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CASE REPORT: Effects of Functional Communication Training with and without Delays to Decrease Aberrant Behaviour in a Child with Autism Spectrum Disorder

Abstract

The purpose in this study was to implement functional communication training (FCT) in order to reduce tantrum and aggressive behaviours in a single child with autism spectrum disorder. Could one teach a child to communicate or request things and what would this do to their level of inappropriate behaviors? This investigation attempted to examine the efficacy of this procedure with a child diagnosed with autism spectrum disorder. The study was conducted in the child's home as well as in the Behavioural Assessment Lab at a local private university. The behaviors measured were the percentage of tantrum and aggressive behaviours and the number of mands (client requests). A functional analysis of aberrant behavior was conducted following which an ABABCDEFG reversal design was used to evaluate the outcomes of treatment evaluation. The functional analysis indicated that the participant's aberrant behaviours were maintained by tangible reinforcers. Therefore, our participant received something for his tantrums and aggression. Our results showed a reduction in the percentage of tantrum and aggressive behaviours, as well as an increase in participant requests via FCT. These requests can include verbal as well as non-verbal requests such as using a Picture Exchange Communication System or pointing to an object. The implementation of a delay in the FCT treatment package also revealed that with an increased time delay of reinforcement, increased levels of mands as well as decreased levels of aberrant behaviours were kept at a low level.

There is consensus among researchers and clinicians that the elimination of behaviour problems is an important first step to remediation (Carr & Durand, 1985). The application of functional communication training (FCT) includes an implementation of a communicative response that results in access to the reinforcer that has previously been paired with the problem behaviour the client is engaging (i.e., the problem behaviour is replaced with communication). In order to successfully choose a treatment package, the function of the behaviour must first be found via a functional analysis (Iwata, Dorsey, Slifer, Bauman, & Richman, 1994). For example, does the child act out to obtain something such as adult attention (tangible function), avoid or escape something such as washing the dishes, completing assignments, making ones bed, (escape function), or is the behaviour part of the syndrome (automatic function)? In the tangible function,

the child or client is provided access to a preferred item or activity when he or she engages in inappropriate (aberrant) behaviour. FCT is one of the many treatment packages that is based upon reinforcement, and its implementation is based directly on the results of the functional analysis (Iwata et al., 1994). Carr and Durand (1985) point out that in FCT the children are taught a skill that allows them to have an active role in the control of the delivery of reinforcement. The goal of FCT is to implement an appropriate alternative behaviour (i.e., a mand – requesting for things that are wanted) to replace the aberrant behaviours that were obtaining reinforcement.

Many different types of mands have been used in FCT, including picture or word cards (e.g., Lalli, Casey, & Kates, 1995), and asking verbally (e.g., Marcus & Vollmer, 1995). The functionality of reducing aberrant behaviours by replacing those behaviours with a mand has been questioned. However, Carr and Durand (1995) showed that if a stimulus that causes aberrant behaviours is replaced by a trained mand such as pointing to a picture, it should be functionally relevant for that specific child. The use of FCT in the reduction of aberrant behaviour has been successful in a large number of studies (e.g., Day, Horner, & O'Neill, 1994; Durand & Carr, 1991; Fisher, Piazza, Cataldo, Harrell, Jefferson, & Conner, 1993; Hagopian, Fisher, Sullivan, Acquisto, & LeBlanc, 1998; Kahng, Iwata, DeLeon, & Worsdell, 1997; Wacker et al., 1990).

The implementation of a delay in reinforcement within the procedure of FCT has rarely been formally been evaluated. For example, in a large-scale study of FCT outcomes conducted by Hagopian et al. (1998) it was shown that implementing a delay between a communication response and the delivery of positive reinforcement can be successful in reducing aberrant behaviors. This rationale for increasing this delay is that such delays are typical in the natural environment. In their study, the procedure led to a 90% decrease in aberrant behaviours with five of the 12 participants. In order to maintain the low levels of aberrant behaviours, implementation of punishment procedure in addition to the FCT training package was necessary. This increase was probably a function of the severity of their intellectual functioning.

