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The Effects of Motivating Operations on Challenging Behavior, Communication Intervention, and Generalization

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The Effects of Motivating Operations on Challenging Behavior, Communication Intervention, and Generalization

by

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Dissertation

Presented to the Faculty of the Graduate School of

The University of Texas at Austin

in Partial Fulfillment

of the Requirements

for the Degree of

Doctor of Philosophy

The University of Texas at Austin

August 2008

Acknowledgements

This journey has been made possible by so many important people in my life. I would like to thank both of my parents for working tirelessly throughout their entire lives not only to support me, but to instill in me a work ethic that has helped me tremendously to be successful in my education and career. I would like to thank my dad for his reliable wisdom and advice on life. I would like to thank my mom for her encouragement and teaching me to pursue my dreams. I would also like to thank my grandmother for being a constant support and undeniable sense of humor.

I would like to thank my sister Shelley for being a constant shoulder to lean on and ensuring that I enjoy my life and not become consumed by this process. I cannot explain how grateful I am to have a sister who is more than a best friend.

I must also thank Ross for his support, patience, and understanding how important this journey has been for me. He has undoubtedly made many sacrifices for me and I am so thankful to have him in my life.

I would like to thank my advisor, Dr. Mark O'Reilly, for the invaluable advice throughout the years. I am so grateful for the opportunity to work with someone whom I have such great respect for. I am so appreciate of his guidance and the many learning opportunities he made available to me. I would also like to thank my dissertation committee, Dr. Karrie Shogren, Dr. Jeff Sigafoos, Dr. Diane Bryant, and Dr. Randy Parker, as well for agreeing to provide your help and wisdom to this project.

Finally, I would like to thank my colleagues who have contributed so much to my experiences in this program. I am grateful for the enormous amount of assistance they have each contributed to this project. I must also thank Mandy Rispoli for her thoughtfulness and uplifting disposition and Wendy Machalicek for being a trailblazer in the process and happily answering my endless questions, and Soyeon Kang for always lending a helping hand. I thank Jeff Chan for organizing our much needed social outings and Russ Lang for keeping us all laughing along the way. I am so lucky to have been surrounded by such amazing people.

The Effects of Motivating Operations on Challenging Behavior, Communication Intervention, and Generalization.

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The University of Texas at Austin, 2008

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Communication is an integral part of life that allows for independence. It is common for individuals with disabilities to have deficits in communication, which often coincide with an increased presence of challenging behavior. One successful method of addressing this issue is the use of functional analysis to determine the function of challenging behavior. Next, functional communication training is used to teach the individual an a socially-appropriate and functionally-equivalent method of communication so that he/she no longer relies on challenging behavior in order to get his/her needs met. While functional communication training has proven to be a helpful procedure, it has been noted that it should be combined with other procedures for maximum efficiency. Additionally, very little research has targeted the generalization of skills acquired via functional communication training, although, research clearly identifies that generalization of skills as an area of difficulty among individuals with

developmental disabilities. One possibility of improving both the intervention and the generalization of skills is the use of motivating operations. Motivating operations are any environmental change that alters the value of a reinforcer. Therefore, the purpose of this study is to assess the effects of potential motivating operations on functional communication training and generalization of newly acquired skills across four participants. This was accomplished by conducting functional analyses on each participant. The maintaining condition was repeated with pre-session conditions of either no access to the reinforcer or satiation with the reinforcer to identify motivating operations. These pre-session conditions, which were identified as motivating operations, were then implemented prior to functional communication training sessions, in the effect of no prior access to the reinforcer or 15 minutes of prior access to the reinforcer. This was again repeated with four different generalization assessments. Several patterns of behaviors resulted. First, functional communication training was improved for two participants when prior access to the reinforcer was implemented. Second, approximately half of the generalization assessments also showed improved responding when the participant had prior access to the reinforcer. Also, prior access to the reinforcer rarely impaired intervention or generalization. The results, limitations, and further research are discussed.

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CHAPTER 1

INTRODUCTION

Communication is an integral part of daily functioning for any individual. It is the means in which one regulates his or her environment, gains access to wants and needs, and avoids undesired activities (Noonan & Siegel, 2003). However, individuals with developmental disabilities often do not develop appropriate communication skills in order to express his or her wants and needs (Bondy & Frost, 2001; Lancioni, et al., 2007; Mirenda, 2003; Sigafoos, 2005).

Lack of communicative ability can present a major concern. Particularly, because limited communication abilities is linked to increased challenging behavior. In fact, many studies have shown an inverse relationship between communication ability and presence of challenging behavior (Sigafoos, 2005). This relationship is likely due to the fact that challenging behavior often serves as a form of communication for individuals with disabilities (Carr et al., 1994). In other words, challenging behavior often occurs in order to gain access to attention or tangibles or escape undesired activities or people (Carr, et al., 1994). Therefore, having a lack of communication then increases the likelihood of an individual using challenging behavior in order to communicate those needs that are otherwise difficult to express.

Needless to say, challenging behavior is problematic on many levels. Commonly reported challenging behaviors among individuals with disabilities

include self-injury, physical aggression, elopement, verbal aggression, property destruction, stereotypy, and disruptive behavior (Sigafoos, Arther, & O'Reilly, 2003). Negative consequences of challenging behavior include increased family stress resulting in physical and emotional health problems, increased staff turnovers, negative effects on quality of life, injury or danger to self, injury or danger to others, social rejection, exclusion from community services, exclusion from school involvement, exposure to high levels of restraint, and seclusion (Allen, Kowe, Moore, & Brophy, 2007; Emerson, 1995; Lowe, et al., 2007; Sigafoos, 2000).

It is pertinent that individuals are taught socially-appropriate and functionally-equivalent behaviors to replace these challenging behaviors (Carr & Durand, 1985). In other words, the appropriate behavior should be taught so the new behavior can be used in lieu of the challenging behavior in order to gain the same consequences. Functional communication training (FCT) is a commonly used method that does just this (Reichle & Wacker, 1993). According to Riechle and Wacker, the steps to FCT intervention begin by conducting a functional behavior assessment to determine the function of the challenging behavior, then selecting a replacement behavior. The replacement behavior is a communicative behavior, such as a manual sign, that will serve the same purpose as the challenging behavior. Replacement behaviors include a variety of behaviors such as a spoken word, gesture, sign language, picture, printed word(s), or speech

generating devices (SGD) (Carr et al, 1994). Then, FCT consists of teaching the individual to request a desired item/activity/person and then reinforcing the individual with that item/activity/person as requested. Additionally, consequences for challenging behavior typically include extinction or punishment (Reichle & Wacker). Many studies have demonstrated that teaching functionally-equivalent replacement behaviors can reduce challenging behavior (Olive, De la Cruz, Davis, & Lang, 2006; Sigafoos, 2000). However, relatively few of these studies have studied the generalization of the reduction of challenging behaviors and the newly acquired communicative behaviors (Olive, et al.).

Baer, Wolf, and Risley (1968) stated that generalization is "is a valuable characteristic of applied behavior analysis" (p. 96). Generalization is considered to be an important topic in the area of developmental disabilities. According to Stokes and Baer (1977), generalization is the phenomenon of an individual demonstrating newly acquired skill in instances with stimuli that were not present in the initial training. Skills can be generalized to new activities, people, or settings. Two types of generalization exist. Stimulus generalization refers to the generalization of a skill in the presence of new stimuli. On the other hand, response generalization is the event in which an individual increases the use of a behavior that is functionally-equivalent, but not identical to, the behavior taught (Duker, Didden, Sigafoos, 2004).

The importance of generalization cannot be understated. According to Durand (1999) “The true test of an intervention strategy lies not only in its ability to reduce behavior problems in controlled situations but also in its potential to be integrated into everyday environments, that is, with people who are not trained and in unpredictable settings” (p. 263). Mancil (2006) continues saying that generalization across settings and people leads to greater independence. Schindler and Horner (2005) agree that the goal applied behavior analysis should strive to make behavior changes that are socially important and expands to all areas of one’s life. However, generalization of newly acquired skills does not always occur naturally for individuals with developmental disabilities (Duker, Didden, Sigafoos, 2004).

Although generalization has been recognized as a crucial element of applied behavior analysis for the past 40 years, relatively few studies regarding FCT have assessed the generalization of newly acquired communication skills. Olive and colleagues (2006) created a synthesis of FCT studies conducted between 1968 and 2005. They found that only 18% of FCT studies assessed the generalization of newly acquired skills. Of the studies that have assessed generalization, not all have had encouraging results. For example O’Neil and Sweetland-Baker (2001) found that probes across untrained task post-FCT demonstrated mixed generalization results. They stated that while generalization may occur, it may not occur “across all tasks or to the extent desired from a

clinical perspective" (p. 239). Drasgow, Halle, an Ostrosky (1996) also found that after teaching a participant a manual sign to protest, the participant continued to use challenging behavior in situations outside of training. Schindler and Horner (2005) also found that FCT was not effective at producing generalization in untrained settings. However, Mirenda (2003) questions, "one way to assess whether a new communicative behavior is truly functional pertains to the question: Does the individual use it in a generalized manner (i.e., across people and settings) over time?" (p. 204). Furthermore, Wacker and colleagues (2005) continue to stress for the need for improvement of the generalization of skills taught using FCT due to the time and labor intensity of FCT. In other words, because teaching a new communication skill takes a great deal of time, effort, and personnel, it is important that this newly taught skill be generalization to justify the investment and validate the use of FCT. Therefore, it is necessary that techniques to improve generalization are established.

Historically, several techniques have been suggested to improve generalization. Heward (1987a) identifies six general strategies for enhancing generalization. These strategies include aiming for natural contingencies of reinforcement in which suggests selecting behavior targets that will be naturally reinforced in the individual's environment. The second strategy is teaching enough examples, which includes teaching in a variety of settings, with a variety of people and teaching a variety of form of the target behavior and so forth. The

third strategy is programming common stimuli. This method involves teaching the target in conditions in which many stimuli common to the natural environment are present. The fourth strategy, train loosely, consists of including a wide variety of dimensions of stimuli and accepting a variety of similar responses. The fifth strategy is to use indiscriminable reinforcement contingencies and the sixth strategy is to include self-management techniques. Although these six general techniques have been historically recommended in the literature, no technique has been repeatedly supported with the use of FCT in the literature (Olive et al., 2006). In fact, as stated previously, very few studies regarding FCT have included a probe or assessment of generalization of newly acquired skills, and even fewer have systematically applied techniques to improve generalization (Olive et al.; Wacker et al., 2005). It is necessary to determine strategies to promote generalization that can be easily combined with FCT.

One potential method for improving FCT treatment, particularly by increasing generalization of skills acquired via FCT, may be found in the literature regarding motivating operations. Motivating operations were first introduced by Keller and Schoenfeld in 1950, and then re-introduced by Millenson in 1967 under the term *establishing operations*. Again, Michael re-introduced the concept in a 1982 conceptual paper. In this paper, he defines an establishing operation as "any change in the environment which alters the effectiveness of some object or event as reinforcement" (1982, p. 150 – 151).

Michael further describes that that establishing operations have two effects. The first is "an alteration in the reinforcing effectiveness of some stimulus, object, or event (the reinforcer-establishing effect) and an alteration in the current frequency of all behavior that has been reinforced by that stimulus, object or event (the evocative effect)" (Michael, 2000, p. 403). In other words, establishing operations increase the value of a reinforcer, making that particular stimulus more reinforcing, and also increases the frequency of behavior that has previously been rewarded with that reinforcer. In other words, if a child had been deprived of food, not only would food have an increased value as a reinforcer, but the child would also be more likely to request food if that behavior had a history or being rewarded with food.

Michael (1982) expanded on this concept suggesting that reinforcement value could both increase and decrease. He warned that the term *establishing operation* suggests that the value of the reinforcer could only be increased, but in fact the valued of the reinforcer could also be decreased; therefore he used the term *abolishing* to describe this phenomenon. He continued to say that "in the present context 'establishing' should be taken to be short for 'establishing or abolishing'" (Michael, 1982, 151). Due to this drawback of the definition, in 2003 Laraway and colleagues encouraged the change in terminology, suggesting that a broader term, *motivating operations*, replace the existing term *establishing operations*.

In his historic 1982 paper, Michael argues that using the "basic operant procedure … involving stimulus, response, and consequence … is not in effect until the relevant establishing operation is at an appropriate level" (p. 151) which sends out the message of the significance of motivating operations in conceptualizing behavior. McGill (1999) supports the value of motivating operations stating that "the occurrence of a behavior reflects both the ability (skill or knowledge) and the motivation (want) to produce it" (p. 394).

However it was not until 1991 that the concept was put into applied research by Vollmer and Iwata (1991) (Michael, 2000). Since then there has been an increase of applied research assessing effects of motivating operations in some manner (Iwata, Smith, Michael, 2000). According to Iwata, Smith, and Michael, the applied research falls into three categories including demonstrations of motivating operations, the use of motivating operation to support behavioral assessments, and the use of motivating operations to increase or decrease target behaviors. In particular, both noncontingent reinforcement and behavior momentum have been conceptualized from a motivating operation perspective (Iwata, Smith, Michael; McGill, 1999).

However, McGill (1999) discusses a few commonly used behavior treatments from a perspective of the influence of motivating operations, including FCT. In particular, McGill notes that FCT is usually combined with other procedures, such as extinction, in order to improve effectiveness. In fact, he says

that FCT does not have support for use as a single-component treatment. He goes on to discuss the influence of motivating operations on FCT, saying "FCT seeks to modify the response evoked by the establishing operation rather than the establishing operation directly" (p. 406). He continues to say that without considering the motivating operations that evoke the challenging behavior, FCT may less effective and actually be unethical by leaving those motivating operations unchanged. In this paper, McGill makes a strong call for the systematic assessment of the effects of motivating operations in FCT.

However, while McGill argues that FCT does not have support as a single-component treatment, Michael (2000) makes a similar argument for treatment consisting solely of motivating operation modification, saying "reducing the frequency of problem behavior by modifying its establishing operation will not constitute a permanent improvement. The behavior will return when its establishing operation is again in effect" (p. 403).

Therefore, it is clear that treatments should be combined for ultimate effects. This alones pleads for research to combine FCT and motivating operation treatments. Furthermore, with major gaps in the research regarding the generalization of newly acquired communicative responses in FCT, it would be worthwhile to determine if 1) motivating operations could improve the implementation and results of FCT and 2) if the systematic manipulations of

motivating operations could be used to improve generalization of the target communicative response.

In summary, the concept of motivating operations is not necessarily new to applied behavior analysis. However, the use of motivating operations in applied research is relatively new. There is a great deal of conceptual and theoretical support for the concept of combining motivating operations with established treatment procedures. This line of research is on the forefront. Functional communication training is a well-established treatment, but it has been noted that the treatment itself is improved when combined with other treatments; therefore, a natural next step would be to combine the possible treatment effects of motivating operations and to take this one step further to determine if this combination could also prove to be a new method of programming for generalization.

CHAPTER 2

EMPIRICAL REVIEW OF MOTIVATING OPERATION LITERATURE

Motivating operations have increased in popularity in the research over the past two decades. However, despite the increasing trend to include motivating operations in research, a comprehensive review of the literature on the topic does not exist. Therefore, the purpose of this is to review the literature from the years 1990 – 2007.

The first aim of this paper is to review the research conducted within the last 17 years on this topic in order to describe the participants, motivating operation variables, target behaviors, implementation procedures, and results found in the literature.

The second aim is to answer the following seven questions. First, what types of motivating operations exist within the literature? Second, what methods are use to identify effective motivating operations for individuals? Additionally, what are the characteristics of the participants in the literature? What behavior changes have been targeted via the use of motivating operations and can particular motivating operations be matched to particular behaviors? What is the effectiveness of the use of motivating operations on change target behavior? Sixth, what characteristics of the participant, the motivating operation, and implementation procedures can influence the effectiveness of implementation? Last, can motivating operations make behavior changes that can be maintained,

generalized, and socially valid? The final aim is to outline possible areas of future research.

Methods

Search Criteria

Several criteria for the literature search were set. The first criterion was a demonstration of a potential motivating operation using methodologies suggested by O'Reilly, Edrisinha, Sigafoos, Lancioni, and Andrews (2006). O'Reilly and colleagues suggest that the typical methodology used to determine the effect of a motivating operation is to hold the reinforcer constant across conditions. Therefore, a potential motivating operation is presented and removed across conditions; however, the reinforcer remains unchanged across those conditions as to isolate the effects of the potential motivating operation. However, for the purposes of this review, not only potential reinforcers, but all consequences, must have been held constant across conditions. This particular criterion can prove to lead to a great deal of gray area. For example, in Dunlap, Kern-Dunlap, Clarke, and Robbins (1991) a participant was exposed to two types of activity conditions, a fine and gross motor activity. In both conditions, prompts to work and time out for challenging behavior were held constant. However, one could argue that the participant received different consequences from each activity; for example, if she particularly enjoyed a gross motor activity versus a fine motor then she could have received automatic reinforcement while engaging in the gross motor activity,

but not the fine motor activity. Further, several studies compared participant behavior in choice versus no-choice conditions. For example, in Romaniuk, et al. (2002) participants were exposed to two conditions, one in which they selected an activity, and one in which an activity was selected for them. In both conditions, escape was provided contingent upon challenging behavior. Again, it could be questioned if one activity, most likely the activity selected during the choice conditions, could have provided automatic reinforcement, while the other did not, thereby altering the consequences of each condition. Also, it could be argued that escape from one activity is an entirely different consequence than escape from the other activity. On the other hand, others could argue that escape from an activity contingent upon challenging behavior was held constant across conditions; therefore, it meets the criterion of this review. In conclusion, these, and similar studies, are included in this review for two reasons. First, it is impossible to determine from each study, if automatic reinforcement occurred, and if so, to what degree, for the different activities presented. Second, McGill (1999) also included similar studies in his seminal work regarding motivating operations, suggesting that these and similar studies have historically been considered demonstrations of motivating operations.

Also important to note is that to be included in this review, it was necessary that the authors of each study explicitly state or describe that consequences were held constant across conditions. Several studies simply did not

mention or describe consequences for each condition. No assumptions regarding consequences being held constant were made; therefore, studies lacking description of consequences were not included in this study.

One last comment regarding the first criterion is that it was not required that the authors use or identify possible motivating operations as *motivating operations*. In other words, as long as some antecedent was experimentally manipulated while holding the consequence(s) constant across conditions, it was not necessary for the author(s) to identify those antecedent(s) as likely motivating operation(s). In fact, several studies did not employ the use of the *motivating operations* terminology; instead, many favored a more broad terminology such as antecedent(s) (i.e., Asums, et al., 1999; Kennedy, Itoken, & Lindquist, 1995).

The second criterion was that participants were diagnosed with an intellectual and/or developmental disability. While some studies involved participants with intellectual and/or developmental disabilities along with participants without intellectual and/or developmental disabilities, only the methodologies, results, etc. of those participants who fit the criteria were included in the review (i.e., Call, Wacker and Ringdahl, 2005; McAdam, et al., 2005).

Third, the study must have been published in 1990 or later. This date was selected due to the nature of the motivating operation literature being produced at the time. Vollmer and Iwata (1991) published a study that has since become a historical piece in that it has become a model for the current methodology for

assessing the effect of a motivating operation in applied research. In fact, Wilder and Carr (1998) state that Vollmer and Iwata "presented the first systematic examination of the manipulation of motivating operations in the applied literature" (p. 45). Michael (2000) agrees that Vollmer and Iwata's work revealed the importance of the concept of motivating operations in applied settings. In addition, Iwata, Smith, and Michael (2000) identify that prior to the 1990s; very little work was published regarding motivating operations. In fact, they report that it was not until the very late 1980s and early 1990s that the Journal of Applied Behavior Analysis began publishing work that used the term *establishing operation*. This review identified a similar history across all relevant scientific journals; in fact, only 72% of the studies reviewed were published within the last decade, with only one published in 1990 and one published in 1991. Therefore, the history of the research regarding motivating operations and this particular seminal work were used to determine the timeline for this review. The last criterion was that the study implemented an experimental design.

Search Procedures

The search procedures began with an electronic database search of EBSCO using 27 relevant databases, such as PsychINFO, PsycARTICLES, MEDLINE, and Education Resources Information Center (ERIC) for studies published between 1990 and 2007.

The following terms were cross-referenced, using Boolean operators including truncation for the electronic database search: *establishing operation, setting event, evocative effect, motivating operation, abolishing operation, antecedent, and noncontingent reinforcement.* A total of 37 articles were identified using the electronic database search.

The second search method was a hand search of the *Journal of Applied Behavior Analysis*. Volumes 23 through 40, encompassing the years 1990 to 2007 were included in the hand search. Sixteen more studies were found in this search.

Third, electronic author searches of Mark O'Reilly, Brian Iwata, and David Wacker were conducted. These three names were selected because they had the highest frequency within the studies identified via the first two steps. The author electronic search was conducted using the same EBSCO databases as previously described. Four additional studies were located.

Last, the reference citations from the articles identified via the previous search methods were scanned for appropriate studies for the synthesis. Nineteen more studies were located via reference chasing for a total of 76 studies. See Table 1 for a list of studies included in the review.

Table 1. Studies listed according to categories of motivating operations.

CATEGORY/Author	N	Disability	Target Behavior	Function of Target Behavior	Result
DEPRIVATION/SATIATION					
Berg et al. (2000)	2	MR, Seizure, SI, Microcephaly, Other	SIB, Verbal aggression,	Not stated	Effect
Gottischalk, Libby, & Graff (2000)	4	AU, Seizure, Other	Other appropriate behavior	N/A	Effect
Klatt, Sherman, & Sheldon (2000)	3	MR	Engagement	N/A	Effect
Levin & Carr (2001)		MR, AU	SIB, Physical aggression, Food acceptance, Other inappropriate behavior	Not stated	No Effect
McAdam et al. (2005)	3	MR	Food acceptance	N/A	Varied
North & Iwata (2005)	2	MR, Seizure, CP	Task Compliance	N/A	No Effect
O'Reilly (1999)	1	MR	SIB	Attention-maintained	Varied
O'Reilly, Edrisinha, et al. (2006)	1	AU	Other inappropriate behavior	Attention-maintained	Effect
O'Reilly et al. (2007)	1	AU	SIB	Tangible-maintained	Effect
O'Reilly et al. (In Press)	1	AU	SIB, Verbal aggression, inappropriate behavior not specified, Other inappropriate behavior	Attention-maintained	Effect

Table 1. *(continued)*

CATEGORY/Author	N	Disability	Target Behavior	Function of Target Behavior	Result
O'Reilly, Sigafoos, et al. (2006)	2	MR	SIB, Physical aggression, Other inappropriate behavior	Attention-maintained, Tangible maintained	Effect
Taylor et al. (2005)	3	AU	Communication	N/A	Effect
Umbreit (1997)	1	MR	Other inappropriate behavior	Attention-maintained	Effect
Vollmer & Iwata (1991)	5	MR	Task compliance	N/A	Effect
Wilder, Carr, & Gaunt (2000).	4	MR	Task compliance	N/A	Varied
Worsdell et al. (2000).	6	MR	SIB	Attention-maintained, Tangible-maintained	Varied
Zhou, Iwata, & Shore (2002)	9	MR	Communication	N/A	Varied
NONCONTINGENT REINFORCEMENT					
Carr, Kellum & Chong (2001)	2	MR, Other	Task compliance	N/A	Effect
DeLeon et al. (2000)	1	MR, AU	SIB, Engagement	Automatically-maintained	Effect
Fischer, Iwata, & Mazaleski (1997)	2	MR	SIB	Attention-maintained, Tangible-maintained	Effect

Table 1. *(Continued)*

CATEGORY/Author	N	Disability	Target Behavior	Function of Target Behavior	Result
Fisher et al. (2000)		MR, Seizure, CP, SI, Other	SIB, Physical aggression, Property destruction, Verbal aggression	Attention-maintained	Effect
Fisher et al. (1999)	3	MR, Seizure	SIB, Physical aggression, Property destruction, Communication	Attention-maintained	Varied
Hagopian et al. (2000)	4	MR, AU, Seizure, CP, Microcephaly	SIB, Physical aggression, Property destruction, Verbal aggression, Other inappropriate behavior	Attention-maintained, Tangible-maintained	Effect
Lindberg, Iwata & Roscoe (2003)	2	MR	Engagement	N/A	Effect
Reed et al. (2004)	4	DD, SI, Other	Inappropriate vocalizations, Inappropriate behavior not specified, Food acceptance	Not stated	No effect
Ringdahl et al. (1997).	3	DD	SIB, Communication, Engagement	Inconclusive	No effect
Wilder et al. (1997)	1	MR	Other inappropriate behavior	Not stated	Varied

Table 1. *(continued)*

CATEGORY/Author	N	Disability	Target Behavior	Function of Target Behavior	Result
Wilder, Normand & Atwell (2005)	1	AU	SIB, Food acceptance	Escape-maintained	Effect
ENVIRONMENTAL STIMULI					
Call, Wacker & Ringdahl (2005)	1	MR, Seizure	Physical aggression	Escape-maintained	Effect
Carey & Halle (2002)	1	MR	SIB	Escape-maintained, Other	Effect
Carr, Yarbrough & Langdon (1997)	3	MR, AU	SIB, Physical aggression, Disruption	Inconclusive	Effect
Durand & Mapstone (1998)	3	MR, CP	SIB, Physical aggression, Property destruction, Other inappropriate behavior	Escape-maintained, Tangible-maintained	Effect
Harding et al. (2005)	2	MR, DD, Seizure, CP, SI, Microcephaly	SIB, Engagement	Inconclusive	Effect
O'Reilly, Lacey, & Lancioni, (2000)	1	MR, Other	Physical aggression, Property destruction	Escape-maintained	Effect
Ringdahl et al. (2002)	2	MR	Physical aggression, Other appropriate behavior	Attention-maintained	Varied
Roane Kelley & Fisher (2003)	1	MR, AU, CP	Other inappropriate behavior	Inconclusive	Effect
Vollmer Marcus & LeBlanc (1994)	2	MR, AU, Other	SIB	Inconclusive	Varied

Table 1. *(Continued)*

CATEGORY/Author	N	Disability	Target Behavior	Function of Target Behavior	Result
Wilder et al. (1997)*	1	MR	Other inappropriate behavior	Not stated	Varied
BIOMEDICAL					
Blum et al. (1996)	3	MR, Seizure, Other	Physical aggression, Disruption, Property destruction, Engagement	Not stated	Varied
Dicesare et al. (2005)	1	MR, ADHD	Disruption	Inconclusive	Effect
Horner et al. (1997)	3	MR, AU, SI, Other	SIB, Physical aggression	Tangible-maintained	Effect
Irvin (2006)	1	MR, AU	SIB, Physical aggression, Property destruction,	Not stated	No Effect
Kennedy & Meyer (1996)	3	MR	SIB, Physical aggression, Property destruction	Escape-maintained	Effect
Lofts, Schroeder, & Maler (1990)	1	MR	Other inappropriate behavior	Not stated	Effect
O'Reilly (1995)	1	MR	Physical aggression	Escape-maintained	Effect
O'Reilly (1997)	1	Other	SIB	Inconclusive	Effect
Pace & Toyer (2000)	1	MR	Other inappropriate behavior	Not stated	Effect

Table 1. *(Continued)*

CATEGORY/Author	N	Disability	Target Behavior	Function of Target Behavior	Result
ACTIVITIES					
Asmus et al. (1999)	3	MR, ADHD, SI, Other	SIB, Physical aggression, Disruption, Property destruction,	Escape-maintained	Varied
Bambara et al. (1995)	1	MR	Physical aggression, Verbal aggression	Not stated	Effect
Dunlap et al. (1991)	1	MR, ADHD, Other	Physical aggression, Disruption, Property Destruction, Verbal Aggression, Inappropriate NOS, Other appropriate behavior	Not stated	Effect
McComas, Hoch, et al. (2000)	3	AU	Physical aggression, Disruption	Escape-maintained	Varied
Moes (1998)	4	AU	Disruption, Other appropriate behavior, Task compliance	Not stated	Effect
Romaniuk et al. (2002)	4	AU, CP, DS	Disruption	Escape-maintained	Varied
Seybert, Dunlap, & Ferro (1996)	3	MR, SI	Verbal aggression, Inappropriate vocalizations, Other inappropriate behavior	Not stated	Varied

Table 1. *(Continued)*

CATEGORY/Author	N	Disability	Target Behavior	Function of Target Behavior	Result
Smith et al. (1995)	9	MR	SIB	Escape-maintained	Varied
BEHAVIOR MOMENTUM					
Bambara et al. (1995)*	1	MR	Physical aggression, Verbal aggression	Not stated	Effect
Ducharme & Worling (1994)	2	MR	Task compliance	N/A	Effect
Kennedy Itkonen & Lindquist (1995)	2	MR	Task compliance	N/A	Effect
Mace et al. (1997)	2	MR, AU	Task complaince	N/A	Effect
McComas, Wacker, et al. (2000)	3	DD	Food acceptance, Communication, Other appropriate behavior	N/A	Effect
Patel et al. (2006)	3	DD, SI	Inappropriate NOS, Food acceptance	Not stated	Effect
Zarcone et al. (1993)	1	MR	SIB	Escape-maintained	Effect
Zarcone et al. (1994)	2	MR, Seizure	SIB, Task compliance	Escape-maintained	No effect
PRESESSION CONDITIONS					
McComas, Thompson & Johnson (2003)	4	MR, AU, DD, DS, SI, Other	Physical aggression, Property destruction, Other inappropriate behavior	Attention-maintained, Escape-maintained	Varied

Table 1. *(Continued)*

CATEGORY/Author	N	Disability	Target Behavior	Function of Target Behavior	Result
O'Reilly & Carey (1996)	1	MR	Physical aggression	Attention-maintained	Effect
O'Reilly, Lancioni, & Emerson (1999)	2	MR, DS, SI	SIB, Physical aggression	Attention-maintained, Escape-maintained	Effect
Rapp (2007)	2	MR, AI	Inappropriate vocalizations	Not stated	Varied
Roantree & Kennedy (2006)	1	MR	Other inappropriate behavior	Inconclusive	Effect
INSTRUCTIONAL METHOD					
Kennedy (1994)	3	MR, AU, CP, Other	SIB, Physical aggression, Property destruction, Verbal aggression, Inappropriate NOS	Not stated	Varied
McComas, Hoch et al. (2000)*	3	AU	Physical aggression, Disruption	Escape-maintained	Varied
O'Reilly et al. (1996)	1	MR, TBI	Inappropriate vocalizations	Not stated	Effect
Smith et al. (1995)*	9	MR	SIB	Escape-maintained	Varied

Table 1. *(Continued)*

CATEGORY/Author	N	Disability	Target Behavior	Function of Target Behavior	Result
RAPPORT					
Asmus et al. (1999)*	3	MR, ADHD, SI, Other	SIB, Physical aggression, Disruption, Property destruction,	Escape-maintained	Varied
Dunlap et al. (1991)*	1	MR, ADHD, Other	Physical aggression, Disruption, Property Destruction, Verbal Aggression, Inappropriate NOS, Other appropriate behavior	Not stated	Effect
McComas, Hoch, et al. (2000)*	3	AU	Physical aggression, Disruption	Escape-maintained	Varied
McLaughlin & Carr (2005)	3	MR, AU	SIB, Physical aggression, Task compliance	Not stated	Effect
SOCIAL INTERACTION					
Kennedy (1994)*	3	MR, AU, CP, Other	SIB, Physical aggression, Property destruction, Verbal aggression, Inappropriate NOS	Not stated	Varied
Kennedy Itkonen & Lindquist (1995)*	2	MR	Task compliance	N/A	Effect

Table 1. *(Continued)*

CATEGORY/Author	N	Disability	Target Behavior	Function of Target Behavior	Result
Wacker et al. (1996)	2	MR, DD, SI, Other	SIB, Verbal aggression	Attention-maintained, Inconclusive	Effect
RESPONSE EFFORT					
Hanley et al. (1998)	1	MR, CP, SI	SIB, Other inappropriate behavior, Communication, Engagement, Food acceptance	Automatically-maintained	Effect
Zhou, Goff & Iwata (2000).	4	MR	SIB	Automatically-maintained	Effect
OTHER					
Adelinis & Hagopian (1999)	1	MR, AU	Physical aggression	Other	Effect
Horner et al. (1997)*	3	MR, AU, SI, Other	SIB, Physical aggression	Tangible-maintained	Effect
Reed et al. (2005)	1	DD	Food acceptance	N/A	Varied
Taylor et al. (1993)	1	MR, SI	Physical aggression	Attention	Effect
Tustin (1995).	1	MR, AU	Other inappropriate behavior	Not stated	Effect
Wacker et al. (1996)*	2	MR, DD, SI, Other	SIB, Verbal aggression	Attention-maintained, Inconclusive	Effect

Note. The function of the target behavior is no applicable to appropriate behaviors. N/A = not applicable and represents when appropriate behaviors were targeted.

