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The Use of Computer Activity Schedules to Increase Initiation of and Engagement in Domestic and Leisure Activities in an Adult with Acquired Brain Injury

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The purpose of this case study was to highlight the use of Microsoft® PowerPoint® to construct a computerized activity schedule for an adult with acquired brain injury. We also questioned whether teaching the individual schedule following skills would increase his initiation of and engagement in leisure and domestic activities. Computer activity schedule teaching was shown to increase on-task and on-schedule behavior, both of which remained high when the schedule was resequenced. Schedule following skills were also shown to generalize to novel activities. Computer schedules might thus serve a supportive role in adult brain injury rehabilitation.

Key Words: activity schedules, Microsoft® PowerPoint®, acquired brain injury, domestic skills, leisure skills.

Individuals with acquired brain injury (ABI) often display a number of cognitive impairments that limit their abilities to independently initiate and sustain engagement in leisure and domestic activities. Frequent instruction from habilitative staff may be necessary to engage individuals in such activities. Activity schedule instruction is an intervention that may hold promise for this population. Typically taking the form of a notebook or binder, activity schedules usually consist of a series of pictures or words that ultimately occasion a chain of activities with minimal guidance from a staff person (McClannahan & Krantz, 1999). MacDuff, Krantz, & McClannahan (1993), for example, showed that the acquisition of photographic schedule following skills permitted students with autism to demonstrate lengthy response chains and independently change activities in the absence of immediate supervision from others.

An approach that may be particularly relevant for the ABI population is the use of computer activity schedules. Rehfeldt, Kinney, Root, and Stromer (2004) recently delineated the use of Microsoft® PowerPoint® to create computer schedules, in which each slide depicts a pictorial or textual cue corresponding to a particular activity, and the learner advances through the schedule by clicking the computer mouse upon a page turner

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on each slide. Computer activity schedules may be perceived as being more age-appropriate than hand-held notebook schedules for adults with ABI, and many adults with ABI may have used computers regularly prior to their injury. Thus, a computer schedule may be perceived as being a more advanced teaching aid than a hand-held schedule, as well as being more interesting to those using it. In this case study, we explored whether a computerized activity schedule would increase the initiation of and sustained engagement in leisure and domestic activities in an adult with ABI.

Method

Participant

Max was an adult with ABI who participated in a neurobehavioral rehabilitation program at the Center for Comprehensive Services in Carbondale, IL. Max was a 20-year old male who sustained an ABI at the age of 3 as a result of a motor vehicle accident. His full scale IQ score was 75. Level of severity of injury for Max was mild, with a coma duration of less than 30 minutes. Max had upper and lower body mobility and was able to operate a computer mouse. He presented with few substantial limitations in gross or fine motor skills. Max seldom initiated domestic or leisure activities in the absence of considerable staff instruction to do so, despite the fact that the skills required to complete such activities were in his repertoire; Max was capable of completing such skills of daily living as cleaning his room, preparing simple meals, and dressing and grooming himself.

Setting

Sessions were conducted at Max's residential facility, an inpatient facility for individuals with acute brain injury. Ten individuals resided in the facility, where they received 24-hour supervision due to the high risk of suicide attempts and elopement from the facility.

Apparatus

Max's activity schedule was created using Microsof® PowerPoint® software following the instructions presented by Rehfeldt et al., 2004. His schedule included eight slides, six of which contained digitized photographs of domestic and leisure activities. As shown in Figure 1, photographs were surrounded by a border and offset by a black background. The pictures were accompanied by textual stimuli corresponding to the name of each activity. The pictures were also accompanied by auditory stimuli which cued the participant to complete the activity depicted in the slide (i.e., "its time to make Ramen noodles"). The first slide in each schedule presented textual and auditory stimuli stating, "Max, it's time to do your schedule," while the last slide included several pictures of pre-determined preferred activities from which Max was allowed to choose upon completion of the schedule. Figure 1 shows that Max's schedule included pictures corresponding to the following activities: Preparing Ramen noodles, reading a pre-selected Bible passage, completing a