Previous research has shown that the implementation of FCT was a suitable treatment option for a child who is tangibly maintained (Braithwaite & Richdale, 2006) The main purpose of this study was to study the effectiveness of FCT in a tangibly maintained child, while at the same time having the goal to reduce the level of their aberrant behaviours. By decreasing aberrant behaviours, the child would be able to increase his learning both in preschool and in the natural environment. Along with this, the child and his family might be able to function and enjoy each other without the difficulties related to high levels of aberrant behaviours.

Method

Participant and Settings

The participant in this two-part study was Johnny (pseudonym), a five-year-old male who attended Gonzaga University's preschool in the spring of 2012. Johnny's mother reported that he had been diagnosed with severe autism spectrum disorder (ASD). Johnny lived at home with his mother and father as well as three brothers ages 2, 7, and 10. According to his mother, Johnny engaged in aberrant behaviours that included aggression, tantrum behaviours, licking his lips, as well as refusing the name given to him. Due to the levels of Johnny's behaviours, it was important to decrease the behaviours, while increasing his functional communication skills.

Johnny was chosen for this study because he engaged in behaviours that caused difficulties in the home as well as in public places. Along with this, Johnny's aggressive behaviours had caused dangerous situations with his siblings such as throwing heavy toys at them.

The study was conducted in Johnny's home as well as in the Gonzaga University clinic (Derby, Weber, McLaughlin, Williams & Goris, 2002). Johnny and the clinician met once or twice per week. Typical meetings consisted of Johnny's mother and 2-year-old brother present. Occasionally, meetings would include the presence of Johnny's older brothers as well as his father. The first author was present at all times, and occasionally one or two other graduate students and a professor were present to assist during sessions.

The sessions were conducted either in the living room of Johnny's family home, or in the clinic room at Gonzaga University (Derby, Weber, McLaughlin, Williams, & Goris, 2002). Where the sessions were conducted depended on the schedule of Johnny's family, as well as the clinician.

Materials

In each of the different phases of the study, different materials were used. When the preference assessment was completed, the materials used included Oreos, a pig book, a puzzle, fruit snacks, a pig toy, coloring books, Rice Krispy treats® and Nutri-Grain bars®. The materials used during baseline included a laptop computer, a train set, Batman toys, plastic food, blocks, paper or white boards, and markers. During the treatment phase, additional materials needed included a Wii video game console, a stuffed animal pig, a card that read "my turn," as well as a timer. Other miscellaneous materials included data collection sheets during each phase, a video camera, pencils, a tripod, and a laptop computer.

Response Definitions and Measurement

There were three dependent variables measured in this study. The first dependent variable was aberrant behaviours that were described by Johnny's mother. Tantrums were recorded when Johnny engaged in screaming, crying, or arching of his back. On the data collection sheet this behaviour was designated with a "—." The second aberrant behaviour described was aggression. Aggressive behaviours were defined as any time Johnny attempted to hit, kick, bite, or throw an object at someone. If an attempt was blocked by the first author or Johnny's mother, the attempt was still considered an aggressive behaviour. On the data collection sheet these behaviours were designated with an "A." The final dependent variable was labelled as "mands." These consisted of appropriate touching of the card labelled "my turn" or a verbal statement (mand) of "my turn please" or "please." On the data collection sheet these behaviours were designated with an "M."

All sessions were videotaped to allow for scoring of the data to occur at a later time. Each session was 5 minutes in duration, and data were collected using a 6-second partial interval recording system. Any occurrence of the behaviours described above occurred during the interval, a mark was made using the corresponding symbol on the data collection sheet.

Experimental Design and Procedure

This study was conducted in two phases. A functional analysis was conducted which was followed by a treatment evaluation of communication. First an in-person interview was carried out with Johnny's mother in order to determine his problem behaviours to develop a hypothesis, as well as the wishes of the family. Such interview procedures have been described in detail elsewhere (Alberto & Troutman, 2010). Briefly one asks the child's caregiver(s) what seems to trigger the behaviour. What do you do when the aberrant behaviour takes place? How do other members of the family or classroom respond to the behaviour? This was followed by a functional analysis and function-based treatment.

