

## **An Examination of the Effects of a Classroom Activity Schedule on Levels of Self-Injury and Engagement for a Child with Severe Autism**

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We examined the effects of an individualized schedule on levels of engagement and self-injury for a student with severe autism. We first conducted a series of functional analyses to identify contexts in which self-injury occurred in his classroom. Results of the functional analyses suggested that self-injury was associated with academic demands. Self-injury rarely occurred during the play and no interaction conditions (i.e., when the teacher was present but did not attend to him) of the functional analysis. Furthermore, when the functional analysis conditions were organized according to a specific schedule (no interaction–play–demand) self-injury did not occur. This schedule of activities was then evaluated within the context of his regular curriculum and produced substantial reductions in self-injury and increases in engagement. Positive results maintained for up to five months following the assessment. These findings seem to indicate that functional analysis methodologies might provide helpful information when developing individualized schedules for students who may not have the skills to comprehend and follow a schedule.

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**KEY WORDS:** Autism; challenging behavior; self-injury; functional analysis; individualized schedules; curriculum.

Challenging behaviors such as self-injury are common among children with autism and other severe disabilities (Horner, Carr, Strain, Todd, & Reed, 2002). Such behaviors can place the child at physical risk and can limit participation in educational and community activities (Sigafos, Arthur, & O'Reilly, 2003). These students typically require

intensive assessment and rigorous behavioral support plans to ameliorate such behaviors.

One strategy that has proven successful in reducing challenging behavior with this population has been the use of individualized and predictable routines (Mesibov, Browder, & Kirkland, 2002). Indeed, a core component of the TEACCH model of curriculum and instruction with children with autism involves the use of structured individualized schedules (Heflin & Simpson, 1998). Individualized schedules may act as a form of antecedent intervention to reduce challenging behavior as they may limit the impact of various setting events (e.g., stressful activities, unpredictable transitions) on such behaviors. Indeed, the use of schedules has been associated with increases in engagement, maintenance

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and generalization of responding, as well as reductions in challenging behavior (e.g., MacDuff, Krantz, & McClannahan, 1993; Lalli, Casey, Goh, & Merlino, 1994). One potential limitation of this strategy is that not all students will have the ability to understand and follow a schedule (Brown, 1991). With such students we may need to examine ways to determine an optimal schedule and then evaluate the effects of such schedules on various parameters of responding such as engagement and challenging behavior.

One technique that might help the clinician determine an optimal schedule could be the analogue functional analysis methodology (Iwata, Dorsey, Slifer, Bowman, & Richman, 1994). Analogue functional analysis is an assessment tool that has been used to determine environmental consequences maintaining challenging behavior. This assessment typically involves systematically and repeatedly exposing the child to four conditions (i.e., attention, demand, play, and alone). In addition to identifying maintaining contingencies, analogue analyses may also provide us with other important information such as those social situations when challenging behaviors *do not* occur (Iwata, Vollmer, & Zarcone, 1990).

For example, a child may self-injure when presented with a difficult task. This would indicate that the child is in some way frustrated with the task and self-injures to escape from the activity. However, the same child might not engage in self-injury during play activities. We get two sets of information from such results. First, we may wish to intervene directly with the demand situation by teaching the child alternative appropriate communication skills to escape the task and/or directly manipulate the task situation itself to make it less aversive for the child (e.g., reducing the task difficulty or time spent on such tasks). Second, as play activities do not evoke challenging behavior we may wish to schedule play activities judiciously within the curriculum. For example, we might precede and/or follow demanding activities with play activities rather than additional demand activities. By embedding activities that evoke challenging behavior within a schedule of activities that are not associated with challenging behavior we may reduce the probability of such behavior occurring during ongoing instruction (Carr, Newsom, & Binkoff, 1976).

