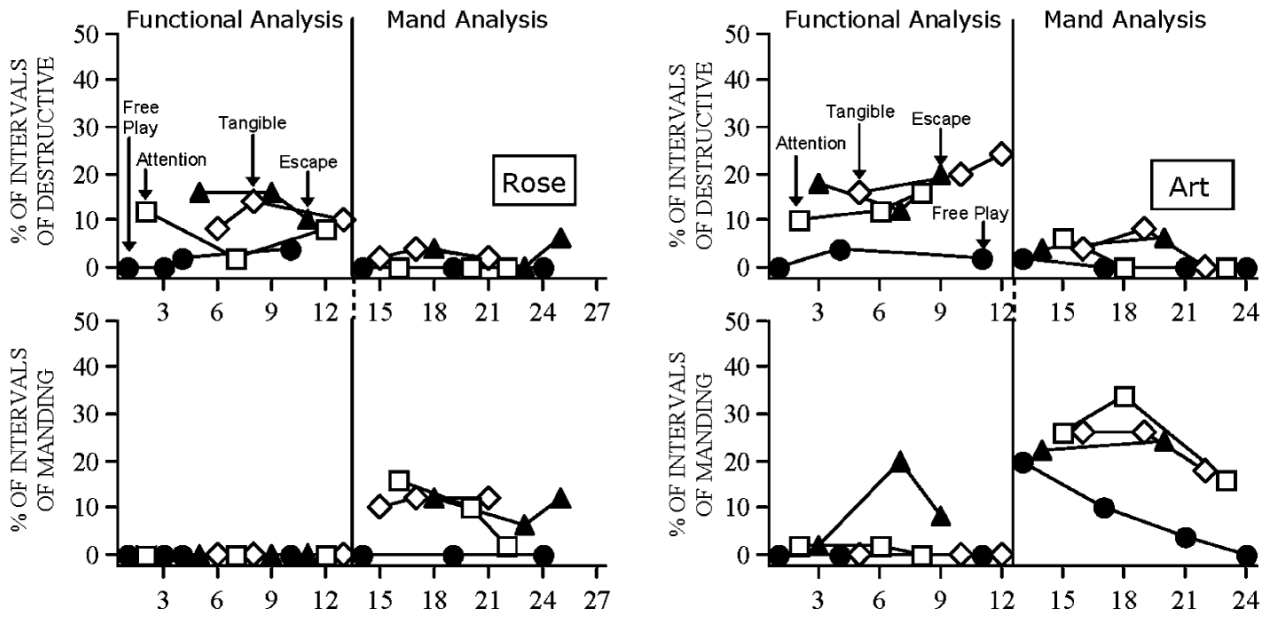

Fig. 1.

Percentage of intervals of destructive behavior (*top panels*) and independent manding (*bottom panels*) during functional and mand analyses for Rose (*left*) and Art (*right*)