Several studies are identified repeatedly as they fall into more than one category. Asterisk (*) denotes that the study is previously listed in the table.
MR = mental retardation; SI = sensory impairment; SIB = self-injurious behavior; AU = autism; CP = cerebral palsy; DD = developmental disability; ADHD = attention deficit/hyperactivity disorder; NOS = not otherwise specified; DS = Down syndrome; TBI = traumatic brain injury.

Results

Participant Description

A total of 190 participants were included across the 76 studies. However, nine of these participants did not meet the participant criterion; therefore, only specifics regarding these 181 participants are included within the review. Gender was identified for all participants, with 34% (n = 62) female and 66% (n = 119) male.

Participants' disabilities were outlined for each participant in every study. Figure 1 identifies the proportion of participants across disabilities. All disabilities, in which two or less participants across studies were diagnosed, were included in the *other* category. This category contains twenty-one disabilities, including traumatic brain injury, Rett Syndrome, and hydrocephalus. For a complete list of disabilities included in this category, please contact the author.

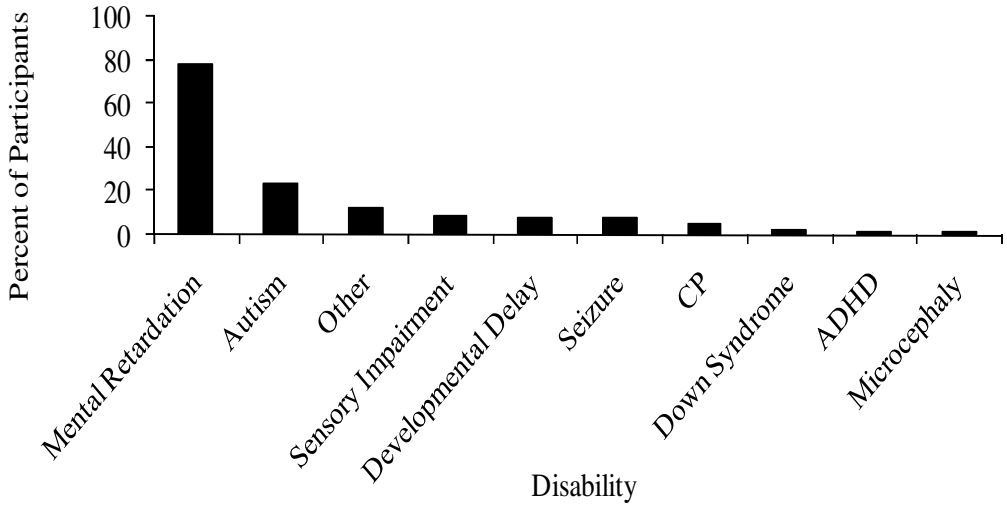

Figure 1. Disabilities identified across all participants (N = 181).

A wide range of ages exists among participants, with the youngest participant only one year of age and the oldest 54 years of age. A small proportion of participants (9%, n = 16) fell into the early childhood age range of birth to three years old. Ten percent of participants (n = 18) were ages four to five years, also known as the preschool age range. Elementary-age children, ages six to twelve years accounted for 25% (n = 45) of participants, while teenage participants, ages 13 – 18 years accounted for 13% (n = 23) of participants. The largest proportion of participants (44%, n = 79) were adults, falling into the 19 years and older age category.

Description of Motivating Operations

The establishing operations will be described in terms of variables that were altered in order to assess the potential of acting as a motivating operation.

Variable

A large variety of potential motivating operations were assessed across the 76 studies, as some studies assessed more than one motivating operation. Figure 2 identifies the categories of motivating operations found in the review.

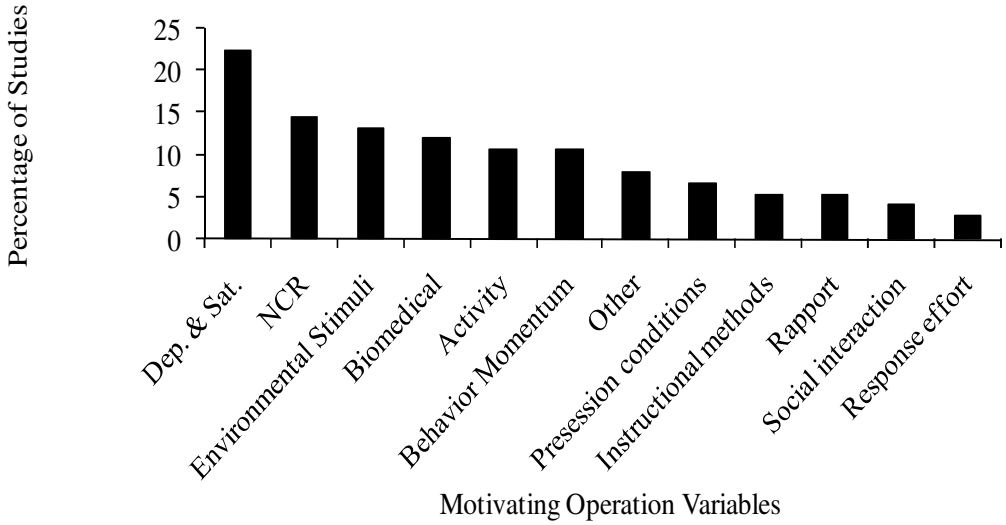

Figure 2. Variables assessed as possible motivating operations across studies (N = 76).

The most commonly used motivating operation variable was deprivation and/or satiation (n = 17). With this procedure, a reinforcer was selected for a particular behavior. Then conditions were conducted in which the participant

received the reinforcer for the target behavior after periods of deprivation or satiation of the reinforcer. For example, in O'Reilly (1999) the participant was provided a typical attention condition of a functional analysis (FA). In other words, contingent attention was provided contingent upon target challenging behavior, head hitting and yelling. This was conducted under two deprivation/satiation conditions. Therefore, in the satiation condition, this attention-contingent condition was conducted after one hour of attention satiation, which consisted of therapist interaction on a fixed time schedule of 30 seconds for one hour prior to the attention-contingent condition. In the deprivation condition, the child was left alone and received no therapist interaction for one hour prior to the attention-contingent condition. As a result, higher levels of head hitting and yelling were seen in conditions which were preceded by deprivation, or one hour of alone prior to the condition.

The second most common variable implemented as a possible motivating operation was noncontingent reinforcement (NCR) (n = 11). The NCR studies essentially identified a reinforcer for a target behavior, then provided that reinforcer noncontingently upon the target behavior. It must be noted that NCR can be conducted both with and without extinction. For example, NCR with extinction would provide reinforcement to the participant noncontingently, but withhold the reinforcer for the target behavior. NCR without extinction would also provide reinforcement noncontingently, but would also reinforce the

participant contingent upon the target behavior. To be included in this review, reinforcement must have remained constant across conditions in order to isolate the effect of the motivating operation. Therefore, if during baseline conditions, reinforcement was not provided contingent upon the target behavior, NCR with extinction was required, but if during baseline conditions, reinforcement was provided contingent upon the target behavior, NCR without extinction was required. All of the studies reviewed followed the latter protocol. Another note worth mentioning is that many authors suggest that NCR is simply satiation as previously described (i.e., Hagopian, Crockett, Van Stone, DeLeon, & Bowman, 2000). However, all studies that identified their procedure(s) as NCR were included in this separate category in order to provide a more detailed description. The effects of NCR as a motivating operation were typically assessed by providing a baseline in which the participant received reinforcement contingent upon the target behavior only, then an NCR condition in which the child received noncontingent access to the reinforcer, but also received the reinforcer contingent upon challenging behavior as in the baseline condition. For example, in Hagopian et al., baseline conditions consisted of providing the participants with 30 seconds of access to a tangible reinforcer contingent upon challenging behaviors, such as aggression. During the NCR condition, the participant received continuous access to the tangible item; however, when the participant engaged in the challenging

behavior, the therapist would reintroduce the tangible item if the participant was not currently interacting with it.

Environmental stimuli were also implemented as possible motivating operations in 10 studies. Environmental stimuli included several variables, for example, items present during conditions, typically, tangibles such as toys, puzzles, magazines, etc. Other environmental stimuli include high and low levels of noise, music presence, and locations of the participant(s) during conditions.

Biomedical factors were assessed as possible motivating operations in nine studies. The studies included several biomedical factors, including medication, specifically methylphenidate, vitamins, specifically zinc and iron supplements, gluten and casein free diet, illness, and sleep deprivation.

Activities were implemented as motivating operations in eight studies as well. Typically, in these studies, instructional method, reinforcement, etc. were held constant across different types of activities. Various activities were presented or altered as possible motivating operations, including fine and gross motor activities, a serious of novel activities, repeated activities, familiar activities, new activities, long duration activities, short duration activities, choice of similar activities, and no choice of activities. For example, Dunlap, Kern-Dunlap, Clarke, and Robbins (1991) compared the challenging behavior of a participant when engaging in conditions consisting of various activities, including fine versus gross motor, and functional versus analogue activities. In every activity condition, the

participant was reinforced for being on task, prompted to continue if he or she was off task and received a time out contingent upon disruptive behavior in order to test the effects of the activity acting as a motivating operation.

Another eight studies implemented behavioral momentum as potential motivating operations. Behavior momentum is essentially the practice of providing a few high-probability (high-p) requests, or requests which are have a high probability of resulting in compliance, along with reinforcement for compliance, immediately before providing a low-probability (low-p) request, or a request which has a low probability of resulting in compliance (Zarcone, Iwata, Mazaleski, & Smith, 1994). For example, Zarcone and colleagues identified demands that would be considered high-p and low-p via a compliance assessment. In baseline, only the low-p instruction and the participant were praised for compliance and received escape contingent upon self-injurious behavior. During the high-p condition, the experimenter made three high-p requests before the low-p request, still praising compliance and providing escape contingent upon self-injurious behavior. However, the difference between the percent of trials with self-injurious behavior in the two conditions was not substantial.

Another possible motivating operation manipulated in five studies was the effect of conditions that occurred prior to FA conditions. In other words, pre-session conditions were systematically manipulated to determine if they had an effect on the results of an analogue assessment of reinforcement contingencies.

For example, O'Reilly, Lancioni and Emerson (1999) conducted an FA with one participant, using the attention, demand, alone, and leisure conditions. However, in addition to the FA, one of two conditions was presented to the participant for 30 minutes prior to the FA. The participant was either exposed to a classroom demand condition in which demands were given, but removed contingent upon challenging behavior, or a classroom attention condition in which classroom demands were also given, but the participant received attention contingent upon challenging behavior for 30 minutes prior to the FA. As a result, more challenging behavior occurred in the FA, particularly during attention conditions, when the FA was preceded by classroom attention conditions.

Instructional methods were assessed as likely motivating operations in four studies. These studies looked at the effect of the rate or pacing of instructional demands and tasks as well as the effect of the strategies used for instruction. Another four studies also measured the effect of the rapport and/or familiarity between the instructor and the participant as probable motivating operations.

Three studies assessed the effects of social interaction between the people, such as the therapist or mother, and the participant. In other words, the amount of social interaction was systematically evaluated while reinforcement for target behaviors remained constant to determine if social interaction could act as a motivating operation.

Two studies assessed the effects of items placed on the participant to increase response effort in engaging challenging behaviors. For example, Hanley, Piazza, Keeney, Blakeley-Smith, and Worsdell (2005) placed wrist weights on the participant to determine the effect on self-injurious behavior, while Zhou, Goff, and Iwata (2000) placed arm restraints on a participant to determine the effect on self-injurious behavior. While the inclusion of response effort studies in a review of motivating operations may be controversial, it should be noted that they were included because they fit the criteria for determining the effect of and motivating operation; in other words, and antecedent variable was changed (i.e., wrist weights and arm restraints) and all consequences were kept constant.

An *other* category was included for all possible motivating operation variables that were assessed in only one study each. The motivating operations included in this category included the types of requests made; specifically, Adelinis and Hagopian (1999) found that redirecting participants with requesting that they *don't* continue the behavior currently engaged in produced more challenging behavior than requesting that the participants *do* engage in an incompatible activity. In addition, Horner, Day, and Day (1997) determined the effects of delaying activities, while Reed, Dolezal, Cooper-Brown, and Wacker (2005) assessed the effects of interrupting sleep for feeding. Wacker and colleagues (1996) determined the effects of the number of meals per day on target behavior and Tustin (1995) assessed the effects of giving participants advanced

warnings that they would soon need to change tasks. Last, Taylor, Sisson, McKelvey, and Trefelner (1993) compared altered attention conditions of an FA. During one attention condition, the implementer provided attention to another student, but in the other condition, the implementer provided attention to another student as well as another adult. It was the latter condition that produced more challenging behavior.

Target Behaviors

Topography of Behaviors

A total of fourteen categories of target behaviors were identified. Target behaviors were those in which experimenters hoped to see an increase or decrease as a result of manipulation of possible motivating operations. Many researchers collected data on multiple target behaviors for each participant.

The majority of these target behaviors would be considered challenging behaviors. In fact, self-injurious behavior, which includes behaviors such as head banging, body hitting, skin picking, and self-biting was the most frequently addressed target behavior. Other challenging target behaviors include physical aggression, disruption, property destruction, verbal aggression and inappropriate verbalizations. Also, a few studies identified target behaviors as inappropriate, and did not specify the nature of these behaviors.

In addition, an *other inappropriate* category accounted for 16% (n = 25) of target behaviors and included all challenging behaviors that five or less

participants exhibited. This category included tantrum, elopement, spitting, throwing items, pica, noncompliance, inappropriate self-touching, rumination, wet pants, object mouthing, climbing on furniture, and dropping to the floor.

Several appropriate behaviors were targeted as well. The most frequently targeted appropriate behavior was task compliance or completion and the second most frequently targeted behavior was engagement. Food acceptance and communication also accounted for two categories of appropriate target behaviors. An *other appropriate* category included appropriate target behaviors that were targeted in five or fewer participants. This category included behaviors such as social interaction, microswitch activation, choice selection, sucking a pacifier, and verbal imitation.

Last, participant affect, which cannot be characterized into either the inappropriate nor appropriate behavior category, accounted for a very small percentage of target behaviors.

Figure 3 identifies the categories of target behaviors found in the review.

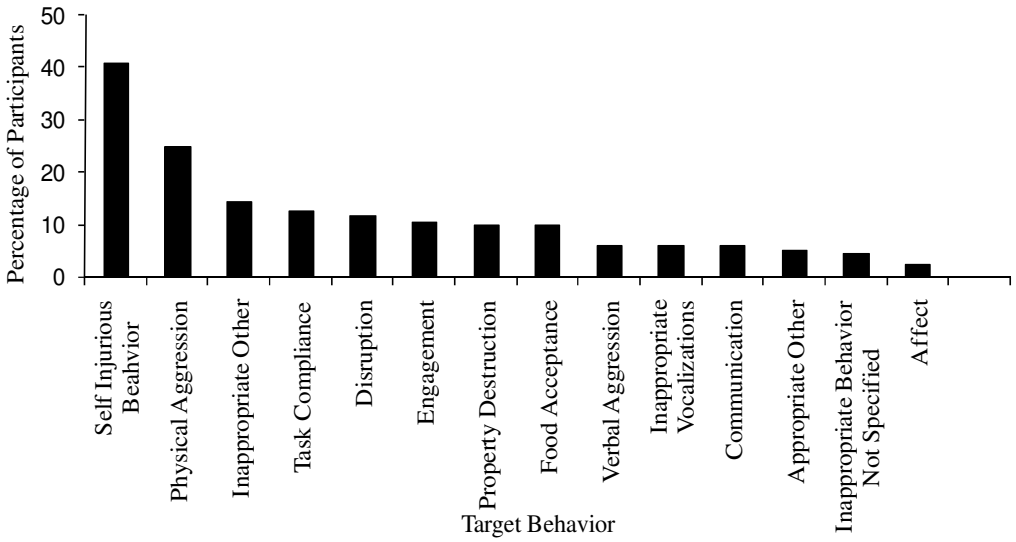

Figure 3. Target behaviors expressed as percentage of participants displaying each behavior (N = 187).

Function of Behaviors

The majority of studies that targeted challenging behavior identified the function of the target behavior using a variety of methods, including observation, interview, and functional analysis. It is noteworthy that 26% (n = 47) of participants' target behavior was solely appropriate behavior; therefore, function of behavior is not applicable. For the remaining, 20% (n = 37) of participants' target behavior was maintained by escape and 13% (n = 23) was maintained by attention. Six percent (n = 11) of participants' target behavior was maintained by access to tangibles and another 5% (n = 9) were maintained by automatic reinforcement. On the other hand, 9% (n = 16) of participants' functional

assessment of challenging behavior function was inconclusive. Two participants' target behavior was maintained by other reinforcement described by the authors. First, Carey and Halle (2002) identified that challenging behavior was maintained by access to music. Second, Adelinis and Hagopian (1999) that challenging behavior was maintained by permission to continue in an activity. Twenty-one percent (n = 38) of participants' target behavior function was not identified.

Implementation

Trainer

All but 14% (n = 11) studies identified who was responsible for conducting the research/assessment, with some studies identifying more than one individual. In 33% (n = 25) of the studies a therapist conducted the trials to determine the effects of possible motivating operations. In another 22% (n = 17), the author or an experimenter was identified as conducting the condition, while a parent was identified in another 12% (n = 9). In addition, 11% recognized a staff person (n = 8), while another 9% (n = 7) of studies recognized teachers as conducting assessments to determine the effects of possible motivating operations. Last, undergraduate or graduate students were utilized in 7% (n = 5). An *other* category accounted for the remaining 7% (n = 5), which include nonspecific descriptions, such as *trainer* or *instructor*.

In summary, in at least 58% (n = 44) of the studies employed someone other than the author, therapist, or experimenter to conduct the assessment to

determine the effects of potential motivating operations, and possibly more due to the number of studies that did not identify who conducted the research. Therefore, it would be valuable to know what, if any, training was provided to those implementers. However, 87% (n = 66) of the studies did not describe or mention training used to prepare individuals to conduct assessment on possible motivating operations. Another 8% (n = 6) mentioned coaching, but did not describe it. Four studies (5%) described methods to train implementers. Two studies described that a criterion level was created and coaching occurred until implementers reached this criterion on several areas, such as use of instructions, prompting, and more (McLaughlin & Carr, 2005; Moes, 1998). On the other hand, Bambara, Koger, Katzer, and Davenport (1995) explained that 20 – 30 minute training sessions occurred several times a week, but did not provide details as to what the training involved. Last, Carr, Yarbrough, and Langdon (1997) provided implementers with a text on the topic and allowed for time to practice.

Training Setting

Another important piece of information regarding the application of motivating operations is the settings in which the implementation of motivating operations took place.

The majority of studies (59%, n = 45) took place in clinical-like settings. For example, 25% (n = 19) were conducted in a clinic or hospital. Additionally, 20% (n = 15) of studies were conducted in a school setting, but in an empty

classroom or another type of pull-out room. Another 11% (n = 8) were conducted at residential facilities, but again in an empty or pull-out room. Last, 4% (n = 3) were conducted at work settings, but in a segregated area or pull-out room.

A smaller percentage (20%, n = 15) of studies occurred in non-clinical settings. The majority of these occurred in the home (12%, n = 9). Five percent (n = 4) of studies were conducted in school settings while typical classroom activities occurred and 1% (n = 1) of studies were conducted in residential settings while typical activities occurred. Another 1% (n = 1) of studies were conducted in work settings while typical activities occurred.

Another 24% (n = 18) of studies provided little detail regarding the setting, making it impossible to conclude if the studies occurred in a clinical-like setting or while typical activities occurred. For example, 8% (n = 6) occurred in a school setting, but it was unclear if these studies were conducted during typical classroom activities or in pull-out rooms. In addition, 12% (n = 9) occurred in a nonspecific area of a residential facility and another 4% (n = 3) occurred in a nonspecific area of a work setting. Another 5% (n = 4) provided very nonspecific setting descriptions, such as a *therapy room*.

Finally, 7% (n = 5) did not identify the setting. Last, it is noteworthy that no studies were conducted in general education classrooms or in community settings.

Treatment Fidelity

In any teaching situation, it is necessary to know if the instructional methods and/or intervention were implemented appropriately (National Research Council, 2001). A report of treatment fidelity provides this information regarding the intervention implementation (National Research Council). This would be particularly valuable information if someone other than the researcher implemented instruction, which was the case for at least 64% (n = 48) of the studies reviewed, and possibly more due to the fact that 11 studies did not identify the trainer. Seventy-eight percent (n = 59) did not report treatment fidelity data. The remaining 17 studies reported treatment integrity data, with 12 studies reporting integrity means of 90% or more and two studies reporting means of less than 90%. The remaining three studies mentioned procedural integrity, but did not utilize traditional statistical analysis to asses it; instead, other methods, such as identifying any and/or all procedural violations and other forms of anecdotal data were applied.

Results of Motivating Operation Manipulation

Effect of Motivating Operations

It is important to identify if the proposed motivating operation truly had an effect on the behavior of the participants. In other words, it is essential to identify via visual analysis of behavior graphs, if a difference existed between target

behaviors in conditions in which the projected motivating operation was present and conditions in which the projected motivating operation was not present.

Seventy-two percent (n = 55) studies reported an effect noticeable via visual analysis of graphs for all participants in conditions in which motivating operations were present as compared to conditions in which motivating operations were not present. Another 25% (n = 19) reported a varied effect, in other words, some participants demonstrated an effect and others did not. Last, 8% (n = 6) demonstrated no effect for all participants.

Due to the large variety of motivating operations that were implemented across this review, it is noteworthy to determine the effectiveness of each category of motivating operation. First, of the 17 studies that examined the effects of deprivation and satiation, 58% (n = 10) were effective across all participants, while 29% (n = 5) reported varied effects, and 12% (n = 2) reported no effect.

Of the 11 studies that examined noncontingent reinforcement as a potential motivating operation, 64% (n = 7) of studies demonstrated an effect across all participants, 18% (n = 2) reported varied effects, and 18% (n = 2) also reported no effect across participants.

Ten studies examined the effects of environmental stimuli. Seventy percent (n = 7) reported effects across all participants, and 30% (n = 3) reported varied effects, while no studies reported no effect across all participants.

Of the 9 studies that examined the effects of biomedical factors, 77% (n = 7) found an effect across all participants. Eleven percent (n = 1) found varied effects across participants and another 11% (n = 1) found no effect across participants.

Activities were assessed as prospective motivating operations in eight studies. Thirty-eight percent (n = 3) of these studies demonstrated an effect across all participants. The remaining 63% (n = 5) found varied effects across participants.

Behavior momentum was targeted in another 8 studies. Eighty-eight percent of these studies (n = 7) reported an effect across all participants, while the other 13% (n = 1) found no effect across participants.

Of the 5 studies that assessed the effects of presession conditions, 60% (n = 3) found an effect across all participants. The remaining 40% (n = 2) found varied effects across participants.

The majority of the four studies that assessed instruction methods (75%, n = 3) found a varied effect across participants. The remaining 25% (n = 1) reported an effect across all participants.

Of the four studies that measured the effect of rapport as a potential motivating operation, half (n = 2) found an effect across all participants, while the other half (n = 2) reported varied effects across participants.

The majority of the three studies that evaluated the effects of social interaction as possible motivating operations found an effect across all participants (66%, n = 2), while the remaining study found a varied effect across participants.

Both studies that assessed response effort as a probable motivating operation, found effects across all participants.

Maintenance

According to Duker et al. (2004), "maintenance is the continued use of newly acquired responses after training is completed" (p. 147). It would be valuable to know if the effects of the presence or absence of a motivating operation could be maintained for long periods of time. Eighty-nine percent (n = 68) of the studies did not report information regarding maintenance. All of the remaining eight studies reported that effects of the motivating operation were maintained during follow-up assessment. The majority of the follow-up data were taken two to six months after the initial investigation; while one study conducted a follow-up 16 months later (Ducharme & Worling, 1994) and another 30 months later (Irvin, 2006).

Generalization

Generalization is the use of the newly acquired behavior in circumstances different from those associated with training (Duker et al., 2004). For example, generalization assessment could determine if the effects of motivating operations

would also be present in a new environment or with new instructors. Of the studies reviewed, 97% (n = 74) did not report information regarding generalization of motivating operation effects. Of the remaining 3% (n = 2) studies, both found that the motivating operations had a similar effect when generalized to new settings (Adelinis & Hagopian,1999), in addition, one of the two also found that the motivating operations had similar effects when generalized to new instructors (McComas, Hoch, Paone & El-Roy, 2000).

Social Validity

Social validity reports how well a program is considered appropriate and socially important (Heward, 1987b). Of the studies reviewed, 95% (n = 72) did not report information regarding social validity. Of the remaining 5% (n = 4), all found positive results, either that the treatment was found acceptable and/or the consumer was satisfied.

Four assessments were used to assess social validity, the Treatment Acceptability Rating Form-Revised (TARF-R) (Reimers & Wacker, 1988), the Motivation Rating Scale (MRS) (Dunlap & Koegel, 1980; Koegel & Egel, 1979), Treatment Evaluation Inventory (TEI) (Kazdin, 1980), and Parent's Consumer Satisfaction Questionnaire (Forehand & McMahon, 1981; McMahon, Tiedemann, Forehand, & Griest, 1984). Social validity was collected from the participants' parents in two studies, staff members from an employment setting in another, and special education teachers in the remaining study.

Discussion

Seventy-six studies published between 1990 and 2007 were reviewed. Findings suggest that motivating operations can be isolated and manipulated in a way that will affect particular target behaviors as the majority of studies found effects across all participants. These findings, while encouraging, are simply the beginning of understanding the complexities of motivating operations and how to best implement motivating operation interventions for this population. The results of the review can be organized according to the original aims and research questions of this review.

Motivating Operation Variables

One of the most evident themes in this review is the variety of variables that can act as motivating operations. A total of 12 categories of potential motivating operations were identified across 76 studies. Further, within most categories were several subcategories. For example, the biomedical and activities categories each contained five subcategories. Biomedical, for example, included medicine, illness, diet, sleep deprivation and vitamin use as subcategories. Additionally, the environmental stimuli category contained 4 subcategories, including nose levels, music in the background, location, and objects present. This suggests that the range of potential motivating operations is very broad, and possibly limitless.

Motivating Operation Identification

While it can be easily concluded that motivating operations take on many shapes and forms, it is unclear how to identify potential motivating operations for individuals. None of the 76 studies provided a description of a systematic method of identifying potential motivating operations for participants. Considering the wide variety of potential motivating operations, this could prove to be a very daunting task; however, this review found no evidence for direction regarding this step of the process.

Participants

Motivating operation effects do not discriminate among participant attributes. There was no limitation on the type or severity of the disability. In addition, motivating operations can have an effect on a wide age range, seeing as approximately half of participants were children and the other teenagers or adults. Also, both males and females were well represented throughout the research. This concludes that motivating operations should be considered and systematically assessed across all individuals, regardless of disability, age, or gender.

Target Behaviors

Topography of Behavior

This review suggests that motivating operations may be most helpful in attempting to reduce severe challenging behaviors. The majority of target behaviors targeted in these studies were severe behaviors, such as self-injurious

behaviors, including head hitting, head banging, biting, and scratching, as well as physical aggression towards others. Also noteworthy, the majority of the 34 studies that targeted self-injurious behavior found an effect across all participants (68%, n = 23). Additionally, the majority of the 27 studies that targeted physical aggression also found an effect across all participants (67%, n = 18). This suggests that the systematic assessment and manipulation of motivating operations should be considered for potential behavior management plans targeting severe challenging behavior.

In addition, the review also concludes that motivating operations would be helpful in increasing appropriate behavior, but specifically behavior related to task completions, rather than social interaction, communication, or self-help skills. The majority of research targeting appropriate behavior, concentrated on behavior related to task completion, such as task engagement, compliance and completion. Accordingly, food acceptance represented a large proportion of appropriate behaviors targeted, which, although separated in the initial description of target behaviors, could also be considered as task compliance and completion. Again, the majority of the 24 studies that targeted behavior related to a task or activity found an effect across all participants (67%, n = 16).

Several behavior categories were not well-covered in the research or completely omitted, such as communication, self-help skills, social interaction with adults, peer interaction, and play skills. This suggests that severe challenging

behavior and task completion and/or compliance are best suited for interventions that include components of motivating operations.

Function of Behavior

Motivating operations can be successful in generating behavior change in challenging behavior regardless of the function of behavior. In fact, fairly equal success exists among escape- and attention-maintained behavior. Sixty-three percent of studies (n = 10) in which escape maintained behavior was assessed demonstrated an effect among all participants, while 66% (n = 11) of studies in which attention-maintained challenging behavior was assessed reported effects.

Moreover, studies including participants whose behavior was maintained by access to tangibles reported a higher proportion of studies that demonstrated an effect across all participants (86%, n = 6). Yet, studies assessing participants whose behavior was automatically maintained reported the most impressive results. In fact, 100% (n = 4) of these studies reported effects across all participants. However, it is noteworthy that fewer studies assessed tangible- and automatically-maintained challenging behaviors compared to attention- and escape-maintained challenging behaviors, which could account for the differences in results.

