EVALUATION OF THE DIVIDED ATTENTION CONDITION DURING FUNCTIONAL ANALYSES

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A common condition included in most functional analyses (FAs) is the attention condition, in which the therapist ignores the client by engaging in a solitary activity (antecedent event) but delivers attention to the client contingent on problem behavior (consequent event). The divided attention condition is similar, except that the antecedent event consists of the therapist conversing with an adult confederate. We compared the typical and divided attention conditions to determine whether behavior in general (Study 1) and problem behavior in particular (Study 2) were more sensitive to one of the test conditions. Results showed that the divided attention condition resulted in faster acquisition or more efficient FA results for 2 of 9 subjects, suggesting that the divided attention condition could be considered a preferred condition when resources are available.

Key words: functional analysis, problem behavior, attention condition

A functional analysis (FA) of problem behavior often includes a test condition for the effects of attention as a source of positive reinforcement (Hanley, Iwata, & McCord, 2003). In the typical attention condition, the experimenter or therapist ignores the client and engages in a solitary activity (e.g., reading a magazine) but delivers attention contingent on each instance of problem behavior (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994). Higher response rates in the attention condition than in a control condition (noncontingent attention) provide evidence that problem behavior is maintained by attention when it is withheld before but delivered after the occurrence of problem behavior. Mace, Page, Ivancic, and O’Brien (1986) described a procedural variation called the divided attention condition that is identical to the typical attention condition with one exception: Rather than engaging in a solitary activity, the therapist engaged in conversation with a second adult. Thus, the divided attention condition includes an additional antecedent manipulation—delivery of attention to another person—that may influence client behavior in several ways. First, the divided attention condition may be more discriminative for the availability of attention (discriminative stimulus, SD). That is, perhaps the ongoing delivery of attention to another is more highly correlated with the past delivery of attention for the client’s problem behavior. Alternatively, the

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divided attention condition may be discriminative for the unavailability of attention ($S^A$) if the delivery of attention to another had been correlated with the absence of attention for the client’s problem behavior in the past. Finally, observing an exchange of attention between two people may serve as a more potent establishing operation (EO). That is, simply observing social interaction may increase the reinforcing value of attention and occasion behavior maintained by attention.

If the divided attention condition serves as an $S^D$ or an EO for attention-maintained behavior, it is likely that faster or greater differentiation between responding in test and control conditions of an FA will be obtained, leading to a more efficient assessment. However, the opposite would be true if the divided attention condition served as an $S^A$ for attention-maintained behavior. Although Mace et al. (1986) were the first to describe the divided attention condition, results of their study showed that problem behavior was slightly lower in the divided attention condition than in the typical attention condition for both subjects. Additional studies (Fisher, Kuhn, & Thompson, 1998; Hagopian, Contrucci-Kuhn, Long, & Rush, 2005; Kahng, Hendrickson, & Vu, 2000; Mace et al., 2009; St. Peter Pipkin, Vollmer, & Sloman, 2010) have included both attention and divided attention conditions; however, when considered collectively, results of these studies were mixed. Three subjects in the Fisher et al. (1998), Mace et al. (2009), and St. Peter Pipkin et al. (2010) studies engaged in higher levels of problem behavior in the divided attention condition than in the attention condition, whereas two subjects in the Hagopian et al. (2005) and Kahng et al. (2000) studies engaged in similar levels of problem behavior across both attention conditions. It should be noted, however, that these studies were not designed to compare the attention and divided attention conditions; therefore, some contained features that limit the conclusions that can be made. For example, manipulation of only antecedent events (Mace et al., 2009), introduction of one condition type following a series of exposures to a second condition type (Fisher et al.; Mace et al., 1986; St. Peter Pipkin et al.), and identification of a function other than attention (Kahng et al.) render comparisons tenuous, susceptible to sequence effects, and uninformative, respectively. Thus, although the divided attention condition has been used in several studies, its utility remains unknown.