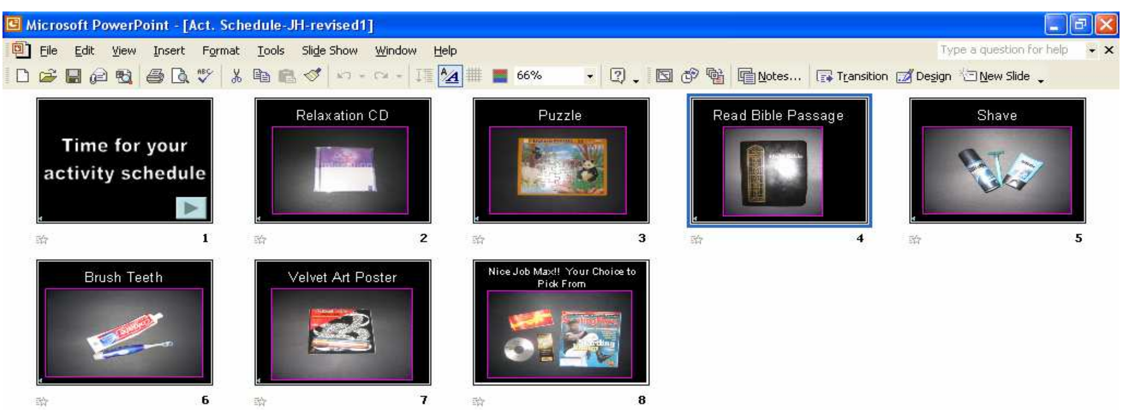

Figure 1. Max's activity schedule

25-piece puzzle, coloring a velvet art poster, and listening to a music CD containing two of his favorite songs. The activities all had clear endings, all of which Max completed independently and enjoyed performing.

Max's schedule was presented upon a standard Dell Inspiron 8200 laptop computer. An external mouse was used to advance from one slide to the next by clicking upon a page-turner on each slide.

Independent variables

We used the same independent variables as MacDuff et al., (1993).

Verbal contacts. Verbal contacts consisted of verbal instructions, questions, and praise statements (e.g. "it's time to work on behavioral relaxation" or "wow, that's a great job brushing your teeth, keep it up!") (see MacDuff et al., 1993).

Gestural prompts. Gestural prompts included all pointing, motioning, or nodding toward the computer or task materials (see MacDuff et al., 1993).

Dependent measures

On-task. On-task behavior was scored if Max a) visually attended to the task materials, b) looked at the schedule, c) manipulated task materials appropriately, or d) transitioned from one activity to the next.

On-schedule. On schedule behavior was scored if Max was engaged in the activity depicted upon the computer screen.

Observation system and Experimental Design

A 60-s momentary time sampling procedure was used to score on-task and on-schedule behavior and verbal contacts and gestural prompts. An AB design was used in this case study to evaluate the effects of computerized activity schedules on on-task and on-schedule behavior during baseline, teaching, maintenance, resequencing, and generalization to novel photographs. All sessions were 30-60 min. in duration. It was confirmed that Max was able to operate the computer mouse to advance through the schedule prior to the experiment.

Procedure

Baseline. After the initial instructions to "find something to do," no verbal contacts or gestural prompts were delivered. The computer was present during all baseline sessions. Prior to baseline, Max was provided with a brief orientation on how to use the computer mouse to advance through his computer schedule. The baseline condition ended once on-task and on-schedule behavior did not vary by more than 10% for three consecutive sessions.

Training. After the initial instructions were given, the instructor used verbal contacts and gestural prompts to teach Max to orient to the computer screen, activate the schedule, obtain and return materials needed for each activity, transition between activities, and advance through the schedule. Verbal contacts and gestural prompts were gradually faded. When on-task and on-schedule behavior were scored for at least 80% of the time for three consecutive sessions with no verbal contacts or gestural prompts, this condition ended.