On the other hand, those studies that did not state the function of challenging behavior did not find as much success in identifying motivating operations that had an effect across all participants. In fact, 56% (n = 10) of

studies in which the function of the challenging behavior was not identified found an effect, while 17% (n = 3) found a varied effect and 28% (n = 5) found no effect.

This information suggests that 1) the function of the target behavior is an important key to identifying motivating operations that truly have an effect on challenging behavior, and 2) tangible- and automatically-maintained behaviors may be more susceptible to effects of motivating operations. Therefore, in practice, it is important to first determine the function of a challenging behavior using an assessment, such as an FA, before implementing a behavior intervention involving motivating operations in order to improve the likely success of the intervention. Although it is impossible to deduce the explanation as to why identifying the function of the behavior improves the success of isolating an effective motivating operation, it is obvious that doing so will in some manner improve the success of an intervention involving motivating operations.

Treatment Matched to Behavior

Due to the large number of studies reviewed and the variety of motivating operations included in these studies, it can become difficult to draw conclusions regarding which categories of motivating operations are effective for particular types of behaviors. It would be relevant for practice to know specifically which motivating operations match particular behavior needs. Therefore, Table 2 identifies which motivating operations have been shown to have an effect across

the topographies of behaviors as well as appropriate behaviors. The table is divided into three columns, representing which category of motivating operations has little research support, moderate support, or substantial support in the literature. Motivating operation categories were considered to have little support if either no studies have assessed particular category of motivating operations with the particular function of behavior or 25% or less of studies that do exist showed an effect across all participants. Categories were considered to have moderate support when at least one study under that category assessed the impact on the particular behavior and 25 – 75% of those studies showed an effect across all participants. Finally, motivating operation categories were considered to have substantial support if at least one study was conducted with that particular motivating operation for that particular behavior and 75% or more of those studies found effects across all participants.

Additionally, Table 3 identifies which categories of motivating operation have various levels of support in the literature for specific functions of behavior. The designation of categories is the same as that applied to Table 2.

Table 2. Levels of support for motivating operations according to topography of target behaviors.

	Little Support	Moderate Support	Substantial Support
Self-injurious Behavior	Environmental Stimuli Activity Instructional Methods	Deprivation and Satiation Noncontingent Reinforcement Behavior Momentum Pre-session Conditions Rapport Social Interaction	Biomedical Response effort
Physical Aggression	Environmental Stimuli Instruction Social Interaction Response effort	Deprivation and Satiation Noncontingent Reinforcement Biomedical Activity Behavior Momentum Pre-session Conditions Rapport	
Task Compliance	Biomedical Behavior Momentum Pre-session Conditions Instruction Response effort	Deprivation and Satiation Noncontingent Reinforcement Activity Rapport Social Interaction	Environmental Stimuli

Table 2. (Continued)

	Little Support	Moderate Support	Substantial Support
Disruption	Deprivation and Satiation Noncontingent Reinforcement Pre-session Conditions Instruction Social Interaction Response effort	Environmental Stimuli Biomedical Activity Rapport	Behavior Momentum
Engagement	Biomedical Activity Pre-session Conditions Instruction Social Interaction	Deprivation and Satiation Noncontingent Reinforcement Environmental Stimuli Response effort	Behavior Momentum Rapport
Property Destruction	Deprivation and Satiation Pre-session Conditions Instruction Social Interaction	Noncontingent Reinforcement Biomedical Activity Rapport Response effort	Environmental Stimuli Behavior Momentum

Table 2. (Continued)

	Little Support	Moderate Support	Substantial Support
Food Acceptance	Deprivation and Satiation Environmental Stimuli Biomedical Activity Pre-session Conditions Instruction Rapport Social Interaction	Noncontingent Reinforcement Response effort	Behavior Momentum
Verbal Aggression	Environmental Stimuli Biomedical Pre-session Conditions Instruction Response effort	Behavior Momentum Rapport Social Interaction	Deprivation and Satiation Noncontingent Reinforcement
Inappropriate Vocalizations	Deprivation and Satiation Noncontingent Reinforcement Environmental Stimuli Biomedical Behavior Momentum Pre-session Conditions Rapport Social Interaction Response effort	Activity Instruction	

Table 2. (Continued)

	Little Support	Moderate Support	Substantial Support
Communication	Noncontingent Reinforcement Environmental Stimuli Biomedical Activity Pre-session Conditions Instruction Rapport Social Interaction	Deprivation and Satiation Behavior Momentum Response effort	
Affect	Deprivation and Satiation Noncontingent Reinforcement Environmental Stimuli Biomedical Activity Behavior Momentum Pre-session Conditions Instruction Rapport Social Interaction Response effort		

Table 3. Levels of support for motivating operations according to function of target behaviors.

	Little Support	**Moderate Support**	**Substantial Support**
Attention-Maintained	Environmental Stimuli Biomedical Activity Behavior Momentum Instructional Methods Rapport Response Effort	Deprivation and Satiation Pre-session Conditions Social Interaction	Noncontingent Reinforcement
Escape-Maintained	Deprivation and Satiation Activity Instructional Methods Rapport Social Interaction Response Effort	Noncontingent Reinforcement Behavior Momentum Pre-session Conditions	Environmental Stimuli Biomedical
Tangible-Maintained	Activity Behavior Momentum Pre-session Conditions Instructional Methods Rapport Social Interaction Response Effort	Deprivation and Satiation Environmental Stimuli Biomedical	Noncontingent Reinforcement

Table 3. (Continued)

	Little Support	Moderate Support	Substantial Support
Automatically Maintained	Deprivation and Satiation Environmental Stimuli Biomedical Activity Behavior Momentum Pre-session Conditions Instructional Methods Rapport Social Interaction	Noncontingent Reinforcement	Response Effort
Functional Assessment Inconclusive	Deprivation and Satiation Noncontingent Reinforcement Activity Behavior Momentum Instructional Methods Rapport Response Effort	Pre-session Conditions Social Interaction	Environmental Stimuli Biomedical
Function Not Stated	Noncontingent Reinforcement Environmental Stimuli Activity Pre-session Conditions Rapport Social Interaction Response Effort	Deprivation and Satiation Biomedical Instructional Methods	Activity Behavior Momentum Rapport

Table 3. (Continued)

	Little Support	**Moderate Support**	**Substantial Support**
Appropriate Behavior (Function Not Relevant)	Environmental Stimuli Biomedical Activity Pre-session Conditions Instructional Methods Rapport Social Interaction Response Effort	Deprivation and Satiation	Noncontingent Reinforcement Behavior Momentum

Effectiveness

Overall, this review concludes that motivating operations should be considered when assessing variables that contribute to behavior. When attempting to decrease a challenging behavior, therapists should consider not only the function of that behavior, but also the influences of motivating operations in order to possibly improve interventions. Additionally, teaching situations may also be improved if motivating operations are systematically included in teaching methodology.

Influences on Effectiveness

The details of implementing successful motivating operations as part of an intervention to reduce challenging behavior or increase appropriate behavior are deduced from this review. It is important to know which characteristics, if any, of the participant, motivating operation variable, or implementation may influence the effectiveness of the establishing operation.

Participant

Participant disability does not seem to have an influence on the effect of intervention including motivating operations. In fact, studies that included individuals with mental retardation, ADHD, a sensory impairment, autism, cerebral palsy, or seizure all demonstrated similar effects; 60 – 70% of studies in each of these groups demonstrated an effect across all participants. Only three disability categories did not follow this trend. Of the studies that included

participants identified with developmental delays, 50% showed an effect across all participants. On the other hand, all studies that included participants with microcephaly demonstrated an effect. However, it should be noted that this difference is likely due to the lack of studies (n = 3) that included participants with this disability. This holds true for Down Syndrome. Thirty-three percent of studies that included participants with Down Syndrome found an effect across all participants. Again, this was only across three studies; therefore, the results are easily skewed. This suggests that an individual's disability should not influence the effectiveness of an intervention implementing motivating operations.

Motivating Operation

While the review concluded as a whole that motivating operations can influence target behaviors, it is also important to identify if any types of motivating operations were particularly successful or unsuccessful. In other words, does the type of motivating operation selected affect the success of that motivating operation altering target behavior? This review suggests that it does.

Three particular types of motivating operations show the most success in altering target behaviors in that 70% or more of the studies demonstrated an effect across all participants. These include: 1) response effort with 100% showing effectiveness across all participants, 2) behavior momentum (88%), 3) biomedical (78%), and 4) environmental stimuli (70%).

On the other hand, several categories of motivating operations showed similar effects ranging within 50 – 70% of studies finding an effect across all participants. This includes: 1) social interaction with 67% demonstrating effectiveness across all participants, 2) noncontingent reinforcement (64%), 3) deprivation and satiation (61%), 4) pre-session conditions (60%), and rapport (50%).

A few categories of motivating operations did not have overwhelming support in the literature. In fact, both the categories of activity and instructional methods had less than 40% of studies demonstrating an effect across all participants, 38% and 25%, respectively.

This information could be extremely helpful in practice. Due to the fact that no systematic method is in place for identifying potential motivating operations, it may be wise for professionals to opt for other methods to select motivating operations to include in interventions. If this is the case, then it seems wise that professionals should consider the effects of response effort, biomedical conditions, and environmental stimuli if they need assistance in identifying potentially successful motivating operations before selecting other potential motivating operations. On the other hand, activities and instructional methods should not be as widely used, but reserved for those individuals in which evidence suggests that these could be appropriate.

Implementation

Several details of implementation can influence the effectiveness of the intervention. These details include the setting and implementer.

Setting

In terms of settings, clinical settings are most commonly used. In fact, when interventions were implemented in non-clinical settings, such as schools or residential facilities, the authors opted to use pull-out rooms in which regular activities were not in progress, suggesting that the clinical settings may have a benefit over more typical settings. On the other hand, both settings produced similar results. In particular, of the 44 studies that utilized clinical-type settings, 64% (n = 28) reported effects across all participants. Additionally, of the 15 studies that utilized non-clinical settings, such as the home or classroom during regular activities, 71% (n = 12) demonstrated effects across all participants. Therefore, both settings are acceptable locations for implementing interventions that include motivating operation; however, clinical settings seem to be favorable for an unknown reason.

Implementer

While a variety of people implemented the assessment of motivating operations, it is more common for an individual with extensive knowledge regarding the use of motivating operations, such as an experimenter or therapist. However, utilizing someone with extensive knowledge does not necessarily

increase the likelihood of finding an effect when implementing the motivating operation. In fact, of the 45 studies that implemented an author, experimenter, or therapist, 67% (n = 30) reported an effect across all participants. On the other hand, of the 23 studies that implemented someone with less extensive knowledge of motivating operations, such as teacher, parent, staff person, or student, 91% (n = 21) reported effects across all participants.

This concludes that while utilizing individuals with extensive knowledge is more widespread, results may actually be improved by utilizing someone without as extensive knowledge. This is a difficult result to interpret for two reasons, 1) it is impossible to determine the reason for the differences in results, and 2) most studies did not thoroughly describe training and coaching that took place.

First, it is easy to assume that less knowledge regarding motivating operations would not be a beneficial factor in isolating the effects of motivating operations. However, several hypotheses as to why clearer effects were demonstrated with these implementers exist. First, it could be that they are more familiar with the participants due to their role. Second, it could be that a learning history exists between the implementer and the participant. Additionally, with the lack of detail regarding the training and coaching for these implementers it is impossible to provide a standard of training that must take place before these individuals are prepared to act as implementers.

Results of Motivating Operation Manipulation

Due to the fact that very few studies reported data regarding maintenance, generalization, or social validity, it is impossible to draw conclusions regarding these topics.

Future Research

Four lines of suggested future research were concluded from this review. First, methods to identify potential motivating operations need to be identified. While this review was helpful in identifying that several potential motivating operations exist and proving that systematically altering motivating operations has the possibility of reducing challenging behavior and increasing appropriate behavior, it did not identify methods of how an interventionist would identify possible motivating operations. A suggested line of research should identify systematic methods of determining motivating operations, which could potentially include checklists, interviews, or rating scales.

A second line of suggested research is to continue fine-tuning what currently exists. While the fact that 76 studies may suggest that a great deal of work already exists on the topic, this is actually a misconception. In fact, with the large variety of motivating operations that exist in the literature, it is necessary to continue fine-tuning which motivating operations address particular topographies and functions of behaviors. Several motivating operations simply have not been researched with particular functions and topographies. Take for example,

deprivation and satiation of reinforcers. Although this was the most frequently cited motivating operation, no studies assessed the effects of deprivation and satiation of reinforcers on escape-maintained behavior. Additionally, research should begin to include details that were scarce throughout this literature base, including assessment of social validity, maintenance, and generalization, and details concerning the training of implementers.

The third line of suggest research is to identify how motivating operations can affect other topographies of behaviors that were either scarcely covered or not covered at all in this literature. For example, increased appropriate communication is a goal for many individuals with developmental disabilities; however, this was scarcely targeted throughout the 76 studies in this review. Other target behaviors that were not targeted, but should be assessed in future research include self-help skills, social interaction with peers, and play skills.

A fourth line of research is to identify if motivating operations can be used to improve generalization. While it is of note that systematic alteration of motivating operations can influence a change in target behaviors in one setting, it is also significant to know if this change can be generalized to new stimuli, such as setting and people. However, very few studies assessed the ability of the effects of motivating operations to generalize. Therefore, further research into the results of generalization should be conducted. Moreover, due to the fact that it is common for newly acquired skills or behavior reduction to be reluctant to

generalization for this target population, it would be noteworthy to determine if motivating operations can be systematically altered to improve generalization of skills. In other words, could motivating operations serve as a possible approach to improving generalization?

CHAPTER 3

METHODS

The purpose of this chapter is to identify the research questions and describe the methods implemented in the study. In the first section, the research questions are identified. In the second section, the participant characteristics and setting are described. In the third section, the response definitions are introduced. Fourth, settings and materials used in this study are discussed in detail. In the fifth section, data collection procedures and the methods for calculating interobserver agreement and treatment fidelity are presented. Finally, the procedures of the four main phases of the study, FA, FA with motivating operation manipulation, FCT, and generalization probes, are outlined. Additionally, the experimental design and training procedures are described.

Research Questions

The purpose of this study is to answer specific research questions identified during the literature synthesis. Specifically, two research questions were identified for this study. First, what are the effects of motivating operations on FCT intervention? Second, what are the effects of motivating operations on the generalization of skills acquired via FCT intervention?

Participants

Four children with a diagnosis of a developmental disability participated in this study. Table 4 provides descriptive information regarding these

participants, including age, gender, ethnicity, mode of communication, and disability diagnosis.

All four participants attended a private school serving children with developmental disabilities. Additionally all participants were placed in a self-contained special education classroom.

Table 4. Participant information including age reported in years, gender, ethnicity, communication methods, and disability diagnosis.

Participant	**Age**	**Gender**	**Ethnicity**	**Communication**	**Disability**
Carson	4	male	Mexican-American	3 – 4 word phrases	pervasive developmental delay-not otherwise specified, severe expressive language delay
Jude	6	male	Caucasian	2 – 3 word phrases	autism
Kyan	7	male	Asian-American	2 – 3 word approximations paired with manual signs	autism
Mason	6	male	Caucasian	speech generating device	autism, moderate intellectual disability, speech and language delay, chiara malformation type I, hypothyroidism

Response Definitions and Measurement

Carson's challenging behavior consisted of verbal protest. Carson protested with typical verbal protests, including *no, mine, let go* and *stop*, but also with more unique protesting words, such as *oh* and *wait*. Teacher reported that

these words were commonly used in protest. Target communication taught during FCT and assessed in generalization probes was a verbal mand, specifically *more [toy name]*. During FCT intervention, the mand taught was *more game*, while generalization probe requests included *more movie* and *more toy*.

Jude's challenging behavior was throwing objects, which was defined as forcefully launching an item at least 5 inches away from his body. Target communication taught during FCT and assessed in generalization probes was a verbal mand, specifically *more [toy name]*. During FCT intervention, the mand taught was more crayons, while generalization probe requests included *more chalk* and *more markers*.

Mason communicated using a 6-button speech generating device (SGD). Specifically, Mason used the Go-Talk 4+™ with the following six buttons: *yes, no, more, potty, eat, drink*. Mason's challenging behavior was aggression, defined as pinching, grasping the experimenter's skin between fingers with any amount of forcer, and scratching, forcefully sliding fingertips across experimenter's skin. Target communication taught during FCT and assessed in all generalization probes was the depression of the *more* button of his SGD. This was defined as depression of the SGD with enough pressure to emit the message.

Kyan's challenging behavior was chair tipping, which was defined as any leg of the chair not in contact with the ground for any amount of time. Target communication taught during FCT and assessed in all generalization probes was a

verbal approximation of more accompanied with the manual sign for more. Specifically, Kyan's verbal approximation was *ma*.

Both target challenging behaviors and communicative behaviors were measured using 10-second partial interval recording. During the functional analyses, data was collected only on challenging behavior, while data on both challenging and communicative behaviors was measured during the FCT baseline, FCT intervention, and generalization probe sessions.

Settings and Materials

Functional analyses, functional communication (FCT) baseline and intervention sessions, and probes for generalization to new toys were conducted in an empty room at the participants' school. For Carson, this was a therapy room at his school that was typically used for one-to-one instruction. Toys and educational materials were visible, but stored away. Generally, no other students were present during times of assessment or intervention; however, occasionally other parts of the room were utilized for instruction in which one student and one teacher would work at table across the room separated by a partition. For Jude, Mason, and Kyan, this was an empty classroom in which toys and educational materials were visible, but stored away. No other children were present during times of assessment or intervention.

Probes for generalization to new settings were conducted in various settings. Carson's generalization probes to a new setting were conducted in his

classroom. Toys and educational materials were visible, but stored away. Typical classroom activities continued. This included students transitioning in and out of the room; therefore, at times no other students or teachers were present, but at others up to six other students and three teachers were in the room conducting typical classroom activities.

Jude's generalization probes to a new setting were conducted in his grandmother's home. Jude's grandmother picked him up from school on a daily basis and spent approximately 4 hours a day at her house. Additionally, he stayed overnight at his grandmother's house one to two nights a week. Specifically, generalization probes were conducted in the kitchen area, an area that Jude commonly played. His drawing materials were stored in the kitchen and his grandmother reported that he typically utilized the kitchen table to use drawing and coloring materials.

Mason's generalization probes to a new setting were conducted in his home. Specifically, these assessments were conducted in a media room that served a dual function as his play room. The majority of his toys were stored here, as well as child-sized furniture. Parents and caregiver reported that the majority of Mason's play occurred in this media room.

Kyan's generalization probes to a new setting were conducted in a therapy room in his school. Kyan received one-to-one instruction in this therapy room on

a daily basis. Up to three other students and three teachers were in the therapy room at any given time during these probes.

All participants had a previously-administered pair-wise preference assessment (Fisher, 1992). The results of this preference assessment as well as teacher and caregiver interview were used to determine toys to be utilized in various phases of the study. In some instances, some tangibles, such as food, identified in the preference assessment could not be used due to ethical concerns (i.e., 15 minutes unlimited access to candy).

Three toys were selected for the various phases of the study. The highest preferred item was included in the tangible condition of the FA, FCT, and generalization probes to new setting with the original person and toy. The second highest preferred toy was incorporated into the generalization probes to a new toy, but original person and setting. The third highest preferred toy was incorporated into generalization probes to a new toy and new setting and generalization probes to a new toy, new setting, and new person for Carson and Kyan. Generalization probes to new a new toy and new setting as well as generalization probes to a new toy, new setting, and new person were identified by caregiver interview for Jude and Mason.

Additionally, an SGD was implemented with Mason during FCT and generalization probes. His personal SGD, the Go-Talk 4+™ with the following six buttons: *yes, no, more, potty, eat, drink*. Specifically, the *more* button was

targeted in FCT and generalization probes; no other buttons were used in these sessions.

Data Collection

Most sessions were videotaped. The author served as the primary coder. While some data collection occurred during the session, other data collection was done via videotape depending upon the feasibility of each session. Both target challenging behaviors and target communication behaviors were recorded using 10-second partial interval recording. See Appendix A for a sample FA data sheet. See Appendix B for a sample FCT data sheet. See Appendix C for a sample generalization data sheet.

Five other coders were trained regarding behavior definitions, and recording methods. Training will consisted of viewing video samples of behavior similar to those expected to be demonstrated by the participants in the study. Training continued until all observers reach 90% agreement on at least three 5-minute video samples. Additionally, operational definitions were provided for each behavior, and behavior examples were provided as needed.

Interobserver Agreement

Secondary coders independently scored 20-67% of all sessions to determine inter-observer agreement. Agreement was defined as an interval in which both coders scored an occurrence or nonoccurrence of the behavior. Interobserver agreement (IOA) was calculated by dividing the number of

agreements by the number of agreements plus disagreements and multiplying by 100 (Cooper, 1987). The percentage of session calculated, mean IOA, and range of IOA are presented in Table 5.

Table 5. Interobserver agreement for all participants across all phases, including percentage of sessions calculated for each participant, mean IOA, and range.

Participant	Phase	Percentage of Sessions Calculated	Mean IOA	Range
Carson	FA	25%	98.2%	94-100%
	FA with MO manipulation	20%	98%	97-100%
	FCT Baseline	67%	97%	93-100%
	FCT Intervention	31%	92%	90-97%
	Generalization to New Toy	22%	88%	88-90
	Generalization to New Setting	22%	90%	-
	Generalization to New Toy & Setting	22%	88%	87-90%
	Generalization to New Toy, Setting, & Person	56%	91%	87-93%
Jude	FA	60%	100%	-
	FA with MO manipulation	40%	100%	-
	FCT Baseline	67%	97%	93-100%
	FCT Intervention	36%	97%	93-100%
	Generalization to New Toy	22%	100%	-
	Generalization to New Setting	33%	88%	83-93%
	Generalization to New Toy & Setting	22%	85%	83-87%
	Generalization to New Toy, Setting, & Person	22%	88%	83-93%
Kyan	FA	33%	98%	93-100%
	FA with MO manipulation	40%	100%	-
	FCT Baseline	30%	90%	-
	FCT Intervention	43%	93%	87-100%
	Generalization to New Toy	33%	92%	87-100%
	Generalization to New Setting	22%	93%	-
	Generalization to New Toy & Setting	22%	92%	87-97%
	Generalization to New Toy, Setting, & Person	22%	98%	98-100%

Table 5. (Continued)

Mason	FA	30%	97-100%	100%
	FA with MO manipulation	30%	100%	-
	FCT Baseline	33%	90%	-
	FCT Intervention	37%	92%	83-100%
	Generalization to New Toy	22%	88%	87-90%
	Generalization to New Setting	22%	80%	73-87%
	Generalization to New Toy & Setting	22%	88%	87-90%
	Generalization to New Toy, Setting, & Person	22%	97%	93-100%

Treatment Fidelity

Treatment fidelity was assessed for 10-410% of the functional analysis, FCT intervention, and generalization probes conducted by an experimenter. Treatment fidelity was assessed for 56-100% of generalization probes conducted by the classroom teacher or caregiver. Treatment fidelity was assessed by having an observer score the experimenter's behavior using a 10-second whole-interval system. The observer noted if the steps specific to each phase of the study were completed correctly during each interval (see Appendix D).

Five advanced doctoral students who are knowledgeable regarding traditional methods for conduction an FA, FCT, and generalization probes served as secondary observers for sessions conducted by the researcher. The author conducted treatment fidelity assessment for all generalization sessions conducted by the classroom teacher or caregiver.

For all three phases, FA, FCT, and generalization probes, treatment fidelity will be calculated by dividing the number of intervals in which all steps of the were completed correctly by the total number of intervals (Cooper, 1987). The mean will be determined for each phase of the study, FA, FCT, and generalization.

The percentage of session calculated, mean treatment fidelity, and range of treatment fidelity are presented in Table 6.

Table 6. Treatment fidelity for all participants across all phases, including percentage of sessions calculated for each participant, mean treatment fidelity, and range.

Participant	Phase	Percentage of Sessions Calculated	Mean Treatment Fidelity	Range
Carson	FA	20%	100%	-
	FA with MO manipulation	20%	100%	-
	FCT Baseline	33%	100%	-
	FCT Intervention	13%	98%	97-100%
	Generalization to New Toy	17%	100%	-
	Generalization to New Setting	17%	100%	-
	Generalization to New Toy & Setting	17%	100%	-
	Generalization to New Toy, Setting, & Person	100%	99%	93-100%
Jude	FA	10%	98%	97-100%
	FA with MO manipulation	40%	100%	-
	FCT Baseline	33%	100%	-
	FCT Intervention	14%	100%	-
	Generalization to New Toy	17%	100%	-
	Generalization to New Setting	17%	100%	-
	Generalization to New Toy & Setting	17%	100%	-
	Generalization to New Toy, Setting, & Person	100%	95%	90-100%
Kyan	FA	25%	100%	-
	FA with MO manipulation	10%	100%	-
	FCT Baseline	33%	100%	-
	FCT Intervention	14%	100%	-
	Generalization to New Toy	17%	100%	-
	Generalization to New Setting	17%	100%	-
	Generalization to New Toy & Setting	17%	100%	-
	Generalization to New Toy, Setting, & Person	56%	99%	97-100%

Table 6. (Continued)

Mason	FA	10%	100%	-
	FA with MO manipulation	10%	100%	-
	FCT Baseline	33%	100%	-
	FCT Intervention	11%	100%	-
	Generalization to New Toy	17%	100%	-
	Generalization to New Setting	17%	100%	-
	Generalization to New Toy & Setting	17%	100%	-
	Generalization to New Toy, Setting, & Person	67%	97%	96-100%

Procedures

Functional Analysis

An FA was implemented to determine possible reinforcers maintaining target challenging behaviors using methods similar to that of Iwata, Dorsey, Slifer, Bauman, & Richman (1982/1994). Four conditions were presented (attention, escape, tangible, and play). Each condition was 5 minutes in length.

During the attention condition, several toys were presented to the participant. At the beginning of the session, the participant was instructed to play because the experimenter has to do some work. At this time, the experimenter read a magazine or other reading materials. Contingent upon target behavior, the experimenter provided attention for 10 seconds in the form of disapproval with statements such as “don’t do that” or “no, you may hurt someone”. This condition was used to determine the possibility of positive social reinforcement maintaining target behaviors.

During the escape condition, an academic task that is difficult for participant to complete independently was presented. These tasks were identified via questioning the classroom teacher. Both the experimenter and the participant sat at a table and the experimenter gave a verbal instruction to begin the task, if no response occurred within 5 seconds; the experimenter repeated the verbal instruction while modeling the desired behavior. Again, if no response occurred within 5 seconds, the experimenter used hand over hand physical prompting to assist the participant in completing the task. Completion of one step towards task completion was praised. Contingent upon target challenging behavior, the experimenter removed the task and turned away from the participant. The experimenter remained turned for 10 seconds after the absence of target behavior. This condition assessed the possibility of negative reinforcement maintaining the target behaviors.

During the tangible condition, both the experimenter and participant sat at a table. The participant was allowed to play with the highest preferred item for ten seconds. The toy was then removed and contingent upon target challenging behavior, the toy was returned to the participant for 10 seconds, but no other attention was provided. This condition assessed the possibility of positive reinforcement in the form of tangibles maintaining tantrum behaviors.

During the play condition, both the experimenter and participant sat with no more than 3 feet from one another and the second highest preferred toys within

reach of the participant. The participant was allowed to play with toys and/or move around the room. Social praise and physical contact were presented every 10 seconds, while challenging behavior was ignored. This condition was included as a control in that it was considered an enhanced environment; therefore, little challenging behavior would be expected.

The effects of the FA were assessed using an alternating treatments design (Richards, Taylor, Ramasamy, & Richards, 1999).

It should be noted that Carson and Kyan had previously conducted functional analyses as a part of a previous study. Those functional analyses were conducted within the school year and conducted by trained doctoral student researchers that also served as interobserver agreement and treatment fidelity coders.

Functional Analysis with Motivating Operation Manipulation

In order to determine an influence of motivating operations on the results of an FA, the maintaining condition, the tangible condition, was repeated with systematic manipulation of a potential motivating operation. In other words, one of two pre-session conditions was implemented prior to conducting a tangible condition. Pre-session conditions consisted of *pre-session satiation* or *pre-session no access*. The purpose of this phase of the study was to determine the effects of pre-session access and no access to the reinforcer on the challenging behavior during the tangible condition.

During pre-session satiation conditions, the participant was allowed free access to the tangible item until he rejected the item three times. This process was developed in order to identify when a student has reached a level of satiation with an item by O'Reilly, Lang, Davis, Rispoli, Machalichek, Sigafoos, and Didden (2008).

During pre-session satiation conditions, when the participant rejected the item, it was handed back to the participant and he was reminded that he could play with his toy. Once the toy had been rejected three times, and presumably the participant had reached a level of satiation, a tangible condition was implemented.

Definitions of rejecting behavior were identified via teacher interview. Carson's rejecting behavior was defined as orienting eye gaze away from the television screen for more than 5 seconds. Jude's rejecting behavior was defined as putting the item in his non-dominant hand and manipulating other tangibles. Mason's rejecting behavior was defined as removing physical contact with the toy for at least 30 seconds. Kyan's rejecting behavior was also defined as removing physical contact with the toy for at least 30 seconds.

During *pre-session no access* conditions, the participant had no access to the preferred item for at least two hours prior to implementation of the tangible condition. The effects of the pre-session access and pre-session no access conditions were assessed with an alternating treatments design (Richards, et al., 1999).

Functional Communication Training

Functional Communication Training (FCT) was implemented to teach participants to request the highest preferred tangible item.

During baseline conditions, both the experimenter and the participant sat next to one another. During Mason's sessions, the SGD was placed within his reach. The experimenter presented the participant's highest rank toy and allowed him to interact with that toy for 10 seconds, then withdrew the toy just as the tangible condition used in the FA. Contingent upon target communicative behavior or challenging behavior, the toy was returned for 10 seconds. Pre-session access to the tangible items was not systematically altered prior to baseline sessions. Each baseline probe session was five minutes in length.

During intervention sessions, both the experimenter and the participant sat next to one another. During Mason's sessions, the SGD was placed within his reach. The experimenter presented the preferred toy, allowing the participant to interact with the toy for ten seconds, and then withdrew the toy, similar to the onset of a tangible condition of the FA. Immediately after withdrawing the toy, progressive time delay was used to teach the participant to request the toy using the target communication behavior. Specifically, a verbal prompt of "say 'more [toy name]'" was implemented for Carson and Jude. A hand-over-hand prompt was implemented with Mason and a verbal prompt of "say 'more'" simultaneously presented with a physical prompt for creating the sign for *more*

was implemented with Kyan. First a zero second delay was implemented. After three consecutive prompts of the same delay increment, the prompt delay was increased by two seconds. If the participant made an error during the delay, the prompt delay returned to zero seconds for the next trial.

Prompted and independent communication resulted in the toy being returned for 10 seconds. All challenging behavior will be ignored. Each FCT intervention session was five minutes in length.

