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Magda M. Stropnik

Western New England University

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Running Head: OFF-TASK INTERVENTION

Assessment and Treatment of Off-Task Behavior
Exhibited by Adolescents with Autism in Vocational Contexts

Magda Stropnik

New England Center for Children and
Western New England College

Abstract

The current study extends research in the area of function-based assessment and treatment to off-task behavior in a vocational context. Two adolescents with autism who engaged in off-task behavior participated. A functional analysis of off-task behavior was conducted and showed elevated levels of off-task in both the escape and tangible conditions for both participants. Effects of a multiple schedule in which reinforcement (SR) and extinction schedules for off-task behavior operated in alternation, each in the presence of different stimuli were then assessed. After desirable amounts of off-task behavior were observed with each component, (a) schedule alternation was made contingent upon completion of a specified number of work products, (b) self-monitoring procedures were introduced, (c) the duration of the SR schedule component was reduced, (d) the number of work products required to alternate schedules was systematically increased, and (e) session duration was increased from 10 min to 30 min to emulate typical vocational conditions. Treatment effects maintained or improved following these practical schedule enhancements. An objective social validity assessment showed that participants preferred the multiple schedule treatment to either a mixed schedule or extinction alone. An additional indirect social validity assessment indicated that other stakeholders found the goals of the intervention important, the procedures acceptable, and the outcomes desirable. The results are discussed in the context of promoting vocational independence for adolescents with autism.

Keywords: autism, functional analysis, multiple schedule, off-task, self-monitoring, social validity, supported work, vocational skills

Assessment and Treatment of Off-Task Behavior

Exhibited by Adolescents with Autism in Vocational Contexts

Employment provides valuable benefits to an individual. It allows access to a variety of reinforcers including money, social interaction, and independence. Increasingly, individuals with disabilities are being presented with opportunities to enter the work force and experience these benefits (e.g., The Americans with Disabilities Act of 1990 [P.L. 101-336]; Shelly, Sample, & Spencer, 1992). Although community-based opportunities are becoming more available, many individuals with intellectual disabilities engage in problem behavior that precludes their successful employment (Carr & Carlson, 1993). Severe problem behavior, including aggressive and destructive behavior, does require special attention for a small percentage of individuals with intellectual disabilities (Horner, Carr, Strain, Todd & Reid, 2002; Rojan, Matson, Lott, Esbensen & Smalls, 2001), but other less severe behavior, classified as *off-task behavior*, interferes with the ability of many more to participate successfully in the workplace (Ackerman & Shapiro, 1984; Lattimore, Parsons, & Reid, 2008). Off-task behavior can be described generally as the failure to persist at assigned tasks in the absence of constant supervision. Seymour and Stokes (1976) used the terms “interrupted work” and “nonwork” and described the phenomena of off-task behavior as looking away from task materials, ceasing to work on a set task, or dawdling. Saunders, McEntee, and Saunders (2005) added that off-task behavior may take several additional forms including seeking peer or supervisor attention, wandering, sitting idly or engaging in repetitive or stereotyped movements. Identifying treatments designed to reduce the frequency and duration of off-task behavior and promote persistent work behavior that is not dependent on the prompting and supervision of others is likely to contribute to the employment and success of individuals with disabilities in the workplace.

Investigators interested in addressing workplace performance issues typically have approached the problem of off-task behavior as either a skill deficit or a motivational deficit. Approaches to remediating the problem of off-task behavior have included: providing additional instruction (Lattimore, Parsons, & Reid, 2006; Lattimore et al., 2008), modifying the work environment (Parsons, Reid, Green, & Browning, 1999; Wacker, Berg, Berrie, & Swatta, 1985; Sowers, Verdi, Bourbeau, & Sheenan, 1985), allowing a choice of tasks (Reid, Parsons, & Green, 1998; Parsons, Reid, Reynolds, & Bumgarner, 1990; Worsdell, Iwata & Wallace, 2002), introducing self-monitoring strategies (Seymour & Stokes, 1976; Shapiro & Ackerman, 1983; Ackerman & Shapiro, 1984; Sowers et al., 1985) and employing stimulus-control based interventions (Saunders et al., 2005).

For those investigators addressing the issue of off-task behavior exhibited by individuals with disabilities in work settings as a skill deficit, lack of independent work performance was remediated either through additional training and prompting procedures or by modifying the environment to compensate for physical disabilities (Parsons et al., 1999). Accordingly, some researchers interested in increasing independent work performance among individuals with disabilities have focused on increasing the efficacy of job-skill training procedures. Citing lack of sufficient opportunities to learn work skills while on the job, investigators have used simulation training as a forerunner or supplement to on-site training, thereby increasing the number of job steps supported workers were able to perform independently (Lattimore et al., 2006; Lattimore et al., 2008). Another instructional strategy used to increase independent performance in the workplace augments instruction with permanent environmental prompts. For instance, picture prompts depicting assigned tasks or task components in the order in which they are to be performed have been used to make training more efficient and increase independence among workers with disabilities. Wacker et al. (1985) used a picture prompt training procedure

to teach a series of vocational tasks to three adolescents with developmental disabilities. This training procedure resulted in a reduction in the number of training sessions required with each subsequent task introduced. A similar training strategy was used by Sowers et al. (1985) who used picture prompts with self-monitoring to teach four young men with moderate disabilities to independently change tasks in a supported work setting. The strategies were designed to remediate off-task behavior via improved or augmented instruction. These instructional strategies were shown to be effective in improving work performance.

In addition to strategies for improving instruction, strategies for enhancing motivation have been employed to remediate the problem of off-task behavior in the workplace. Allowing for choice of work tasks is one strategy for enhancing motivation. Several studies have focused on choice (Reid, Parsons, & Green, 1998) and effects of task choice on off-task behavior (Parsons et al., 1990; Worsdell et al., 2002). Both Parsons et al. and Worsdell et al. found that allowing individuals to work on preferred tasks resulted in less off-task behavior. Worsdell et al. also demonstrated preference assessment results were predictive of extended task engagement. Although identifying preferred tasks certainly is important when choosing a job, most types of employment require an individual to complete tasks that may vary in type and duration, including some that may be less preferred than others. In many work settings, it is not reasonable to expect less preferred components of a job to be completely eliminated or avoided.

The more developmentally-advanced behavior of remaining on task in the face of non-preferred tasks and more immediate, competing reinforcers (e.g., ongoing activities within the environment, attention of a preferred coworker, breaks from working) without constant prompting and encouragement is an important vocational skill which has received more limited research attention. Demonstrating acceptable *independent* levels of on-task behavior is likely to

make the individual more valuable to the employer, and may increase the opportunities for the individual to access more typical social reinforcement from both coworkers and supervisors.

Researchers interested in addressing motivational deficits affecting off-task behavior and in promoting more independent work performances have examined self-monitoring interventions. Self-monitoring procedures have the potential to increase independent performance by teaching an individual to record their behavior or track their progress on a task in the absence of direct supervision (Sowers et al., 1985). Self-monitoring studies have investigated the effect of: (a) differential token access for accurate self-monitoring and for recruiting social reinforcement (Seymour & Stokes, 1976), (b) self-monitoring alone (Shapiro & Ackerman, 1983), (c) and self-monitoring following differential reinforcement and prompting procedures for work behavior (Ackerman & Shapiro, 1984). These studies have yielded mixed results.

Seymour and Stokes (1976) taught and reinforced self-recording of work and praise-seeking behavior and observed increases in the percentage of work behavior exhibited by three of four adolescent girls in an institutional vocational setting. However, when self-monitoring procedures were implemented as the sole intervention, by Shapiro and Ackerman (1983), the procedures were found to be ineffective at increasing the work productivity of individuals in a workshop setting. In a follow-up study, contingent prompts and praise were used to increase worker productivity *prior* to the implementation of self-monitoring procedures (Ackerman & Shapiro, 1984). The authors demonstrated that self-monitoring procedures introduced subsequent to contingent prompt and praise procedures maintained adult workers' productivity in a workshop setting even when the initial interventions were removed. Based on these findings, Ackerman and Shapiro suggested that self-monitoring procedures were best employed as

maintenance procedures and that the procedures may have been effective because they provided workers with a form of performance feedback (i.e., the specific mechanism was unknown).