Functional Analysis

A functional analysis based on the procedures of Iwata et/ al. (1982) using a multi-element design (Kazdin, 2011) was conducted in order to determine the function of Johnny's aberrant behaviours. This use of alternating treatments design removes order effects as well as providing a control condition to help determine which function or functions are in effect and the level of aberrant behaviours. The functional analysis consisted of five conditions, each one being run for 5-minute sessions. The first condition was known as free play. During the free play condition; Johnny was allowed access to any toy or activity as well as attention from the adults or siblings in the room. Aberrant behaviours were ignored, and no consequences were in place when they occurred. The free play condition was run in both the clinic as well as in the home. This was the control condition in the present case report.

The second condition was the escape condition. During this condition Johnny was prompted to complete a task such as cleaning up toys or writing letters. If Johnny did not comply after two verbal prompts, the first author used hand-

over-hand guidance in an attempt to complete the task. Contingent upon aberrant behaviour, Johnny was allowed a break from the task. After 15–20 seconds had elapsed, the prompt was re-presented.

The third condition was the "Johnny" condition. During this condition, Johnny was allowed access to any toys or activities as well as attention from adults and siblings present. Johnny's mother or the first author would talk to Johnny using the name "Johnny" consistently. Contingent upon aberrant behaviour, an activity or toy was presented to divert Johnny's attention, and if the name Johnny was not said for 20 seconds. This condition was added to the functional analysis because by his parent report and direct observation Johnny engaged in severe behaviour when called by his name.

The fourth condition was the tangible condition. During this condition, Johnny was allowed access to any toys or activities in the environment. The first author removed the toy or activity, stating "my turn." Any time that Johnny reached for or touched a toy this procedure was followed. Contingent upon aberrant behaviour, Johnny was given access to the toy or activity for 20 seconds.

The final condition was the attention condition. During this condition, Johnny was given access to any toy or activity, however the adults and siblings present in the room completely ignored him. Johnny's mother and the first author would engage in a conversation, turning their backs to Johnny. Contingent upon aberrant behaviour, attention was given to Johnny by the adults for 20 seconds. After 20 seconds, Johnny was instructed to "go play" and the conversation between the author and Johnny's mother resumed.

Intervention

The design employed in the treatment phases was an ABABCDEFG reversal design (Kazdin, 2011). This design was used in order to evaluate the outcomes of treatment evaluation developed from the functional analysis and parent interview.

Baseline (A). The tangible condition sessions of the functional analysis (Iwata et al., 1994) as described previously were used as baseline for the treatment package. This condition was in effect for seven sessions.

Functional communication training (FCT) (B). The treatment that was implemented following the functional analysis was completed was functional communication training (FCT). During FCT, Johnny was allowed access to any preferred toys or activities. The activity was then removed and the first author said "my turn." At this time, a card that read "my turn" was presented to Johnny. Contingent upon him touching the card appropriately, access to the toy or activity was given for 20–30 seconds. Contingent on aberrant behaviours, Johnny was removed from the toys and activity with which he was engaged. The card was presented again once no aberrant behaviours were seen for at least 5–10 seconds, with a prompt of "do you want a turn?"

BL (A). A return to baseline was conducted in order to show functional control within the treatment package. The procedure of the tangible condition of the functional analysis as previously described was used for the return to baseline.

Functional communication training + delay (FCT + delay) (C). During FCT + 15-second delay, Johnny was given access to any toy or activity; however a timer was implemented. The first author said, "OK it is my turn," and started a timer for 15 seconds. During this time it was the first author's turn. When the timer sounded, Johnny was asked "Do you want a turn?" In order to gain access to his turn, Johnny had to touch the "my turn" card appropriately. When the card was touched, a 30-second timer was started, signalling that it was Johnny's turn. When the timer sounded, Johnny had to give the toy or activity to the first author. If aberrant behaviour occurred, the author's turn was restarted.

Functional communication training + delay with stuffed animal (30 seconds) (D). During FCT + 30-second delay with the stuffed animal, when it was his turn Johnny was given access to markers, coloring book pages, and his favorite stuffed animal, a pig. The first author stated "OK my turn," and started a timer for 30 seconds. The pig was removed when it was

not Johnny's turn and placed in a basket on the table and he was required to wait. When the timer sounded Johnny was asked "Do you want a turn?" In order to gain access of the markers, paper, and a stuffed animal (pig), Johnny had to appropriately touch the "my turn" card. When he touched the card, a timer for one minute was started. If problem behaviour during the first author's turn, the timer was reset.