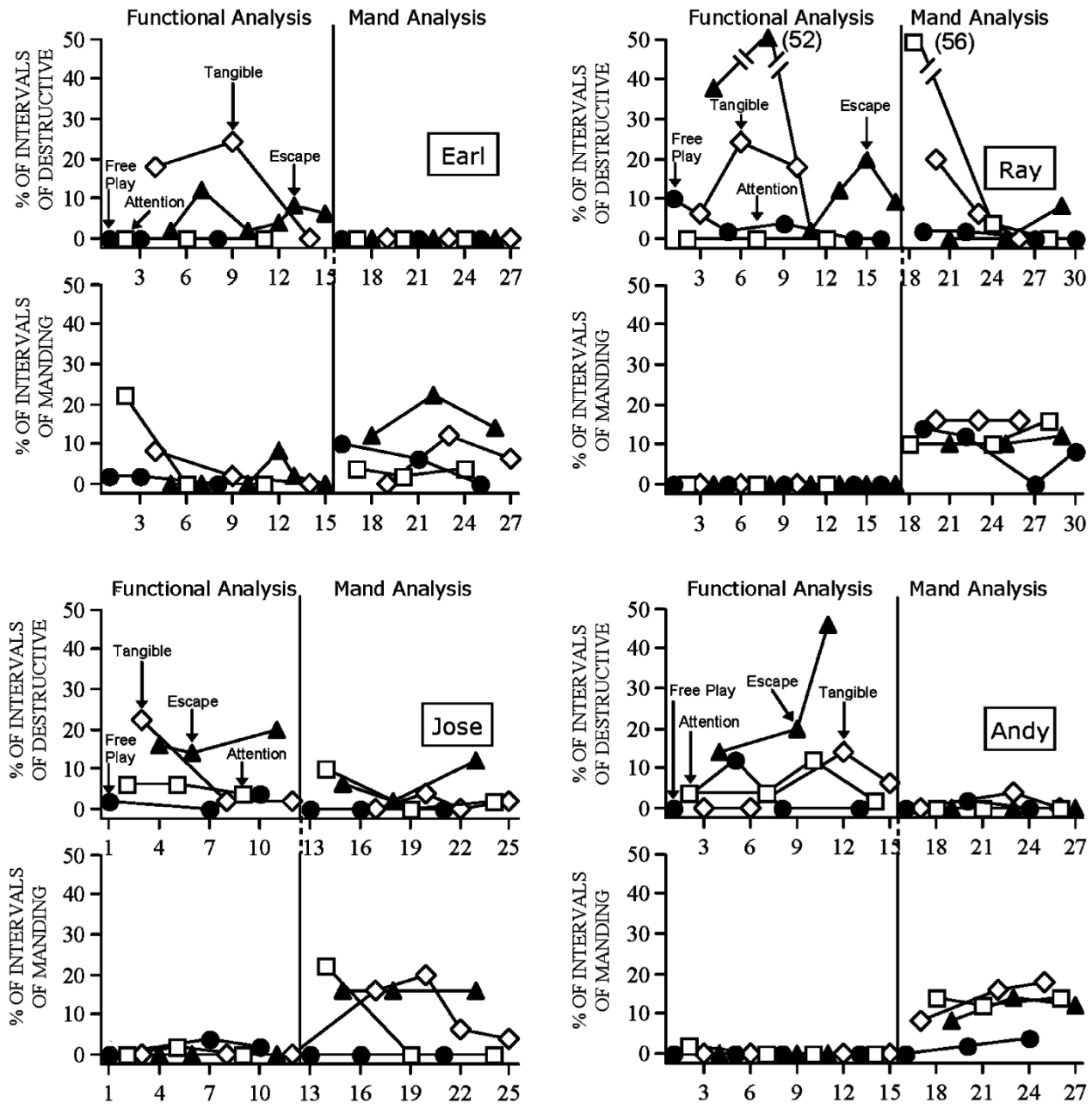

Fig. 2.

Percentage of intervals of destructive behavior (*top panels*) and independent manding (*bottom panels*) during functional and mand analyses for Earl (*top left*), Ray (*top right*), Jose (*bottom left*), and Andy (*bottom right*). Ray's functional analysis results were provided in "Functional and structural approaches to behavioral assessment of problem behavior," by Wacker et al. (in press). In W. Fisher, C. Piazza, & H. Roane (Eds.), *Handbook of applied behavior analysis.* New York: Guilford Publications. Andy's functional analysis is provided in "Conducting functional communication training in home settings: A case study and recommendations for practitioners," by Harding et al. (2009). *Behavior Analysis in Practice*, *2*, p. 27. Copyright 2009 by the Association for Behavior Analysis International