In this study, we used the results of an analogue functional analysis to determine an individualized schedule for a child with severe autism who engaged in high rates of severe self-injury. We then assessed

the effects of this individualized schedule on levels of engagement and challenging behavior within the child's regular classroom activities. The schedule produced reductions in self-injury and increases in engagement supporting previous research on the effectiveness of individualized schedules with this population.

## METHOD

### Participant, Target Behaviors, and Setting

Brendan was a 12-year-old boy with autism and intellectual disabilities. He scored in the severely autistic range on the Childhood Autism Rating Scale (Schopler, Reichler, & Renner, 1988) and was functioning at a 2-year-old level on the daily living skills domain of the Vineland Adaptive Behavior Scales—Interview Edition (Sparrow, Balla, & Cicchetti, 1984). He did not speak. Brendan engaged in self-injury since he was a young child according to clinical reports. His self-injury consisted of forceful slaps (could be heard by the therapist) with the palm of an open hand to either side of the face or to the forehead. Informal observations prior to the study indicated that self-injury occurred daily with episodes lasting anywhere from several minutes to several hours. Brendan's engagement in activities was also measured during the second part of this study. Engagement was defined as being actively and appropriately involved with instructors or items (e.g., responding appropriately to teacher prompts, manipulating toys appropriately etc.). This research was conducted in Brendan's classroom, which was located in a school for children with autism. Four other students with similar diagnoses and two teaching assistants were typically present during classroom sessions. Two advanced graduate students in Special Education implemented the procedures (i.e., conducted the functional analysis and the schedule intervention within the classroom) and recorded the data.

## FUNCTIONAL ANALYSIS

### Procedures and Experimental Design

A series of four functional analysis conditions was examined (i.e., attention, no interaction, demand,

and play). Individual sessions of each of the functional analysis conditions were 5 min in length and self-injury was recorded using a 10 s partial interval procedure during sessions. The functional analysis was conducted over a 4-week-period in the child's classroom. Sessions were implemented in a multi-ement treatment design to demonstrate experimental control. Additionally, the functional analysis was conducted in three phases in which the sequence of presentation of the functional analysis conditions was systematically manipulated. These separate phases of the functional analysis are described below.

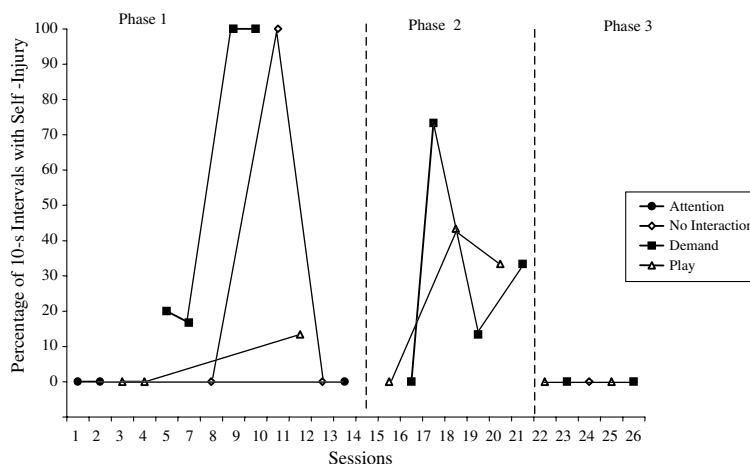
In the *attention condition* the therapist ignored Brendan unless he engaged in self-injury at which point the therapist interacted with him for approximately 10 s. This condition assessed whether self-injury was sensitive to positive reinforcement in the form of attention from others. In the *no interaction condition* the therapist did not interact with Brendan irrespective of his behavior. This condition assessed whether his behavior occurred independent of social consequences. In the *demand condition* Brendan was engaged in a variety of instructional activities that were derived from his classroom curriculum (e.g., comply with various requests such as to sit down, clap hands; identify various pictures from an array when given verbal prompts etc.). If he engaged in self-injury the task was removed for 10 s and was then reinstated. This demand condition assessed whether self-injury was sensitive to escape from tasks. During the *play condition* Brendan engaged in a variety of

activities (walking, swinging, listening to music) that he appeared to enjoy from observations prior to the study. The therapist interacted with Brendan every 30 s irrespective of his behavior during play. The play condition served as a control for the other conditions as demands were absent, and social attention was available.