Stimulus-control based procedures offer another means by which on-task and off-task behavior can be brought under control of environmental stimuli, thereby reducing the need for ongoing prompting and supervision. Such a tactic was examined by Saunders et al. (2005), in the context of a comparison of effects of a variable interval (VI) 60-s schedule and various fixed ratio (FR) schedules (1 through 5) of reinforcement for work completion on off-task and problem behavior exhibited by three individuals with intellectual disabilities in a workshop setting. The effects of the FR schedules were evaluated with and without a materials organizer. The experimental task consisted of picking up a piece of paper and placing it into a shredder. During all VI and some FR schedule sessions, a stack of folded papers was placed in front of the participant. During FR sessions in which a materials organizer was used, a desktop file organizer with slots for holding paper was placed on the participants work table; the number of papers in the organizer corresponded to the ongoing FR requirement. Results showed VI schedules were ineffective in reducing off-task or aberrant behavior and the FR schedule alone reduced off task behavior for one participant. The addition of a materials organizer (referred to as a behavioral prosthesis) to the FR schedule resulted in decreased off-task and problem behavior for all participants. The authors contended that, during FR schedules using a materials organizer, the saliency of the work requirement may have increased. That is, each response (removing paper from the organizer) may have functioned as a discriminative stimulus for the next response and signaled reinforcer delivery.

Although motivational variables and stimulus control for *on-task* behavior have been considered, researchers have yet to report attempts to identify the specific factors affecting *off-task* behavior and then use that information to inform interventions for off-task behavior.

Identifying the contingency controlling problem behavior prior to treatment development is considered best practice in the treatment of severe problem behavior exhibited by persons with intellectual disabilities (e.g., aggression, self-injury; Hanley, Iwata, & McCord, 2003). Some researchers have extended the use of this methodology to the assessment of less severe problem behavior often choosing to group several responses into a single functional analysis contingency class. For example, Harding, Wacker, Cooper, Millard, & Jensen-Kovalan (1994), included off-task behavior along with more severe problem behavior (e.g., tantrums, swearing and attempting to leave the room) and provided the same consequence for all inappropriate responses during test conditions. Although Harding et al. (1994) identified effective interventions based on results of assessments which included off-task among other problem behavior (see also Reimers et al., 1993), a more targeted analysis is warranted for those individuals for whom the primary interfering behavior is off-task (i.e., the function of off-task behavior per se was not experimentally demonstrated in these studies).

The practice of conducting a functional analysis prior to intervention has, however, not yet been extended to the treatment of off-task behavior alone (see Table 3, p. 155 of Hanley et al., 2003), despite the fact that off-task behavior produces a variety of consequences which may serve to maintain the behavior. For example, off-task behavior often results in: (a) attention from supervisors and peers in the form of conversation, encouragement, additional instruction, or prompts to return to work, (b) momentary or extended breaks from the work task, and (c) access to other more preferred activities (people usually do something else when they are not working) such as interacting with electronic devices (radios, computers, televisions, etc.). By first evaluating the conditions under which off-task behavior occurs via a functional analysis (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994), the specific environmental variables influencing off-task behavior can be identified and then used to inform the selection of effective

and precise treatments. Therefore, a potential contribution of this study is to provide the first set of functional analyses specific to off-task behavior informing its treatment. In the absence of functional analysis, a treatment plan may inadvertently strengthen the contingency between problem behavior and reinforcement by providing the functional reinforcer for problem behavior. For example, implementing an escape extinction procedure in the case of off-task behavior maintained by attention would likely exacerbate the problem as would ignoring off-task behavior maintained by escape from the vocational task (see Kern, Delaney, Hilt, Bailin & Elliot, 2002 for similar logic with respect to noncompliance; see Iwata, Pace, Cowdery, & Miltenberger, 1994 for an illustration of the effects of indicated and contraindicated treatment procedures).

After discovering the variable(s) maintaining off-task behavior, selecting a treatment that results in socially-acceptable levels of off-task behavior in the absence of constant supervision is critical. Although differential reinforcement procedures designed to provide the reinforcer maintaining off-task behavior may effectively decrease off-task behavior in a manner similar to that shown for other problem behavior (e.g., Hagopian, Fisher, Sullivan, Acquistio, & LeBlanc, 1998), these procedures require ongoing supervision to implement with sufficient integrity (Ackerman & Shapiro 1984; Saunders et al., 2005; Tiger, Hanley, & Bruzek, 2008; Vollmer, Roane, Ringdahl, & Marcus, 1999), which is antithetical to the goal of maintaining low levels of off-task behavior in the absence of continuous supervision. In contrast, a stimulus-control-based intervention based on the function of off-task behavior should require much less supervision. Once off-task behavior is primarily occurring when it is acceptable to be off-task, it may be possible to add a self-monitoring component to maintain low-levels of off-task behavior while further promoting independence.

One possible treatment option involves bringing on-task and off-task behavior under stimulus control using a multiple schedule. That is, a compound schedule could be programmed

whereby distinct reinforcement and extinction schedules operate in rapid alternation each in the presence of different stimuli (e.g., Hanley, Iwata, & Thompson, 2001). It may be possible to demonstrate stimulus control over and subsequently reduce off-task behavior by initially programming long presentations of the stimulus that signals the availability of reinforcement for off-task behavior in alternation with short presentations of the stimulus signaling the unavailability of reinforcement for off-task behavior. Making schedule alternation contingent on a particular amount or type of work and incorporating a self-monitoring component into the schedule correlated with working (i.e., no reinforcement for off-task behavior) should further increase the efficacy of the procedure by providing additional discriminative stimuli and conditioned reinforcement for working. Component schedule proportions could be also systematically altered to allow the individual to work independently for longer durations (see Hanley et al., 2001, for an example).

Selection of multiple schedule stimuli and self monitoring tools that are easily transportable and inconspicuous to others may also facilitate program implementation across work settings. Nevertheless, the social acceptability of the treatment to relevant stakeholders and to the employee experiencing the intervention (Schwartz & Baer, 1991) is best measured rather than hoped for. Although interviews and questionnaires may provide an appropriate and efficient means of assessing the acceptability of off-task behavioral interventions to relevant stakeholders such as job coaches and employers, using the same procedures to assess the preferences of those whose language skills are limited poses a significant dilemma. Researchers have shown that simply asking individuals with intellectual disabilities what they prefer does not provide a valid means of assessing preference (Hanley, Iwata & Lindberg, 1999; Parsons et al, 1990) yet identifying these preferences is often critical to positive treatment outcomes (Tessing, Napolitano, McAdam, DiCesare & Axelrod, 2006). To address these issues, procedures initially

described by Hanley, Piazza, Fisher, Contrucci and Maglieri (1997) may be useful. Through the use of a concurrent-chains procedure, Hanley et al. demonstrated an objective means by which individuals with intellectual disabilities could choose from among two or more treatment options. The procedure essentially involves opportunities to experience multiple treatments in the presence of different correlated stimuli (e.g., colored poster boards) and then opportunities to choose between the treatments by making selections of the different correlated stimuli.

The overall purpose of the current study was to identify effective and socially acceptable procedures that would promote independent on-task behavior in vocational contexts by adolescents with autism who had historically engaged in high levels of off-task behavior. After identifying the factors influencing the occurrence of off-task via functional analysis (Iwata et al., 1982/1994), we assessed the efficacy of using a multiple schedule to establish stimulus control over off-task behavior in two individuals with autism. After schedule influence was detected, the practical utility and social acceptability of the intervention was enhanced by making the following changes to the treatment: (a) self-monitoring procedures were introduced, (b) schedule alternation was made contingent upon completion of a specified number of work products (as opposed to time-based alternation), and (c) the response requirement for schedule alternation was systematically increased. The treatment was then extended to a second task. Finally, observation and treatment implementation duration was increased and the treatment was implemented in a community setting to assess whether the procedure was effective under more typical vocational time frames and contexts. Following this assessment and treatment process, a concurrent-chains procedure described by Hanley et al. (1997) was used to assess participant preference for treatments (including the one described above) and a questionnaire was administered to other relevant stakeholders (parents, job coaches, teachers and potential

employers) to assess the acceptability of the goals, procedural components, and outcomes the intervention.

Method

Participants

Two adolescent males diagnosed with autism were selected to participate in the current study. At the beginning of the study, Jim was 18 years old and Harry was 14 years old. The participants attended a full-day, full-year program for children and adolescents with autism and intellectual disabilities. Both participants had previously experienced a functional assessment of their self injury and aggression, and functional communication training (FCT; Durand & Carr, 1985) interventions were developed and implemented based on the results of the functional assessments. Although current rates of problem behavior were at or near zero, teacher reports indicated that these individuals continued to exhibit high rates of off-task behavior during independent academic and vocational tasks. Participants engaged in a variety of other activities while off-task during vocational activities; they were reported to engage in motor stereotypy, talk to staff, talk to themselves, look out into space (“space out”), look out the window, watch others work or interact, or watch TV or play on computers.