Functional communication training + delay without stuffed animal (30 seconds) (E). During FCT + 30-second delay without pig, the procedure described in the FCT + 30-second delay with pig was implemented. The difference in the sessions was that the markers and paper were still used, however the stuffed animal was not present. The stuffed animal was removed in the previous sessions because Johnny had non-contingent access during the day to the stuffed animal.

Functional communication training + delay (90 seconds) (F). During FCT + 90-second delay, the preferred activity used was playing a video game on the Wii. During these sessions, Johnny was given access to the Wii controller in order to play the game. When the 3-minute timer went off signaling the end of Johnny's turn, he was instructed to press pause and hand the controller to the first author. At this point, a timer set for 90 seconds was started. When the time ended, Johnny was asked, "Do you want a turn?" In order to gain access to the controller Johnny had to verbally ask for a turn in an appropriate manner saying "my turn please." When the verbal mand occurred, a timer for 3 minutes was started. Contingent upon problem behaviour, the timer for the first author's turn was restarted.

Functional communication training + delay (5 minutes) (G). During FCT + 5-minute delay, Johnny and his two older brothers, Isaac and Aaron (pseudonyms), took turns playing the Wii. When it was Johnny's turn, he was given the Wii controller, and complete control over the game. A timer was set for 2.5 minutes. When the timer sounded, Johnny was instructed to pause the game and give the controller to Aaron. A timer was set for 2.5 minutes for Aaron's turn. When Aaron's turn was up, he gave the controller to Isaac. A timer for 2.5 minutes was then set for Isaac's turn. When Isaac's turn conclud-

ed and the timer went off, Johnny was asked, "do you want a turn?" In order to gain access to the controller, Johnny had to verbally ask for a turn in an appropriate manner saying "my turn please." When the verbal request occurred, a 2.5-minute timer was set, and Johnny began his turn. Contingent upon problem behaviour, Isaac's or Aaron's timers were restarted.

Results

Functional Analysis

Results were collected and recorded for each phase in this study. The results of the functional analysis showed that Johnny's aberrant behaviours were maintained by tangible consequences. This is shown in Figure 1. The mean of tantrum behaviour during the tangible sessions was 20.5% with a range from 14%–26% and aggression was at a mean of 10.2% with a range of 0%–14%. The mean of tantrum behaviour during the free play sessions was 1% with a range of 0%–6%, and aggression was at a mean of 0.5% with a range of 0%–6%. The mean of tantrum behaviour during the attention sessions was 1% with a range of 0%–4%, and aggression was at a mean of 0.4% with a range of 0%–2%. The mean of tantrum behaviour during Johnny's sessions where he was allowed access to items was 0.7% with a range of 0%–6%, and aggression was at a mean of 0.7% with a range of 0%–2%. During the escape sessions tantrums occurred at a mean of 12% with a range of 0%–20% and aggression occurred at a mean of 4.7% with a range of 0%–14%. The high levels of aberrant behaviours during the tangible sessions of the functional analysis lead the focus of treatment based on tangible reinforcement of aberrant behaviours.

