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## BRIEF (TEST-CONTROL) FUNCTIONAL ANALYSIS AND TREATMENT EVALUATION OF AGGRESSIVE BEHAVIOR EVOKED BY DIVIDED ATTENTION

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We measured the effects of divided attention on the aggressive behavior of a 20-year-old man within a test-control functional analysis (FA; Iwata, B. A., Duncan, B. A., Zarcone, J. R., Lerman, D. C., & Shore, B. A. (1994). A sequential, test-control methodology for conducting functional analyses of self-injurious behavior. *Behavior Modification*, 18, 289–306). The FA confirmed that divided attention was associated with high-frequency aggression and aggression-contingent attention from a familiar and preferred staff person. A subsequent treatment evaluation confirmed that aggression decreased when the man was able to request attention from the staff person under the divided attention condition. We discuss the clinical utility of a divided attention and test-control methodology when conducting a FA of serious problem behavior within applied settings Copyright © 2014 John Wiley & Sons, Ltd.

In the typical attention condition of a functional analysis (FA), an experimenter (a) engages in an activity, (b) ignores the participant, and (c) delivers attention when the participant displays problem behavior (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982, 1994). The purpose of this arrangement is to determine whether the problem behavior is attention-maintained compared with a control condition. Notably, the reinforcing effect of attention on problem behavior has been reported in numerous FA studies with children and adults who have intellectual and developmental disabilities (Iwata, Pace, *et al.*, 1994).

Some research has included a *divided attention* condition within a conventional FA (Fisher, Kuhn, & Thompson, 1998; Hagopian, Contrucci-Kuhn, Long, & Rush, 2005; Mace, Page, Ivancic, & O'Brien, 1986; St. Peter Pipkin, Vollmer, & Sloman, 2010). Divided attention is implemented by having the experimenter converse with another person (confederate) instead of engaging in an isolate activity. Fahmie, Iwata, Harper, and Querim (2013) proposed that as contrasted to the usual attention

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condition, divided attention may be more discriminative for the availability or unavailability of attention commonly encountered by clients. Therefore, a divided attention FA may have practical benefits within applied settings when environmental characteristics suggest divided attention as the primary controlling influence on problem behavior (Fahmie *et al.*, 2013; Mace *et al.*, 1986).

Another adaptation of FA methodology is the test-control analysis described by Iwata, Duncan, Zarcone, Lerman, and Shore (1994). With this approach, test and control conditions are evaluated as pairwise comparisons in a multi-element design. For problem behavior that is potentially attention-maintained, Iwata, Duncan, *et al.* (1994) proposed that an initial pairwise arrangement of attention test and control conditions may allow a practitioner to quickly identify behavior function and initiate intervention (p. 301). Similarly, Hanley (2012) advised that practitioners in applied settings should first conduct brief, indirect (interview), and descriptive (observation) assessments to derive a behavior hypothesis that later could be evaluated in a test-control FA. Apropos to intervening with high-risk problem behavior such as aggression and self-injury, the test-control methodology should lessen the time required to conduct FA and also reduce risk to participants and implementers.

The present study featured an FA of aggressive behavior in which a divided attention condition was included in a pairwise comparison with a man who had neurological impairment and developmental disabilities. The FA was based on descriptive assessment and was intended to rapidly assess divided attention effects on aggression followed by a function-based treatment evaluation. The study was also completed under natural conditions so that the FA and treatment evaluation captured the relevant controlling contingencies that were suggested through descriptive assessment. We note that the matter of conforming and adapting FA methods to the demands and constraints of applied settings is a central topic in applied behavior analytic research (Cipani & Schock, 2011; Hanley, 2011, 2012). In summary, the study (a) adds to the relatively sparse research literature concerning divided attention, (b) describes a practical adaptation of FA methodology, and (c) reports treatment outcome.

## METHOD

### Participant and Setting

John was a 20-year-old male who had cerebral palsy with right hemiparesis, global developmental delay, microcephaly, and seizure disorder. He communicated using single words, with poor intelligibility, and responded inconsistently to simple instructions and requests. John enjoyed social interactions with peers and adults,

particularly conversations and greetings. He was referred for assessment and treatment because he frequently displayed aggressive behavior in the form of slapping, grabbing, and biting.

John attended a residential school for children and youth with congenital and traumatic brain injury. The study was conducted in his classroom, which he shared with five other students, a primary teacher, and two to three teacher-assistants. FA and treatment sessions (described in the succeeding text) occurred at a table in a classroom location where John typically sat when receiving academic instruction.

## **Measurement**

The study had two dependent measures. *Aggression* was defined as John initiating physical contact with the experimenters through grabbing (closed fist on hair or clothing for more than 1 s), biting (placing open mouth against body), and hitting (striking with hands) during FA and treatment evaluation sessions. The second dependent measure was a *communication* response in which John independently grasped a staff photograph and placed it in the hand of an experimenter during treatment evaluation sessions. Using event recording, an observer scored frequency of aggression and the communication response. The FA and treatment evaluation sessions were two minutes in duration and were designed to simulate the average duration of instructional activities that required one or more teachers to be in close proximity to John.