Settings and Materials

Sessions took place in a vocational classroom and the student cafeteria within the adolescents’ school. Both settings were established sites for student supported-employment and vocational training. The settings were selected because the ambient distracters they contained mimicked those likely to be encountered in community-based employment setting. The vocational classroom (4.8 m by 9.1 m) contained tables, counters, chairs, two computers and a variety of materials necessary for completing clerical, custodial, and assembly tasks. The student cafeteria (9.7 m by 30.4 m) overlooked train tracks, a playground, and a bus entrance. It

contained lunch tables, counters, chairs and a variety of foods and tools necessary to daily food service activities. Tables, counters, and chairs already in the classroom and cafeteria were designated as work spaces. Items necessary to complete a specific work assignment were placed at the designated work space prior to or at the start of each session. In the vocational classroom, materials required to complete either a mass mailing task (e.g., envelopes and letters) or a food-service silverware assembly task (e.g., gloves, napkins, forks, spoons, knives and plastic sleeves) were provided; in the cafeteria, items necessary to complete the food-service silverware assembly task were available. During some baseline probe sessions and during all training sessions, red or green cards (5.1 cm by 8.9 cm) were placed on the table in front of the participant. The red and green cards would each later be assigned to one component of the multiple schedule. During sessions, both the cafeteria and vocational classroom were in use by staff and students engaging in activities and conversations unrelated to the ongoing experiment. The position of the therapist varied unsystematically within and across sessions. After the first few treatment sessions in which the therapist was seated to the side of and behind the student, the therapist moved about the room, engaging in a variety of setting related activities (e.g., straightening or stocking shelves, reading brochures, responding to questions from staff and students).

Measurement

Functional analyses and treatment evaluations. Observers using hand-held computers recorded data on off-task behavior and prompts across all conditions. The duration of the stimulus (i.e., red or green card) presentation for each component of the multiple schedule arrangement was also recorded when this procedure was active. At the end of each session, the therapist and data collector recorded the number of work products completed (e.g., number of mailings). The duration of off-task behavior was recorded, and it was defined as pausing from

working for more than 2 s, manipulating materials other than those necessary to complete the assigned task for more than 2 s, or any behavior directed toward the therapist. Prompts were divided into two types: instructional prompts and prompts to return to work; the frequency of both was recorded. Instructional prompts included any directive which provided assistance to the participant on how to complete the task. Instructional prompts were delivered only while the participant was actively working. Prompts to work included any directive to resume the assigned task and consisted of a brief verbal instruction (e.g., “keep working”), a gesture toward the work materials or a physical prompt (e.g., placing the participants hand on the work materials). A continuous measurement system was used to collect the data on a second-by-second basis. Off-task behavior was reported as a percentage of time per session and a percentage of time per schedule component; experimenter prompts were reported as a rate (responses per min); and work products were reported as a rate (products per min).

Social validity assessments with participants. During the assessments to identify which of several treatments for off-task was preferred by the participants, a modified concurrent-chains procedure was used (Hanley et al., 1997). Each session consisted of two parts, an initial link and a terminal link. During the initial link, the participant selected from among three different cards (15 cm by 21 cm), which were correlated with three different treatments for off-task behavior in the terminal link (extinction, mixed schedule, and multiple schedule; each are described more fully below). On the cards were photographs of materials correlated with the specific arrangement scheduled for the terminal link. Participants’ card selections, defined as handing one of the three cards to the therapist, were scored by marking the selected card on a data sheet. Card selection in the initial link was the measure of preference for the treatment in the terminal link. Participants’ preference data were reported as cumulative initial-link card selections across sessions. Data measures (i.e., percentage of time off-task and rate of

experimenter prompts) in the terminal links were identical with those used during functional analyses and treatment evaluation sessions described previously.

Social validity assessment with other stakeholders. After assessing each participant's preference for treatment options, participants' parents, job coaches, school administrators and potential employers were surveyed. Respondents were provided with a 13-item questionnaire consisting of 10 closed- and 3 open-ended questions (see Table 1 for the specific questions). Questions pertained to each of the following areas: (a) importance and relevance of program goals, (b) satisfaction with the observed performance, (c) satisfaction with predicted and unpredicted behavior change and (d) acceptability of teaching techniques. Respondents answered the closed-ended questions using a 7-point scale. A score of 1 indicated strong disagreement, a score of 4 indicated uncertainty or no opinion and a score of 7 indicated strong agreement. Closed-ended responses were reported as raw scores per respondent and as a mean score per question. Open-ended responses were copied verbatim from questionnaires.

Interobserver agreement. All assessment and treatment sessions were videotaped. A trained observer using a hand-held computer scored most sessions in real time, and these were used as the primary data. The remaining sessions, and all secondary observations, were scored from videotapes. During sessions in which the observer was present, the location of the observer varied, with the observer either partially obscured from the participant's view or seated in such a position that attending to the observer would require that the participant turn his head. Interobserver agreement (IOA) was collected in 37% of sessions for Jim and in 39% of sessions for Harry. IOA was collected during a minimum of 33% of sessions within each condition (e.g. functional analysis, baseline, uncorrelated cards, multiple schedule, etc.) Agreement for off-task behavior and prompts was determined by partitioning sessions into 10-s bins and comparing data collectors' observations on an interval-by-interval basis. Within each interval, the smaller

number of seconds or responses was divided by the larger number of seconds or responses.

These quotients were then multiplied by 100 and averaged across all intervals for a session.

When determining agreement for the product measures, the smaller number of completed items tallied was divided by the larger number and multiplied by 100 to yield a percentage agreement for each session. Agreement on the duration of off-task behavior averaged 95% for Jim (range 78% to 100 %), 93% for Harry (range 73% to 100%). Agreement on the duration of stimulus presentation for each component of the multiple schedule averaged 98% for Jim (range 94% to 100 %), 98% for Harry (range 96% to 100%). Agreement on the frequency of therapist prompts averaged 96% for Jim (range 80% to 100%), 98% for Harry (range 90% to 100%). Agreement on the number of products completed each session was 100% for both Jim and Harry.

Interobserver agreement was assessed separately for the initial link of the preference assessment by having a second observer independently record participant card selections.

Agreement was collected on 75% of observations for Jim and 63% of observations for Harry and defined as both observers scoring the same card selection. Agreement on card selection was 100%.

Procedures

Overview. All observations were either 10 or 30 min in duration. Participants' baseline level of off-task behavior was measured during 10-min work samples using two familiar tasks. A functional analysis was then conducted to determine the variable(s) maintaining off-task behavior. Next, using the reinforcer(s) identified via functional analysis, a multiple-schedule procedure was used to establish stimulus control over off-task behavior. Once schedule control was demonstrated, the duration of the component schedule correlated with working (extinction for off-task) was increased, and self-monitoring procedures were introduced. Session length then was extended to 30 min, and the treatment was introduced with a second vocational task, in a

different setting, and with a different therapist. Follow-up probes were conducted three weeks and three months post intervention. A final treatment probe was conducted as the treatment was introduced at a vocational site in a community setting. Subsequent to treatment, each participant's preference for treatments was assessed using a concurrent chains procedure. Finally, participants' parents, teachers/job coaches, and potential employers viewed pre and post-treatment videos and completed a questionnaire in which they were asked to rate: (a) the importance of the treatment goals, (b) their impressions of the performances they observed, and (c) the acceptability of the intervention.

Initial evaluation. First, a brief evaluation was conducted to ensure that the participant could complete the assigned tasks independently. During this skill evaluation, the therapist demonstrated the task to the participant and then asked the participant to repeat the sequence on their own. Participants were selected based on their ability to independently complete the assigned task after a visual demonstration (data not shown).

Baseline sessions. Ten-min baseline sessions were conducted with each participant. These sessions took place in the vocational classroom. At the start of each session, the therapist (a) demonstrated the task, (b) presented the task-specific work materials and (c) stated, "Here's your work." Off-task behavior produced no socially-mediated stimulus changes. However it was still possible for the participant to mediate their own reinforcers. For example, participants could (a) mediate their own break from work by ceasing to engage with the task, (b) access other ambient reinforcers (e.g., look around the room, watch others, peer at computer screens, play with work materials, etc.) and (c) engage in motor and vocal stereotypy (e.g., flap their hands, trace letters in the air or on the table, rock back and forth, hum and repeat songs or phrases) Baseline sessions were conducted prior to functional analysis and during probes following treatment evaluations.