Maintenance. Following the initial instructions, no verbal contacts or gestural prompts were delivered. When on-task and on-schedule behavior were scored for at least 80% of the time for five consecutive sessions with no verbal contacts or gestural prompts, this condition ended.

Resequencing computer activity schedule. This condition was identical to maintenance except that the order of the activities in Max's schedule was changed. The condition ended after on-task and on-schedule behavior was scored at least 80% of the time for one session.

Generalization. Three pre-and post-training generalization probes were conducted, in which one activity in Max's schedule was replaced with a novel activity. A different activity was replaced and a different novel activity was included during each probe. No prompts or verbal contacts were delivered. Post-training generalization probes were conducted one day immediately following the completion of resequencing.

Interobserver Agreement

Interobserver agreement data was obtained for the dependent and independent variables during at least 30% of sessions across all conditions. Interval by interval percentage interobserver agreement was calculated by dividing the number of agreements by the number of agreement plus disagreements and multiplying by 100%, separately for occurrences and nonoccurences of on-task and on-schedule behavior, verbal contacts, and gestural prompts. Mean interobserver agreement on the occurrences of on-task was 97% (range, 83%-100%), and mean agreement on non-occurrences of on-task was 99% (range, 91%-100%). For on-schedule, mean agreement on occurrences was 98% (range, 82%-100%), and mean agreement on nonoccurrences of on-schedule was 99% (range, 94%-100%). Mean interobserver agreement on the occurrences of verbal contacts was 97% (range, 82-100), and mean agreement on the nonoccurrences of verbal contacts was 98% (range, 87%-100%). Mean interobserver agreement on the occurrences of gestural prompts was 98% (range, 92%-100%), and mean agreement on the nonoccurrences of gestural prompts was 99% (range, 92%-100%).

Results and Discussion

On-task

Figure 2 shows the percentage of time samples scored as on-task. The mean percentage of time samples scored as on-task during baseline was 0%. On-task behavior increased during training, as the mean percentage of time samples scored as on-task during training was 96%. The mean percentage of time samples scored as on-task during maintenance, resequencing, and generalization conditions was 98%, 100%, and 99%, respectively.

On-schedule

Figure 3 shows the percentage of time samples scored as on-schedule. The mean percentage of time samples scored as on-schedule during baseline was 0%. On-schedule behavior increased

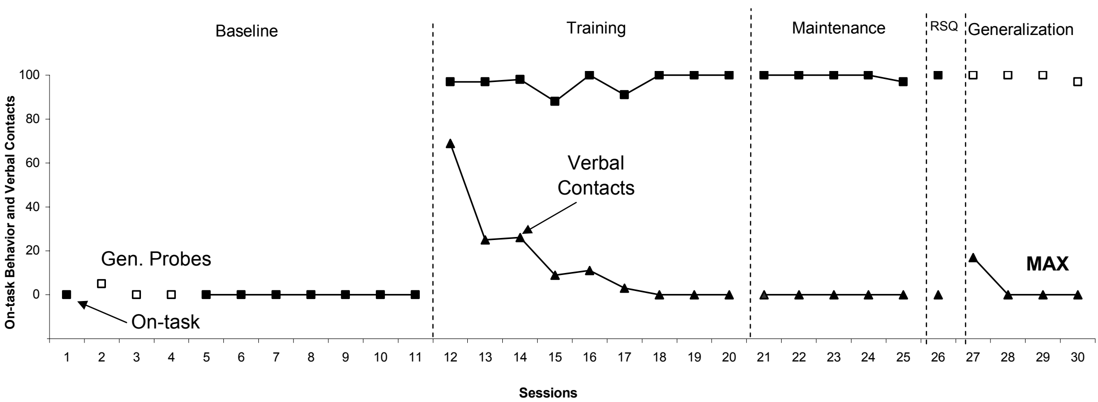

Figure 2. Percentage of time samples scored as on-task and verbal contacts for both participants.