Prior to every intervention session, one of two pre-session conditions was implemented. The *pre-session access* condition consisted of 15 minutes of free access to the tangible item prior to an FCT intervention session. If during the pre-session access condition the participant rejected the tangible, it was returned to him and he was reminded that he could play with the toy. The *pre-session no access* condition consisted of a minimum of two hours without access to the tangible item. The effects of the pre-session conditions were assessed using an alternating treatment design (Richards, et al., 1999).

Generalization to New Toy Assessment

Generalization to a new toy was assessed. This assessment involved implementing a new toy, but occurred in the same location as FCT intervention with the author, who also implemented the FCT intervention.

Toys determined to be second highest preferred were utilized in this assessment. Carson's toy was a movie, Jude's toy was chalk and chalkboard, Kyan's was a hand-held tally counter, and Mason's toy was a merry-go-round toy.

Target communication responses were identical to taught during FCT intervention for Mason and Kyan. On the other hand, the target communication was slightly different for Carson and Jude. Carson and Jude were taught specific verbal requests during FCT, *more game* and *more crayons* respectively. Therefore, they needed to use the new toy name during generalization to new toy probes. This allowed for response generalization in addition to stimulus generalization. Specifically, the target communication response for generalization to new toy probes for Carson and Jude were *more movie* and *more chalk*, respectively.

Generalization probes sessions were identical to FCT baseline sessions previously described, with the exception of the new toy identified for generalization. During generalization probes, both the experimenter sat next to the participant. In Mason's probes, the SGD was placed within arm's reach. The experimenter presented the participant's highest rank toy and allowed him to interact with that toy for 10 seconds, then withdrew the toy. Contingent upon target communicative behavior or challenging behavior, the toy was returned for 10 seconds. No prompts for communication were provided. Each generalization probe was five minutes in length

Access to the tangible items was not systematically altered prior to generalization probes taken prior to FCT intervention. On the other hand, pre-session conditions identical to those implemented for FCT intervention sessions were implemented in generalization probes conducted after the completion of FCT intervention. Again, the pre-session *access* condition involved 15 minutes free access to the toy implemented during the generalization probe prior to conducting the generalization probe. The pre-session *no access* condition was a minimum of two hours without access to the toy prior to the session.

Both target challenging behaviors and target communication behaviors were recorded using 10-second partial interval recording. The effects of the pre-session conditions were assessed using an alternating treatments design (Richards, et al., 1999).

Generalization to New Setting Assessment

Generalization to a new setting was also assessed. This assessment involved the use of the toy and the author that were utilized during FCT intervention. However, these assessments took place in a setting other than the one employed in FCT intervention.

The generalization setting implemented for Carson was his classroom. Jude's generalization to new setting probes occurred at his grandmother's home, while Kyan's probes were implemented in a therapy room at school. Last, Mason's probes were implemented in his home.

Generalization probe sessions were identical to those previously describe for *generalization to new toy* probes. Additionally, pre-session conditions were identical to those previously describes in *generalization to new toy* probes.

Both target challenging behaviors and target communication behaviors were recorded using 10-second partial interval recording. The effects of the pre-session conditions were assessed using an alternating treatments design (Richards, et al., 1999).

Generalization to New Toy and Setting Assessment

Generalization to a new toy and setting was also assessed. These probes were conducted by the author, who implemented FCT intervention; however, they were conducted in a new setting and with a new toy not utilized in FCT intervention.

The generalization setting implemented for Carson was his classroom. Jude's generalization to new setting probes occurred at his grandmother's home, while Kyan's probes were implemented in a therapy room at school. Last, Mason's probes were implemented in his home. Note that these are the same settings employed in the *generalization to new setting* probes.

The toy selected for Carson was that determined to be his third highest preferred toy, a music toy. The toy selected for Jude was one identified by his grandmother as being highly preferred in his home, markers and paper. The toy selected for Kyan was that also determined as third highest preferred toy, a digital

watch. The toy selected for Mason was also one identified by his caregiver as being highly preferred in his home, a personal DVD player. Note that these are *not* the same toys utilized in the *generalization to new toy* probes.

Generalization probes sessions were identical to those previously describe for *generalization to new toy* probes. Additionally, pre-session conditions were identical as well.

Both target challenging behaviors and target communication behaviors were recorded using 10-second partial interval recording. The effects of the pre-session conditions were assessed using an alternating treatments design (Richards, et al., 1999).

Generalization to New Toy, Setting, and Person Assessment

Generalization to a new setting, new person, and a new toy was also assessed. The generalization setting implemented for Carson was his classroom. Jude's generalization to new setting probes occurred at his grandmother's home, Kyan's were implemented in a therapy room at school. Finally, Mason's probes were implemented at his home. Note that these are the same settings employed in the *generalization to new setting* probes.

The toy utilized in Carson's probes was a music toy, while Jude's toys were markers and paper. Mason's toy was a personal DVD player and Kyan's toy was a digital watch. Note that these are *not* the same toys utilized in the

generalization to new toy probes, but they are identical to the toys utilized in *generalization to new setting and toy* probes.

Finally, a school therapist that worked with Carson and Kyan on a daily basis implemented these probes. This therapist provided one-to-one instruction to both Carson and Kyan at their school. The therapist was an advanced doctoral student with extensive knowledge regarding FCT and generalization assessments. Therefore, training for her consisted of a review of procedures with a verbal check for understanding. Jude's grandmother implemented his *generalization probes to new setting, person, and toys,* while Mason's caregiver (nanny) conducted his probes. Training for both Jude's grandmother and Mason's caregiver consisted of review and demonstration of the procedures with a verbal check for understanding. Additionally, they were coached during 100% of all generalization probes.

Generalization probes sessions were identical to those previously describe for *generalization to new toy* probes. Additionally, pre-session conditions were identical to those previously describes in *generalization to new toy* probes.

Both target challenging behaviors and target communication behaviors were recorded using 10-second partial interval recording. The effects of the pre-session conditions were assessed using an alternating treatments design (Richards, et al., 1999).

CHAPTER 4

RESULTS

The purpose of this chapter is to present the results of the study. The results are presented in several sections. In the first section the results of the functional analysis (FA) are presented, while in the second section the results of the FA with motivating operation manipulation as well as data regarding satiation are described. In the third section, results of functional communication training (FCT) with motivating operation manipulation are reported. Finally, in the fourth section, results of the four generalization probes with motivating operation manipulation are presented.

Functional Analysis

The results of the participants' functional analyses indicated that challenging behavior was maintained by access to tangibles. The results of Carson's FA are shown in Figure 4; his analysis reveals that his challenging behavior, protesting, is maintained primarily by escape from demands (M=53%); however, it also suggests that this behavior is also maintained by access to tangibles (M=11%). The remainder of this study addresses the tangible-component maintaining challenging behavior.

On the other hand, Jude's FA reveals that his challenging behavior, throwing items, is maintained solely by access to tangibles. Challenging behavior

was exhibited only during tangible conditions (M=67%). Results of Jude's FA are shown in Figure 5.

Additionally, the results of Mason's FA, shown in Figure 6 suggest that his challenging behavior, aggression, is also maintained solely by access to tangibles. Challenging behavior was exhibited more frequently during tangible conditions (M=15%) than during the other conditions (M=0.4%).

Finally, the results of Kyan's FA reveal that his challenging behavior, tilting back in his chair, is primarily maintained by access to tangibles (M=26%). Results of Kyan's FA are shown in Figure 7.

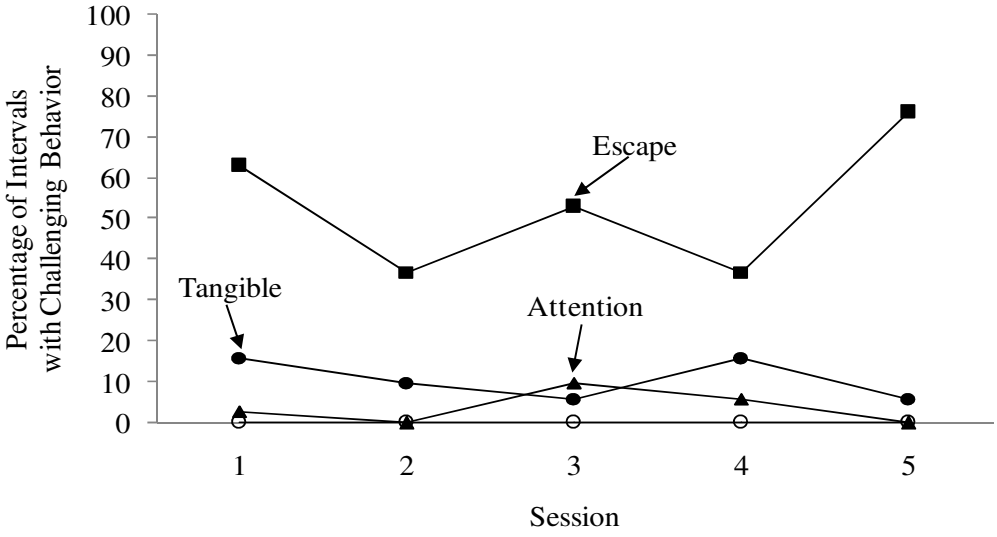

Figure 4. Functional analysis results for Carson.

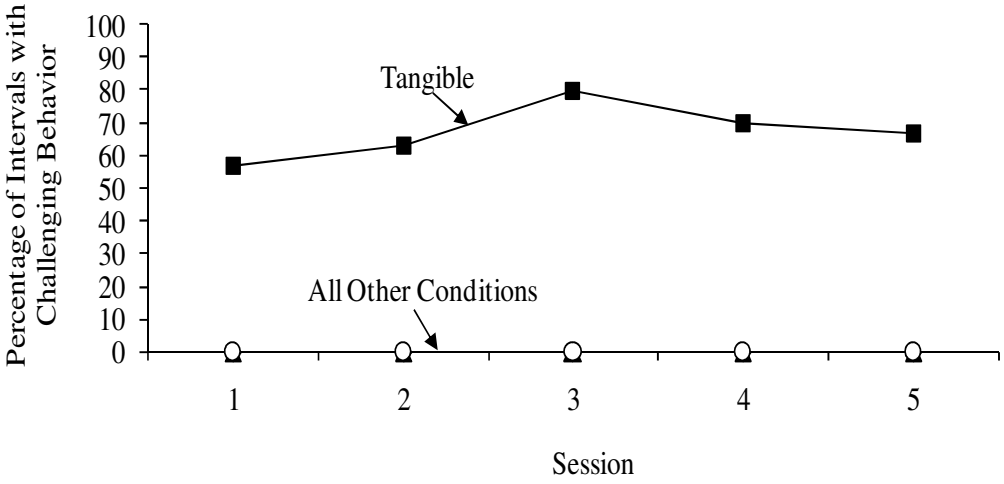

Figure 5. Functional analysis results for Jude.

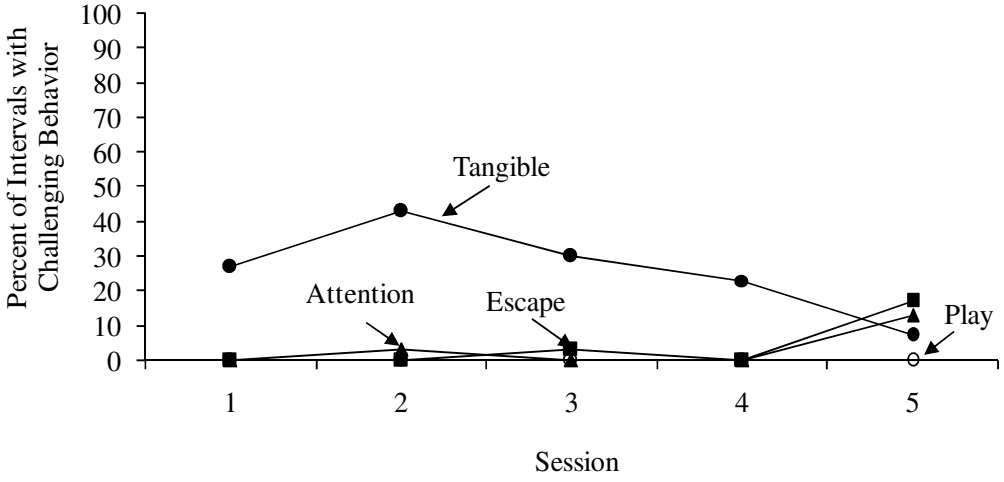

Figure 6. Functional analysis results for Kyan.

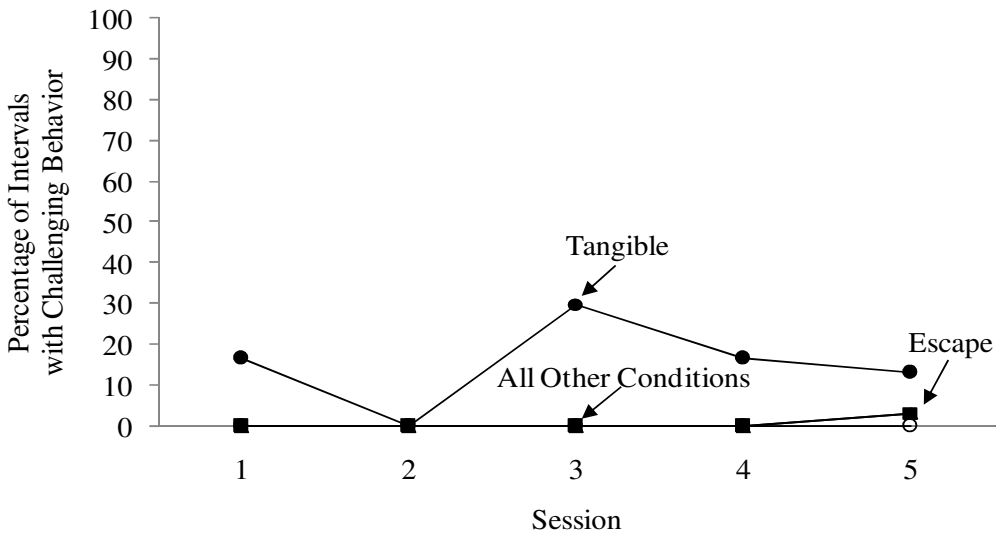

Figure 7. Functional analysis results for Mason.

Functional Analysis with Motivating Operation Manipulation

The results of the tangible conditions following either pre-session conditions of either *satiation* or no *access* indicated that prior access to the tangible item served as a motivating operation for the target behavior. Specifically, the results suggest that pre-session *satiation* served as an abolishing operation for challenging behavior, while pre-session *no access* served as an establishing operation for challenging behavior across all four participants.

Carson displayed a higher amount of protesting during tangible conditions that were preceded by no prior access to the video game (M=48%) than conditions that were preceded by satiation of the video game (M=6%). Results of motivating operation manipulation influences on Carson's FA are presented in

Figure 8. Additionally, the latency of time, in minutes, from toy presentation to satiation was also documented. Carson's mean latency to satiation was 29 minutes, with a slightly decreasing trend across sessions (M= 29 minutes). Results of latency to satiation are depicted in Figure 9.

Jude also displayed challenging behavior in a higher percentage of intervals during conditions preceded by no prior access to the crayons (M=58%) than in conditions that were preceded by satiation of the crayons (M=4%). Results of motivating operation influences on Jude's tangible conditions are represented in Figure 10. Furthermore, the mean latency to satiation for Jude was 18 minutes, with a steady trend across sessions. This information is depicted in Figure 11.

Kyan displayed a similar pattern with higher challenging behavior present in conditions preceded by no prior access to his timer (M=31%) than in conditions preceded by satiation of the timer (M=1%). Results motivating operation influences on Kyan's tangible conditions are depicted in Figure 12. Kyan's mean latency to satiation was the shortest amount of time (M=15minutes). Additionally, his data represented a steady trend. Duration to satiation results are illustrated in Figure 13.

Mason's results demonstrated the same pattern, again with a higher percentage of intervals with challenging behavior present in conditions preceded by no prior access to his potato head (M=25%) than in conditions preceded by satiation to the potato head (M=1%). Results of motivating operation influences

on Mason's tangible conditions are depicted in Figure 14. Additionally, the mean duration of minutes to satiation was 26 minutes. Mason's duration to satiation results are illustrated in Figure 15. The trend of Mason's duration to satiation results are noteworthy in that there is an increasing trend across sessions, compared by the other participants' fairly steady or decreasing trends.

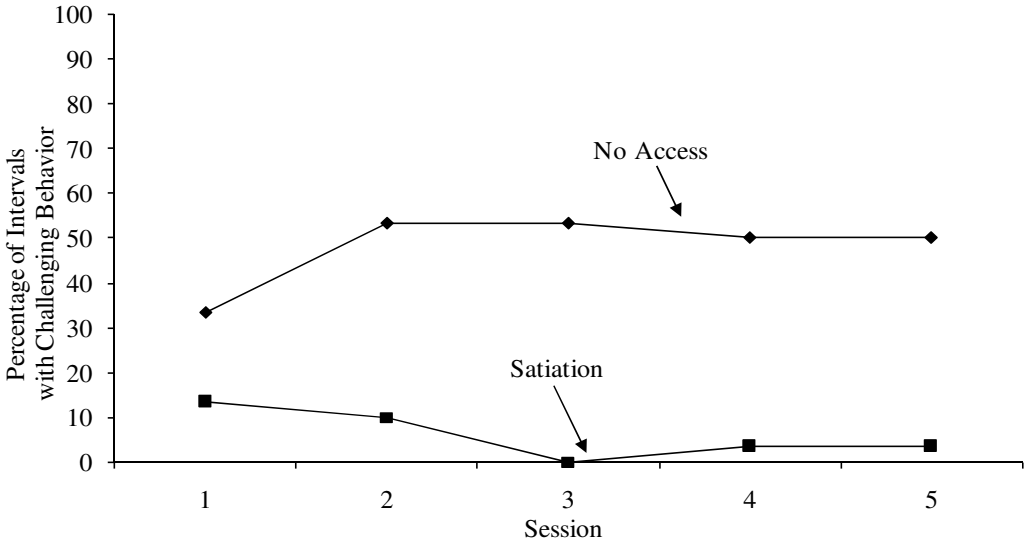

Figure 8. Results of pre-session access and satiation of tangible condition of functional analysis for Carson.

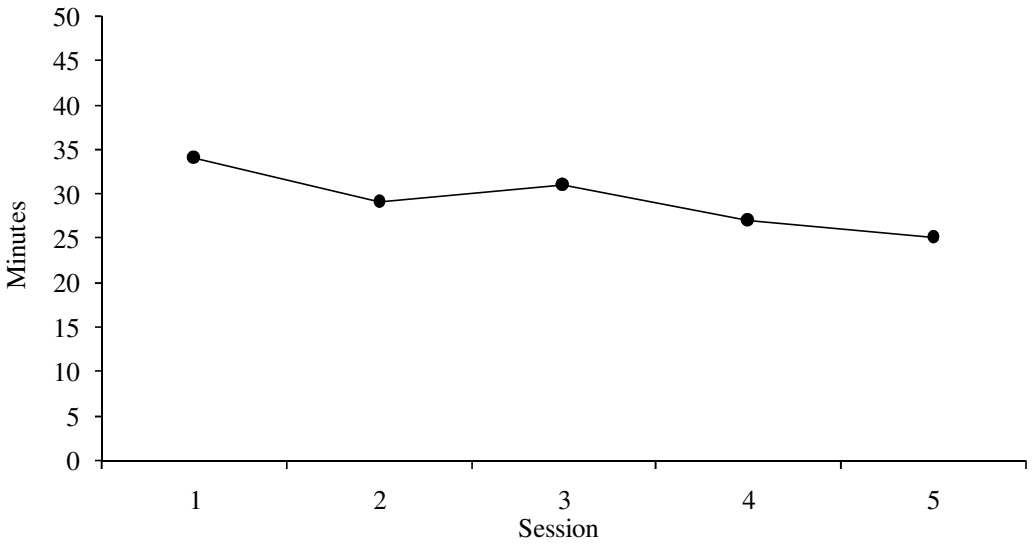

Figure 9. Latency, in minutes, for Carson to reach satiation.

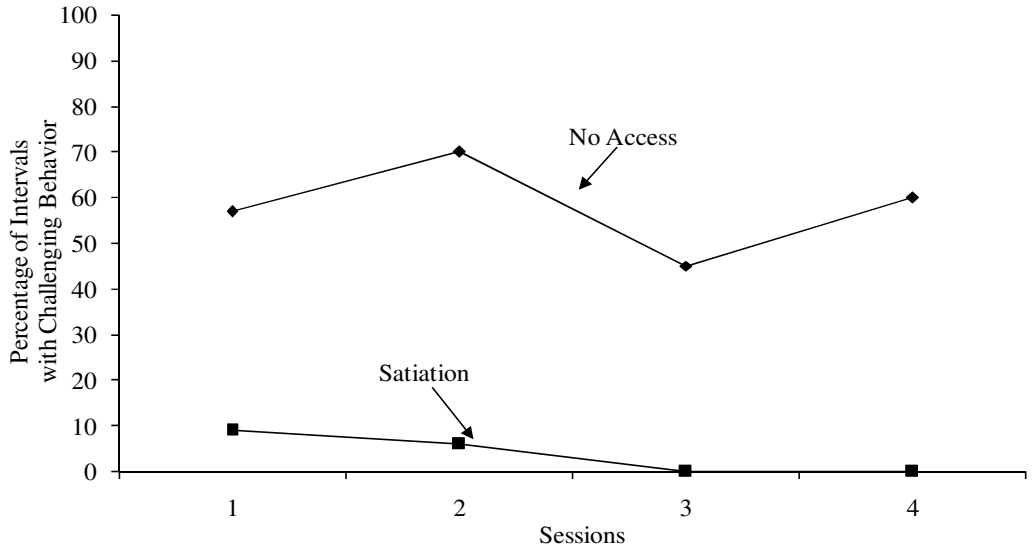

Figure 10. Results of Jude's tangible conditions with pre-session no access or satiation.

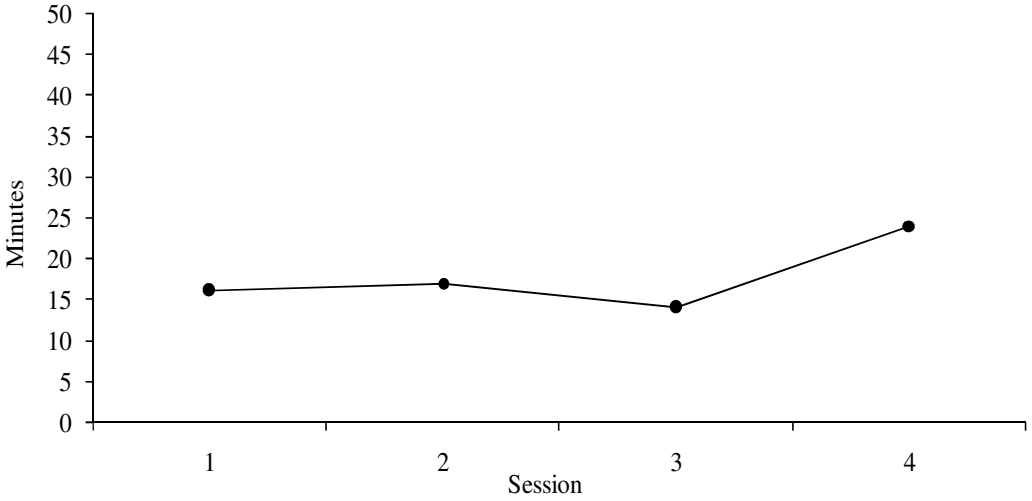

Figure 11. Latency, in minutes, for Jude to reach satiation.

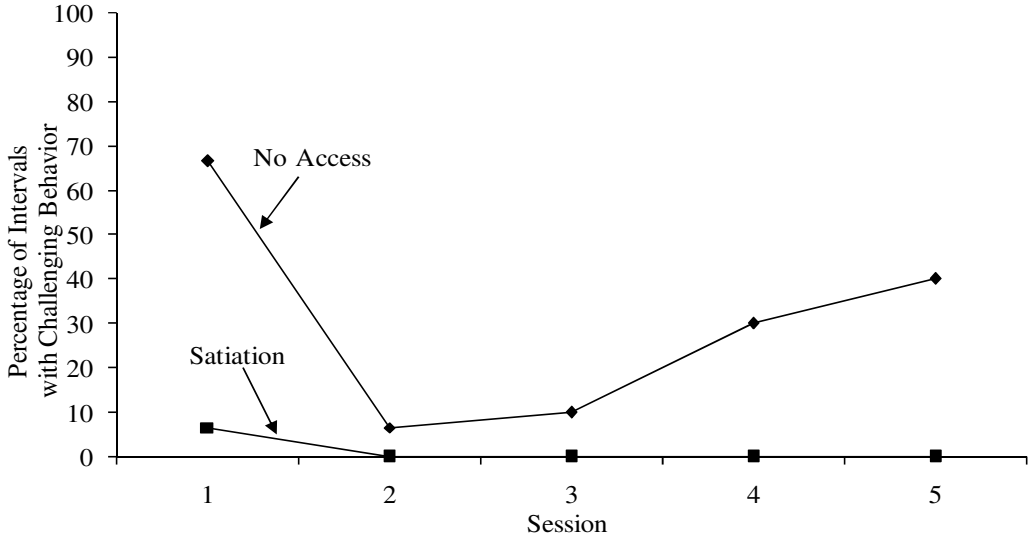

Figure 12. Results of Kyan's tangible conditions with pre-session no access or satiation.

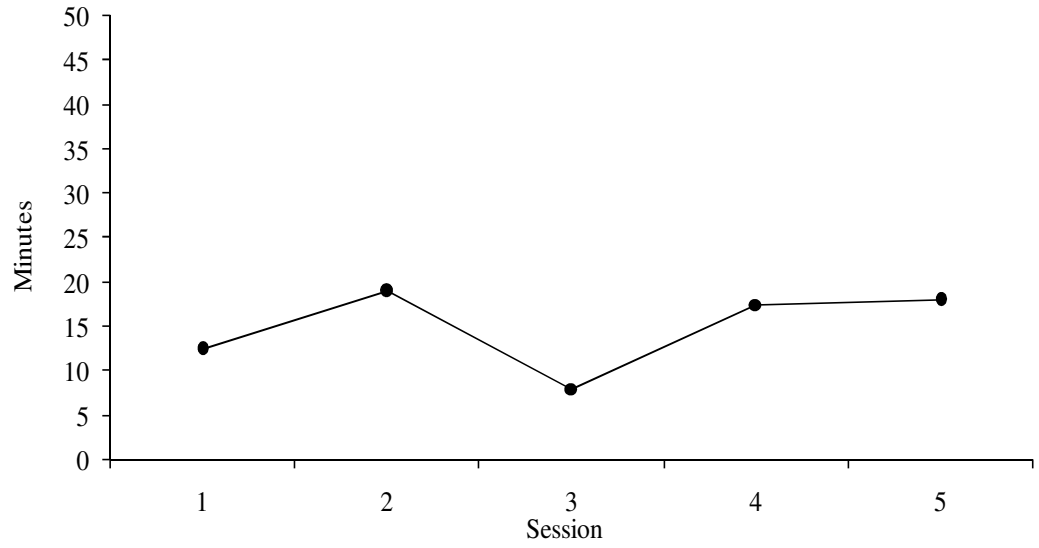

Figure 13. Latency, in minutes, for Kyan to reach satiation.

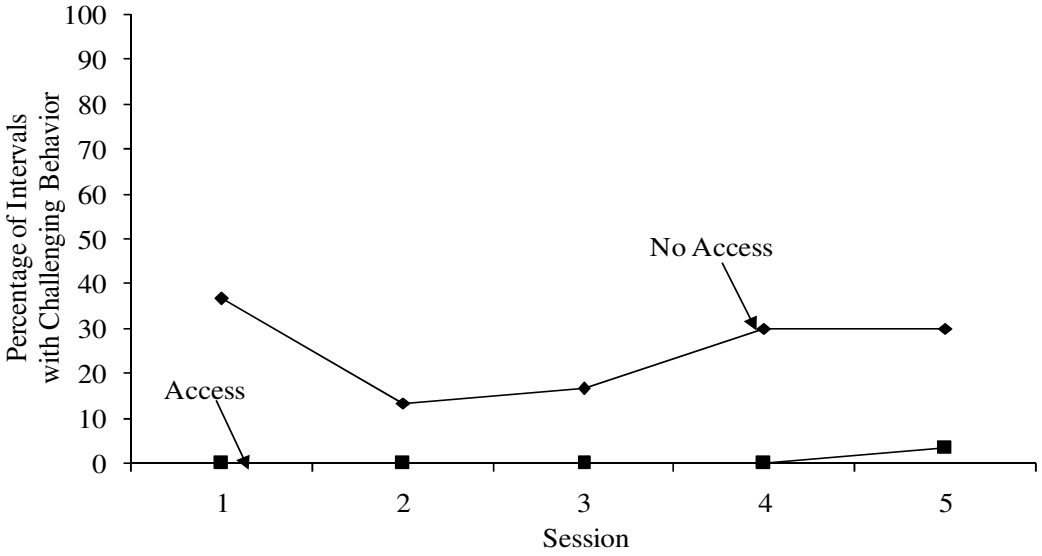

Figure 14. Results of Mason's tangible conditions with pre-session no access or satiation.

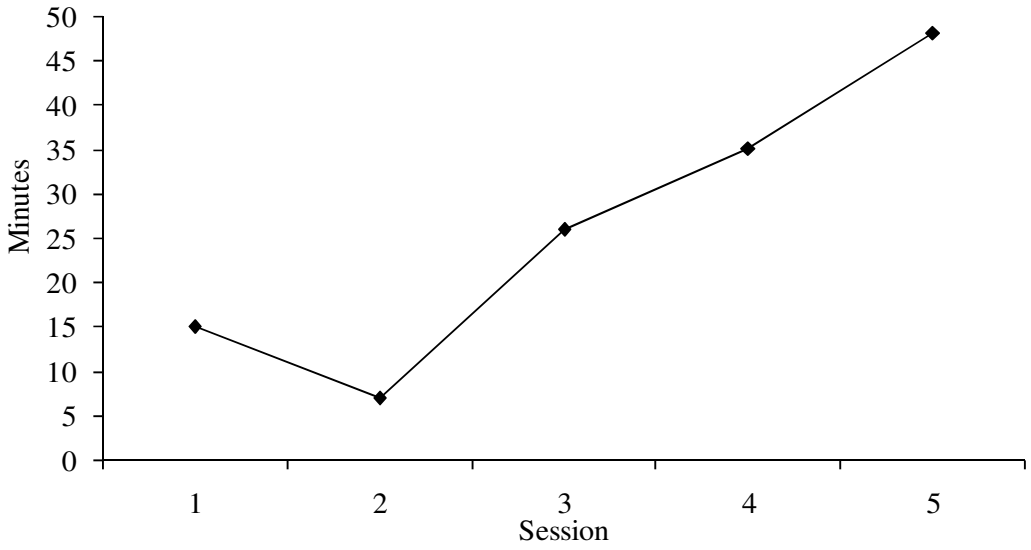

Figure 15. Latency, in minutes, for Mason to reach satiation.