As a variant of the typical attention condition, one might consider the divided attention condition as a supplementary test to be used if results of an initial FA are unclear. However, the divided attention condition is procedurally simple to implement, requiring only the presence of a confederate to serve as conversation partner for the therapist. In fact, the divided attention condition requires no additional staffing if the session observer plays the role of the confederate. Thus, the divided attention condition could be considered as an alternative to the typical attention condition during an initial FA. Thus, the purpose of the current studies was to determine the extent to which the divided attention condition facilitates or hinders responding maintained by attention relative to the typical attention condition. In Study 1, we determined whether responding in general was more likely to be acquired under typical or divided attention conditions. Although not the major focus of our investigation, relative sensitivity to the two conditions has relevance to the design of FAs in general. Study 1 also permitted a comparison of reinforcing effects while minimizing the number of cases in which problem behavior was exposed to multiple test conditions in Study 2 (see Rooker, Iwata, Harper, Fahmie, & Camp, 2011, as an example). In Study 2, we compared the effects of the typical and divided attention conditions during the course of FAs of problem behavior.

**STUDY 1: ACQUISITION OF BEHAVIOR UNDER ATTENTION CONDITIONS**

**Method**

**Subjects and setting.** Six individuals who attended a special education school participated.
All had been diagnosed with an intellectual disability, and none was either reported or observed to engage in problem behavior. Ann was a 17-year-old girl, Mike was an 18-year-old man, Sally was a 15-year-old girl, and Jen was a 6-year-old girl. Mark was an 8-year-old boy who had also been diagnosed with speech-language impairments, and Joe was a 10-year-old boy who had also been diagnosed with autism. Ann, Sally, and Jen initiated and reciprocated conversation with adults, whereas Mike and Joe primarily reciprocated but did not initiate conversation, and Mark had no expressive language. Experimenters engaged in varied social interactions with all subjects prior to the study. Thus, informal observation suggested that attention might be a reinforcer (i.e., subjects did not withdraw or display problem behavior during interactions with the experimenters).

Sessions were conducted in a room that contained tables, chairs, and materials necessary to conduct sessions (see below). All sessions lasted 5 min; three sessions were conducted per day, 3 to 5 days per week.

Task, response measurement, and reliability. An arbitrary task was selected as the target response for each subject. Target responses were designed to be simple, discrete behaviors that were novel to the subjects and were not likely to be encountered in their classrooms or homes. Jen’s target response was placing index cards into an empty box, Mark’s was placing poker chips into a bank, and all other subjects’ target response was touching a card located on the table.

Trained observers used handheld computers to record the frequency of target responses. A second observer independently observed a mean of 44% of sessions (range, 38% to 47% across subjects). Sessions were divided into 10-s intervals, and observers’ records were compared on an interval-by-interval basis. Agreement was calculated by dividing the smaller number of responses by the larger number of responses in each interval and averaging these fractions. Mean agreement was 97% (range, 88% to 100%) for Ann, 96% (range, 80% to 100%) for Mike, 100% for Mark, 97% (range, 87% to 100%) for Jen, 92% (range, 72% to 100%) for Sally, and 100% for Jon.

A nine-item paired-stimulus preference assessment (Fisher et al., 1992) was conducted to identify a low-preference (LP) leisure item to be used in subsequent sessions as an alternative activity. Prior to the assessment, the subject briefly sampled each item. During each assessment trial, the experimenter presented a pair of items, prompted the subject to select his or her favorite, and allowed the subject to engage with the selected item for 30 s. Trials continued until each item had been paired with every other item (36 trials). The item selected on the fewest number of trials was used as the LP item in subsequent sessions.

Trained observers recorded the item selected on each trial. Two observers collected data on 84% of trials across subjects. Observers’ records were compared on a trial-by-trial basis; trials with agreement (both observers indicated that the same item was selected) were divided by total trials, which yielded 98% agreement (range, 94% to 100% across all subjects).

Conditions and design. Three conditions were included in the comparison: attention, divided attention, and play. Before the experiment, but not during any subsequent sessions, the experimenter verbally prompted the subject to engage in the target response once (no consequences were delivered) to insure that he or she was able to engage in the target behavior. The LP leisure item and the materials necessary to complete the target response were freely available on a table in front of the subject in all conditions. The LP item was included in each condition to provide an alternative source of reinforcement to decrease the likelihood of target responding simply because it was the only activity available, as is commonly done in the attention condition of an FA.

During the attention condition, the experimenter sat at a table beside the subject and engaged in a solitary activity (reading a
magazine). Prior to the start of each session, the experimenter said, “I have some work to do; you can do whatever you want.” Contingent on each target response, the experimenter turned towards the subject and delivered 3 to 5 s of attention that was unrelated to the target response (e.g., “You seem to be having a good day!”).