Baseline sessions with uncorrelated cards. After initial baseline sessions, the stimuli that were *to be used* in the multiple schedules were alternated in sessions. This phase was necessary to determine if participants would respond differentially in the presence of either card prior to treatment. Sessions were identical to those baseline sessions previously described with the exception of the presentation and alternation of colored cards. A single card (red or green) measuring 5.1 cm by 8.9 cm was placed in plain view next to the participants' work materials. The cards were alternated at 1-min intervals during the session. Each card was present for a total of 5 min.

Functional Analysis. A functional analysis was conducted with each participant to determine the variable(s) maintaining off-task behavior (Iwata et al., 1982/1994). Four conditions were alternated in a multielement design. The assessment consisted of three test conditions (attention, escape, and tangible) and one control condition. The evaluation occurred in the vocational classroom and each session lasted approximately 5 min. A therapist, familiar to the participant, conducted all sessions and the same vocational materials were present in all sessions. The functional analysis preparation employed was unique in both the target behavior selected and the implicit rather than explicit nature of the demand across test and control conditions. Unlike previous studies that provided consequences for off-task as well as other responses (see Harding et al., 1994; Reimers et al., 1993) programmed consequences were reserved exclusively for off-task behavior. That is, responses other than off-task behavior, including vocal requests for attention or assistance resulted in no programmed consequences. Also distinct from previous studies (Kern et al., 2002; Rodriguez, Thompson & Baynham, in press), the current analysis assessed percentage of session off-task following a *single initial* instruction to work rather than compliance with repeated instruction or series of instructions presented as discrete trials across a single session. Demands are not given continually in our

participant's work environments and on-task was expected in the absence of repeated prompts. The demand, in the present preparation, was implied rather than repeatedly delivered; this variation allowed for assessment of off-task under conditions which closely resembled those that would be encountered in a work setting. To further simulate realistic work conditions, praise was not provided for compliance (on-task responding) during any condition.

At the start of each session across *all* conditions, clerical task materials (e.g., letters and envelopes) were placed in front of the participant and the therapist provided an initial instruction to begin working. During the attention condition, work materials remained present throughout the session. Contingent upon off-task behavior, 30 s of attention was delivered. This attention consisted of encouragement in the form of verbal and gestural prompts to return to work (e.g., the therapist stated "keep working" or "fold the paper" and pointed to the work materials), and included proximal and direct observation of the participant's behavior during the 30-s period. During the escape condition, work materials remained in front of the participant until the participant stopped working (engaged in off-task behavior); contingent upon off-task behavior, work materials were removed for 30 s (no interaction or other materials were provided during this 30-s period). During the tangible condition, work materials remained in front of the participant until the participant engaged in off-task behavior; contingent upon the occurrence of off-task behavior, the work task was removed and a preferred activity was provided for 30 s. The preferred activity for both Jim and Harry was watching a DVD. This activity was selected to mimic "screen time," because access to electronic devices (e.g., computers, TVs, handheld gaming systems, etc.) was available in the participant's vocational settings and is widely available in many work settings. During the control condition, the same work activity was continually present, therapist attention was provided freely throughout the session, and the work task was removed for 30 s and replaced with the preferred activity contingent upon the

completion of one work product (e.g., single mailing). Thus, this final condition controlled for the attention contingency in the test condition by providing attention noncontingently and attempted to control for the escape and tangible contingencies in the other test conditions through differential reinforcement of an alternative to off-task behavior, that being a functional amount of on-task behavior.

Multiple schedule training. After reinforcers for off-task were identified via functional analysis, a multiple schedule procedure was used to establish stimulus control over off-task behavior. The multiple schedule consisted of two signaled component schedules in which different consequences were delivered for off-task behavior. Each component in the multiple schedule was correlated with either a red or green card. In the presence of one card (e.g., red card), extinction (EXT) was programmed for off-task behavior. In the presence of the other card (e.g., green card), off-task behavior was reinforced on an FR-1 schedule. Each component of the multiple schedule (EXT and FR 1) lasted for 150 s; thus, each component occurred twice in each 10 min session.

At the start of each session, the therapist: (a) stated “Here’s your work” or “Here you go,” (b) presented work materials, (c) showed the participant a colored card (red or green), and (d) placed the colored card next to the work materials. After the prescribed component duration elapsed, the operating component schedule changed. This change was signaled by the change in the color of the card (either from green to red or from red to green) as the therapist passed a new card across the participant’s field of vision, and placed the new card on the table while simultaneously removing the old card. The order of card presentation varied across sessions. In the presence of one card (i.e. green card for Jim; red card for Harry), extinction was arranged for off-task behavior. More explicitly, immediate prompts to return to work were provided to address escape-maintained off-task behavior, and tangible reinforcement was withheld to address

off-task behavior maintained by access to tangibles (not only were tangibles not delivered but the participant was essentially blocked from “consuming” ambient visual reinforcers by the experimenters presence following off-task behavior) In the presence of the other card (i.e. red card for Jim; green card for Harry), off-task behavior was reinforced with both escape and access to tangible reinforcement on an FR 1 schedule. Specifically, after each instance of off-task behavior during this component, the participant received both a break from the work task (i.e., work materials remained present but no prompts to return to work were delivered) and 30-s access to a DVD player. After 30 s had elapsed, the DVD player was removed and the session continued. No prompts to work were provided.

Relative component duration changes. Thinning the duration of the reinforcement component of the multiple schedule occurred once data showed that the multiple schedule had begun to acquire control of off-task behavior. The criteria to change schedule component durations was based upon visual inspection of the data. Criteria included: (a) a reduction in the percentage of time off-task behavior occurred in the presence of the card correlated with extinction to less than or equal to 20% of the time for a minimum of 2 consecutive sessions, (b) an increase in the percentage of time off-task behavior occurred when the card correlated with reinforcement was present. After criteria were met, the work schedule (EXT component) was increased to 450 s (EXT) and the reinforcement component leaned to 150 s (FR 1).

Contingent component alternation and self monitoring. Therapist prompts to work, which are a necessary component of escape extinction, were not reduced sufficiently in the extinction component (i.e., total stimulus control was not achieved), therefore a progressive DRA and self-monitoring package was added to the component schedule correlated with extinction. Multiple schedule procedures for this phase were similar to those described previously, with the following critical differences: (a) all sessions began with the presentation of the card previously

correlated with the extinction component, (b) participants were provided with a pencil and a self monitoring sheet containing a grid with unmarked boxes corresponding in number to the ongoing work requirement in effect for that session (e.g., FR 2-15), (c) participants were prompted to mark a box after completing a single item, (d) the DRA requirement was increased systematically across sessions (e.g., FR 2, 3, 4, 6, 8, 10, 15), and (e) the components changed from extinction to reinforcement only after the DRA requirement was satisfied and the participant marked off the final box. In essence, the schedule switched from a multiple schedule with time-based alternation, which was independent of off-task and work unit production, to a chained schedule (see Table 11.1, p. 196 of Catania, 1998), in which components alternated from extinction to reinforcement when and only when a specified amount of work had been completed.

Treatment probes using second task. Next, the treatment probes were implemented across a second task (food-service silverware assembly task) and effects assessed.

Practical enhancements. After probes with a second task showed successful performance, practical enhancements were introduced to task one. Each enhancement was targeted to address a specific concern that might be encountered as the treatment was applied under conditions more similar to typical vocational settings. The first concern was that work periods were too short. Previous studies designed to address workplace performance issues (Ackerman and Shapiro, 1984; Lattimore et al., 2006; Lattimore et al., 2008) suggested that individuals working in community-based volunteer and supported employment would be required to work for periods longer than 10 min. The present intervention would be of limited utility in most work settings unless it could be demonstrated to be effective during extended sessions. We addressed this concern by extending sessions to 30 min. The second concern which required redress was the invariability of the work requirement. Work task requirements were

likely to vary in both type and duration as the treatment was extended to other tasks and settings (e.g., packaging and assembly tasks, Ackerman & Shapiro; clerical tasks, Saunders et al., 2005). The degree to which participants worked productively and at a steady rate across a variety of tasks in the absence of constant supervision was likely to contribute to their success in the workplace (Sowers, et al., 1985). Selecting a schedule of reinforcement that would produce a high and steady rate of performance across tasks was critical. Although an FR schedule was employed during earlier treatment phases to increase responding, FR schedules tend to generate undesirable post-reinforcement pauses that increase in duration as the schedule is leaned (Ferster & Skinner, 1957). In contrast, VR schedules characteristically produce high and constant rates of responding (Ferster & Skinner; for a summary see Table 10.1, p. 178 of Catania, 1998). We addressed concerns stemming from the invariant work requirement by changing the DRA requirement during the work schedule from an FR to a VR schedule. A third concern identified was that reinforcement, to this point, had been provided for off-task behavior during the FR1 schedule. We rectified this concern by changing the reinforced response in the FR1 schedule from off-task to a mand for the reinforcer. This enhancement served to increase the social acceptability of the intervention and made the participants more effective communicators. The fourth concern addressed was the density of reinforcement; the current schedule was too rich to be practical. We addressed this concern by decreasing the reinforcer duration and increasing the work requirement. In effect this change increased the time our participants spent working and as a result increased the number of products completed per session. A final concern which required attention was an increase in off-task behavior (i.e., doodling) occasioned by the self-monitoring materials. We addressed this concern by replacing the pencil and paper with alternative self-monitoring materials (a golf-clicker and post-it note specifying the work requirement).