Functional Communication Training with Motivating Operation Manipulation

Prior Access Improved Functional Communication Training

Both Carson and Jude's results suggested that prior access to the toy improved FCT intervention. Prior to FCT intervention, Carson engaged in protesting in a relatively high percentage of intervals (M=64%). This level of challenging behavior remained variable during FCT interventions conducted with no prior access to his video games. Additionally, challenging behavior was higher in these sessions (M=38%) than during sessions conducted after 15 minutes of access to the video game (M=2%). Moreover, sessions conducted after 15 minutes of access to the video game resulted in a favorable steady decline of challenging behavior unlike the variable pattern seen in session conducted with no prior

access to the video game. Results of Carson's challenging behavior during FCT session are depicted in Figure 16.

Similar results occurred for independent communication. Prior to FCT intervention, Carson never independently requested "more game" (M=0%). Again, during FCT sessions conducted with no prior access to the video game, independent communication remained variable. Although independent communication increased in comparison to baseline (M=15%), it was lower than the amount of independent communication demonstrated during FCT sessions conducted after 15 minutes of prior access to the video game (M=37%). Furthermore, results of independent communication during these sessions showed a more favorable steady increase in independent communication. Results of Carson's independent communication are depicted in Figure 17.

Finally, results of prompted communication are shown in Figure 18. While the average amount of prompted communication is not largely different between sessions conducted with no prior access and sessions conducted after 15 minutes of access (M=17%, M=18%, respectively), it is important to note the trend of the data. Specifically, prompted communication demonstrated a steadier decline during sessions conducted after 15 minutes of access to the video game when compared to those conducted with no prior access to the game.

Last, Carson met criteria for ending FCT intervention during the last three sessions of FCT conducted after 15 minutes of prior access, sessions 15, 17, and

19. During these sessions, Carson did not engage in any challenging behavior and required no prompting for communication. Therefore, FCT intervention consisted of 16 5-minute sessions.

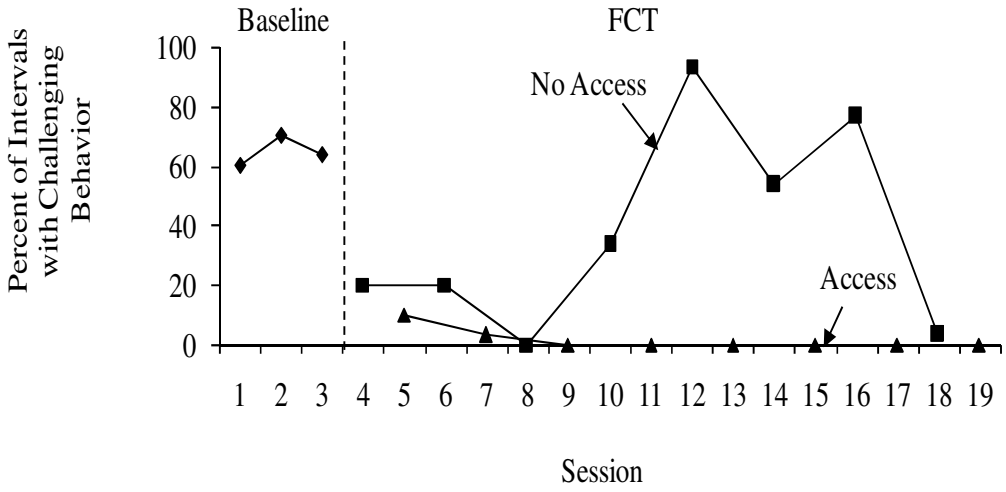

Figure 16. Carson's challenging behavior during FCT intervention.

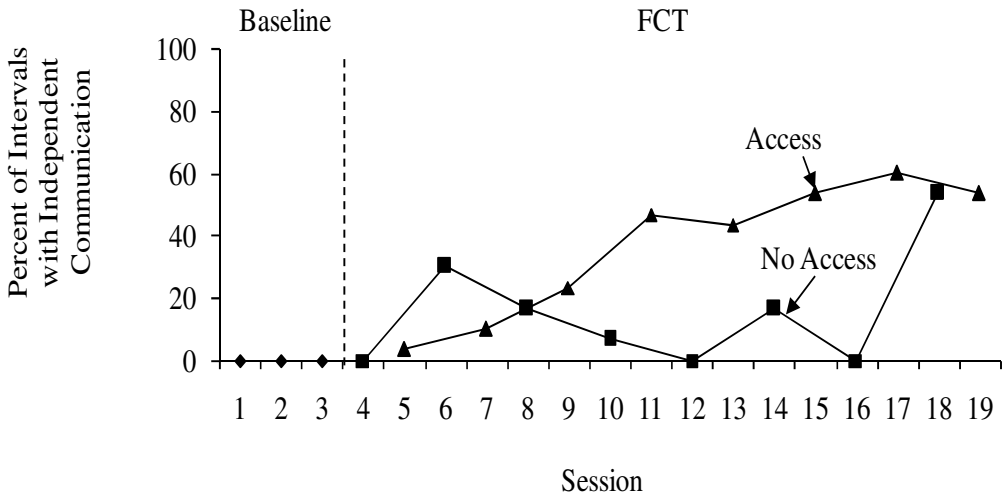

Figure 17. Carson's independent communication during FCT intervention.

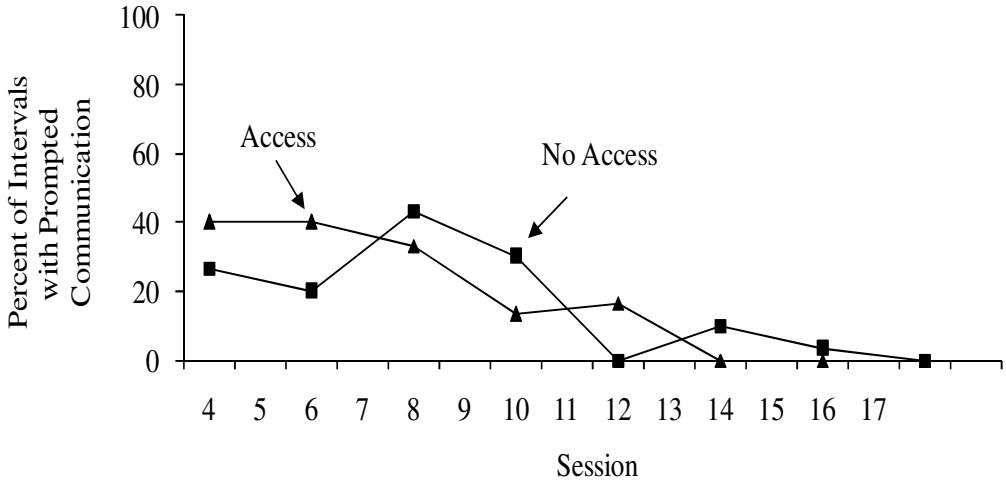

Figure 18. Carson's prompted communication during FCT intervention.

Prior to FCT intervention, Jude engaged in throwing in a relatively high percentage of intervals (M=59%). This level of challenging behavior dropped drastically during FCT intervention. In fact, there was a minimal difference in challenging behavior between intervals conducted with no prior access (M=0.5%) and those conducted after 15 minutes of prior access to the crayons (M=0%). Results of Jude's challenging behavior during FCT session are depicted in Figure 19.

Prior to FCT intervention, Jude never independently requested more crayons (M=0%). Results of independent communication during FCT intervention show a slightly different pattern than that of challenging behavior, in that there was a slight improvement in independent communication in sessions conducted after 15 minutes of access to the crayons (M=86%) compared to those conducted with no prior access (M=78%). Results of Jude's independent communication are depicted in Figure 20.

Finally, results of prompted communication are shown in Figure 21. There was a slight difference in the trends between sessions. Jude required prompting during the first few sessions of sessions conducted with no prior access (M=3%), but almost no prompting was required during sessions conducted after 15 minutes of prior access (M=0.04%).

Last, Jude met criteria for ending FCT intervention during relatively early sessions of FCT intervention. Specifically, he met the criteria during sessions 7, 9,

and 10. Due to the early response to treatment, FCT intervention was continued slightly beyond the original criteria in order to supply enough data to determine a trend. Therefore, FCT intervention consisted of 13 5-minute sessions.

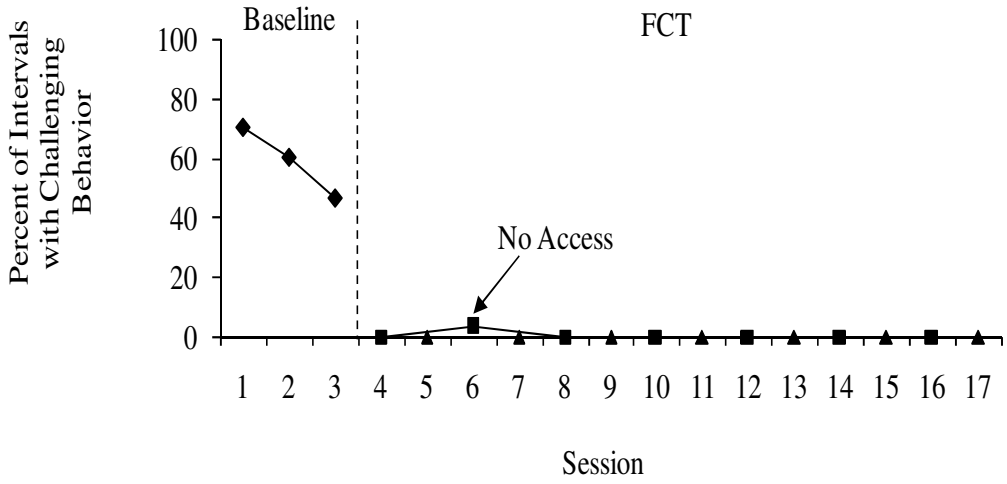

Figure 19. Jude's challenging behavior during FCT intervention.

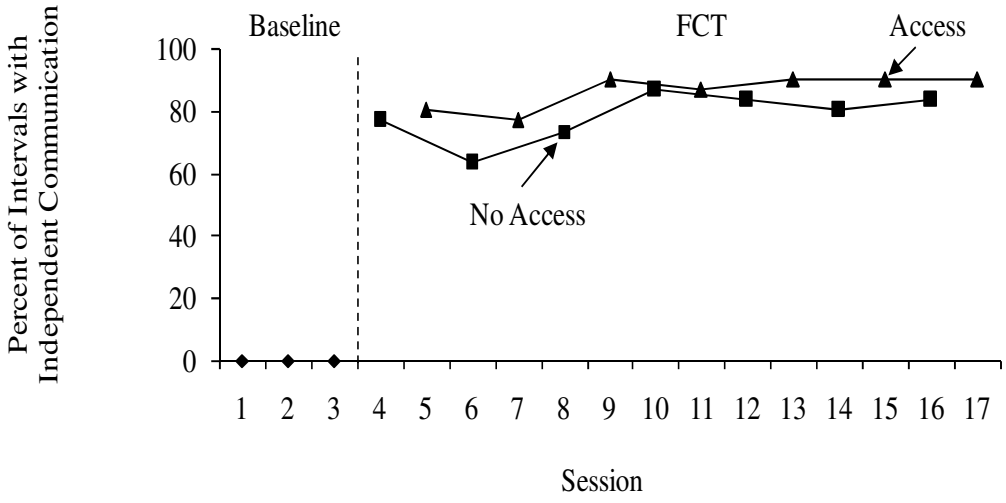

Figure 20. Jude's independent communication during FCT intervention.

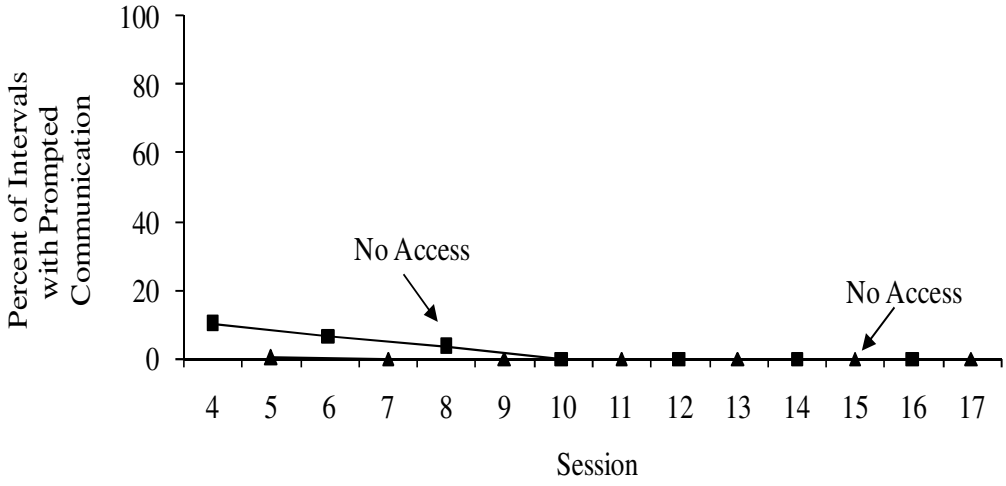

Figure 21. Jude's prompted communication during FCT intervention.

No Difference Between Conditions of Functional Communication Training

Kyan's data portrayed a different result. In fact, his data suggest no differentiation between FCT conducted in either of the two pre-session conditions.

Prior to FCT intervention, Kyan tilted his chair back in a relatively high percentage of intervals (M=53 %%). While challenging behavior was reduced during FCT intervention, there was not a notable difference between sessions conducted with no prior access to the timer (M=8%) and those conducted after 15 minutes of access to the timer (M=7%). In fact, challenging behavior remained variable under both conditions. Results of Kyan's challenging behavior during FCT session are depicted in Figure 22.

Similar results occurred for independent communication. Prior to FCT intervention, Kyan never independently requested more (M=0%). At approximately the ninth FCT session, Kyan began independently requesting more. Again, there was not a notable difference between sessions conducted with no prior access to the timer (M=39%) and sessions conducted with 15 minutes of prior access to the timer (M=35%). Most noteworthy, the trends mirror each other in that they show a similar increase in independent responding at approximately the ninth session. Results of Kyan's independent communication are depicted in Figure 23.

Finally, results of prompted communication are shown in Figure 24. Again, there was not a noteworthy difference between FCT sessions conducted with no prior access to the timer (M=34%) and sessions conducted after 15 minutes of access to the timer (M=35%). Furthermore, there is no remarkable difference between the data trends of the two conditions.

Last, Kyan met criteria for ending FCT intervention during the last three sessions of FCT conducted after 15 minutes of prior access, sessions 13, 15, and 17. During these sessions, Kyan did not engage in any challenging behavior and required no prompting for communication. Therefore, FCT intervention consisted of 13 5-minute sessions.

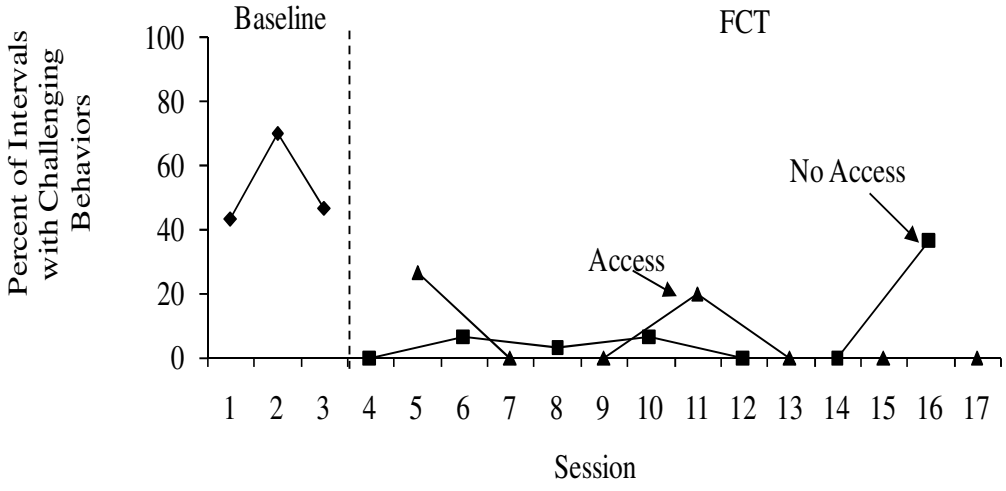

Figure 22. Kyan's challenging behavior during FCT intervention.

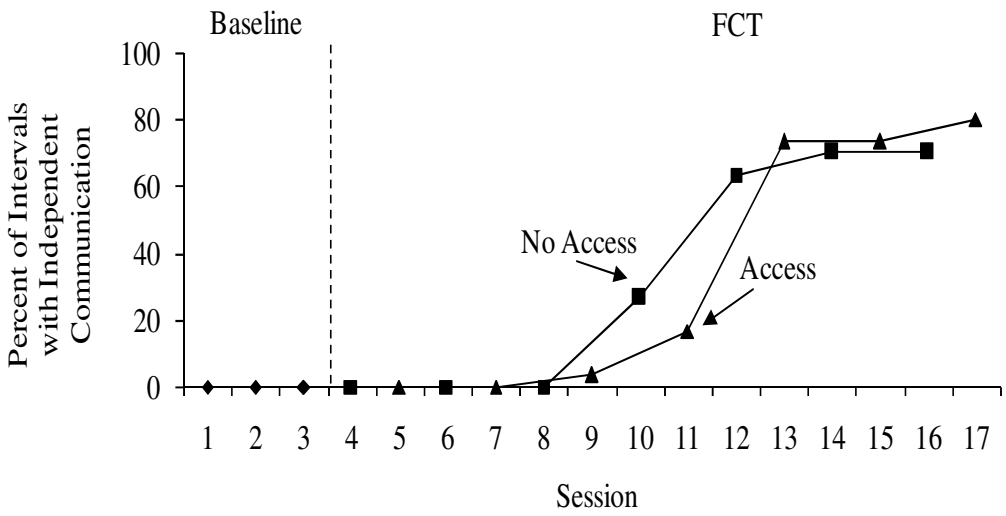

Figure 23. Kyan's independent communication during FCT intervention.

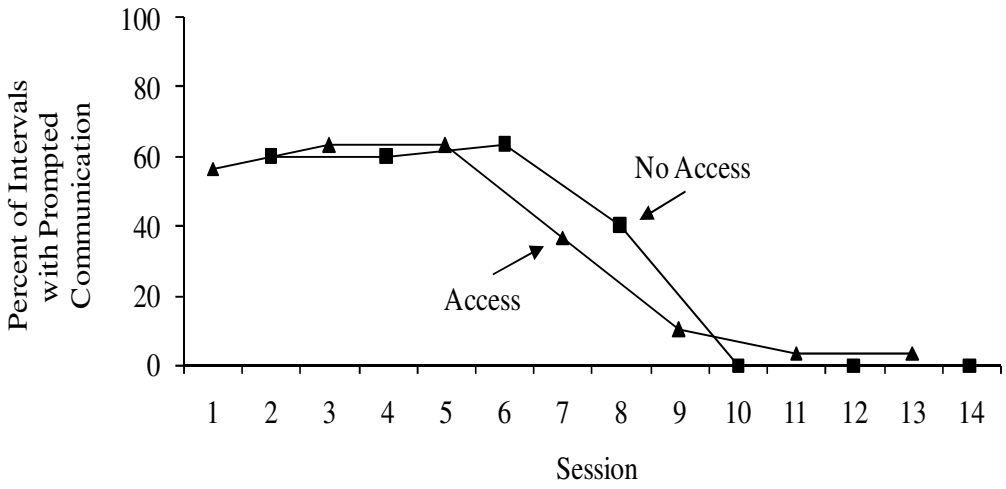

Figure 24. Kyan's prompted communication during FCT intervention.

No Prior Access Improved Functional Communication Training

Mason's results suggested a third pattern. In fact, Mason's data suggest that FCT is improved when no prior access to the toy was provided.

Prior to FCT intervention, Mason engaged in aggression, specifically pinching and scratching the researcher, in a high percentage of intervals (M=62%). Aggression dropped considerably upon FCT intervention. However, there was no distinct difference in challenging behavior between sessions conducted with no prior access to the potato head (M=6%) and those conducted with 15 minutes of prior access to the potato head (M=3%). Additionally, there is no considerable difference in the trend of these data sets as well. Results of Mason's challenging behavior during FCT session are depicted in Figure 25.

Prior to FCT intervention, Mason never independently requested more using his SGD (M=0%). Results of independent communication during FCT intervention show a slightly different pattern than that of challenging behavior, in that there was an improvement in independent communication in sessions conducted with no prior access to the potato head (M=53%) compared to those conducted with 15 minutes of prior access (M=27%). Results of Mason's independent communication are depicted in Figure 26.

Finally, results of prompted communication are shown in Figure 27. Following the same trend as independent communication, Mason required less

prompting during sessions conducted with no prior access to the potato head (M=16%) than in sessions conducted with 15 minutes of access (M=36%).

Last, Mason met criteria for ending FCT intervention during the last three sessions conducted with no prior access to the potato head. Specifically, he met the criteria during sessions 18, 20, and 22. Therefore, FCT intervention consisted of 19 5-minute sessions.

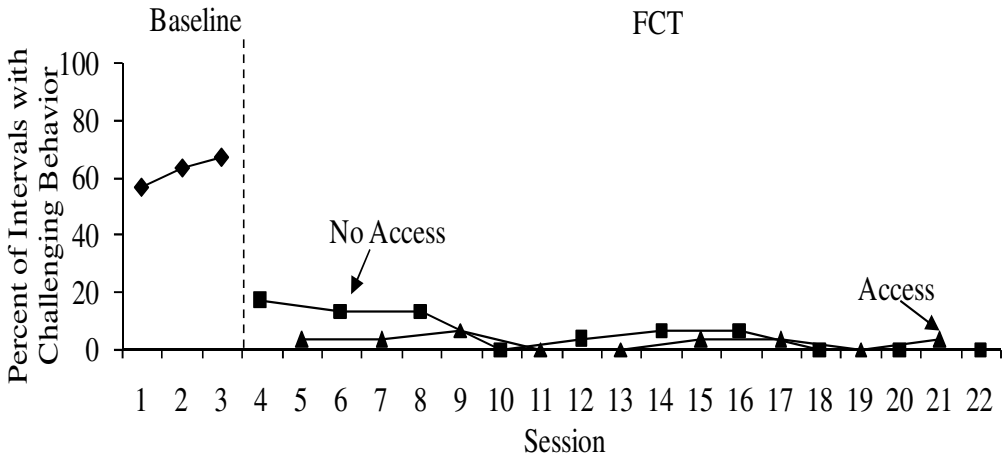

Figure 25. Mason's challenging behavior during FCT intervention.

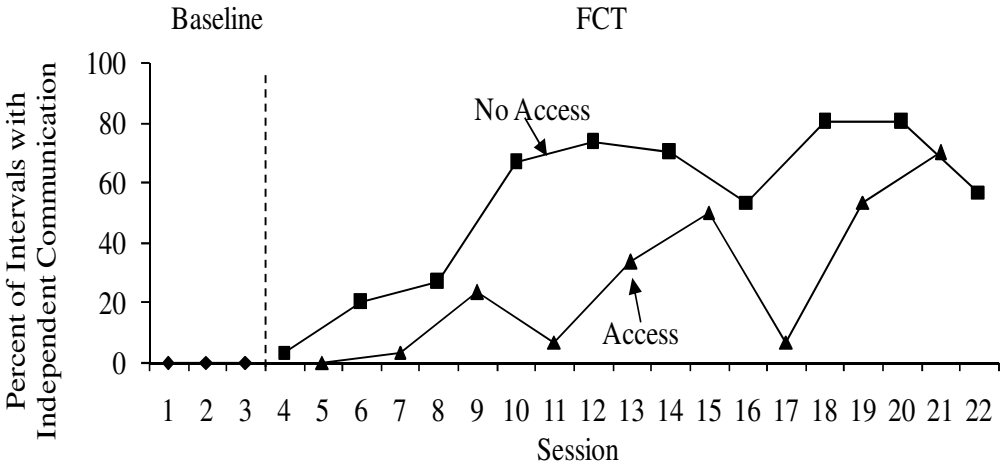

Figure 26. Mason's independent communication during FCT intervention.

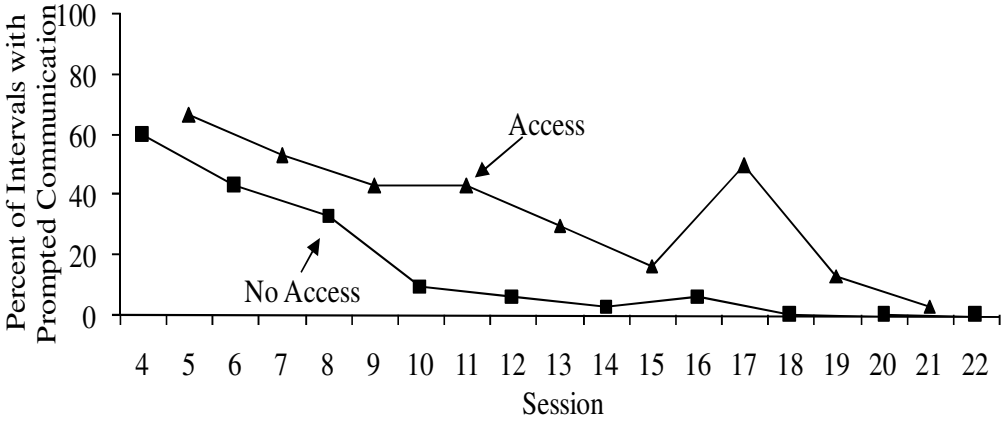

Figure 27. Mason's prompted communication during FCT intervention.

Assessment of Generalization to New Toys with Motivating Operation Manipulation

Prior Access Improved Generalization

All four participants showed the same pattern in this generalization assessment. All four results suggest that generalization to a new toy can be improved with prior access to that toy.

Prior to FCT intervention, Carson engaged in relatively high levels of challenging behavior during generalization probes with the new toy, a movie, but with the original person and in the original setting (M=64%). During post-intervention generalization probes to the new toy that were conducted with no prior access to the movie, challenging behavior remained high (M=58%). However, in post-intervention generalization probes that were conducted after 15 minutes of access to the movie, challenging behavior was drastically lower (M=7%). Results for Carson's challenging behavior during generalization to new toy with original person and setting are depicted in Figure 28.

A similar pattern was found for Carson's independent communication. Prior to intervention, Carson never requested more movie (M=0%). In post-intervention generalization probes that were conducted with no prior access to the movie, requests for more movie remained low (M=1%); yet, in post-intervention generalization probes that were conducted after 15 minutes of access to the movie, an increase in independent communication resulted (M = 53%). Results

for Carson's independent communication during generalization to new toy with original person and setting are depicted in Figure 29.

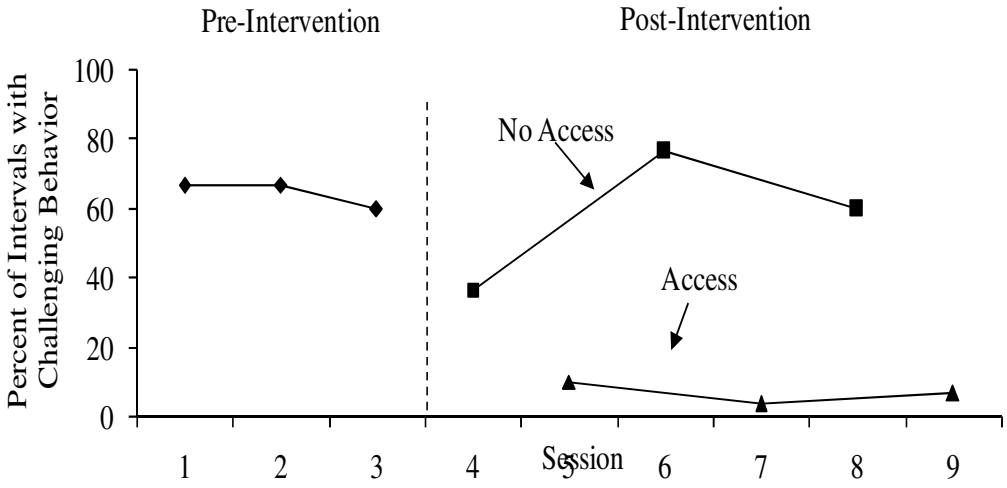

Figure 28. Carson's challenging behavior during generalization to new toy probes with original person and setting.

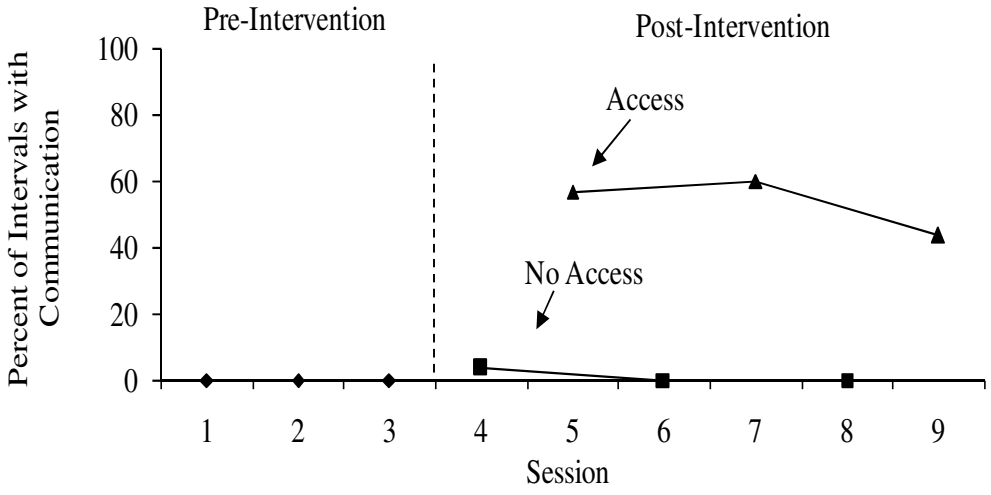

Figure 29. Carson's independent communication during generalization to new toy probes with original person and setting.

Prior to FCT intervention, Jude engaged in relatively high levels of challenging behavior during generalization probes with the new toy, chalk and chalkboard, but with the original person and in the original setting (M=36%). During post-intervention generalization probes to the new toy that were conducted with no prior access to the chalk, challenging behavior remained slightly high (M=24%). However, in post-intervention generalization probes that were conducted after 15 minutes of access to the chalk, challenging behavior was slightly lower (M=12%). Results for Jude's challenging behavior during generalization to new toy with original person and setting are depicted in Figure 30.

A similar pattern was found for Jude's independent communication. Prior to intervention, Jude never requested more chalk (M=0%). In post-intervention generalization probes that were conducted with no prior access to the chalk, requests for more chalk increased slightly (M=12%); yet, in post-intervention generalization probes that were conducted after 15 minutes of access to the chalk, a larger increase in independent communication resulted (M = 58%). Results for Jude's independent communication during generalization to new toy with original person and setting are depicted in Figure 31.