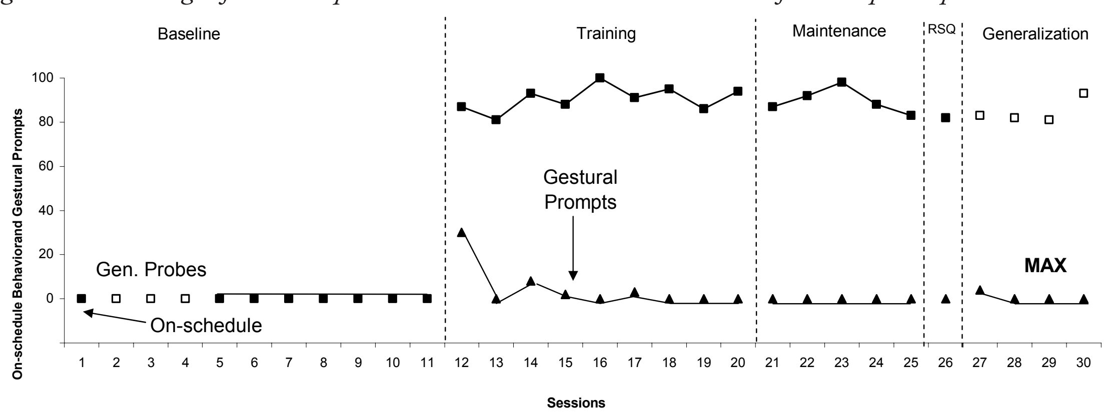

Figure 3. Percentage of time samples scored as on-schedule and gestural prompts for both participant.

during training, as the mean percentage of time samples scored as on-schedule during training was 89%. The mean percentage of time samples scored as on-schedule during maintenance, resequencing, and generalization conditions was 90%.

Verbal contacts

Figure 2 shows the percentage of time samples scored with verbal contacts. The mean percentage of time samples scored with verbal contacts during training was 8%; verbal contacts were successfully eliminated by Max's seventh training session. The mean percentage of time samples scored with verbal contacts during maintenance, resequencing, and generalization conditions was 0%, 0%, and 4%, respectively.

Gestural prompts

Figure 3 shows the percentage of time samples scored with gestural prompts. The mean percentage of time samples scored with gestural prompts during training was 4%; gestural prompts were successfully eliminated by Max's seventh training session. The mean percentage of time samples scored with verbal contacts during maintenance, resequencing, and generalization conditions was 0%, 0%, and 1%, respectively.

These results show that for Max, learning to use a computer schedule increased his initiation of and engagement in domestic and leisure activities. Moreover, his schedule following skills generalized to novel activities. Thus, using Microsoft® PowerPoint® to construct activity schedules may be a useful endeavor in the rehabilitation of persons with ABI. Future research should replicate these results with additional participants, as well as demonstrate a reduction in such challenging behaviors as verbal and physical aggression after the acquisition of schedule following skills (see Lalli, Casey, Goh, & Merlino, 1994). Such challenging behaviors are not uncommon in persons with ABI. Future research should also determine whether the schedule is more effective at enhancing performance than other types of prompts used in isolation, such as the verbal and gestural contacts used in this study (see MacDuff et al., 1993). Because the cost of computer technology may be difficult for many human service agencies to manage, future research should also compare the effectiveness of hand-held notebook schedules to that of computerized schedules in establishing schedule following skills. A computer schedule may be more interesting and age-appropriate for an adult such as Max, who had normal cognitive functioning prior to his head injury. Although this study used only an AB design, making it impossible to conclude that a functional relationship between Max's performance and the activity schedule instruction was established, this case study is noteworthy in that it illustrates the use of innovative new technology to enhance daily living skills in a population for whom little research on effective behavior analytic interventions exists.

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