During the divided attention condition, a confederate adult sat near the experimenter. Before the start of each session, the experimenter stated, “I have to talk to [confederate’s name]; you can do whatever you want.” The experimenter engaged in continuous conversation with the confederate, but stopped to deliver 3 to 5 s of attention to the subject contingent on each target response, as in the attention condition.

The play condition served as a control condition, during which the experimenter delivered continuous attention to the subject irrespective of the occurrence of target responses. That is, noncontingent attention was delivered in this condition.

A multielement design was used to assess the effects of each condition on the target behavior. Conditions were sequenced in the following fixed order: attention, divided attention, and play. A 5-min ignore period was conducted before each attention and divided attention session as a control for presession access to attention. Before each ignore period, the experimenter said, “I cannot talk to you for a bit,” moved at least 3 m away from the subject, and did not interact with him or her. The same experimenter conducted all sessions for a given subject but wore a different-colored shirt during each condition to facilitate discrimination of contingencies.

Results

Figure 1 shows results for all subjects. Rates of target responding were nearly equivalent in the attention and divided attention conditions for Ann (M = 2.3 and 2.1 responses per minute, respectively), Jen (M = 4.0 and 3.8), Mike (M = 1.4 and 2.4), and Mark (M = 2.1 and 2.7). By contrast, Sally’s responding was higher in the attention condition than in the divided attention condition (M = 6.4 and 2.5 responses per minute), whereas Joe’s responding occurred exclusively in the divided attention condition (M = 0.5). Responding in the control (play) condition was lower than in both types of attention conditions for all subjects.

STUDY 2: ATTENTION CONDITIONS IN AN FA OF PROBLEM BEHAVIOR

Results of Study 1 indicated that the programmed antecedents of only the divided attention condition resulted in acquisition of a simple response in one of six subjects; however, whether or not this occasional facilitative effect of the divided attention condition would be observed in the assessment of problem behavior during an FA was unknown. Thus, the purpose of Study 2 was to compare levels of problem behavior maintained by attention during the more typical and divided attention conditions of an FA.

Method

Subjects and setting. Selection of subjects for this study was based on results of their FAs. We routinely included both the attention and divided attention conditions in the FAs for all clients who had been referred for assessment of problem behavior other than stereotypy (which was unlikely to be maintained by attention). Subjects for the current study were the first three clients whose problem behavior was maintained by attention, all of whom attended a special education school. All subjects had been diagnosed with an intellectual disability and had been observed to engage in problem behavior. Ben was an 11-year-old boy with Dandy Walker syndrome and ADHD, Elijah was a 6-year-old boy with autism and speech-language impairments, and Paul was a 20-year-old man with speech-language impairments.

Sessions were conducted in a room at the school that contained a table, chairs, and
materials necessary to conduct the sessions (see below). All sessions lasted 10 min; three sessions were conducted per day, 3 to 5 days per week.

Response measurement and reliability. The primary dependent measure for the FAs was rate (Elijah) or percentage of 10-s intervals (Ben and Paul) of problem behavior. Elijah engaged in dangerous acts (climbing on furniture and touching electrical outlets). Ben and Paul engaged in aggression (hitting or kicking the experimenter, throwing objects at the experimenter, or pulling the experimenter’s hair). Interobserver agreement was assessed in the same manner as that described in Study 1 during 44% of sessions. Mean agreement for target responses was 96% (range, 82% to 100%) for Elijah, 95% (range, 85% to 100%) for Paul, and 96% (range, 87% to 100%) for Ben.

Preference assessment. A preference assessment identical to that described in Study 1 was conducted to identify two high-preference (HP) toys (selected on 75% or more trials), and two medium-preference (MP) toys (selected on 30% to 60% of trials). HP toys were used in the play condition, and MP toys were used in the attention and divided attention conditions of the FA. A trained observer recorded selection responses using paper and pencil. A second observer independently recorded selections on 60% of trials. Reliability was calculated in the same manner as that described in Study 1 and yielded 100% agreement for all subjects.

Functional analysis. Five conditions were included in the FA: ignore, attention, divided attention, play, and demand. The same experimenter conducted all sessions for a given subject.

Figure 1. Target responses per minute during the attention, divided attention, and play conditions of Study 1.
but wore a different-colored shirt in each condition to facilitate discrimination of the contingencies.