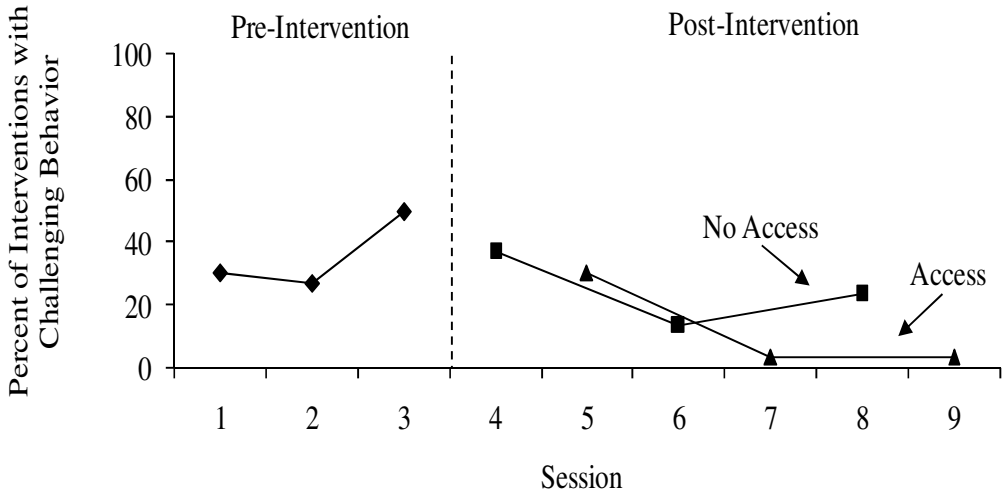

Figure 30. Jude's challenging behavior during generalization to new toy probes with original person and setting.

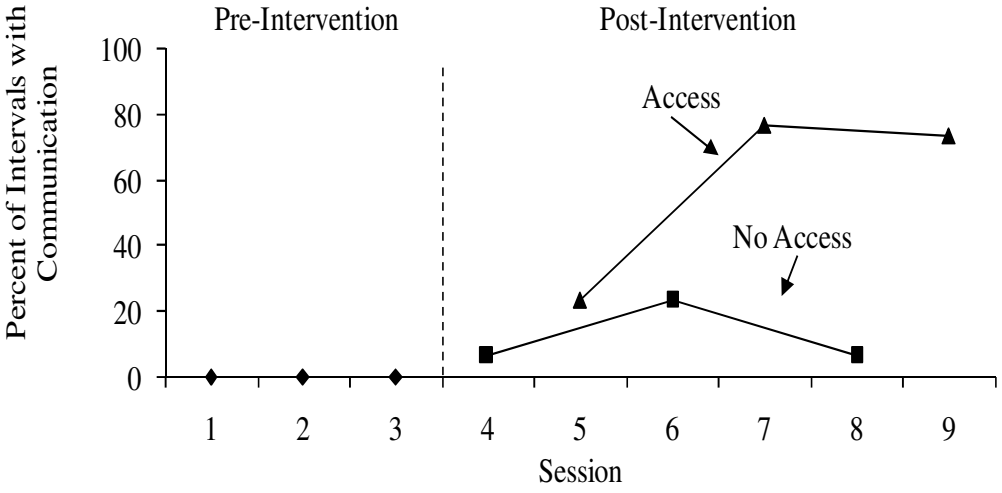

Figure 31. Jude's independent communication during generalization to new toy probes with original person and setting.

Prior to FCT intervention, Kyan engaged in challenging behavior during an average of 47% generalization probes with the new toy, a hand-held tally counter, but with the original person and in the original setting. During post-intervention generalization probes Kyan engaged in no challenging behavior, with the exception of one session, which had no prior access to the hand-held counter. Therefore, the mean percentage of intervals with challenging behavior was higher in sessions with no prior access to the tangible (M=19%) than those conducted after 15 minutes of prior access to the hand counter (M=0%). Results for Kyan's challenging behavior during generalization to new toy with original person and setting are depicted in Figure 32.

Prior to intervention, Kyan never requested more hand-held tally counter using his verbal and sign approximation (M=0%) during assessments for generalization to new toy with original person and setting. In post-intervention generalization probes that were conducted with no prior access to the hand counter, requests increased (M=62%); yet, in post-intervention generalization probes that were conducted after 15 minutes of access to the hand counter, a larger increase in independent communication resulted (M = 81%). Results for Kyan's independent communication during generalization to new toy with original person and setting are depicted in Figure 33.

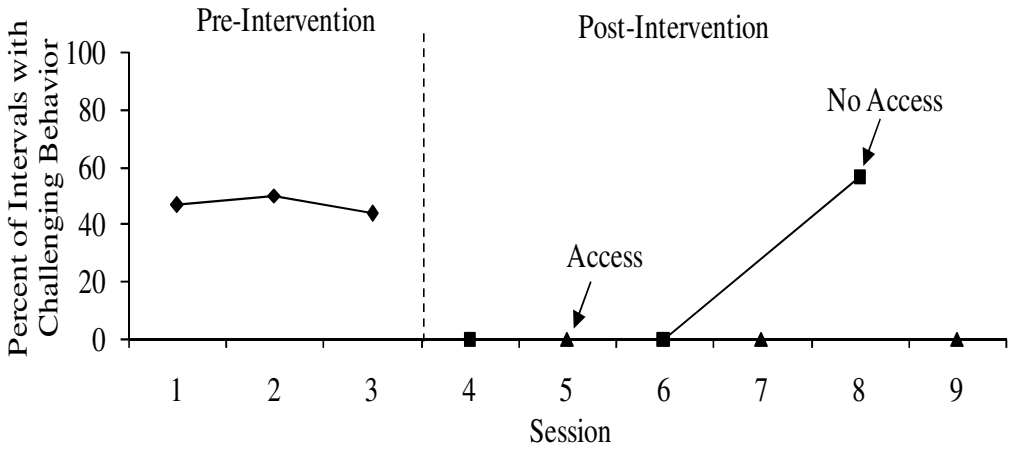

Figure 32. Kyan's challenging behavior during generalization to new toy probes with original person and setting.

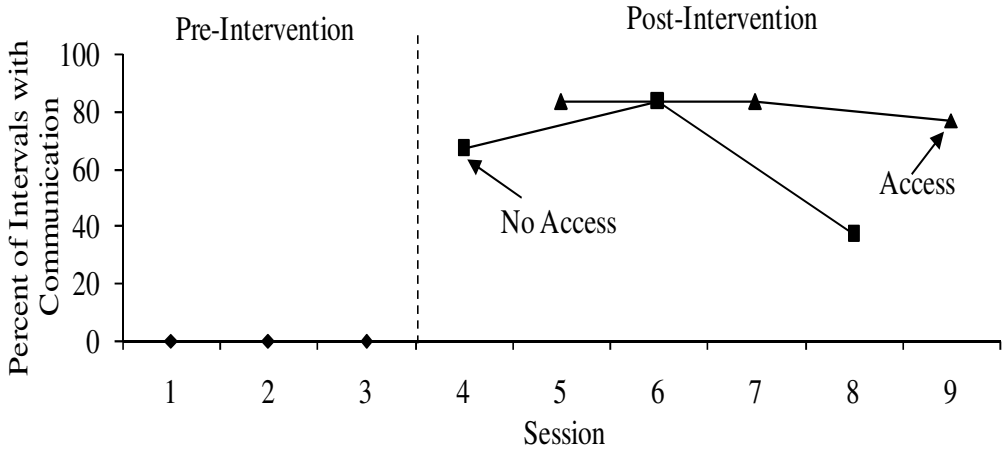

Figure 33. Kyan's independent communication during generalization to new toy probes with original person and setting.

Prior to FCT intervention, Mason engaged in relatively high levels of aggression during generalization probes with the new toy, a merry-go-round toy, but with the original person and in the original setting (M=49%). Due to illness toward the end of school, Mason was only available for one post-intervention probe. During post-intervention generalization probe that occurred with no prior access to the toy challenging behavior occurred in 70% of the intervals. However, in the post-intervention generalization probes that were conducted after 15 minutes of access to the merry-go-round, aggression did not occur. Results for Mason's challenging behavior during generalization to new toy with original person and setting are depicted in Figure 34.

A similar pattern was found for Mason's independent communication. Prior to intervention, Mason never requested more using his SGD (M=0%). During the post-intervention generalization probe that was conducted with no prior access to the toy, Mason never requested more using his SGD. On the other hand, during the post-intervention generalization probe that was conducted after 15 minutes of access to the merry-go-round, Mason used his SGD to request more during 80% of intervals. Results for Mason's independent communication during generalization to new toy with original person and setting are depicted in Figure 35.

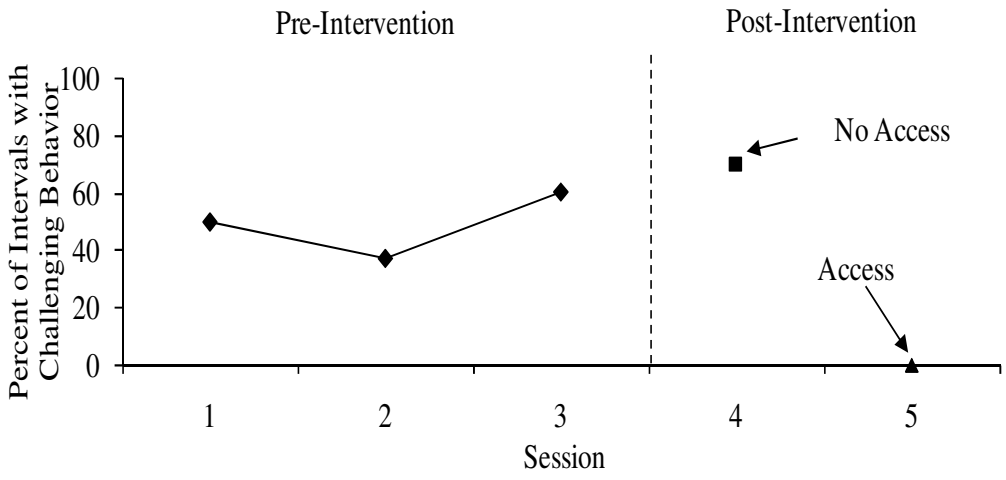

Figure 34. Mason's challenging behavior during generalization to new toy probes with original person and setting.

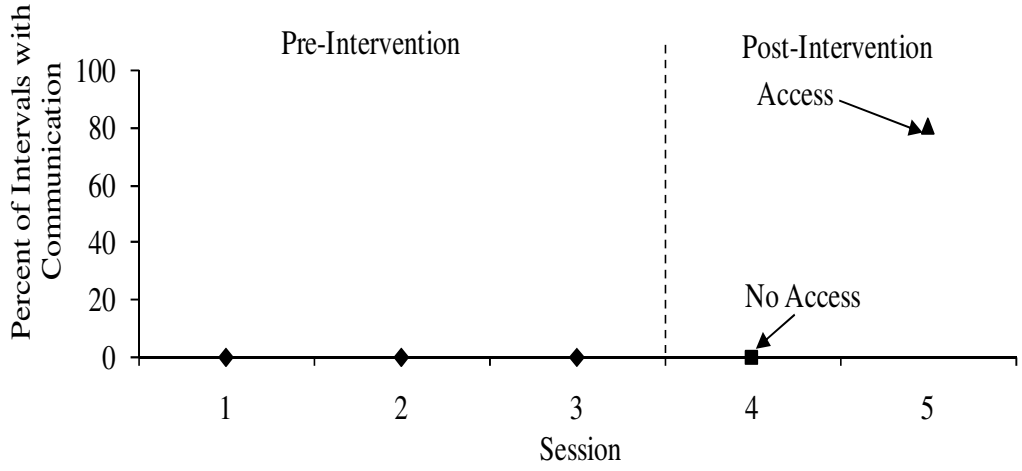

Figure 35. Mason's independent communication during generalization to new toy probes with original person and setting.

Assessment of Generalization to New Setting with Motivating Operation Manipulation

Prior Access Improved Generalization

Carson and Jude displayed similar results in these generalization assessments. Both patterns of results suggest that prior access to the toy improved generalization.

Prior to FCT intervention, Carson engaged in relatively high levels of challenging behavior during generalization probes with the original toy and person, but new setting (M=53%). Challenging behavior dropped during post-intervention generalization probes; however, no notable difference was found

between the two conditions. During post-intervention generalization probes that were conducted with no prior access to the video game protesting was slightly lower (M=3%) than those conducted after 15 minutes of access to the game (M=7%). Results for Carson's challenging behavior during generalization to the original toy and person in a new setting are depicted in Figure 36.

Prior to intervention, Carson never requested more game (M=0%). In post-intervention generalization probes that were conducted with no prior access to the movie, requests for more game were higher (M=57%); yet, in post-intervention generalization probes that were conducted after 15 minutes of access to the movie, a greater increase occurred (M = 67%). Results for Carson's independent communication during generalization to the original toy and person in a new setting are depicted in Figure 37.

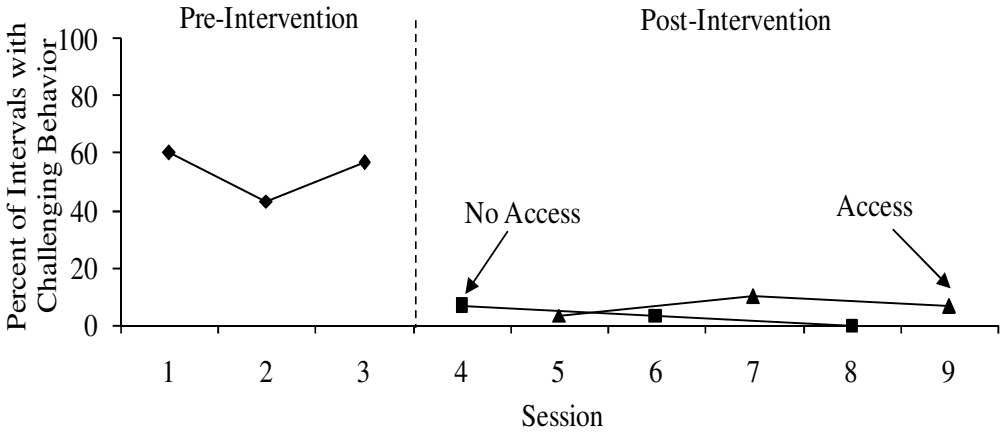

Figure 36. Carson's challenging behavior during generalization to original toy with original person in a new setting.

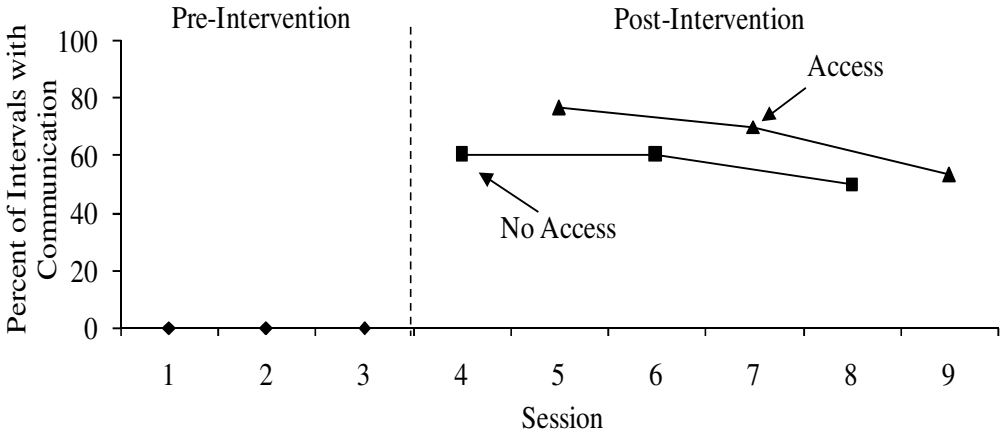

Figure 37. Carson's independent communication during generalization to original toy with original person in a new setting.

Prior to FCT intervention, Jude engaged in relatively high levels of throwing objects during generalization probes with the original toy and person, but new setting (M=66%). On the contrary, during post-intervention generalization probes challenging behavior never occurred in either condition, those in which he had no prior access to crayons as well as those in which he had 15 minute access to crayons. Therefore, there was no difference between conditions in post-intervention generalization probes. Results for Jude's challenging behavior during generalization to the original toy and person in a new setting are depicted in Figure 38.

Prior to intervention, Jude never requested more crayons (M=0%). In post-intervention generalization probes that were conducted with no prior access to the crayons, requests for more crayons were much higher (M=79%); yet, in post-intervention generalization probes that were conducted after 15 minutes of access to the crayons, an even greater increase occurred (M = 92%). Results for Jude's independent communication during generalization to the original toy and person in a new setting are depicted in Figure 39.

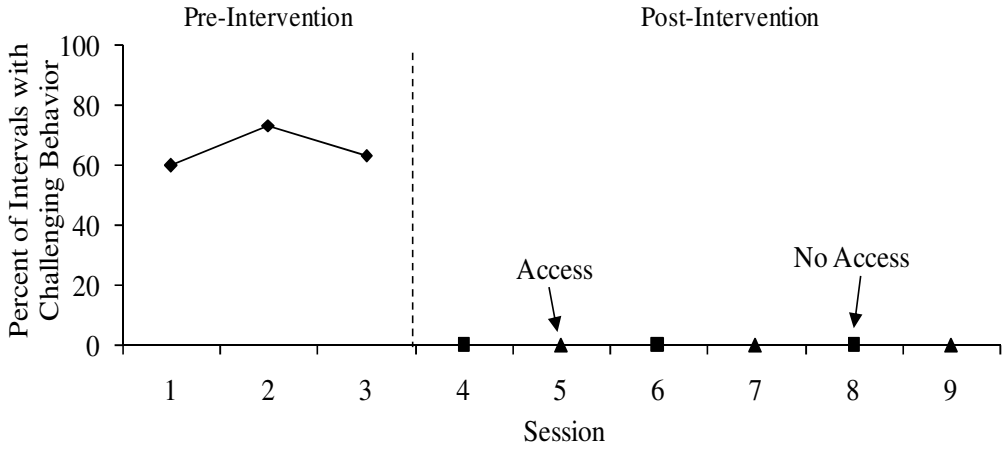

Figure 38. Jude's challenging behavior during generalization to original toy with original person in a new setting.

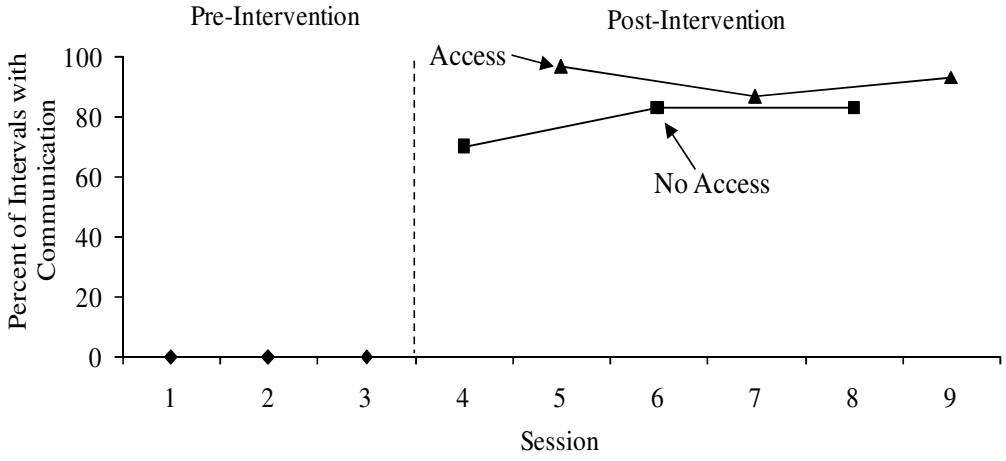

Figure 39. Jude's independent communication during generalization to original toy with original person in a new setting.

No Difference Between Conditions of Generalization Assessment

Kyan and Mason depicted similar results in the assessment of generalization with the original toy and person, but in a new setting. Both participants' results showed no difference between the two pre-session conditions.

Prior to FCT intervention, Kyan tilted back in his chair often during generalization probes with the original toy and person, but new setting (M=42%). This behavior decreased during post-intervention probes. However, there was a slightly greater decrease in challenging behavior during sessions that were conducted with no prior access to the timer (M=9%) than in sessions that were conducted after 15 minutes of access to the timer (M=19%). Visual analysis of the data shows no distinct difference between the two conditions. Results for Kyan's challenging behavior during generalization to the original toy and person in a new setting are depicted in Figure 40.

Similar results occurred for independent communication. Prior to intervention, Kyan never requested more using his verbal and sign approximation (M=0%). This increased in during post-intervention probes with no distinct difference between the two conditions. Post-intervention generalization probes that were conducted with no prior access to the timer (M=68%) had similar results as probes that were conducted after 15 minutes of access to the timer (M=71%). Results for Kyan's independent communication during generalization to the original toy and person in a new setting are depicted in Figure 41.

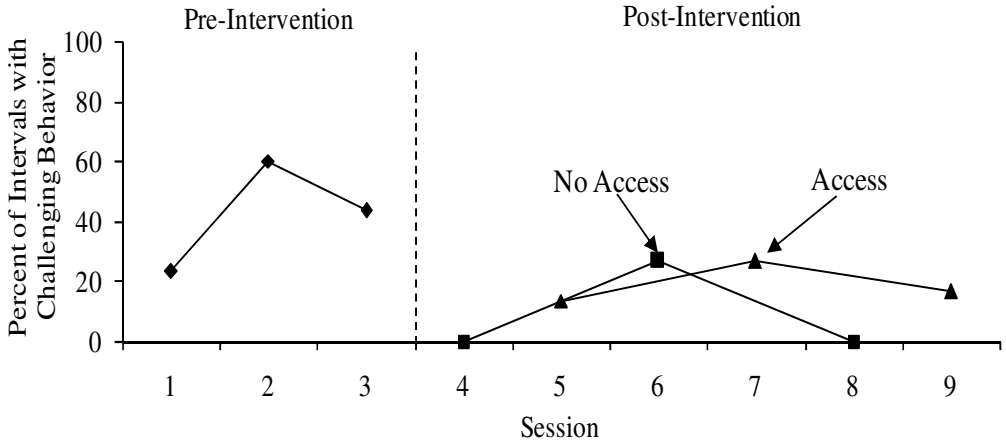

Figure 40. Kyan's challenging behavior during generalization to original toy with original person in a new setting.

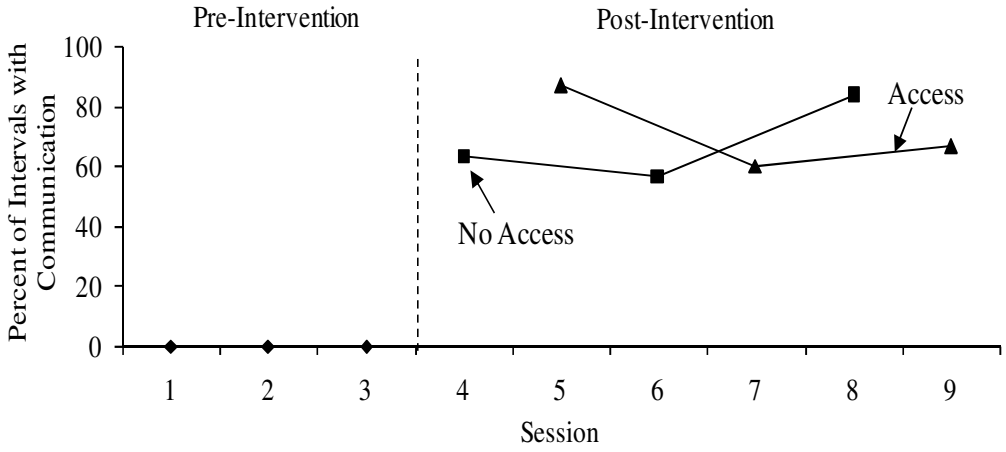

Figure 41. Kyan's independent communication during generalization to original toy with original person in a new setting.

Prior to FCT intervention, Mason engaged in aggression often during generalization probes with the original toy and person, but new setting (M=50%). This behavior decreased during the first three post-intervention probes, but then showed in an increasing trend during the last three sessions. In general, there was no difference among sessions conducted with no prior access to the potato head (M=17%) and those conducted after 15 minutes of access to the toy (M=14%). It should be noted that during the last two sessions, Mason appeared to have no interest in the toy. In fact, when he engaged in aggression and was then provided the toy, he often threw the toy off of the table. It appeared that most of the challenging behavior that was displayed was for the purpose of trying to physically move the researcher so that he could leave the table. Results for Mason's challenging behavior during generalization to the original toy and person in a new setting are depicted in Figure 42.

Similar results occurred for independent communication. Prior to intervention, Mason never requested more using his SGD (M=0%). Again, this behavior increased during the first three post-intervention sessions but then showed a decreasing trend in the last three sessions. Furthermore, there was no distinct difference among sessions conducted with no prior access to the potato head (M=31%) and those conducted with 15 minutes prior access to the potato head (M=23%). Although there is a 12% difference among the two sessions, the graph depicts overlapping data points. Again, it is important to reiterate that

Mason showed no interest in the potato head during the last two sessions, which most likely accounts for the drop in communication during these sessions. Results for Mason's independent communication during generalization to the original toy and person in a new setting are depicted in Figure 43.

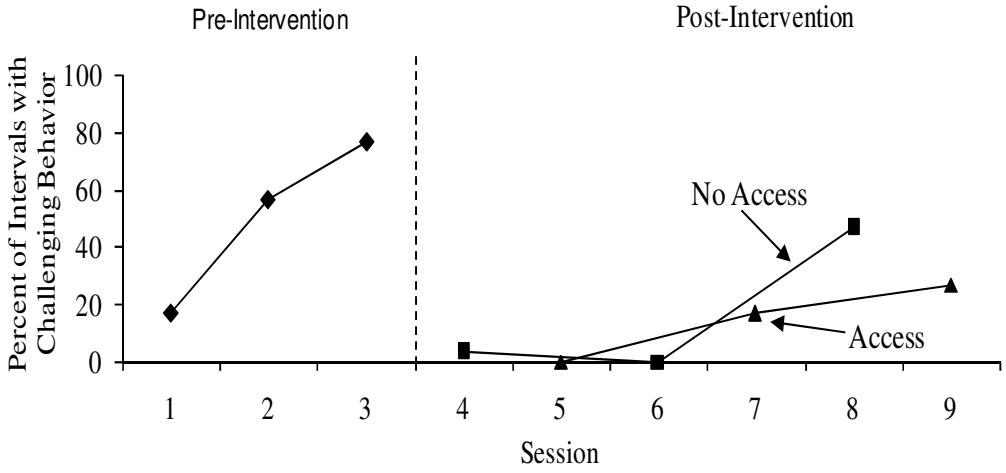

Figure 42. Mason's challenging behavior during generalization to original toy with original person in a new setting.

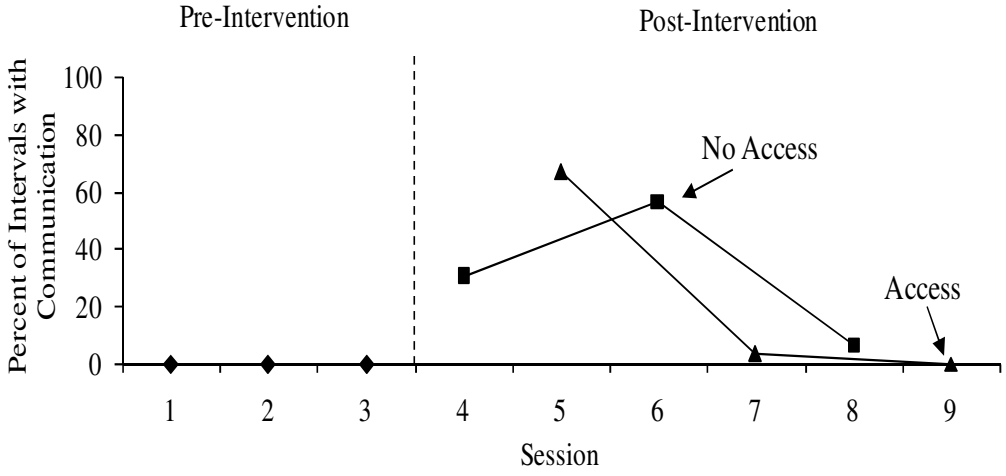

Figure 43. Mason's independent communication during generalization to original toy with original person in a new setting.

Assessment of Generalization to New Toy and Setting with Motivating Operation Manipulation

Prior Access Improved Generalization

Prior to FCT intervention, Mason engaged in relatively high levels of aggression during generalization probes with the original person, but with a new toy and in a new setting (M=47%). Mason never engaged in aggression during post-intervention generalization probes with the exception of one session conducted with no prior access to the DVD player. Thus, there was no distinct difference between sessions conducted with no prior access to the DVD player (M=1%) and those conducted after 15 minutes access to the DVD player

(M=0%). Results for Mason's challenging behavior during generalization to a new toy in a new setting, but with the original person are depicted in Figure 44.

Prior to intervention, Mason never requested more using his SGD (M=0%). On the other hand, during post-intervention generalization probes that were conducted with no prior access to the DVD player, Mason began requesting more (M=67%). However, probes that were conducted after 15 minutes of access to the DVD player produced a slightly higher amount of independent requests (M=72%). Results for Mason's independent communication during generalization to a new toy in a new setting, but with the original person are depicted in Figure 45.

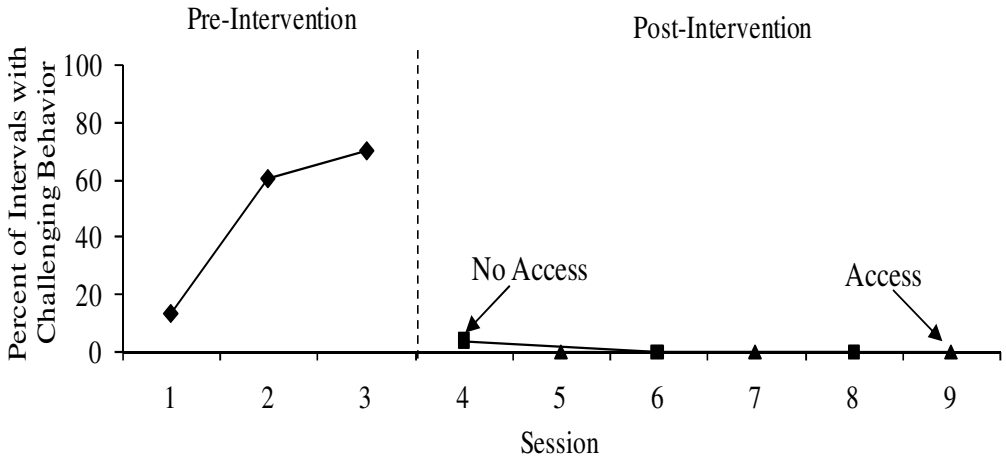

Figure 44. Mason's challenging behavior during generalization to a new toy in a new setting with the original person.