In *Phase 1* of the functional analysis, Brendan's self-injury was examined under all four social conditions described above. In *Phase 2* of the functional analysis, the demand and play conditions were presented only. These demand and play sessions were identical to those in the first phase of the study. The no interaction and attention conditions were not implemented during Phase 2. In *Phase 3* of the functional analysis, a sequence of functional analysis conditions was implemented (demand–no interaction–play–demand). The functional analysis conditions in Phase 3 were identical to those in the previous phases.

**Interobserver Agreement**

A second observer independently recorded self-injury during 40% of all functional analysis sessions. The number of agreements (for each 10 s interval during a 5-min session) were divided by the total number of intervals for that session and multiplied by 100%. Interobserver agreement yielded an overall mean of 100%.



**Fig. 1.** Percentage of intervals of self-injury across attention, no interaction, demand, and play conditions during Phases 1, 2, and 3 of the functional analysis.

## RESULTS AND DISCUSSION

The results of the functional analysis are presented in Figure 1. In Phase 1, self-injury occurred primarily in the academic demand condition. Self-injury did not occur during the attention condition and very rarely occurred during one of the play sessions. These results seem to indicate that Brendan did not self-injure to seek attention and that he was comfortable during social/play interactions with people. Additionally, self-injury occurred during 100% of intervals in two of the demand sessions. Self-injury seemed to carry over into a no interaction session that immediately followed two demand sessions. This result seemed to indicate that the child was frustrated by 10 min of academic activities and that this frustration continued or generalized into the no interaction session. A play session that followed this no interaction session seemed to bring his self-injury under control by redirecting his attention to pleasant activities with the therapist.

In Phase 2 of the assessment, we wanted to see if we could control his self-injury by interspersing demand sessions with play sessions. As the play session seemed to bring his self-injury under control in Phase 1, we hypothesized that frequent play sessions interspersed with demand sessions might have a controlling effect on his self-injury. The results of Phase 2 did not support this hypothesis, with self-injury occurring across the majority of play and demand sessions. We knew from the first phase of this assessment that play did not seem to be associated with self-injury. These results in Phase 2 seemed to suggest that the transition between demand and play did not provide a clear enough signal that the demand session was terminated. For example, play and demand sessions both involved close proximity with a therapist, social interactions with a therapist etc.

In Phase 3, we decided to examine the effects of a sequence of sessions that consisted of demand–no interaction–play–demand. Here we hypothesized that a brief single 5-min demand session, followed by immediate removal of all activities (no interaction), and subsequently followed by preferred activities (play) might reduce self-injury. We hypothesized that the removal of all activities (i.e., no interaction) following a demand session would provide a clear signal that demands had been removed. We also decided to use a 5-min rather than 10-min of academic demands as Brendan seemed to get extremely agitated during Phase 1 of this assessment,

when two 5-min demand sessions were implemented back to back. No self-injury occurred during Phase 3. We decided to further examine the effects of this schedule of activities (demand, no interaction, play, demand) within the context of his ongoing classroom activities in the next part of this study.

## CLASSROOM SCHEDULE

### Procedures and Experimental Design

Observations were conducted during 30-min sessions of regular classroom activities in which no schedule was present (the No Schedule condition described below) and during 30-min sessions in the classroom when the schedule derived from the functional analysis was implemented (the Schedule condition described below). One of these 30-min sessions (No Schedule or Schedule) was conducted each week at the same time and on the same day (10:30–11:00 am on Friday).