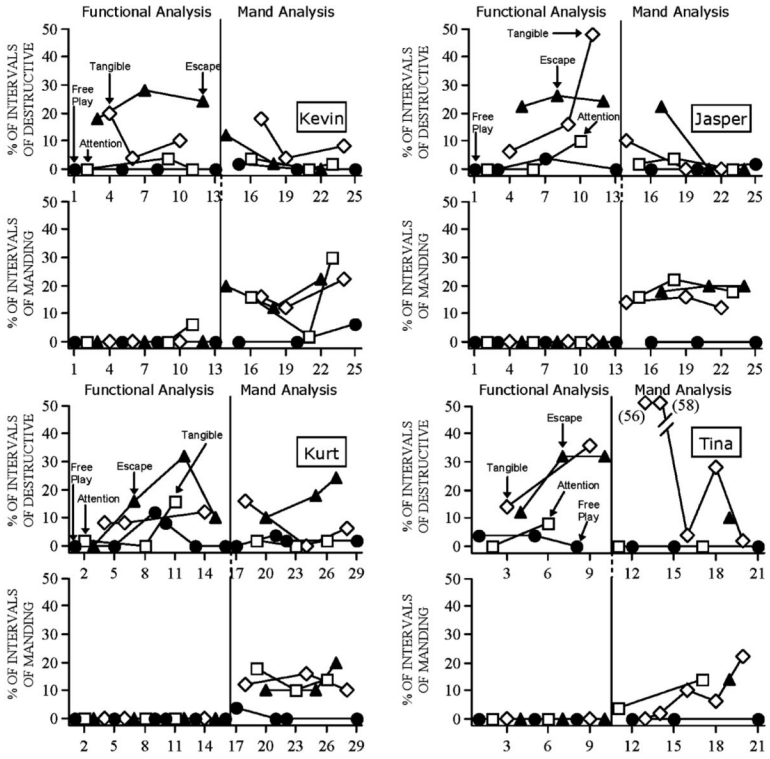

Fig. 3.

Percentage of intervals of destructive behavior (*top panels*) and independent manding (*bottom panels*) during functional and mand analyses for Kevin (*top left*), Jasper (*top right*), Kurt (*bottom left*), and Tina (*bottom right*). Tina's functional analysis results were provided as a bar graph in "Matching treatment to the function of destructive behavior," by Wacker et al. (2009). In P. Reed (Ed.), *Behavioral Theories and Interventions for Autism*. New York: Nova Science Publishers

Table 1

Demographic characteristics of participants

Child	Gender	Chronological age	Medical diagnosis	Intellectual functioning	Behavior topography	Communication
Rose	Female	3–4		Mild mental retardation	Aggression, self-injury	Single words
Art	Male	3–2		Developmental delay	Aggression, destruction, self-injury	Single words
Earl	Male	4–6	Autism	Mild mental retardation	Aggression, self-injury	2-word phrases
Ray	Male	4–1	Mental retardation, autism	Mild mental retardation	Aggression	Single words, signing
Jose	Male	4–4	Fragile-X	Moderate mental retardation	Aggression. self-injury, destruction	Single words, signing, pointing
Andy	Male	2–6	Peter's anomaly	Developmental delay	Aggression, destruction	Single words, signing
Kevin	Male	2–3	Viral-induced asthma	Developmental delay	Self-injury, aggression	Single words, signing
Jasper	Male	1–8	Mecke's diverticulum reflux	Developmental delay	Self-injury, aggression, destruction	Single words, signing
Kurt	Male	2–4	Mental retardation	Mild mental retardation	Self-injury, aggression, destruction	Single words
Tina	Female	3–11	Autism	Developmental delay	Aggression, destruction	Single words, object exchange

Table 2

Specific topographies of destructive behavior

Child	Self-injury	Aggression	Property destruction
Rose	Head banging, head hitting, throwing self down	Hitting	Throwing toys, kicking toys
Art	Head banging, throwing self down	Hitting, kicking, throwing objects	Throwing toys
Earl	Head banging, throwing self down	Kicking, head butting	Tearing book pages
Ray	Throwing self down, arm biting, mouth gouging	Grabbing, pinching, scratching, hitting, biting	Throwing objects, banging furniture, biting objects
Jose	Face hitting, pulling hair, finger biting	Pulling hair	
Andy	Throwing self down, head banging, eye poking	Pinching, kicking, hitting, pushing	Ripping books, throwing toys, knocking over furniture, slamming doors
Kevin	Throwing self down, head banging, head hitting	Kicking	Throwing toys
Jasper	Throwing self down	Scratching, throwing objects	Throwing toys, hitting toys, mouthing toys
Kurt	Throwing self down	Hitting	Throwing objects, hitting objects, kicking toys
Tina	Throwing self down, head banging	Hitting, kicking, pinching, throwing objects, pushing	Throwing objects, kicking objects