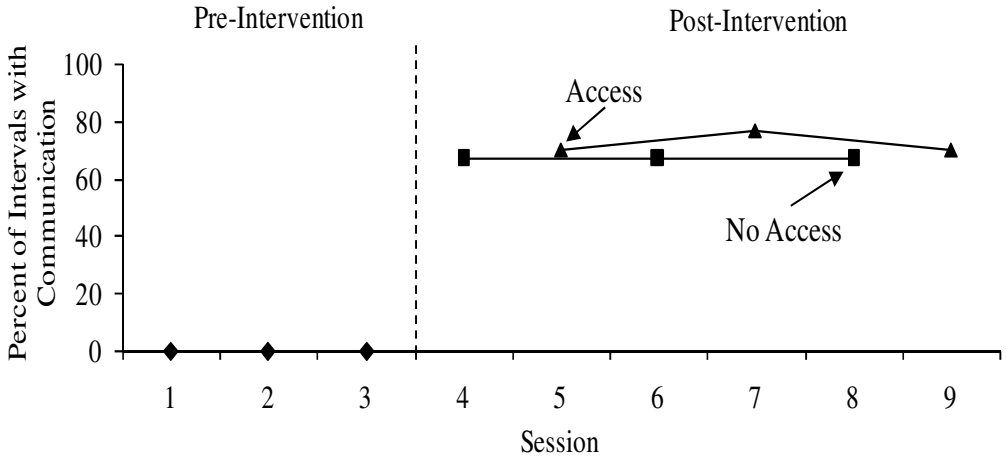

Figure 45. Mason's independent communication during generalization to a new toy in a new setting with the original person.

No Difference Between Conditions of Generalization Assessment

Carson, Jude, and Kyan's results showed no difference among pre-session conditions. On the other hand, one major difference existed between Carson's results and those of Jude and Kyan. Specifically, Jude and Kyan demonstrated generalization regardless of pre-session condition, but Carson did not demonstrate generalization under either pre-session condition.

Prior to FCT intervention, Carson engaged in relatively high levels of protesting during generalization probes with the original person, but with a new toy and in a new setting (M=51%). Challenging behavior increased during post-intervention generalization probes that were conducted with no prior access to his

music toy (M=77%). Conversely, challenging behavior remained similar to that in pre-intervention generalization probes conducted after 15 minutes of access to his music toy (M=50%). Therefore, though challenging behavior was not decreased post-intervention in general, sessions conducted after 15 minutes of access to his music toy resulted in lower challenging behavior than sessions conducted with no prior access to the toy. Results for Carson's challenging behavior during generalization to a new toy in a new setting, but with the original person are depicted in Figure 46.

Prior to intervention, Carson never requested more toy (M=0%). Carson also never requested more toy during post-intervention generalization probes that were conducted with no prior access to the music toy (M=0%). Additionally, Carson made very few requests during generalization probes that were conducted after 15 minutes of access to the music toy (M=2%). Results for Carson's independent communication during generalization to a new toy in a new setting, but with the original person are depicted in Figure 47.

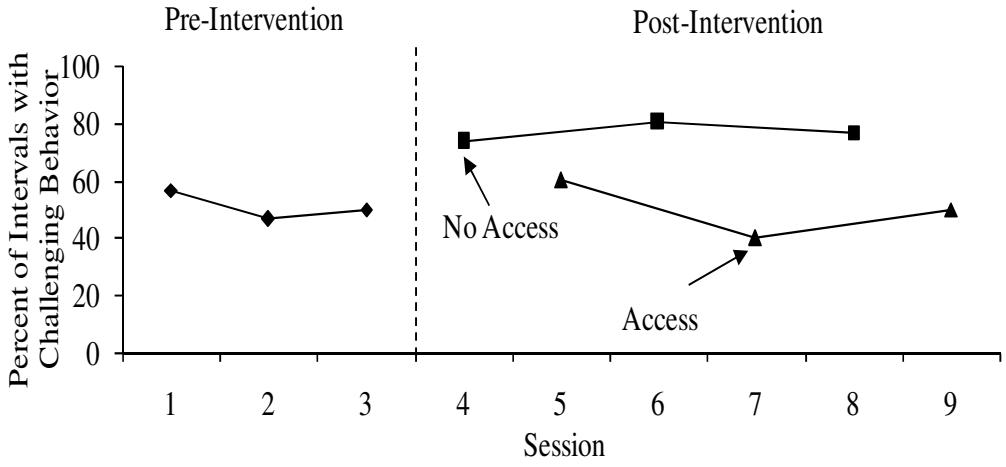

Figure 46. Carson's challenging behavior during generalization to a new toy in a new setting with the original person.

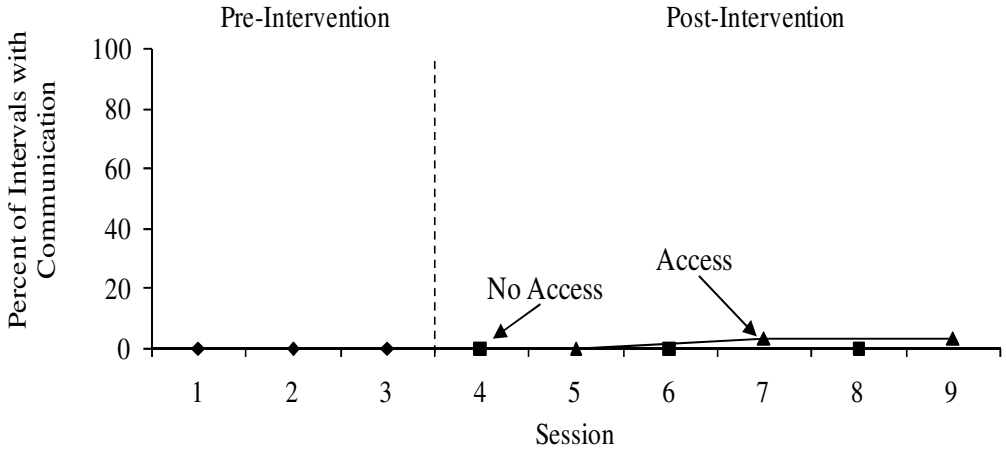

Figure 47. Carson's independent communication during generalization to a new toy in a new setting with the original person.

Prior to FCT intervention, Jude engaged in relatively high levels of throwing objects during generalization probes with the original person, but with a new toy and in a new setting (M=41%). Regardless of pre-session access to markers, Jude never engaged in challenging behavior during post-intervention generalization probes. Results for Jude's challenging behavior during generalization to a new toy in a new setting, but with the original person are depicted in Figure 48.

Prior to intervention, Jude never requested more markers (M=0%). Jude's independent requests for more markers rose drastically during post-intervention generalization probes. However, there was not a distinct difference between post-intervention generalization probes conducted with no prior access to the markers (M=80%) and those conducted after 15 minutes of access to the makers (M=88%). Results for Jude's independent communication during generalization to a new toy in a new setting, but with the original person are depicted in Figure 49.

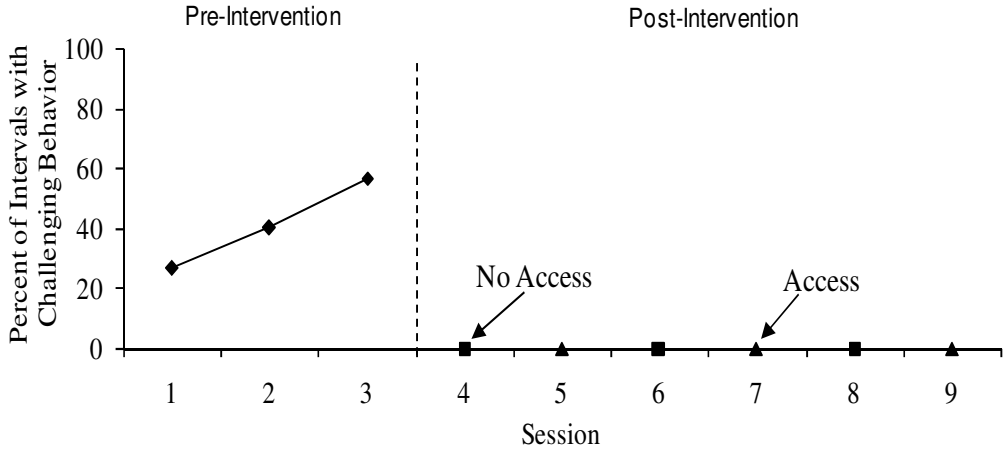

Figure 48. Jude's challenging behavior during generalization to a new toy in a new setting with the original person.

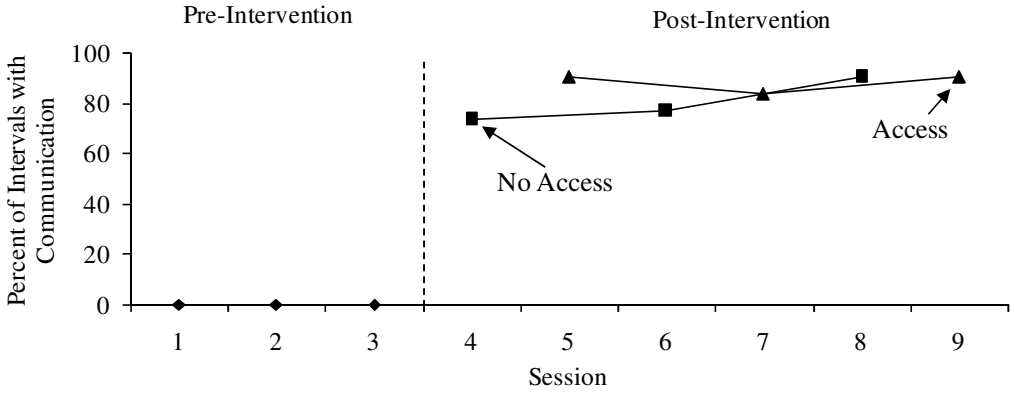

Figure 49. Jude's independent communication during generalization to a new toy in a new setting with the original person.

Prior to FCT intervention, Kyan engaged in relatively high levels of tilting in his chair during generalization probes with the original person, but with a new toy and in a new setting (M=64%). Regardless of pre-session access to his watch, Kyan never engaged in challenging behavior during post-intervention generalization probes (M=0%). Results for Kyan's challenging behavior during generalization to a new toy in a new setting, but with the original person are depicted in Figure 50.

Prior to intervention, Kyan never requested more using his verbal and sign approximation (M=0%). On the other hand, during post-intervention generalization probes that were conducted with no prior access to the watch, Kyan's requests increased in comparison to pre-intervention probes (M=78%). While probes that were conducted after 15 minutes of access to the watch produced a slightly higher amount of independent requests (M=83%), there was not an outstanding difference between the two conditions. Results for Kyan's independent communication during generalization to a new toy in a new setting, but with the original person are depicted in Figure 51.

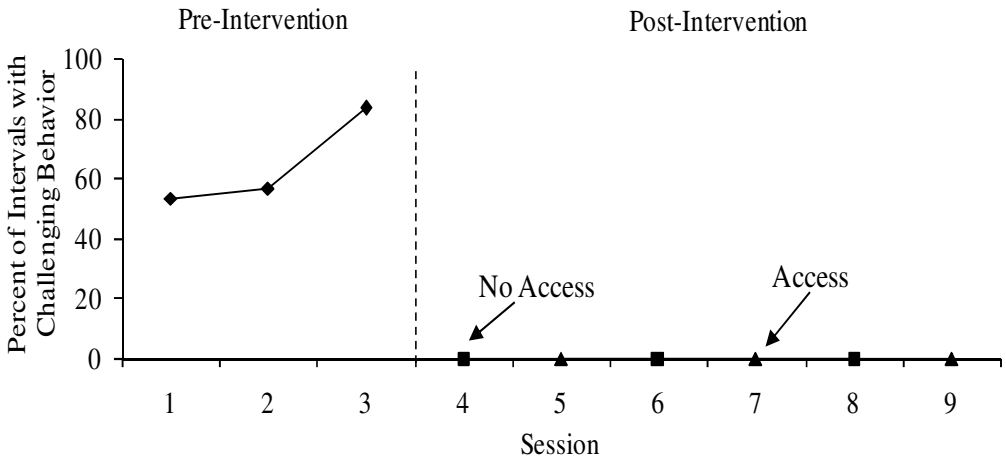

Figure 50. Kyan's challenging behavior during generalization to a new toy in a new setting with the original person.

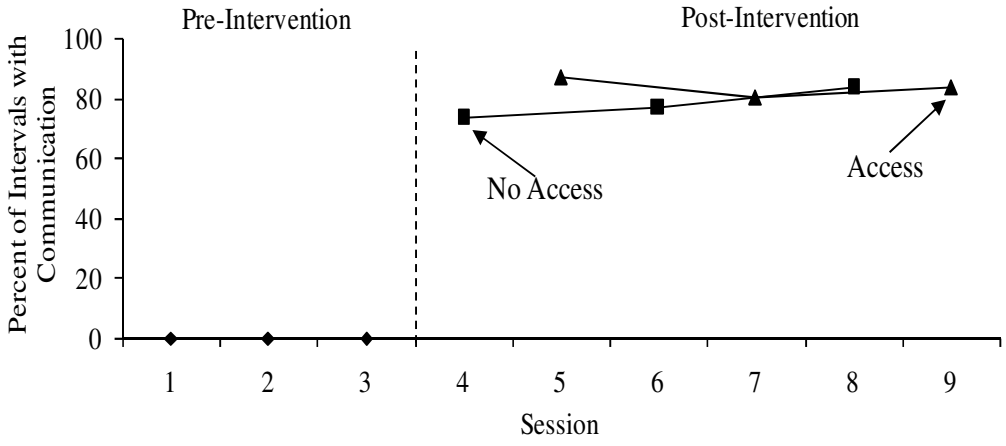

Figure 51. Kyan's independent communication during generalization to a new toy in a new setting with the original person.

Assessment of Generalization to New Toy, with New Person, and in New Setting with Motivating Operation Manipulation

Prior Access Improved Generalization

Prior to FCT intervention, Jude engaged in relatively high levels of throwing toys during generalization probes to a new toy, with a new person and in a new setting (M=49%). Challenging behavior never occurred during post-intervention probes; therefore, there was no difference between sessions that were conducted with no prior access to the markers (M=0%), and those conducted after 15 minutes access to the markers (M=0%). Results for Jude's challenging behavior during generalization to a new toy, with a new person, and in a new setting are shown in Figure 52.

Prior to intervention, Jude never requested more markers (M=0%). Independent requests increased in sessions that were conducted after FCT intervention, with sessions conducted with no prior access to the markers producing a lower number of requests (M=84%) than those conducted after 15 minutes prior access to the makers (M=88%). Results for Jude's independent communication during generalization to a new toy in a new setting, but with the original person are illustrated in Figure 53.

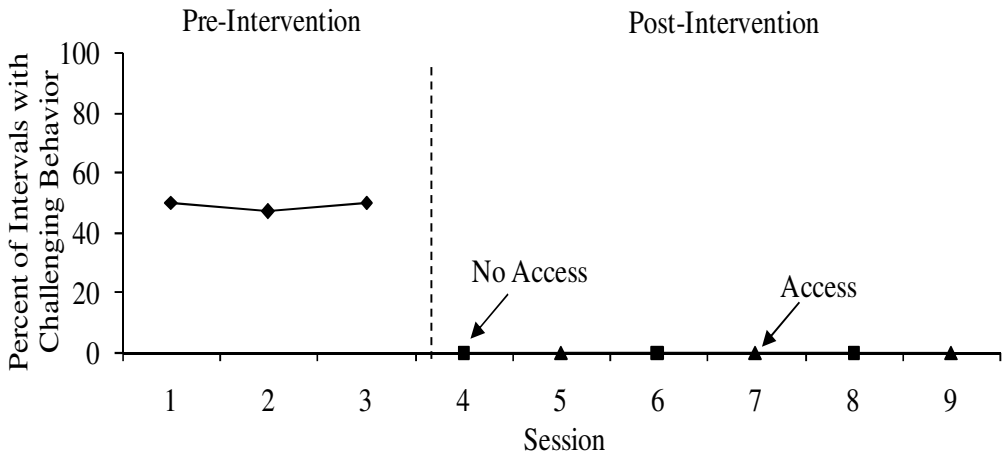

Figure 52. Jude's challenging behavior during generalization to a new toy, with a new person, and in a new setting.

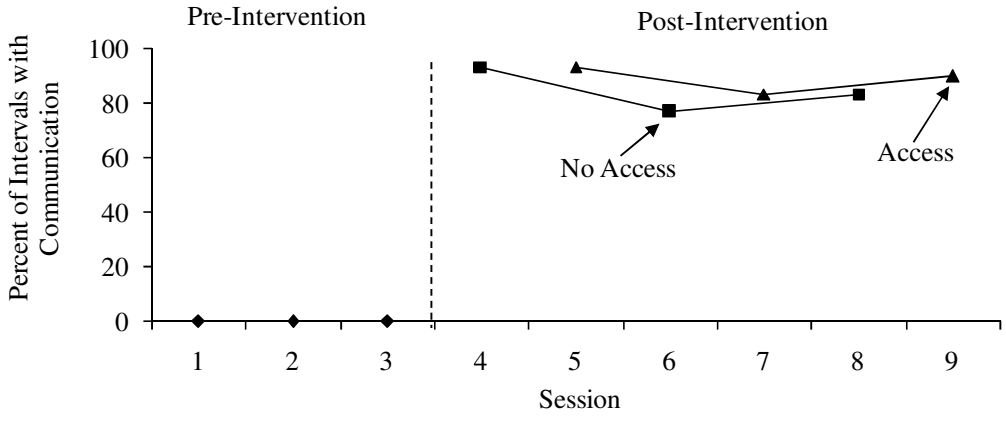

Figure 53. Jude's independent communication during generalization to a new toy, with a new person, and in a new setting.

No Prior Access Improved Generalization

Prior to FCT intervention, Kyan engaged in relatively high levels of challenging behavior, tilting back in his chair, during generalization probes to a new toy, with a new person and in a new setting (M=38%). Challenging behavior never occurred during post-intervention probes with the exception of one session with no prior access to the watch. Therefore, there was no distinct difference between sessions that were conducted with no prior access to the watch (M=1%), and those conducted after 15 minutes access to the watch (M=0%). Results for Kyan's challenging behavior during generalization to a new toy, with a new person, and in a new setting are shown in Figure 54.

Prior to intervention, Kyan never requested "more" using his sign and verbal approximation (M=0%). On the other hand, independent requests increased during post-intervention probes, with a slightly higher number of requests in sessions conducted with no prior access to the watch (M=78%) than in sessions conducted after 15 minutes access to the watch (M=71%). Results for Kyan's independent communication during generalization to a new toy in a new setting, but with the original person are illustrated in Figure 55.

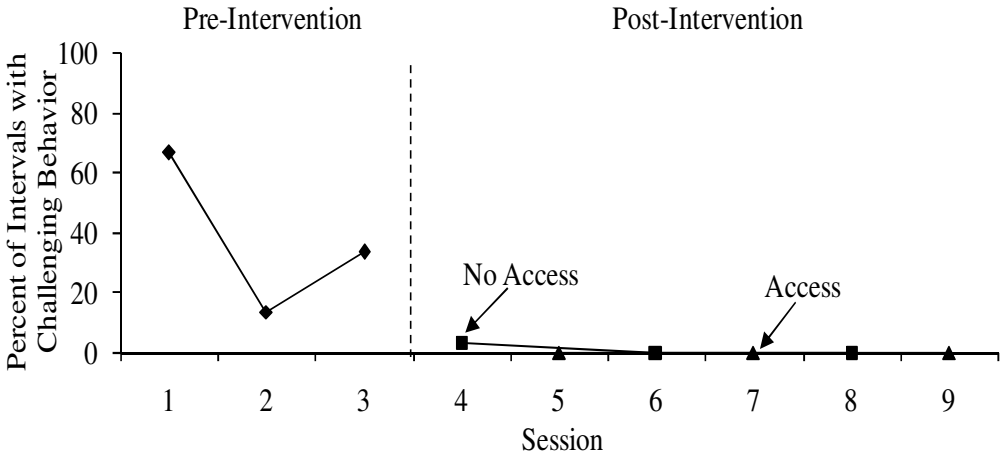

Figure 54. Kyan's challenging behavior during generalization to a new toy, with a new person, and in a new setting.

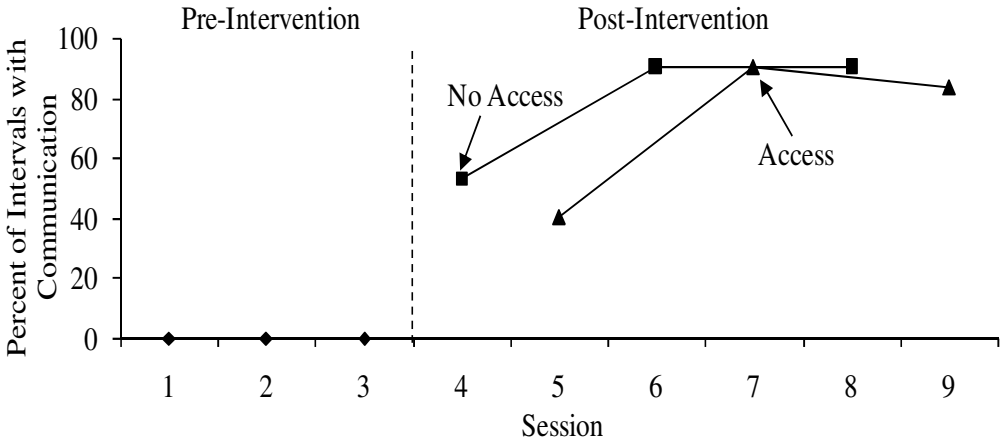

Figure 55. Kyan's independent communication during generalization to a new toy, with a new person, and in a new setting.

No Difference Between Conditions of Generalization Assessment

Mason and Carson both showed similar results in that they both showed no difference among pre-session conditions. On the other hand, one major difference exists between Mason and Carson's results. Specifically, Mason demonstrated generalization regardless of pre-session condition, but Carson did not demonstrate generalization under either pre-session condition.

Prior to FCT intervention, Mason engaged in relatively high levels of aggression during generalization probes to a new toy, with a new person and in a new setting (M=47%). Challenging behavior never occurred during post-intervention probes with the exception of one session with no prior access to the DVD player. Therefore, there was no distinct difference between sessions that were conducted with no prior access to the DVD player (M=1%), and those conducted after 15 minutes access to the DVD player (M=0%). Results for Mason's challenging behavior during generalization to a new toy, with a new person, and in a new setting are shown in Figure 56.

Prior to intervention, Mason never requested more using his SGD (M=0%). On the other hand, independent requests increased during post-intervention probes, with a only a slightly higher number of requests in sessions conducted with no prior access to the DVD player (M=68%) than in sessions conducted after 15 minutes access to the DVD player (M=66%). Results for

Mason's independent communication during generalization to a new toy in a new setting, but with the original person are illustrated in Figure 57.

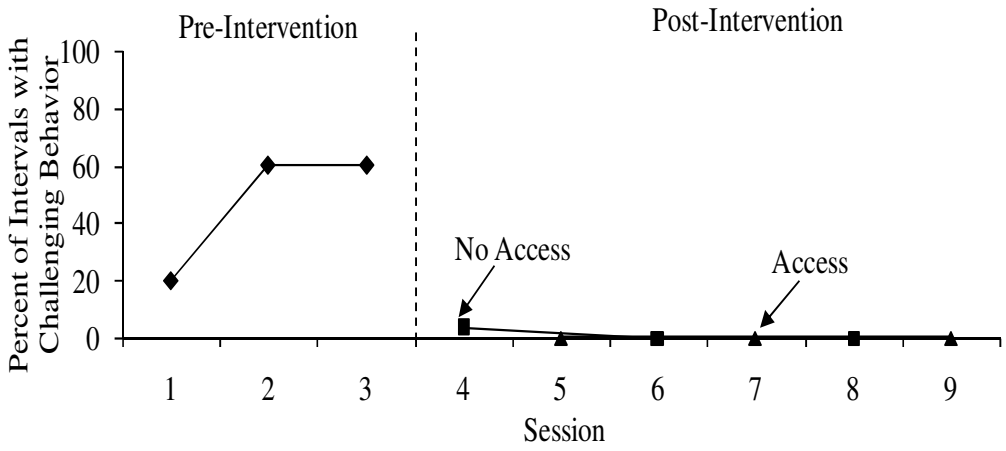

Figure 56. Mason's challenging behavior during generalization to a new toy, with a new person, and in a new setting.

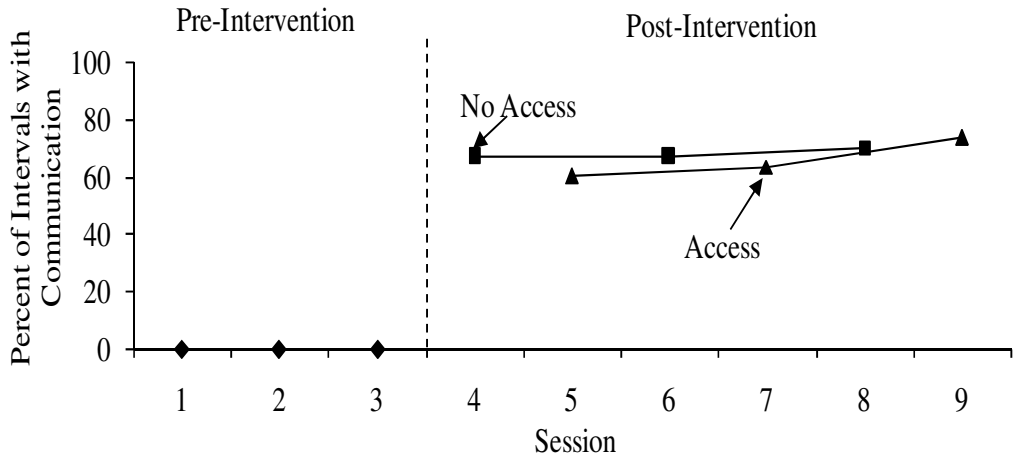

Figure 57. Mason's independent communication during generalization to a new toy, with a new person, and in a new setting.

Prior to FCT intervention, Carson engaged in relatively high levels of protesting during generalization probes to a new toy, with a new person and in a new setting (M=66%). Challenging behavior slightly decreased during post-intervention generalization probes, but no difference occurred between sessions that were conducted with no prior access to his music toy (M=60%) and those that were conducted after 15 minutes of access to his music toy (M=60%). It should be noted that only one session of each condition was conducted after intervention due to parent request. Results for Carson's challenging behavior during generalization to a new toy, with a new person, and in a new setting are shown in Figure 58.

Prior to intervention, Carson never requested more toy (M=0%). Carson also never requested more toy during post-intervention generalization probes, regardless if those were conducted with no prior access to the music toy or after 15 minutes prior access to the toy (M=0%). Again, noted that only one session of each condition were conducted post-intervention due to parent request. Results for Carson's independent communication during generalization to a new toy in a new setting, but with the original person are illustrated in Figure 59.

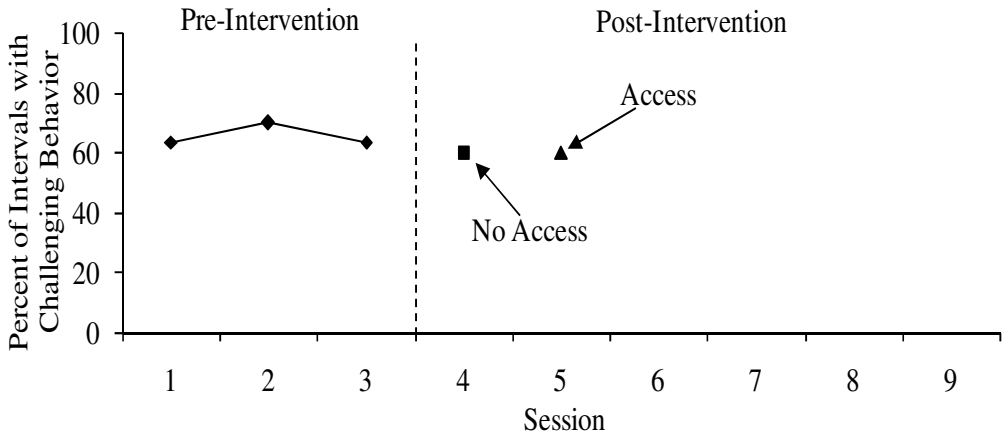

Figure 58. Carson's challenging behavior during generalization to a new toy, with a new person, and in a new setting.

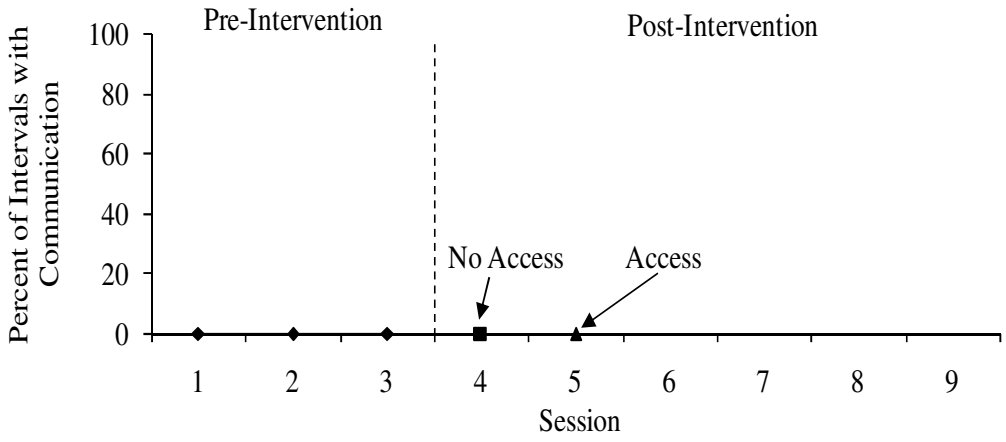

Figure 59. Carson's independent communication during generalization to a new toy, with a new person, and in a new setting.

CHAPTER 5

DISCUSSION

Functional Analysis

The purpose of this study was to twofold. The first purpose was to examine the effects of motivating operations on functional communication training (FCT). Second, the purpose was to examine effects of motivating operations on generalization of the skills taught via FCT.

In the first phase of this study, functional analyses were conducted in order to determine the function of the challenging behavior. Two patterns of results appeared. First, for Jude, Mason, and Kyan, challenging behavior seemed to serve only one purpose, to gain access to tangibles. No other condition other than the tangible produced a noteworthy amount of challenging behavior. Carson portrayed a different pattern in that his challenging behavior occurred at high frequencies in two conditions, suggesting that he displayed challenging behavior to gain access to tangibles and escape demands. Although two patterns of results occurred, only the function of gaining access to tangibles was addressed in this study.

Functional Analysis with Motivating Operation Manipulation

In the second phase of the study, the tangible conditions of the FA were repeated, but with pre-session conditions of *no access* or *satiation* in order to identify if either of these pre-sessions had an effect on the challenging behavior.