Treatment extension to different task. After the practical enhancements described above were introduced, the treatment was implemented at its terminal state across the second task (food-service silverware assembly task) in a different setting (student cafeteria) by a different therapist.

Follow-up and extension of treatment to community setting. Probes were conducted three weeks and three months post-intervention. An additional probe was conducted with each participant as the intervention was introduced at a volunteer community site.

Experimental Design

The influence of the multiple schedule (i.e., signaling reinforcement and extinction components with colored cards) on off-task behavior and number of work products completed was evaluated in a reversal design with each participant. The influence of contingent component alternation and self-monitoring on off-task behavior and job coach prompting was evaluated using a multiple baseline across subjects design.

Social Validity Assessments

Social validity assessment with participants. When selecting between available treatment options, it is important to consider not only the relative effectiveness of the procedure but also the preferences of those receiving the intervention (Schwartz & Baer, 1991; Tiger, Hanley, & Heal, 2006; Wolf, 1978). Treatment decisions, however, are often based on the opinions and preferences of well meaning caregivers speaking on behalf of those in need of services. Although advocacy may be useful, it may be misleading to base treatment decisions on *assumptions* about what an individual might prefer, when that individual can be asked their opinions directly using a choice preparation (Hanley et al., 1997). Therefore, preference assessment sessions were conducted directly with both participants using a modified concurrent-chains procedure (Hanley et al.). Preference assessment sessions were conducted in the

vocational classroom and lasted approximately 30 min. Each session consisted of two parts, an initial link and a terminal link. During the initial link, the participant selected from among three different cards (15 cm by 22 cm) which were correlated with three different treatments for off-task behavior in the terminal link (extinction, mixed schedule, and multiple schedule). On the cards were photographs of materials correlated with the specific arrangement scheduled for the terminal link. Each card included one, two, or three photographs (5 cm by 8 cm) correlated with the materials present in the corresponding session. Option one, EXT, depicted work materials only (letters and envelopes); option two, a mixed schedule (time-based component alternation with no correlated stimuli) included two images: the work materials previously depicted and a photograph of a DVD player. Option three, a multiple schedule with self-monitoring and contingent card alternation included three images: the work materials, the DVD player depicted previously and a third photograph depicting the multiple schedule stimuli (self monitoring sheet and pencil for Jim; golf clicker and post-it with number corresponding to work requirement for Harry). Participants' card selection in the initial link was the measure of preference for the treatment in the terminal link.

Prior to the evaluation of participant's preference for treatment, training sessions were conducted to expose participants to the contingencies arranged for selecting each card. During exposure sessions, participants were physically guided to select one of the three cards corresponding to the different treatments (initial link), and subsequent to selection, experienced the different treatments for the selected card (terminal link). The first exposure session for each participant was the multiple schedule. Thereafter, session duration (both EXT and mixed schedule options) and duration of reinforcer presentation (mixed schedule option only) were yoked to the session duration and reinforcer duration from the previous multiple schedule session. After six experiences with each option (i.e., extinction, mixed, and multiple schedule),

participant preference for treatment was assessed by presenting the cards corresponding to the different treatments and allowing the participants to select the treatment to be experienced. Previous experience with each card and its consequences during exposure sessions increased the likelihood that the participants (who had limited receptive and expressive language skills) would be able to accurately indicate a preference. As an additional safeguard against a side bias or position preference, cards were rotated right to left before each session. A minimum of three (free choice) preference assessment sessions were conducted with each participant.

Social validity assessment with other stakeholders. After assessing the participants' preference for treatment, the participants' parents, job coaches, and potential employers were asked participate in a survey to assess their views on the current intervention. Directly asking the opinions of those who work with, educate, and care about individuals receiving behavior analytic services is both important and useful. The practice of conducting a social validity assessment increases the likelihood that (a) the goals of treatment are relevant to the individual being served, and (b) the procedures employed are acceptable to the community (Wolf, 1978). In addition, information gathered in the process of assessment has the potential to improve both procedures and outcomes (Schwartz & Baer, 1991). Stakeholders were asked to view video samples collected pre- and post-treatment and then provided with a brief written description of the program goals and procedures. Unique stakeholders were recruited for each participant. This insured that stakeholder responses were not influenced by repeated exposure to the questionnaire or biased by video of the other participant's performance. Video samples for each participant depicted the first 5 min of the initial baseline session and last 5 min of the final treatment session. During the course of the survey, each respondent was asked to respond to items on a questionnaire. The questionnaire (see Table 1 or Appendix A) employed a 7-point scale and contained questions pertaining to each of the following areas: (a) importance and relevance of

program goals, (b) satisfaction with the observed performance, (c) satisfaction with predicted and unpredicted behavior change and (d) acceptability of teaching techniques. To gain additional information, several open ended response questions were included as well.

Results and Discussion

Functional analysis. Functional analysis of off-task behavior presented a unique problem. Assessing the function of off-task behavior was difficult because: (a) off-task often occurs alongside other responses and (b) off-task may produce its own reinforcer (escape from work and access to other reinforcing stimulation are available without being mediated by another person). However, as with other forms of problem behavior, the variables responsible for the maintenance of off-task behavior are best identified via functional analysis (Iwata & Dozier, 2008). To the extent that off-task behavior produces its own negative reinforcer, off-task behavior may be conceptualized as having an automatic function. However, like other responses that can directly produce their own reinforcer (e.g., self injury), off-task may have other functions based on its history of reinforcement (just as self-injury may be maintained by escape or other social reinforcers; Iwata et al., 1994). In addition to the problems presented by off-task behavior's automatic negative function, individuals who engage in off-task behavior (unlike those who engage in noncompliance), may readily respond to prompting, making trial-based assessments (such as those employed by Kern et al., 2002; Rodriguez et al., in press) insensitive to the off-task response.

For the reasons stated, the assessment of off-task behavior required a unique analysis. Although both test and control conditions were included, the present analysis differed from the typical analysis format originally described by Iwata et al. (1982/1994). Specifically, a tangible condition replaced the alone condition in the analysis and all conditions (test and control) included work materials. The tangible condition was specifically introduced to provide access to

a reinforcer that was readily available in vocational settings. Work materials were included across conditions because off-task behavior could only be assessed in the presence of a work task.

The analysis also differed from other extensions of Iwata et al. (1982/1994) to less severe classes of problem behavior in two critical ways. First, unlike previous extensions of functional analysis methodology which grouped off-task with other, often more severe, problem behavior and provided the same consequences for all inappropriate responses during test conditions (Harding et al., 1994; Reimers et al., 1993), the current analysis specifically targeted a single response: off-task. Limiting the contingency class to off-task behavior alone, allowed for the experimental identification of the specific variables maintaining this response (see Hanley et al., 2003, p. 169, for a further discussion on the advantages of limiting the topographies of behavior within a contingency class). A second critical difference related to the way in which demands were presented across assessment conditions. Distinct from previous studies designed to assess *compliance* to a series of instructions or single instruction presented as discrete trials across a single session, (Kern et al., 2002; Rodriguez et al., in press), the current study assessed the percentage of session off-task following the presentation of an *initial* instruction to work. After the initial instruction, the demand was implied and off-task behavior was free to occur. This presentation format created a situation in which off-task could be assessed in a free-operant arrangement that more closely resembled the type of schedule that would be encountered in a work setting.

The operations used in each condition were selected so that the reinforcing efficacy of a variety of consequences could be tested. During the attention condition, social interaction was provided contingent upon the occurrence of off-task. Social interaction in the attention condition mimicked conditions likely to be experienced in a 1:1 job coaching situation and consisted of

prompts to return to work contingent upon the off-task response. Low levels of off-task were observed in the attention condition suggesting that the off-task behavior exhibited by these participants was not maintained by attention (social-positive reinforcement) in the form of repeated prompting. During the escape condition, the putative negative reinforcer (escape from the work task) was provided contingent upon the occurrence of off-task behavior. This condition allowed both breaks from work as well as allowed participants to readily “consume” ambient reinforcers (individuals often do something when they are not working). This not necessarily different than other tests for behavior maintained by negative reinforcement (Iwata et al., 1994), but seems especially important when assessing off-task behavior. During the tangible condition, access to a DVD player was provided contingent upon the occurrence off-task. In order to access the DVD player, it was necessary for participants to also take a break from working. Thus, both escape and tangibles were available in the tangible condition. A positive result in this condition would therefore not allow for a definitive interpretation of a singular tangible function. During the control condition, no differential consequences were provided for off-task. In addition, the putative reinforcement contingencies tested in other conditions were provided; attention was provided freely and access to escape or a DVD were provided contingent upon an alternative response (working).