## **Interobserver Agreement**

A second person recorded frequency of aggression and the communication response simultaneously but independently with the primary observer during 75% of FA sessions and 80% of treatment evaluation sessions. Interobserver agreement (IOA) was computed by dividing the smaller recorded frequency by the larger recorded frequency and dividing by 100. Average IOA for aggression was 99% (range, 97–100%) during FA sessions and 97% (range, 82–100%) during treatment evaluation sessions. For the communication response, IOA was 100%.

## **Experimental Design and Procedures**

Within the FA, we alternated a divided attention condition and a control condition in a nonrandomized sequence (test, control, test, and so on). The treatment evaluation conformed to an A-B-A-B withdrawal design in which the initial baseline phase represented the divided attention condition of the FA.

### *Descriptive Assessment*

Preceding the FA, the senior author observed John interacting with classroom staff during several 10–20 min sessions. A partial-interval recording form was constructed to document six possible antecedent events that were associated with John displaying aggressive behavior: (a) unfamiliar staff in close proximity to John while either presenting or not presenting instructional demands; (b) familiar staff in close proximity to John and either presenting or not presenting task demands; and (c) both unfamiliar and familiar staff in close proximity to John while either presenting or not presenting task demands. The observer also recorded the consequences of John's aggressive behavior as either (a) unfamiliar and familiar staff moving away or (b) unfamiliar staff moving away and being replaced by familiar staff. The interval-recording results revealed that John demonstrated aggression during 93.3% of intervals when both unfamiliar and familiar staff was within arms' reach of one another independent of instructional demands. During 60% of intervals, a familiar staff replaced unfamiliar staff contingent on aggression. Accordingly, we hypothesized that aggressive behavior was evoked when unfamiliar and familiar staff interacted in close proximity to John and he had to share attention. Furthermore, it appeared that aggressive behavior was reinforced when familiar staff immediately replaced unfamiliar staff.

### *Preference Assessment*

Based on a paired stimulus, choice assessment similar to Fisher *et al.* (1992), we evaluated John's preference for six staff that he interacted with regularly at school. Photographs of these six staff were taken and placed on 6 in × 8 in cards. Preference assessment sessions consisted of an experimenter presenting the staff photographs to John in randomly selected pairs and asking him to 'pick one.' A preference choice was recorded when John either (a) stated the staff person's name, (b) pointed and made contact with one of the photographs, or (c) placed his hand over one of the photographs for at least 3 s. Following the first preference assessment, we conducted a second session with the two most frequently selected staff photographs and two photographs of staff that were unfamiliar to John. In both preference assessment sessions, John selected a familiar staff person, Tammy, most frequently. Accordingly, Tammy assumed the role of the familiar and preferred staff in the FA and treatment evaluation sessions.

### *Functional Analysis*

Based on the results of the descriptive and preference assessments, we designed an FA that included control and divided attention conditions across eight sessions. During the control condition, John had unlimited access to an activity, whereas Tammy delivered 10 s of enthusiastic vocal attention every 20 s (e.g., 'John, it is good to see you

today!'). An unfamiliar staff person in the role of confederate stood just inside John's arm reach and made a neutral comment to Tammy every 30 s. If John displayed aggression toward either person, they blocked the behavior without comment or further reaction. The divided attention condition was similar to the control condition with two exceptions. First, after 30 s elapsed from the start of the session the unfamiliar staff person stepped in-between Tammy and John while stating, 'I have to talk with Tammy for a moment.' Second, if John displayed aggression toward Tammy or the unfamiliar staff person, the unfamiliar staff person moved away and Tammy stated, 'Hey, don't hit, it is okay, I don't have to talk with him now.' Thirty seconds after moving away from Tammy and John, the unfamiliar staff person repeated these procedures and continued for the duration of the session.

### *Treatment Evaluation*

Before the treatment evaluation phase, the senior author conducted functional communication training sessions with John. During sessions, the trainer presented John with a picture of Tammy and stated, 'If you want Tammy, give me the card.' Implementing a three-step prompt hierarchy, the trainer first waited 10 s for John to respond, then modeled the communication response, waited 10 s again, and then physically guided John to grasp and hand him the photograph whenever he did not respond independently. Upon completing the photograph exchange successfully, Tammy gave John approximately 10 s of social attention as described previously.

Once John demonstrated three independent communication responses during functional communication training, we initiated the treatment evaluation under the divided attention condition of the FA but with differential reinforcement of alternative behavior in effect. That is, John had to independently initiate the communication response of handing Tammy's photograph to her or the confederate, at which time Tammy delivered approximately 10 s of social attention. If he exhibited aggression toward Tammy or the confederate, they block the behavior but did not comment to John. Following four treatment sessions, John was exposed to a single baseline session in which DRA was withdrawn and Tammy and the confederate reacted to aggression as in the divided attention condition of the FA. Five more treatment evaluation sessions with DRA were then conducted.