During the ignore condition, the experimenter did not interact with the subject and ignored all instances of problem behavior. During the attention condition, the experimenter engaged in a solitary activity (reading a magazine) and delivered 3 to 5 s of attention (statements of concern) contingent on each instance of problem behavior. During the divided attention condition, an adult confederate was in the room with the experimenter. The confederate and the experimenter engaged in continuous conversation unless the subject engaged in problem behavior, at which time the experimenter stopped conversing with the confederate and delivered 3 to 5 s of attention (as in the attention condition) to the subject. During the play condition, the experimenter delivered attention (positive statements) at least once every 15 s or whenever the subject initiated appropriate social interaction. Finally, during the demand condition, the experimenter delivered three-step (verbal, then model, then physical) prompts to engage in age-appropriate tasks (e.g., sorting blocks or drawing shapes), delivered praise for compliance, and terminated the task for 30 s contingent on each instance of problem behavior.

A multielement design was used to assess the function of problem behavior. Each condition was alternated in a fixed sequence across sessions: Ignore, attention, and play conditions were conducted on odd days; and ignore, divided attention, and demand conditions were conducted on even days. This sequence allowed subjects to start each day with a condition in which attention was withheld (ignore condition) followed by one of the attention conditions. A 2-min break separated each condition.

Results

Figure 2 shows results for all subjects. Responding in both the attention and the divided attention conditions was higher than in the play condition for all subjects, indicating that each subject’s problem behavior was maintained by attention. Ben engaged in similar levels of aggression in the attention and divided attention conditions ($M_s = 50\%$ and $59\%$ of intervals, respectively). Elijah engaged in slightly lower levels of dangerous acts in the attention condition than in the divided attention condition ($M_s = 3.2$ and $5.7$ responses per minute, respectively). Paul’s aggression emerged immediately in the divided attention condition; similar high levels of aggression eventually were observed in the
Results of Study 1 showed that the attention and divided attention conditions had similar reinforcing effects on the behavior of five subjects; a sixth subject acquired the target response only in the divided attention condition. Results of Study 2 showed that two subjects engaged in similar levels of problem behavior during both the attention and divided attention conditions, whereas a third subject’s problem behavior emerged more quickly during the divided attention condition. Taken together, these results suggest that the divided attention condition should be considered to be a viable alternative to the more typical attention condition in an FA, especially when maximum efficiency is desirable and an additional therapist is available.

It is important to note that data for only two of our nine subjects showed a beneficial effect of the divided attention condition. This was not surprising given that the typical (single-therapist) attention condition has been used successfully to identify attention-maintained problem behavior in hundreds of studies. Nevertheless, results indicate that the divided attention condition is a variant that may facilitate responding in some cases. Although the learning histories of our subjects were unknown, it appears that the antecedent event of attention being delivered to another served as either a more salient SD or a more effective EO for attention-maintained behavior for these two subjects.

Although our procedures were not intended to distinguish between SD and EO effects, Paul’s data (Study 2) were suggestive of the former. His problem behavior emerged immediately and at high levels in the divided attention condition; the same high levels of responding were observed eventually in the attention condition following repeated exposure. Given the similarity in responding across conditions in the terminal sessions, it is likely that the reinforcing effects of attention were equal (i.e., no differential EO effect). Thus, the difference in the initial onset of Paul’s behavior across conditions suggest that he may have had a more significant history of reinforcement for problem behavior under divided attention conditions prior to the study (i.e., enhanced SD effect).

It also is notable that the divided attention condition did not appear to function as an SD in any case. Although responding was consistently lower in the divided attention condition for one subject (Sally), her responding was maintained in both attention conditions. If the divided attention condition served as an SD, its effects were not sufficient to suppress behavior.

Several variables that were not examined in the current analysis may influence the effects of divided attention on behavior. For example, the relation of the confederate to the subject (e.g., peer vs. adult; Taylor, Sisson, McKelvey, & Trefelner, 1993), the form of confederate behavior (e.g., conversation vs. problem behavior; Kuhn, Hardesty, & Luczynski, 2009), or the number of confederates (O’Reilly, Lancioni, King, Lally, & Dhomhnaill, 2000) may alter the probability that behavior will occur in the divided attention condition. The current procedures provide a framework for assessing the influence of each of these variables on behavior maintained by attention.

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