Treatment Outcomes for Aberrant Behaviours

The sessions of the tangible condition were used as baseline for the treatment. It was apparent that FCT as treatment showed a decrease in the aberrant behaviours, evaluation by replacing aberrant behaviours with mands (see Figure 2). During treatment, aggressive behaviour occurred at a mean of 2.2% and tantrum behaviour occurred at a mean of 3.9%. Mands
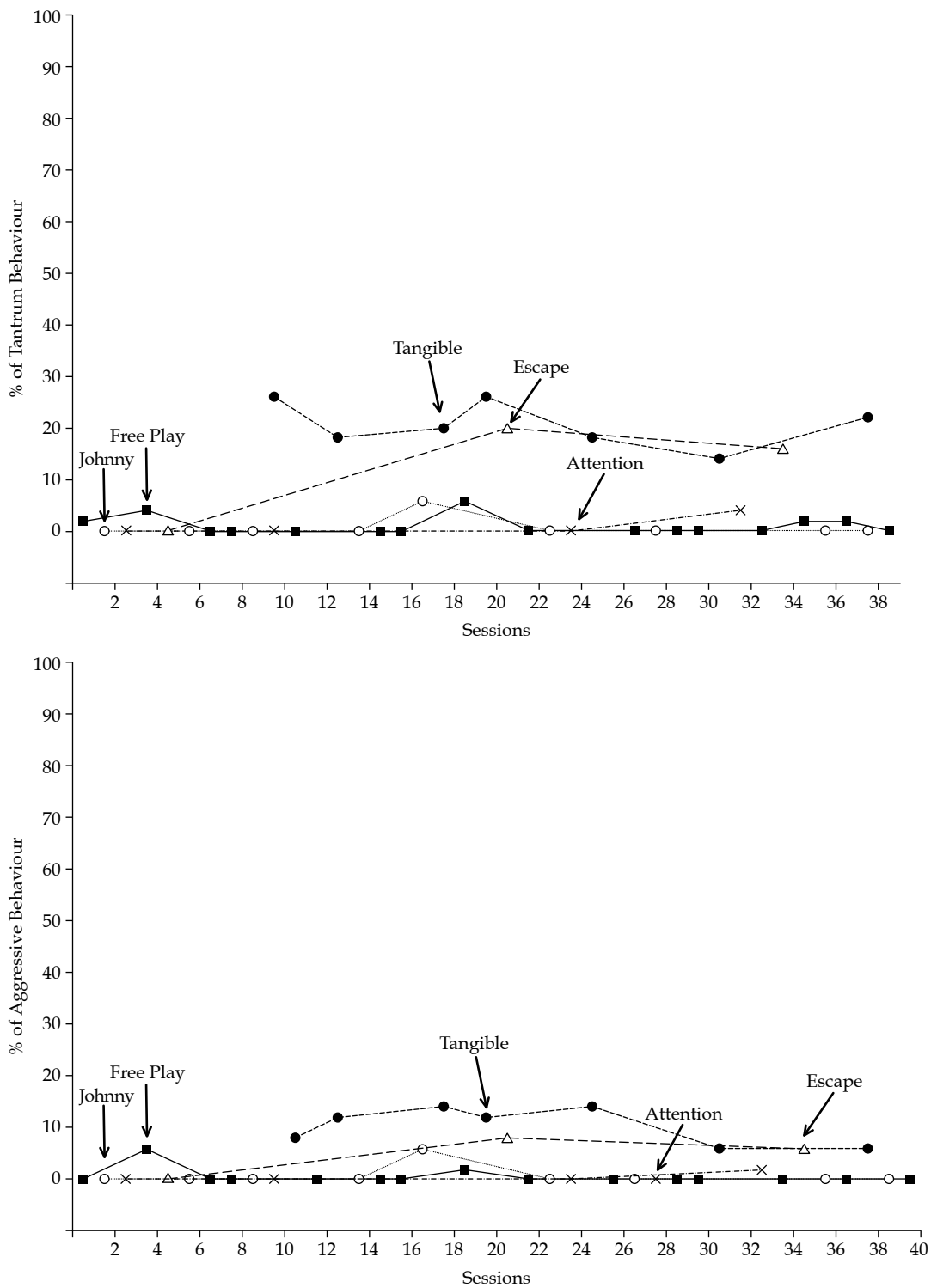
Figure 1. Percentage of 6-second intervals of tantrum behaviour (top panel) and aggressive behaviours for Johnny (bottom panel) during functional analysis

during FCT occurred at a mean of 14.8%. A return to baseline for one session produced tantrum behaviours at a mean of 18% and aggression at a mean of 22%. During FCT + 15-second delay tantrum and aggressive behaviours were at a mean of 0% and mands at a mean of 9.6%. During FCT + 30-second delay with the pig, results were tantrum behaviours at a mean of 28.7%, aggressive behaviours had an average of 1%, and mands at a mean of 3.2%. During FCT + 30-second tantrum and aggressive behaviours were at a mean of 0% and manding had a mean of 5.2%. During FCT + 90-second delay, verbal manding was required. The results for these sessions were tantrum and aggressive behaviours at a mean of 0% with mands at a mean of 2%. During the FCT + 5-minute delay, turn taking with Johnny's brother was implemented and zero aberrant behaviours were seen. Along with this, Johnny manded in an appropriate verbal way each time it was his turn. Results for baseline as well as the treatment packages can be seen in Figure 2.