Results of the functional analysis are displayed in Figure 1. Levels of off-task behavior were elevated in both the escape and tangible conditions relative to the control condition, indicating that the off-task behavior of both participants was sensitive to social-negative (escape from demands) and possibly social-positive (access to DVD) reinforcement.

Both participants’ off-task behavior showed sensitivity to escape and access to screen time as reinforcers. Because rates were not higher in the tangible condition, we cannot conclude that the tangible reinforcers were as or more critical than escape. Similarly, because participants

could access ambient stimulation during the escape condition, it is not possible to assert that negative reinforcement was the sole variable influencing off-task behavior. It can, however, be asserted that attention in the form of prompts to return to work did not serve as reinforcement for Harry or only were only a weak influence on off-task for Jim. Therefore, these data were useful in conveying that prompts to return to work would not exacerbate off-task behavior and that escape and tangible reinforcers could be used to establish stimulus control of the off-task behavior in a multiple schedule.

The present data sets did not isolate an exclusive tangible or attention function but the assessment model has the capacity to identify both. With respect to identifying a tangible function, if responding had occurred in the tangible condition but not the escape condition, results would indicate a simple effect of tangible reinforcement. With respect to identifying an attention function, social-positive reinforcement for off-task was provided exclusively in the attention condition. Altering the assessment to provide tangible reinforcement without escape would require the use of a different stimulus that would not require much time to consume (e.g., an edible) and necessitate the introduction of prompts to prevent escape from the task from confounding this tangible condition attention in the form of prompts to work.

In the present analysis, for both participants, off-task behavior appeared to be multiply controlled by both escape and tangibles. These results showed that despite the availability of automatic positive and negative reinforcers for off-task, systematic manipulation (mediation) of these same reinforcers resulted in an understanding of the differential sensitivity of off-task to different types of positive and negative reinforcers. This information is critical for designing a function-based and stimulus control-based intervention for off-task. Additional research could be conducted to determine if attention or escape alone serve to maintain off-task in some

individuals. If an attention function is identified, future research should assess the degree to which the present assessment and treatment model successfully address an attention function.

Treatment evaluation. The results of the baseline and treatment sessions are provided in Figures 2 and 3. During the initial evaluation, both participants performed the assigned tasks independently; however, baseline data showed that neither Jim nor Harry worked consistently during sessions when presented with either work task. Jim engaged in high rates of off-task across all baseline sessions, whereas Harry's work performance was variable, with an average of 36% of session off-task (range, 22% to 46%).

During the next series of baseline sessions colored cards were introduced to assess their effects on off-task responding. The introduction of uncorrelated cards resulted in changes in responding for both participants. For one participant (Jim) the presentation of uncorrelated cards resulted in a decrease in the overall level of off-task behavior (see top panel, Figure 2). It is possible that the approach of the therapist every minute to change cards functioned as a prompt for Jim to return to work. However, work behavior did not persist after the therapist moved away. Jim's off-task behavior remained elevated above optimal performance levels, and differential responding to card color was not observed (bottom panel). For the second participant (Harry), differential responding to card color *was* initially observed (see bottom panel, Figure 3); however, the effect was inconsistent and off-task behavior (top panel) increased across uncorrelated card sessions.

During the first treatment phase, a multiple schedule (EXT for off-task and FR1 access to escape and a DVD player for off-task) was used to establish stimulus control over off-task behavior for both participants across one task. Due to Harry's initial differential responding to card color during baseline sessions, the colored card correlated with the highest rates of off-task behavior during baseline (i.e., red card) was correlated with the extinction schedule. As the

multiple schedule was introduced (and subsequently leaned), changes in off-task behavior (top panels, Figures 2 and 3) came to correspond closely to the ongoing schedule requirement programmed (e.g., 450 s working and 150 s off-task). The multiple schedule arrangement decreased the percentage of time off-task during the extinction component (bottom panels) and increased work production (i.e., products completed per minute; third panels) for both participants, supporting the use of a multiple schedule to increase the discriminability of reinforcement availability for being off-task in a work context. However the overarching goal of promoting persistent work performance in the absence of constant supervision was not achieved in this phase. Although off-task behavior was reduced and schedule control was established using the multiple schedule arrangement, the time-based alternation of EXT and FR 1 for off-task did not decrease instances of prompting during the schedule correlated with working (second panels) to meaningful levels for either participant.

Perhaps continued off-task responding (as evidenced by the continued need for prompting) in the EXT component resulted from the automatic-negative reinforcement inherent in off-task. Although multiple schedule arrangements have been employed successfully to facilitate discriminated responding with behavior maintained by access to positive reinforcement where control of the reinforcer is exclusively socially mediated (for examples see Hanley et al., 2001; Tiger & Hanley, 2004), both the automatic-negative reinforcement properties of off-task, and the time-based schedule alternation inherent in the multiple schedule may have prohibited stimulus control from developing over off-task with this treatment. In order for off-task to be observed and consequences provided, the response was necessarily allowed to occur in both schedules. In effect, each component within the multiple schedule may have provided some reinforcement for off-task and therefore, each component stimulus signaled the availability of more or less reinforcement for off-task responding (as opposed to some versus no

reinforcement). Specifically, the stimulus correlated with the extinction schedule signaled the availability of brief access to reinforcement for off-task as participants could mediate their own breaks and access ambient reinforcers by ceasing to work for up to 2 s before prompts were delivered and the stimulus correlated with reinforcement for off-task signaled the availability of extended reinforcement for off task (2 s of off-task produced an extended break and access to a DVD).

Because off-task responding during the EXT component continued at an unacceptable level, the schedule arrangement was changed such that participants could move from the EXT component to the FR 1 component only after completing a particular response requirement. We hypothesized that making schedule component alternation contingent on a particular amount of work and incorporating a self-monitoring component into the schedule correlated with working (i.e., EXT) might further decrease the need for ongoing prompting by providing conditioned reinforcement and additional discriminative stimuli for reinforcement for working.

During the next treatment phase (multiple schedule plus self-monitoring and contingent card alternation) changes were introduced to the multiple schedule to address the need for frequent prompting. The addition of progressive DRA and self-monitoring to the EXT component resulted in a desired decrease in the frequency of therapist prompts during this component schedule for both participants (second panels). Both Jim and Harry quickly learned to self-monitor their own production. Jim required 16 prompts across seven sessions to master the self-monitoring task; Harry required 13 prompts across the same number of sessions.

The move to response-contingent component alternation did not, however, result in an increase in productivity for either participant (third panels); although participants were off-task less and required fewer prompts, they did not produce more. Unlike participants in Ackerman and Shapiro (1984) who maintained performance after the introduction of self-monitoring

procedures, a slight decrease in productivity (third panels) from the previous phase was noted immediately for Jim and as schedule requirements increased for Harry. It is possible the introduction of additional stimuli to the work schedule (self-monitoring materials) had the effect of slowing down responding. The decrease in the number of work products completed per minute may have been (a) the result of the additional time necessary to complete the self-monitoring, (b) an artifact of the chained schedule itself in which discriminative stimuli support less responding the further the stimuli are from the end of the chain (Catania, 1998) or (c) a combination of both: time to complete the self-monitoring and the chained schedule. Despite the slight decreases in work products, both participants productivity remained high with respect to their own baseline performance. Jim completed an average of 2.3 products per min during this phase compared to 0.2 products per min during baseline, and Harry completed an average of 3.4 products per min during this phase compared to 1.0 products per min during baseline.

The purpose of moving from a multiple schedule with response independent card alternation to a schedule which included response-dependent schedule alternation and a self-monitoring component was to decrease the amount of supervision the participants required during work periods. We speculate that the addition of progressive DRA and self monitoring to the EXT component was effective in reducing prompts because it made the contingency more discriminable. Participants were provided with stimuli signaling the ongoing work requirement before reinforcement could be accessed. In contrast to the previous arrangement in which the opportunity to access reinforcement for off-task was produced on a response-independent, time based-schedule (also known as noncontingent reinforcement; NCR), the progressive DRA schedule allowed participants to maximize reinforcement by working during the EXT schedule component. It is possible that the presence of the self-monitoring sheet also may have become a

conditioned reinforcer for working through its pairing with longer, higher quality breaks with a DVD.