Table 3

Specific topographies of communication

Child	Vocalizations	Signing	Other
Rose	“Hi”, “mom”, “bye”, “I get it”, “bubbles”		
Art	“truck”, “mommy”, “daddy”, “milk”, “cookie”, “bus”, “thank you”, “please”		
Earl	“stop”, “drink please”, “where are we going?”		
Ray	“bye-bye”, “night-night”	“more”	
Jose	“please”, “more”, “done”	“please”, “more”, “done”	pointing
Andy	“no”, “bye-bye”, “hello”	“more please”	
Kevin	“Mommy”, “please”, “puppy”	“please”	
Jasper	Single words	“ball”, “book”	
Kurt	“bye”, “up”, “mom”, “dad”		
Tina	“Thank you”, “bye-bye”, “Hi”		Object exchange

Table 4

Preferred and non-preferred items

Child	Preferred items	Non-preferred items	Task item (task demand)
Rose	Puzzles, shape sorter, books, magna doodle	Blocks, pop-up toys	Blocks (Picking up)
Art	Books, Leap Frog, puzzles	Blocks	Blocks (Picking up)
Earl	Puzzles	Books, beads, dinosaurs	Books (Pointing)
Ray	Cars, magna doodle	Blocks, books	Blocks (Stacking)
Jose	Ball popper	Books, puzzles	Books (Pointing)
Andy	Electronic games, wooden blocks	Legos, books	Legos (Stacking)
Kevin	Ball toy	Blocks, train, books	Blocks (Stacking)
Jasper	Cars/tractors	Puzzles, shape sorter	Puzzles (Placing a piece)
Kurt	Cars	Blocks, books, puzzles	Blocks (Picking up)
Tina	Books	Legos, dollhouse, see and say	Legos (Stacking)

Table 5

Observed independent mands across functions in the functional and mand analyses

Child	Escape	Attention	Tangible
Rose	Touching switch	Touching switch, hugging mom	Touching switch
Art	Touching switch, saying "No", "Play"	Touching switch, saying "Mommy", "Mom", "Mommy, play"	Touching switch, saying "Please", "More"
Earl	Touching switch, saying "No", "Play", "No work"	Touching switch, saying "Momma", "Mommy"	Touching switch, saying "No", "More please", "Please"
Ray	Touching switch	Touching switch	Touching switch
Jose	Touching switch	Touching switch	Touching switch
Andy	Touching switch	Touching switch, saying "Mommy", "Momma"	Touching switch, saying "Play"
Kevin	Touching switch, saying "Play", "uh-uh"	Touching switch, saying "Mommy"	Touching switch, saying "Mine", "I want bobby" (pacifier), pointing
Jasper	Touching switch, saying "No"	Touching switch	Touching switch, saying "More cars"
Kurt	Touching switch, saying "No"	Touching switch	Touching switch
Tina	Touching switch	Touching switch	Touching switch

Table 6

Summary of identified functions in the functional and mand analyses

Child	Functional analysis results			Mand analysis results		
Rose	Attention	Escape	Tangible	Attention	Escape	Tangible
Art	Attention	Escape	Tangible	Attention	Escape	Tangible
Earl		Escape	Tangible		Escape	
Ray		Escape	Tangible			Tangible
Jose	Attention	Escape			Escape	Tangible
Andy		Escape		Attention	Escape	Tangible
Kevin		Escape	Tangible	Attention	Escape	Tangible
Jasper		Escape	Tangible	Attention	Escape	Tangible
Kurt		Escape		Attention	Escape	Tangible
Tina		Escape	Tangible	Attention	Escape	Tangible