The implementation of FCT as well as FCT + delay showed that Johnny acquired the appropriate mands as a replacement for aberrant behaviour. Although there were three instances of increases in aberrant behaviours, the overall aberrant behaviour decreased dramatically, while the appropriate manding behaviour on the part of our participant increased. The implementation of a delay showed that Johnny was capable of appropriately waiting for his turn with low levels of aberrant behaviour. However, when Johnny's stuffed animal was included as part of a turn, thus getting removed when his turn concluded, Johnny's aberrant behaviours spiked increased dramatically, and his functional communication in the form of mands decreased. The implementation of the delay continued to show that Johnny had increased his ability to appropriately communicate for a turn. Johnny was also able to adapt to the increase in delay, as well as the implementation of turn taking with his brothers. This shows a functionality of the treatment package to generalize into both the home and school settings. Also, it provides our participant a very functional skill.

This study correlates with previous studies (Lalli, Casey, & Kates, 1995; Marcus & Vollmer, 1995; Winborn, Wacker, Richman, Asmus, &

Geier, 2002) in that it shows the effectiveness of communication devices such as cards in decreasing aberrant behaviours. Along with this, it shows that an implementation of functional communication increased appropriate communication while decreasing aberrant behaviours. The implementation of FCT + delay shows that a turn-taking model can be used in conjunction with functional communication training to increase the time that Johnny must wait for his turn, while decreasing aberrant behaviours. The change from the use of a card as the functional communication to verbal communication shows that Johnny has been able to increase his functional communication not only through the use of a "my turn" card, but through the use of appropriate verbalizations. The second skill is highly functional in the natural environment.