To confirm that improvements in work performance were attributable to the intervention, and not merely an artifact of repeated exposure to the work materials, a brief reversal was conducted with both participants. This reversal condition was identical to the baseline condition with work materials and no schedule-correlated stimuli. In this condition, there were no scheduled consequences for either off-task or work completion. Reinforcement was not explicitly provided but, participants could and did mediate their own reinforcement by ceasing to work on the task, engaging in motor stereotypy, talking to staff, talking to themselves, looking out into space, looking out the window, watching others, or peering at computer screens. In the return to baseline, rates of off-task behavior and product completion returned to original baseline levels (first and third panels). Once treatment was reintroduced, off-task behavior decreased (first panels), performance again came under control of the ongoing schedule (bottom panels), the number of products completed per minute increased (third panels), and the rate of therapist prompts to work returned to rates consistent with the previous treatment phase (second panels).

Although the procedural changes made to the multiple schedule arrangement (a) decreased the need for ongoing supervision and (b) allowed the participants to predict the ongoing schedule (work) requirements, the intervention in its current form remained somewhat impractical. Work periods were too short, work requirements invariant, reinforcement continued to be provided for the problem behavior, and the reinforcement schedule was too rich. Changes were necessary if the intervention was to be useful under more typical work conditions. In addition, the utility (and practicality) of the intervention would be increased greatly if probes conducted with a second task showed generalization of treatment effects across people, tasks and

settings without need for additional training trials (Baer, Wolf & Risley, 1968; Stokes & Baer, 1977).

To address concerns over the utility of the treatment and to address possible factors that might limit the generality of the treatment, practical enhancements to the intervention were introduced (depicted below the top panels of Figures 2 and 3). The effects of the enhanced treatment were assessed across both the initial task (clerical task) and a second task (food-service silverware assembly). With respect to the first task, schedule control (bottom panels) and productivity (third panels) were maintained and prompts (second panels) remained low as sessions were extended to 30 min. During treatment probes with the second task, off-task behavior was reduced significantly relative to baseline (open circles, top panels, and productivity increased (open circles, third panels). The multiple schedule arrangement exerted control over off-task (bottom panels) for both Jim and Harry, and prompts (open circles; second panel, Figure 3) during the extinction schedule remained very low for Harry.

For Jim, the increase in frequency of therapist prompts to work across successive probes with task two (open circles; second panel, Figure 2) resulted from his difficulty completing a specific portion of the second task (inserting rolled silverware into a plastic sleeve while wearing loosely fitted food-service gloves). During these probes, the majority of prompts to return to work were provided after Jim (a) quit the task after several unsuccessful attempts to insert the silverware into the sleeve, or (b) requested and waited for assistance with this portion of the task. Unlike previous sessions in which prompts were provided only for off-task behavior, in these sessions prompting included both instruction to keep working and assistance with task itself. This circumstance highlighted the need for ongoing assessment of variables affecting work performance as treatment was extended across different tasks (Parsons et al., 1999). In this instance it was determined that environmental modification (e.g., tighter fitting gloves), rather

than changes to either the extinction or work schedules, was necessary to increase Jim's independence with this task, and plans were made to include this modification in subsequent probes.

In typical work-training environments, the goal of training is to prepare individuals to work independently (Lattimore et al., 2006; Lattimore et al., 2008; Sowers et al., 1985). For this goal to be met, work behavior must generalize to other settings and be maintained by schedules operating within those settings (Stokes & Baer, 1977). Therefore, sessions in which no prompts were provided were conducted to assess the efficacy of the intervention under more typical work conditions and to determine whether prompting could be eliminated completely from the treatment package. Of primary interest was the effect of this no-prompt condition on off-task behavior and productivity during the work schedule. For both participants, schedule-correlated cards exerted stimulus control over off-task behavior (bottom panels, Figures 2 and 3) and productivity (third panels) was maintained for the first two to three sessions. Off-task behavior during the work schedule increased for both participants in subsequent no-prompt sessions as participants' off-task behavior presumably came into contact with automatic negative and positive reinforcement; participants could stop working and access the available ambient reinforcers for extended periods of time. Although access to a DVD for completing the work requirement was still available, in the absence of an extinction component (minimal prompts to return to work), participants increasingly accessed more immediate reinforcers (i.e. escape as well as ambient reinforcers described previously). Previous research conducted on the efficacy of reinforcement-based interventions implemented with and without extinction (Hagopian et al., 1998; Iwata et al., 1994) suggests that effective treatment usually requires withholding the behavior's maintaining reinforcer. In the present case, functional analyses had identified escape and possibly access to tangibles as the reinforcers maintaining off-task behavior. Data from no-

prompt sessions strongly suggest prompts (which functioned to prevent escape during the work schedule) were a necessary component of treatment for both Jim and Harry. Prompts may have effectively interfered with access to both escape and ambient positive reinforcers. Prompts to work (escape extinction of off-task) not only resulted in the discontinuation of negative reinforcement (escape from task), but also interrupted the consumption of ambient reinforcers (i.e., functioned as a type of sensory extinction). The return to full treatment (reintroduction of prompts during the work schedule) resulted in immediate decreases in off-task behavior (top panels), and increases in productivity (third panels).

After the return to full treatment, additional probes were conducted to assess the generality and durability of the treatment across settings and over time. Generality was demonstrated when treatment effects were maintained as the intervention package was implemented by a second therapist, using a second task in a different setting within the school (open circles; first, second and third panels). Durability was demonstrated when treatment effects were maintained during probes conducted three weeks and three months after intervention. Finally, the generality and the durability of the intervention were further demonstrated when treatment effects were maintained as the intervention package was introduced at a community-based volunteer site. In sum, the addition of self-monitoring and progressive DRA procedures probably increased the utility and portability of the multiple schedule preparation by: (a) signaling the ongoing schedule requirements for various tasks and (b) providing participants' coworkers and employers the opportunity to observe supported employees remaining on-task and self-monitoring product production. The ease with which the treatment package has been applied to and effectively established stimulus control over off-task behavior across tasks, people, and settings without the need for additional training sessions lends further support to the treatment's utility and practicality.

In the present analysis, participants were not required to change work tasks during sessions; however, the ability to transition independently between tasks may be important in some work contexts. It is possible that incorporating picture prompts (Wacker et al., 1985) into the current treatment arrangement could further increase the efficacy of the intervention in situations that require such transitions. Future research should focus on assessing the utility of the intervention under conditions which require transitions between work activities and if necessary the effect of incorporating additional discriminative stimuli (picture prompts) into the self-monitoring component of the intervention.

Secondary efficacy evaluation: The treatment evaluation showed that the multiple schedule effectively reduced off-task behavior; data from exposure sessions conducted prior to assessing each participant's preference for treatment (top and middle panels, Figures 4 and 5) provided a secondary efficacy evaluation and further supported the use of the multiple schedule as an intervention for off-task behavior maintained by escape and access to tangibles. Off-task behavior exhibited by each participant in each of the three session types (i.e., extinction only, a mixed schedule and a multiple schedule) was lowest during multiple schedule sessions (top panels). The number of prompts to work per min (middle panels) was also lowest during multiple schedule sessions. Although Jim's performance provides the most compelling illustration of the superior efficacy of the multiple schedule arrangement on both off-task behavior and prompts, the results are generally similar for both participants.

Social validity assessment with participants. The initial treatment evaluation showed that the multiple schedule was an effective treatment, and the secondary efficacy measures indicated that the multiple schedule was more effective than either extinction alone or a mixed schedule; however, it was still unclear which treatment each participant preferred. In the current study, therefore, preference assessment sessions were conducted directly with both participants.

As expected, both participants exclusively selected the treatments in which reinforcement was available (mixed schedule and multiple schedules) as opposed to the extinction treatment, in which no programmed reinforcement was available. However, both participants showed a strong preference for the multiple schedule arrangement. Given a choice, Jim chose the multiple schedule exclusively and Harry allocated 75% of selections toward the multiple schedule arrangement (bottom panels, Figures 4 and 5). This preference for the multiple schedule over the mixed schedule cannot be attributed to either (a) a higher rate of reinforcement or (b) shorter extinction period in the multiple schedule sessions; durations for both reinforcement and extinction were equal across the two session types. In fact the multiple and mixed schedules were equal in all but two respects: (a) the presence or absence of schedule correlated stimuli and (b) the presence or absence of a contingency between alternative responding and access to reinforcement. That is, during multiple schedule sessions access to reinforcement was contingent upon completing a work requirement, whereas, during mixed schedule sessions, access to reinforcement was time-based and yoked to the previous multiple schedule session. Preference for the multiple schedule may have been a function of the schedule correlated stimuli functioning as conditioned reinforcers or a function of the explicit contingency between working and accessing reinforcement (see Hanley et al., 1997, and Luczynski & Hanley, 2009, for other studies showing people preferring contingent to noncontingent reinforcement).