Results were similar across all four participants in that, there was a distinct difference in conditions. Specifically, for all participants, pre-session satiation resulted in a markedly lower frequency of challenging behavior than no access to the toy prior to the assessment. This replicates the results found by McComas, Thompson, and Johnson (2003).

Although the patterns of challenging behavior during tangible conditions were similar across participants, the amount of time to reach satiation was not consistent. For Carson, Jude, and Kyan, the amount of time to reach satiation was fairly stable, with an 11, 10, and 11 minute span between latency from access to toy to satiation, respectively. On the other hand, Mason's data revealed a span of 41 minutes between the longest and shortest duration to reach satiation. Another anomaly of his data was that the latency to satiation depicted an increasing trend in the amount of time across sessions. It would be expected that this length of time would be stable, or decrease over time as he was exposed to the toy repeatedly. In fact, no other participant showed an increasing trend.

Additionally, it was anecdotally noted that longer periods of time with his toy tended to increase behaviors associated with frustration or anxiety, such as crying, fussing, body tensing, and tugging or chewing on his shirt; however, systematic data were not collected on these behaviors. Although the explanation for this phenomenon is unknown, it is possible that the two observations could be connected. Perhaps some individuals respond differently to prolonged exposure to

preferred items and that the behaviors observed during the satiation period of free access to the toy, i.e., body tensing, crying, etc., are somehow related to an increased trend of latency to satiate. It could be possible that this response could be representative of a subgroup of individuals who display this particular behavioral phenotype that results in a heightened arousal when provided access to particular toys, and which then leads to increasing trend of latency to satiation. Although very little research supports either theory, Rogers and Oznoff (2005) report that two commonly reported theories explaining self-stimulatory and stereotypical behavior among individuals with autism are the over- and under-arousal theories. In other words, these theories suggest that self-stimulatory behaviors are used to compensate for an over- or under-aroused body. Although research for these theories is minimal, further research on this topic may lead to a greater understanding of Mason's response to prolonged exposure to and stereotyped behavior with that toy.

Functional Communication Training

In the third phase, FCT was conducted with one of two pre-sessions conditions, either no access to the toy prior to intervention, or 15 minutes of access to the toy prior to intervention. Three patterns of results appeared among the participants.

Prior Access Improved Intervention

For Carson and Jude, FCT intervention conducted after 15 minutes prior access to the toy produced more favorable results than intervention sessions conducted with no prior access. For Carson, challenging behavior was reduced and communication was increased in FCT intervention sessions conducted after 15 minutes of access to the toy. In fact, there seemed to be a relationship between these two improvements. During FCT sessions conducted with no prior access to the toy, Carson engaged in such high levels of protesting, he was practically unable to respond to the experimenter's prompts. He was so loud, that it is likely he simply could not hear the prompts. Additionally, he appeared so frustrated he simply was not in the mind frame to respond. It is possible that simply being required to work with the researcher was so aversive that this lead to challenging behavior. In fact, it was noted in Carson's FA that his challenging behavior served two functions, escape from demand and access to tangibles. Therefore, it is likely that he viewed FCT sessions served as a demand, in fact he was required to leave his classroom and come sit at a table with the researcher. Therefore, he was displaying challenging behavior in order to attempt to escape this work demand. On the other hand, after 15 minutes of free access to the toy, Carson was much calmer and therefore his demeanor was conducive to listening and responding to the experimenter's prompts. It appears the 15 minutes of prior access to the toy took the edge off of the intervention session, allowing Carson to respond

appropriately to the verbal prompting, and therefore, increase independent requesting. It is likely once that he had the 15 minutes of prior access to the video game, he no longer viewed the intervention session with the researcher as a demand to work; therefore, challenging behavior naturally decreased.

For Jude, results of FCT was also favorable in sessions that were conducted after 15 minutes of access to the toy, but his pattern of response was slightly different. First, challenging behavior was decreased to near zero levels regardless of the pre-session condition. On the other hand, Jude made slightly more independent requests during FCT sessions that were conducted after 15 minutes of access. Again, the 15 minutes of prior access appeared to take the edge of the intervention session, or in other words, reduce the aversiveness of the intervention sessions for Jude as well. In fact, although Jude was capable of making independent requests in sessions conducted with no prior access to the toy, he appeared more anxious during these sessions and often stumbled over his words, displayed facial expressions of frustration, and tried to reach for the toy before requesting it. Although he did not resort to the target challenging behavior, it was observed that Jude appeared to be anxious during these sessions. On the other hand, these behaviors did not exist in intervention sessions conducted after 15 minutes of access to the toy; therefore, Jude immediately requested more crayons without delay or displaying behaviors observed during the sessions

conducted without prior access to the crayons, thereby leading to a slight increase in independent communication in these sessions.

No Difference Between Conditions of Functional Communication Training

Kyan's results suggested no differentiation between the two pre-session conditions. In other words, challenging behavior and independent communication did not seem to be affected by the pre-session conditions.

These results could possibly be explained by the results of the second phase of this study. It is noteworthy that Kyan's mean latency to satiation was shorter than the other participants, in fact, it was 15 minutes. Therefore, it is possible that the 15 minutes of pre-session access implemented prior to FCT was simply too long for Kyan to have the same effects as it did for Carson and Jude. In fact, in several FCT sessions, Kyan demonstrated the criteria of satiation during the 15-minutes of pre-session access. It was hypothesized that 15 minutes of pre-session access reduced the aversiveness of intervention sessions for Carson and Jude. On the other hand, the aversiveness of intervention sessions may not have been reduced for Kyan because if he reached satiation with the toy; it would be assumed that he is no longer motivated to request the toy.

Unfortunately, a methodology for determining successful pre-session access duration has yet to be established in the literature. While several studies have assessed the effects of pre-session access and no access on challenging behavior, toy preference, and task compliance, little research provides significant

guidance to this study. First, the range of pre-session access found in the literature ranges from as short as 10 minutes, to as long as 2 hours (i.e., Klatt, Sherman, Sheldon, 2000; Rapp, 2007). Additionally, many studies target attention-maintained behaviors, therefore, pre-session access involves access to attention, which, needless to say, is distinctly different from pre-session access to toys, specifically if during that access session the participants interacts with toys in a stereotypical manner. Last, most research targeting tangible-maintained behaviors have used food; therefore pre-session access was conducted after a meal time and pre-session no access was provided before meal time (i.e., Zhou, Iwata, Shore, 2002). This type of pre-session access is markedly different from pre-session access to a toy in which the participant engages in stereotypical behavior with the toy.

No Prior Access Improved Intervention

Mason produced a third pattern of results. First, results of challenging behavior during FCT intervention suggested no differentiation between the two pre-session conditions. On the other hand, independent communication increased in FCT conditions that were conducted with no prior access to the toy. Several explanations could be provided for this trend. First, it was noticed during the second phase of this study, that prolonged access to the toy caused challenging behavior other than the target challenging behavior, such as crying and fussing. This occurred regardless of his perceived interest in the toy. It could be

hypothesized that as these behaviors increased with longer exposure to the toy, Mason became less receptive to instruction and therefore made less independent requests during sessions conducted after 15 minutes access to the toy. A second possible hypothesis is that Mason began to satiate on the toy over time. While this pattern was not found during the second phase of the study, in fact, the later sessions resulted in a longer latency to satiation, observations of later FCT sessions suggest that Mason began to lose interest in the potato head over time. It is noteworthy that Mason required more sessions than any other participant to reach ending criteria to FCT intervention; therefore, it could be expected that he would be more likely to satiate over time than any other participant. Additionally, observations of the FCT intervention suggested that Mason frequently demonstrated previously defined behaviors that indicated satiation during the 15 minutes of free access with his toy (i.e., removing physical contact with the toy for more than 30 seconds). When this occurred, Mason no longer had interest in playing with his potato head and became very frustrated when it was presented to him. In fact, during these sessions, Mason would often throw the toy off the table immediately after receiving the toy, which rarely occurred in sessions conducted with no prior access to the potato head. Additionally, he became highly agitated at the demand to stay at the table during intervention sessions conducted after 15 minutes of access to the toy. He often physically struggled with the experimenter to leave the work area, also suggesting satiation with the toy. In other words,

during these sessions, Mason had no motivation to make independent requests for the toy if he was satiated on the toy and no longer wanted access to the toy.

Therefore, unlike Jude and Carson whose demeanor appeared to be calmed by access to the toy, Mason appeared to either become agitated, and therefore less responsive to instruction, or satiated on the toy and no longer had motivation to request the toy after 15 minutes of free access.

Assessment of Generalization to New Toys with Motivating Operation Manipulation

All four participants presented similar results in generalization probes to new toys, with original person and in the original setting. In fact, generalization to the new toy was improved in sessions conducted after 15 minutes of prior access to that toy for all four participants, in varying degrees. For example, the most drastic difference was depicted in Carson's results. Additionally, Mason was unable to complete data collection for this assessment, but the one post-intervention session depicted a drastic difference in results between the two sessions.

It is important to also note that this generalization assessed both stimulus and response generalization for Carson and Jude. Although Carson was taught to request *more game* during FCT intervention, he requested *more movie* during these generalization assessments. Similarly, Jude was taught to request *more*

crayons during FCT intervention, but requested *more chalk* during the generalization assessment.

It is difficult to hypothesize why this pattern of responding occurred, particularly considering that both challenging behavior and target communication received the same consequence during these sessions. One possible hypothesis for the difference between the two sessions falls under the theory of taking the edge off of the session. In other words, the 15 minutes of prior access to the toy reduced possible aversiveness of the generalization assessment or possibly served as a calming period that allowed the participant to access or cognitively plan the use of the newly-taught communication methods. The participants occassionally showed signs of not wanting to come work with the experimenter and anxiety about the assessment session. Additionally the participants may have been uninterested in the toy during sessions where they had no prior access to the toy. Specifically, some participants seemed disappointed with the new toy. It is important to keep in mind that the highest preferred toy was selected for FCT intervention and participants likely became accustomed to playing with this toy during sessions with the experimenter; therefore, changing the toys may have been upsetting to the participants. However, when they were allowed 15 minutes of access to the toy, this appeared to act as a calming experience and/or allowed them to explore the toy as a reminder that it too was a preferred item, which then allowed them to possibly think clearly and remember the target communication

that had previously been taught. Another similar hypothesis for this pattern of responding could be related to the participant's learning history. For instance, the participants had a long history of using challenging behavior to gain access to preferred toys. When generalization probes were conducted without prior access to the toy, leading to possible anxiety and frustration, the participants tended to rely on the behavior that had the longer history of being effective at gaining access to the toy, the challenging behavior. However, after the 15 minute calming effect of access to the toy, the participant no longer relied on the learning history for response allocation, but the cognitive ability to remember the intervention sessions targeting appropriate communication, thereby selecting the appropriate communication as the method of gaining access to the toy.

Assessment of Generalization to New Setting with Motivating Operation Manipulation

Prior Access Improved Generalization

Two patterns arose in generalization to a new setting, with the original toy and person. First, Carson and Jude demonstrated an improved response in generalization sessions that were conducted after 15 minutes of access to the toy. Although challenging behavior was undifferentiated between the two conditions, independent communication was higher in sessions that were conducted after 15 minutes prior access. Similar theories previously explained could account for this difference. First, the pre-session access period acted to reduce the aversiveness of

assessments which may have led to an easier recollection of newly-aquired skills. Second, the lack of pre-session access may have caused the toy removal the beginning of the generalization probe to be highly aversive, and in such an aversive situation, the participant immediately relied on the behavior with a longer history or reinforcement, the challenging behavior. The aversiveness of the generalization probe procedure of removing the toy after 10 seconds of access may have been reduced after the participant had 15 minutes prior access to the toy.

Additionally, both participants appeared somewhat confused during generalization to new settings, possibly because of the length of time the experimenter had been working in the same room for FCT intervention. Therefore, it could be that participants were confused and unsure how to respond in sessions immediately conducted without prior access to the toy. On the other hand, 15 minutes of prior access to the toy could have again acted to take the edge off, or create a level of comfort and interest in the toy in this new setting, that allowed them to utilize the newly taught communication.

No Difference Between Conditions of Generalization Assessment

The second pattern that arose was an undifferentiated pattern. Kyan and Mason showed no distinct differences between conditions. Additionally, both sets of data show generalization of the newly taught communication skill. This is noteworthy because it is common for individuals with cognitive disabilities to

have difficulty with generalization (Westling & Fox, 2004). There is no obvious explanation as to why Kyan and Mason were able to generalize to a setting without specific programming to promote generalization. It is possible that having similar stimuli from training, specifically the researcher and the toy, provided enough cues to promote generalization. In fact, the use of sufficient stimulus exemplars is a common practice to promote generalization (Duker, et al., 2004).

Mason's data show a slightly different pattern than Kyan's. In fact, Mason's challenging behavior dropped immediately after intervention, but rose again in the fourth session. Similarly, communication increased immediately after intervention, but decreased again in the fourth session. As previously discussed, this provides more evidence of the hypothesis that Mason satiated over time to this toy. In other words, it is possible that this pattern of responses suggested that after the fourth session, Mason was no longer motivated to communicate for his toy. As previously mentioned, he also appeared to be engaging in challenging behavior in order to escape the work area as he literally tried to move the research so that he could get away from the table, causing him to pinch and scratch. Furthermore, he often threw the toy once he was provided access to the toy, suggesting that he was satiated with that toy. It could be assumed that he showed an interest in the toy during the first three sessions due to the fact that it was new to this setting, but then quickly grew tired of it again as he most likely did in the original intervention setting.

Assessment of Generalization to New Toy and Setting with Motivating Operation Manipulation

Prior Access Improved Generalization

Three patterns of responding occurred in assessment of generalization to a new toy and setting, with the original person. First, Mason showed improved generalization in sessions conducted after 15 minutes of access to the toy. While challenging behavior decreased almost entirely in sessions conducted post intervention, communication was improved during sessions conducted after 15 minutes of access. Again, a hypothesis for this pattern is that the 15 minutes of access to the DVD player acts to take the edge off of the assessment and allow Mason to think more clearly about how to get access to his toy using appropriate communication. It was observed that during sessions that occurred with no prior access to the DVD player, Mason appeared somewhat anxious when the DVD player was taken away. He would often first reach for it before using his SGD to request more. On the other hand, after 15 minutes of access, taking away the DVD player rarely caused any signs of anxiety nor did Mason reach for the toy, instead he quickly reached for SGD to request more toy; therefore, causing a slightly higher level of independent communication in these sessions.

No Difference Between Conditions of Generalization Assessment

Generalization Occurred

A second pattern of responding occurred with Jude and Kyan. Both Jude and Kyan showed no difference in responding among the two conditions. However, both participants demonstrated generalization although it was not specifically planned for using methods traditionally thought to improve generalization. While it seems that no specific method for addressing generalization had been provided, this may only be true for Kyan. Due to the fact that Jude reached criteria for ending FCT earlier than anticipated, but FCT continued in order to identify a trend in responding, Jude may have unexpectedly benefited from overtraining, a common method of programming for generalization (Duker, et al., 2004). Additionally, the researcher may have acted as a common stimulus between intervention and generalization assessment for both participants, which could have unintentionally increased the likelihood of generalization (Duker, et al.).

Generalization Did Not Occur

A third pattern of responding occurred with Carson. Similar to Jude and Kyan, he showed no difference among the two conditions; however, Carson did not show generalization of the newly taught communication skill in either session after intervention. It is unclear as to why these two patterns exist with some participants naturally generalizing the new skill and others not. One possible

hypothesis is that the similarity between the toys utilized in intervention and generalization sessions for Jude and Kyan helped to promote generalization, while Carson's toys were not quite so similar. In fact, both toys for Jude were art materials (crayons and markers), and both toys for Kyan were objects with numbers (timer and hand-held tally counter). However, Carson's intervention toy was a video game, and his generalization toy was a music toy. It is possible that this could explain the fact that Carson did not demonstrate generalization, unlike Jude and Kyan.

Assessment of Generalization to New Toy, with New Person, and in New Setting with Motivating Operation Manipulation

Prior Access Improved Generalization

Four patterns of responding appeared during generalization to a new toy, in a new setting, and with a new person. First, Jude's generalization was improved during sessions conducted after 15 minutes of access. Again, it is important that Jude performed not only stimulus generalization, but also response generalization in that he had to request *more markers*. This can be explained as previous generalization assessments with similar findings, in that the 15 minutes of access served as a calming period allowing him to utilize his newly acquired skills.

No Prior Access Improved Generalization

Kyan showed improved generalization in sessions that were conducted with no prior access to the toy. This is the only generalization assessment with

this pattern. One hypothesis for this pattern is that Kyan satiated to the watch over time and simply had no interest in the watch after 15 minutes of access and therefore was no longer motivated to request the watch. This is likely as his challenging behavior remained low post intervention regardless of the condition as well. It was observed during the sessions that Kyan often reached criteria of satiation as defined in the second phase of the study (i.e., removing physical contact with the toy for longer than 30 seconds). If it Kyan reached satiation, it would be assumed that he no longer had interest in the watch; therefore he used neither challenging behavior nor communication to attempt to gain access to the watch. It is also noteworthy that Kyan had the shortest mean latency to satiation with his highest preferred toy (15 minutes); therefore, it would be likely for Kyan to satiate on a less preferred toy within the 15 minute access period.

No Difference Between Conditions of Generalization Assessment

Generalization Occurred

Mason, on the other hand, showed an undifferentiated pattern of responding, but showing generalization in both conditions. Again, this is an unexpected occurrence for an individual with cognitive disabilities to demonstrate generalization without prior programming (Westling & Fox, 2004). However, it is quite possible again that a common stimulus among intervention and generalization promoted generalization (Duker, et al., 2004). Although this particular generalization assessment utilized a new toy, setting, and person, the

research was a common stimulus because she was present in order to coach Mason's nanny through the assessments.

Generalization Did Not Occur

On the other hand, Carson's results had an undifferentiated pattern of responding, but he did not demonstrate generalization in either condition. It should be noted that only one data point was collected for each data point post intervention.

Implementer and Coaching Differences

It is important to note that the experimenter who provided FCT intervention was present during both Mason and Jude's generalization probes in order to coach the caregiver. Because the person conducting Kyan and Carson's generalization assessment was a highly trained doctoral student, the experimenter was not present and providing coaching during their assessments, which may explain the different patterns of results. Specifically, the experimenter could have served as a common stimulus across the generalization settings that unintentionally programmed for generalization for Jude and Mason.

Unexpected Generalization

A noteworthy result of this study is that several generalization assessments resulted in generalization regardless of the pre-session condition implemented. While this was unexpected, due to the fact that programming for generalization was not systematically implemented, this could have occurred without intention.

For example, one commonly used method for programming for generalization, using natural contingencies, may have occurred (Heward, 1987a). For example, it is possible that because of the nature of the request is a commonly understood request for the particular reinforcer, that it was likely to be generalized. Additionally, due to the general nature of the request for more, it is likely that it was being targeted in the classroom as well, which would have been an application of teaching enough examples (Heward, 1987a). Last, as previously mentioned, Jude may have experienced overtraining during FCT as well (Heward, 1987a). Without these unintended programs for generalization, it is quite possible that the effects of pre-session access to the toy would have been more distinct for many participants.

Application

Half of the participants benefited from the 15 minutes of prior access to the toy prior to functional communication training. Only one participant did not benefit from this pre-session. Additionally, half of assessments of generalization demonstrated improved generalization in sessions conducted after 15 minutes of access to the toy. Another 31% of the assessments show no difference between conditions, yet participants demonstrated generalization. On the other hand, 13% of the assessments showed no generalization of the newly taught skill, regardless of the pre-session condition. This suggest, that prior access to the toy will most likely improve or at least have no negative effect on intervention or generalization

responding. In fact, only one FCT intervention session and one generalization assessment resulted in improved generalization when no prior access to the toy was provided.

The results of this study suggest that providing prior access to a toy prior to either intervention or generalization assessment will likely improve the anticipated results. It seems that this prior access often provides a calming effect allowing individuals to benefit from instruction or draw from newly acquired skills. While it can only be hypothesized as to why this phenomenon occurs, it could be that when individuals do not have prior access to the toy, entering intervention or assessment can be anxiety-inducing. For instance, often participants were taken away from their typical routines to work with the experimenter, which could naturally cause anxiety. During high-anxiety moments, it would be natural for the student to be less responsive to intervention, unlikely to use newly taught behaviors, or resort to behaviors that have a long history of success of gaining access to desired toys (i.e., challenging behavior). While some participants did not engage in the target challenging behavior, they demonstrated other behaviors symptomatic of anxiety, such as stumbling over words, reaching for the toy, and showing facial expressions of frustration that could have prevented them from clearly focusing on instruction during FCT or utilizing newly-acquired appropriate method of re-gaining access to the toy during generalization assessments.

Therefore, it may be suggested that standard practice should involve prior access to the toy prior to intervention and generalization assessment, seeing as it is likely to be either beneficial or have no effect. However, it may be beneficial to teachers to create schedules that would naturally provide prior access to the toy, rather than simply replacing 15 minutes of instruction with pre-session access.

Limitations

Although the results of this study seem valuable to planning FCT intervention and programming for generalization, they should be interpreted with caution due to some limitations of the study. First, this study only addressed behaviors with a tangible function. Therefore, it is impossible to determine if similar results would occur with behaviors that serve a different function.

Second, some individuals may have challenging behaviors that serve a tangible function, but would be unethical to target with this procedure. For example, many individuals use challenging behavior to gain access to food, but it may be unsafe to allow 15 minute of free access to food, and then continue to use food as a reinforcer in intervention and generalization assessment. Additionally, some practitioners or caregivers may not want to allow an individual 15 minutes of free access to the tangible. All participants in this study preferred toys that were either atypical, or used in an atypical fashion. For example, Jude's preferred toy was crayons, but he used the crayons to repeatedly draw the cover of his favorite movie. Additionally, Mason's preferred toy was a potato head, which he

used to spin on the table top. Some practitioners or caregivers may oppose allowing an individual to utilize their preferred toys in an idiosyncratic or non-functional manner.

Third, it is impossible to determine why prior access to the toy seemed to be beneficial in most, but not all cases. This is problematic because it is impossible to hypothesize who will benefit from this procedure without being able to determine why the differences exist.

Future Research

Several lines of future research are in order. First, it is necessary to identify a systematic method of determining the length of time that prior-access will be beneficial to an individual. In other words, the 15-minutes of access used in this study was an arbitrary selection, and efforts should be made to individualize this time selection. For example, Kyan had the shortest average satiation and also showed the least benefit from the 15 minutes of prior access for both FCT intervention and generalization assessments, quite possibly from satiation during the 15 minute access period. One possibility is to create a method for identifying this time based upon the latency to satiation during the second phase of the study. For example, perhaps half of the average latency to satiation is the most effective amount of pre-session access time. Future research should examine the differences among pre-session access times in order to identify a systematic method for identification of the most beneficial durations of access.

A second line of research should further identify the duration of the effects of the pre-session access. While pre-session access proved helpful for many of the assessments, it was not determined how long this positive effect would last. In other words, it is unknown if the 15-minute pre-session toy access improved intervention and generalization beyond the 5 minute intervention or assessment session. This is an important piece of information for practitioners. Naturally, the pre-session access should have a long-lasting effect to justify providing 15 minutes of access. In other words, without a long lasting effect, it may not be worthwhile to allow a student 15 minutes of access to the toy. Therefore, future studies should assess the effects of pre-session access over a longer duration.

A third line of research should attempt to further uncover why some assessment resulted in improved responding after 15 minutes of access, yet others showed either no response, or occasionally poorer results. This could be done by systematically collecting data on some behaviors that were observed in this study, for example increased agitation with prolonged toy play that was observed with Mason, signs of anxiety often seen in sessions conducted with no prior access to the toy, and satiation of the toy during the 15 minute access period.

A fourth line of research would expand this concept beyond behaviors that are maintained by access to tangibles. This should be replicated with participants whose challenging behaviors are maintained by access to attention or escape from demands.

Summary

In summary, this multi-phase study served to identify the function of challenging behavior among four participants. It was verified that no prior access to the toy served as an establishing operation for challenging behavior. Additionally, two pre-session conditions of no access and 15 minutes of access were implemented and it was concluded that these sessions can have a positive effect on intervention, but more than one pattern resulted among participants. Finally, the generalization assessment suggested that prior access to the toy will most likely improve or have no effect on generalization; therefore, making it a plausible consideration for improving generalization among individuals with developmental disabilities. More research is needed to continue to replicate these results and begin to understand the properties causing such effects. It is necessary to expand this research to begin to understand the most effective methods for determining specific amounts of pre-session access time as well as individuals that are most likely to benefit from these procedures. This should prove to create a method that is easy to implement to improve intervention and generalization among individuals with developmental disabilities.

APPENDIX A

Functional Analysis Data Collection Sheet

Participant Name: _____ Time & Date:_____

Condition: _____ Pre-Session: _____

Primary Coder: _____ Secondary Coder: _____

Minutes

	1	2	3	4	5
10	CB	CB	CB	CB	CB
20	CB	CB	CB	CB	CB
30	CB	CB	CB	CB	CB
40	CB	CB	CB	CB	CB
50	CB	CB	CB	CB	CB
60	CB	CB	CB	CB	CB

Directions: Circle CB if the challenging behavior occurred during the interval.

CB: Challenging Behavior Definition:

APPENDIX B

FCT Data Collection Sheet

Participant Name: _____ Time & Date:_____

Condition: _____ Pre-Session: _____

Primary Coder: _____ Secondary Coder: _____

	Minutes				
	1	2	3	4	5
10	CB Pro. Comm. Ind. Comm.	CB Pro. Comm. Ind. Comm.	CB Pro. Comm. Ind. Comm.	CB Pro. Comm. Ind. Comm.	CB Pro. Comm. Ind. Comm.
20	CB Pro. Comm. Ind. Comm.	CB Pro. Comm. Ind. Comm.	CB Pro. Comm. Ind. Comm.	CB Pro. Comm. Ind. Comm.	CB Pro. Comm. Ind. Comm.
30	CB Pro. Comm. Ind. Comm.	CB Pro. Comm. Ind. Comm.	CB Pro. Comm. Ind. Comm.	CB Pro. Comm. Ind. Comm.	CB Pro. Comm. Ind. Comm.
40	CB Pro. Comm. Ind. Comm.	CB Pro. Comm. Ind. Comm.	CB Pro. Comm. Ind. Comm.	CB Pro. Comm. Ind. Comm.	CB Pro. Comm. Ind. Comm.
50	CB Pro. Comm. Ind. Comm.	CB Pro. Comm. Ind. Comm.	CB Pro. Comm. Ind. Comm.	CB Pro. Comm. Ind. Comm.	CB Pro. Comm. Ind. Comm.
60	CB Pro. Comm. Ind. Comm.	CB Pro. Comm. Ind. Comm.	CB Pro. Comm. Ind. Comm.	CB Pro. Comm. Ind. Comm.	CB Pro. Comm. Ind. Comm.

Directions: Circle which occurred during interval.

CB: Challenging Behavior Definition:
Pro. Comm.: Prompted Communication Definition:
Ind. Comm.: Independent Communication Definition:

APPENDIX C

Generalization Data Collection Sheet

Participant Name: _____ Time & Date:_____

Condition: _____ Pre-Session: _____

Primary Coder: _____ Secondary Coder: _____

	Minutes				
	1	2	3	4	5
10	CB SG RG	CB SG RG	CB SG RG	CB SG RG	CB SG RG
20	CB SG RG	CB SG RG	CB SG RG	CB SG RG	CB SG RG
30	CB SG RG	CB SG RG	CB SG RG	CB SG RG	CB SG RG
40	CB SG RG	CB SG RG	CB SG RG	CB SG RG	CB SG RG
50	CB SG RG	CB SG RG	CB SG RG	CB SG RG	CB SG RG
60	CB SG RG	CB SG RG	CB SG RG	CB SG RG	CB SG RG

Directions: Circle which occurred during interval.

CB: Challenging Behavior Definition:
SG.: Stimulus Generalization Definition: (this includes saying “more” but wrong toy name for Carson and Jude)
RG.: Response Generalization Definition: (only applicable for Carson and Jude).

APPENDIX D

Treatment Fidelity Data Collection Sheet

Participant Name: _____Time & Date:_____

Phase (Including Pre-Session if applicable): _____

Coder: _____

	Minutes				
	1	2	3	4	5
10					
20					
30					
40					
50					
60					

Directions: Place "+" in interval in the whole interval was completed according to condition-specific guidelines. See guidelines for each phase below.

Guidelines:

FA Demand:

1. Experimenter provides continuous instruction using least-to-most prompt hierarchy.
2. Experimenter delivers praise upon completion of task regardless of prompt.
3. Therapist does not verbally interact with participant other than for praise for task completion.
4. Task is removed contingent upon target behavior.
5. Experimenter re-introduces the task following 10 seconds of no target behavior demonstrated by the participant.
6. Experimenter ignores all other behavior.

FA Tangible:

1. Experimenter presents tangible for 10 seconds at the beginning of condition.
2. Experimenter removes items after 10 seconds of access, leaving the item visible, but out of reach.
3. Experimenter returns the toy contingent upon target behavior, allowing participant 10 seconds of access to the item before removing it again.
4. Experimenter ignores all other behavior, provides no interaction with the participant other than returning the item contingent upon target behavior, and blocks any attempt to reach the item.

FA Attention:

1. Experimenter instructs the participant to play at the beginning of the condition.
2. Experimenter provides brief attention in the form of concern/reprimand and physical contact contingent upon the participant's demonstration of the target behavior.
3. Experimenter ignores all other behaviors.

FA Play:

1. Experimenter directs participant towards preferred toys.
2. Experimenter responds to all of participant's appropriate behaviors.
3. Experimenter delivers attention to the participant approximately every 10 seconds.
4. Experimenter engages in developmentally-appropriate play with the participant.

FCT Baseline Probes

1. The SGD is within arm's reach from the participant, if applicable.
2. Experimenter presents the participant's toy and allowed him to interact with that toy for 10 seconds, then withdraws the toy.
3. Contingent upon target communicative behavior or challenging behavior, the toy will be returned for 10 seconds.

FCT Intervention

1. The SGD is within arm's reach from the participant, if applicable.
2. Experimenter presents the participant's toy and allowed him to interact with that toy for 10 seconds, then withdraws the toy.
3. Immediately after withdrawing the toy, the experimenter prompts the participant to request the toy using progressive time delay.
    a. First prompt has 0-second delay.
    b. Increase delay by 2 seconds on every 3rd prompt.
    c. Errors (i.e., challenging behavior, inappropriate communication) prior to prompt are immediately corrected, and prompt delay is decreased for next trial.
4. Challenging behavior is ignored.

Generalization Probes

1. The SGD is within arm's reach from the participant, if applicable.
2. Experimenter presents the participant's toy and allowed him to interact with that toy for 10 seconds, then withdraws the toy.
3. Contingent upon target communicative behavior or challenging behavior, the toy will be returned for 10 seconds.
4. If participant uses stimulus generalization (i.e. says "more" or "more [other toy name]" correct him and give him the toy (only applicable for Jude and Carson).

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