Self-injury was measured during sessions using the 10-s partial interval procedure described in the functional analysis section. Additionally, Brendan's engagement was measured using a 10-s whole interval procedure. These measures were mutually exclusive (i.e., if self-injury was scored during any given interval, then engagement could not be scored for that interval and vice versa). Experimental control was demonstrated using an ABAB reversal design for the No Schedule and Schedule conditions.

### No Schedule

During the no schedule condition, the classroom-teaching assistant implemented regular curricular activities with Brendan. These activities were not organized according to a schedule in the classroom. Activities included those tasks that were included in the demand and play conditions of the functional analysis. No attempt was made to control for activities or instruction that occurred during the no schedule condition. We merely wished to compare what was typically in place with the schedule derived from the functional analysis.

### Schedule

The contents (in terms of activities and instruction) and sequence of the schedule (no interaction–play–demand) were identical to those described in

Phase 3 of the functional analysis. Each of the activities (i.e., demand, no interaction, and play) lasted for 5 min during the Schedule condition.

**Follow-up**

Follow-up assessments were conducted for up to 5 months in Brendan’s classroom. During these assessments the regular teaching assistant implemented the schedule derived from the functional analysis. All follow-up assessments were conducted during the demand conditions of the schedule.

**Interobserver Agreement**

A second observer independently recorded self-injury and engagement during 50% of all No Schedule and Schedule sessions. The number of agreements (for each 10 s interval during a 5-min session) were divided by the total number of intervals for that session and multiplied by 100%. Interobserver agreement yielded an overall mean of 100%.

**RESULTS AND DISCUSSION**

The results of the No Schedule and Schedule conditions on Brendan’s self-injury and engagement are presented in Fig. 2. Each session of the No Schedule condition was broken down into six, 5-min periods with self-injury and engagement plotted

during each of these 5-min periods. The 5-min sessions of no interaction, play, and demand were repeated once during each Schedule condition. The activity schedule during the Schedule condition is identified on the x-axis of Figure 2.

During the No Schedule conditions, we can see relatively high levels of self-injury for Brendan. He continuously self-injured during three of the observations under the No Schedule condition. His self-injury was relatively low (i.e., observed in less than 10% of intervals) during two of the observations in this condition. Brendan’s levels of engagement fluctuated during the No Schedule condition. He was observed to be engaged above 50% of intervals during four of the observations. He was engaged for less than 20% of intervals during seven of the observations under the No Schedule condition.

There was significantly less self-injury during the Schedule condition. Brendan’s self-injury was low (i.e., observed in less than 10% of intervals) during nine of the observations in this condition. In fact he did not self-injure at all during six of these observations. In contrast, his levels of engagement were relatively high during the Schedule condition with levels of engagement above 70% of intervals during seven observations. Brendan did not engage with individuals or activities during the no interaction condition.

Two follow-up observations were conducted at 3 months and again at 5 months. These were