## **RESULTS**

Figure 1 shows the frequency of aggressive behavior that John displayed during FA and treatment evaluation sessions. These data revealed differentiated responding

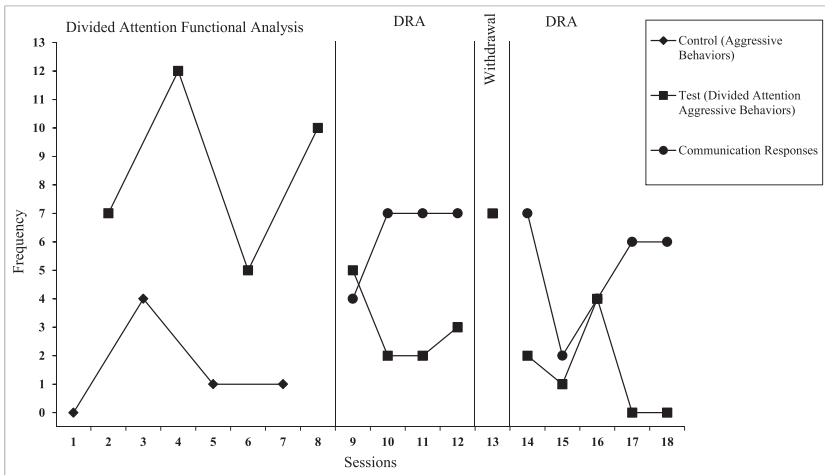


Figure 1. Frequency of aggressive behaviors during the divided attention functional analysis baseline phase, first treatment phase with differential reinforcement of the alternate (DRA) communication responses, Withdrawal phase and DRA reinstatement phase, and frequency of alternate communication responses during DRA phases.

with 0–4 aggressive behaviors in the control condition ( $M=1.5$ ) and 5–12 aggressive behaviors ( $M=8.5$ ) in the divided attention condition of the FA. In the first treatment phase with DRA, John had 2–5 aggressive behaviors per session ( $M=3.0$ ), which was a mean level decrease of 64.7% from the divided attention condition in the preceding FA. He initiated 4–7 communication responses ( $M=6.2$ ) during these sessions. There were seven aggressive behaviors recorded during the one-session withdrawal. When DRA was implemented, again John displayed 2–4 aggressive behaviors ( $M=1.4$ ) and 2–7 communication responses ( $M=5.0$ ) per session.

## DISCUSSION

The descriptive assessment conducted in this study suggested that the participant frequently displayed aggressive behavior when he was required to share attention in the presence of familiar and unfamiliar staff. This observation was followed by an assessment that was intended to confirm John's staff preferences before initiating the test-control FA. Specifically, the divided attention condition of the FA featured a familiar and preferred staff diverting her attention from John toward an unfamiliar staff. Contingent on aggression from John, the familiar and preferred staff returned her attention to him. The results of the FA supported the hypothesis that aggressive behavior was evoked by divided attention and maintained by access to attention

from the familiar and preferred staff. Accordingly, we conducted a brief treatment evaluation in which John was able to request attention from the familiar staff as an alternative to aggression. This communication-focused intervention was associated with self-initiated requests for staff attention and a corresponding decrease in aggressive behavior.

As noted previously, the basis of this study was to further explore the utility of a divided attention condition within an FA. We were also interested in applying a test-control FA methodology to accommodate the time and resource constraints that are common in applied settings (Hanley, 2012). Benefits notwithstanding, our FA did not compare the conventional attention condition with the divided attention condition (Fahmie *et al.*, 2013) nor did the test-control format include sequential pairwise comparisons of different test conditions (Iwata, Duncan, *et al.* 1994). Another limitation was the non-random order of the test-control conditions throughout the FA. However, from a clinical perspective, the FA results were compelling enough to confirm the effects of divided attention on aggression and formulate treatment accordingly.

As Hanley (2012) advised, our study had the divided attention condition of the FA as the baseline phase in the treatment evaluation. Throughout treatment sessions, John independently initiated the communication response that produced attention from the familiar and preferred staff. Simultaneously, his aggressive behavior decreased and did not occur during the final two treatment evaluation sessions. One caution when interpreting these results is the one-session treatment withdrawal phase. Although recognizing that a lengthier withdrawal phase may have demonstrated more conclusive experimental control, we deemed it necessary to curtail a more extended no-treatment analysis in order to reduce the risk of increased aggression. We also acknowledge that the treatment evaluation was brief albeit suggestive of an effective intervention that could be confidently extended with John during other activities in which he had to share attention among multiple staff.

In conclusion, our findings support a test-control methodology as an FA variant that can be conducted rapidly within an applied setting and with problem behavior such as aggression. It is possible that having a divided attention condition within such an FA may expedite the analysis of problem behavior that is hypothesized to be attention maintained. In particular, a divided attention condition may be useful when the traditional attention condition does not capture variables attendant to some applied settings such as a classroom setting where teachers typically interact with multiple students and other staff members. Future research should also explore how gender, learning history, type of communicative responding, and similar features of confederates influence the occurrence of problem behavior during the divided attention condition (Fahmie *et al.*, 2013).

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