There were several strengths and weaknesses of this study. The strengths included its ease of implementation both by the first author, as well as by Johnny's mother in the home. The return to baseline showed that the functional communication training was decreasing the levels of aberrant behaviours. Along with this, the implementation of the turn taking model with his brothers showed that it could be used as a strategy in the home, not only for Johnny, but for his brothers as well. The ease of parent training, as well as the ability to generalize across settings is also both strengths of this study. The weaknesses included a difficulty capturing behaviours, as well as the spike in the data when the stuffed was included as a part of the turn taking. When the stuffed animal was included, Johnny's behaviours increased dramatically, and it was extremely difficult to get him calmed down throughout the rest of that day in the laboratory. Finally, as with most behavioural research, the number of participants is small. In the present report we employed only one participant, so caution regarding our outcomes is urged. Also, completing such a functional analysis required the use of several adults. Those wishing to conduct functional analysis need to have access to several staff. Since this is sometimes difficult, many simply use the parent interview. However, the completion of the functional analysis can provide empirical evidence that may collaborate or not what was found in the interview. Finally, the reduction of the child's aberrant behaviour may have been a function of the time that was
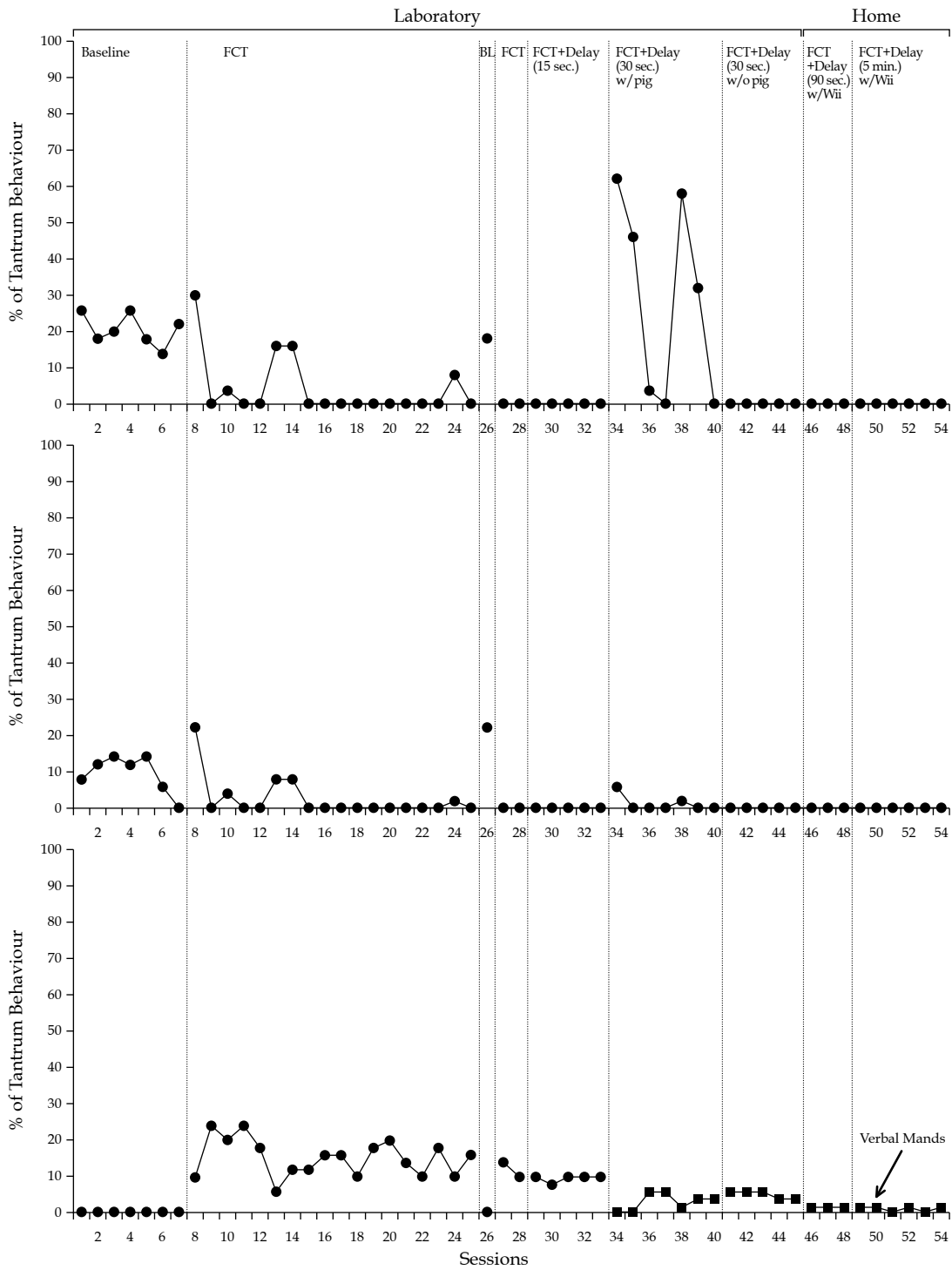
Figure 2. Percentage of 6-second intervals of tantrum behaviour (top), aggressive behaviour (middle), and mands (bottom) during baseline and treatment. Mands are shown as circles when card was used and squares for verbal mands.

allowed for such behaviour to take place. The increasing delay procedures may well have been a contributing factor in Johnny's reduction of aberrant behaviours. Additional research will have to occur to test this issue. In such a research project, one could control the amount of time that provided for aberrant behaviours to take place. This could be easily accomplished by comparing several amounts of time using a single case research design.

Key Messages From This Article

People with disabilities: There is a evidence based way to teach communication skills to these individuals and the is very likely to reduce their aberrant behaviours. This could make them more likely to be successful in the school as well as in a work place environment. Reductions in aberrant behaviour provide opportunities to learn new skills either social or academic.

Professionals: FCT provides professionals a data based way to assess their clients in a home, school, or work environment. It also provides a set of suggested causes as well as treatments for these behaviours. Finally, using FCT can be carried out with a single or multiple clients.

Policymakers: Policymakers can provide funds for training care providers to employ FCT procedures. This training can be on site or in a clinic type setting. Also, one taught in a clinical setting, instruction and implementation should take place in the settings where the child or client are found. Finally, one could legislate the use of Functional Behavioural Assessment when there is a change in student placement. This has occurred in the United States.

Acknowledgements

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