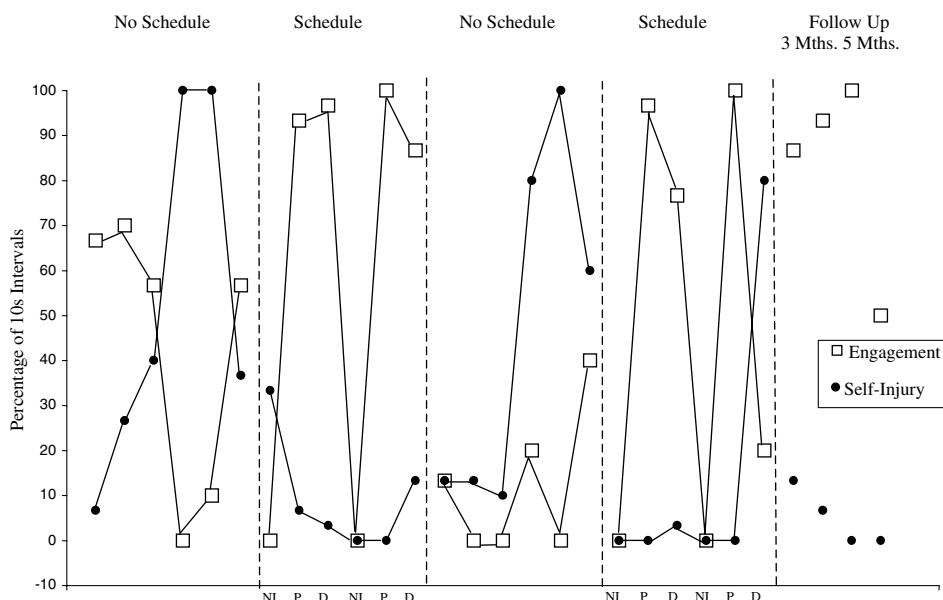


Fig. 2. Percentage of intervals with self-injury and engagement across No Schedule, Schedule, and Follow-up conditions. (NI, No Interaction; P, Play; D, Demand).

conducted during demand activities of the schedule condition. The results demonstrate that the schedule continued to be effective in maintaining low levels of self-injury and high levels of engagement.

Overall, the results of the classroom schedule seemed to be positive. Brendan was actively engaged more in activities and self-injured less than during the typical classroom routine. The classroom assistant also reported that the new schedule was easy to implement and continued to follow the schedule for up to 5 months following the assessment. The classroom assistant also noted that Brendan seemed to be happier during the schedule (i.e., he smiled frequently, seemed to seek out attention from the assistant more frequently, and attempted to communicate using manual signs more frequently).

## OVERALL DISCUSSION

This study provides yet another demonstration of how an activity schedule can be effectively used to enhance engagement and reduce challenging behavior with students with autism. Activity schedules, when tailored to the specific needs of a student, can act as a powerful antecedent intervention in positive behavioral support plans (Mesibov, et al., 2002). However, it may be difficult in some cases to determine an individualized schedule for students with severe disabilities (e.g., severe autism) who engage in high rates of challenging behavior. In this study, we demonstrated how one might use the results of an analogue functional analysis to determine an effective individualized schedule for such a student. Future research should continue to examine the utility of functional analysis techniques to develop individualized schedules for such students.

The introduction of a schedule is only one of several possible interventions that could have been conducted with this student. For example, we could have reduced the difficulty or number of tasks during academic sessions. We might also have taught the child a communication strategy that he could have used to terminate activities. These other interventions should be incorporated as part of a comprehensive behavioral support plan. However, we were interested in isolating the effects of the activity schedule on challenging behavior and engagement in this study. Introducing several interventions (e.g., changing task difficulty) may have clouded our analysis of the effectiveness of the schedule.

Some researchers/educators have questioned the feasibility of conducting analogue functional analysis techniques (such as those conducted in this study) in settings such as classrooms (Sturme, 1995). Indeed, some recent descriptions of how to conduct functional assessments in schools with students who have significant disabilities have emphasized interview and observation techniques with little or no consideration given to functional analysis procedures (e.g., Knoster, 2000). It may be premature for educators to reject analogue techniques as these procedures can provide a systematic and controlled analysis of challenging behavior. It may not have been possible in the current study to identify the influence of the schedule of activities on Brendan's self-injury through interview and classroom observation alone. Future research should clarify the role of various functional assessment techniques in classroom settings for students with significant disabilities who engage in challenging behavior.

In summary, we examined self-injury with a child with severe autism using a functional analysis methodology within a classroom setting. The student seemed frustrated with academic demands and engaged in self-injury primarily during demand conditions of the functional analysis. Further manipulations using the functional analysis indicated that self-injury did not seem to occur under a specific schedule of activities (no interaction–play–demand). The schedule of activities in the child's classroom curriculum was modified based on the functional analysis results. This modified curriculum resulted in substantial reductions in self-injury and increases in classroom engagement. These positive results were maintained for up to 5 months following the intervention. This study presents preliminary evidence that functional analysis methods might be helpful in developing predictor strategies such as individualized schedules for such students.

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