Tiger, Hanley, and Heal, (2006) also compared participant preference for varieties of compound schedules. These authors compared the effectiveness of and participant preference for two different multiple schedule arrangements (i.e., one involving a signal for reinforcement and a different signal for extinction [S+/S-] and another involving only an explicit signal for reinforcement [S+ alone]), and mixed schedules and found that participants preferred multiple schedules over mixed schedules. Additionally, although the S-, or extinction correlated stimuli,

were not necessary to produce discriminated responding, schedules that included these stimuli were preferred by participants with better discrimination skills. Tiger et al. argued that the presence of S- stimuli allowed the participant to respond more efficiently. Participants in the present study may have preferred the multiple schedule arrangement (which included an explicitly signaled extinction component) because it allowed them to respond efficiently under both extinction and reinforcement schedules. The multiple schedule stimuli (cards and self-monitoring materials) allowed the participant to predict both (a) the number of required work responses remaining until reinforcement was available and (b) when the target response (e.g., off-task, or polite mand) was likely to result in reinforcement.

Social validity assessment with other stakeholders. After treatment sessions showed the multiple schedule arrangement to be an effective treatment for off-task behavior and a preference assessment confirmed that participants preferred the multiple schedule arrangement to either a mixed schedule or extinction alone, the opinions of relevant stakeholders were sought.

Stakeholders generally agreed that the ability to work independently was an important skill and (after viewing pretreatment video) that neither participant demonstrated this skill to any meaningful degree prior to intervention (see Tables 1 and 2, questions 1-6; see also Appendices B and C, question 5). All respondents, with the exception of Harry's father, reported significant improvement post-treatment (see Tables 1 and 2, questions 7-10; Appendices B and C, question 9). For Harry's father, his son's stereotypy overshadowed any improvements in on-task performance (see Appendix C). Although Harry engaged in stereotypy while on-task (e.g., eye-blinking, shoulder shrugging) and off-task (e.g., tracing patterns on table with his finger) only stereotypy which resulted in off-task behavior during the extinction component was addressed (though indirectly) in the course of treatment. One purpose of soliciting feedback from stakeholders was to improve the intervention. Feedback from Harry's father suggests direct

intervention for stereotypy during sessions as a logical next step in Harry's treatment. Finally, with respect to the intervention process, stakeholder responses were overwhelmingly positive: All stakeholders indicated they would recommend the intervention process to others (Tables 1 and 2, question 12), and two stakeholders made unsolicited positive comments on the unobtrusiveness of the intervention materials (Appendix C).

Summary. A multiple schedule consisting of signaled periods of reinforcement and extinction was used to influence off-task behavior maintained by escape and access to tangibles in two adolescents with autism. Once schedule control was established, the addition of self-monitoring procedures and a progressive DRA to the schedule component correlated with extinction resulted in a reduction in the number of therapist prompts required by both participants. Systematically increasing the work requirement during the extinction schedule, making schedule alternation contingent upon the completion of the work requirement, and leaning reinforcement during the schedule correlated with reinforcement resulted in further decreases in off-task behavior for both participants and increases in productivity for one participant. Results were maintained for both participants as changes to enhance the practicality of the intervention were implemented. These changes included: (a) extending session length to 30 min, (b) changing the DRA requirement during the extinction component from a FR to VR, and changing the response requirement during the reinforcement component from off-task behavior to a polite mand. Probes conducted three weeks and three months after treatment showed gains were maintained across time. Probes conducted by a different therapist, in a different setting with a second task showed generalization across these parameters. During a final probe, the treatment was successfully introduced at a community-based setting. Preference assessment sessions conducted with each participant showed that both preferred the multiple schedule to either a mixed schedule or extinction alone. Finally, social validity assessment

indicated that stakeholders found the goals of the intervention important, the procedures acceptable, and the outcomes desirable.

General Discussion

One primary goal of Applied Behavior Analysis is to broaden the range of reinforcers available to an individual (Wolf, 1978). Central to this is successful integration into community life, including employment. Behavior analytic treatments should seek to move an individual in this direction. Integration of behavior analytic treatments to community settings requires not only that treatment be effective, but that it be practical and acceptable (Hanley et al, 1997; Schwartz & Baer, 1991; Tessing et al., 2006; Wolf, 1978). Incorporating assessment and function-based treatment in a manner that considers the preferences of those receiving services and the opinions of stakeholders increases the likelihood that interventions will be supported and implemented (Wolf, 1978). This study provides one example of a model for assessing a common problem behavior that precludes integration and independence in vocational settings, identifying effective function-based treatment for that behavior, and making that treatment practical and acceptable. A treatment must first be effective--an ineffective treatment will never be practical (nor should it be acceptable). A multiple schedule arrangement was found to be an efficient, effective, and unobtrusive means for influencing multiply controlled off-task behavior in settings where frequent prompting and redirection was impractical, undesirable, and unacceptable. Measures of preference indicated that participants preferred the multiple schedule procedure to other treatment options. The results of the social validity assessment confirmed that stakeholders found the procedures acceptable, and the outcomes desirable. By incorporating proven behavior analytic methods, seeking the opinions of stakeholders and taking into account the environment in which behavior change is desired, behavior analysts are well positioned to improve the employment prospects of the individuals they serve.

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Table 1

Social Validity Assessment (Jim): Responses from Stakeholders

	Vocational Director	Program Director (current)	Program Director (previous)	Job Coach/ Teacher	Human Resources Director	Parent (mom)	Mean Score
Program Goals							
1. Would you consider the ability to work independently a valuable skill for Jim?	7	7	7	7	7	7	7
2. Do you agree that promoting persistent work performance is likely to increase Jim's job success?	7	7	7	7	6	7	6.8
After Viewing Pre-treatment Video							
3. Do you think this sample of Jim's work performance would be appreciated at a job?	1	1	1	1	1	1	1
4. Are you satisfied with Jim's performance?	1	1	1	1	1	1	1
6. Based on what you just saw, would you hire him?	1	1	1	1	1	1	1
After Viewing Post-treatment Video							
7. Do you think this sample of Jim's work performance would be appreciated at a job?	7	7	6	7	7	7	6.8
8. Are you satisfied with Jim's performance?	7	7	6	7	7	7	6.8
10. Based on what you just saw, would you hire him?	7	7	6	7	7	7	6.8
After debriefing							
11. Would you agree the instruction provided to Jim would be acceptable in a work setting?	7	7	6	7	7	7	6.8
12. Would you recommend this intervention process to others?	7	7	7	7	7	7	7

Note. Judgments were made on 7 point scales (either 1 =strongly disagree, 4 = no opinion and 7=strongly agree or 1=no, 4 = no opinion and 7= yes).

Table 2

Social Validity Assessment (Harry): Responses from Stakeholders

	Vocational Specialist	Program Director	Job Coach/ Teacher	Human Resources Director	Parent (mom)	Parent (dad)	Mean Score
Program Goals							
1. Would you consider the ability to work independently a valuable skill for Harry?	6	7	7	7	7	7	6.83
2. Do you agree that promoting persistent work performance is likely to increase Harry's job success?	7	6	6	7	7	6	6.5
After Viewing Pre-treatment Video							
3. Do you think this sample of Harry's work performance would be appreciated at a job?	2	1	3	1	2	3	2
4. Are you satisfied with Harry's performance?	2	1	3	1	2	2	1.8
6. Based on what you just saw, would you hire him?	1	1	3	1	1	4	1
After Viewing Post-treatment Video							
7. Do you think this sample of Harry's work performance would be appreciated at a job?	7	6	6	6	5	3	7
8. Are you satisfied with Harry's performance?	7	7	6	6	5	2	7
10. Based on what you just saw, would you hire him?	7	6	7	7	5	4	6
After debriefing							
11. Would you agree the instruction provided to Harry would be acceptable in a work setting?	7	7	5	7	6	5	6.3
12. Would you recommend this intervention process to others?	7	7	7	7	6	6	6.7

Note. Judgments were made on 7 point scales (either 1 =strongly disagree, 4 = no opinion and 7=strongly agree or 1=no, 4 = no opinion and 7= yes).

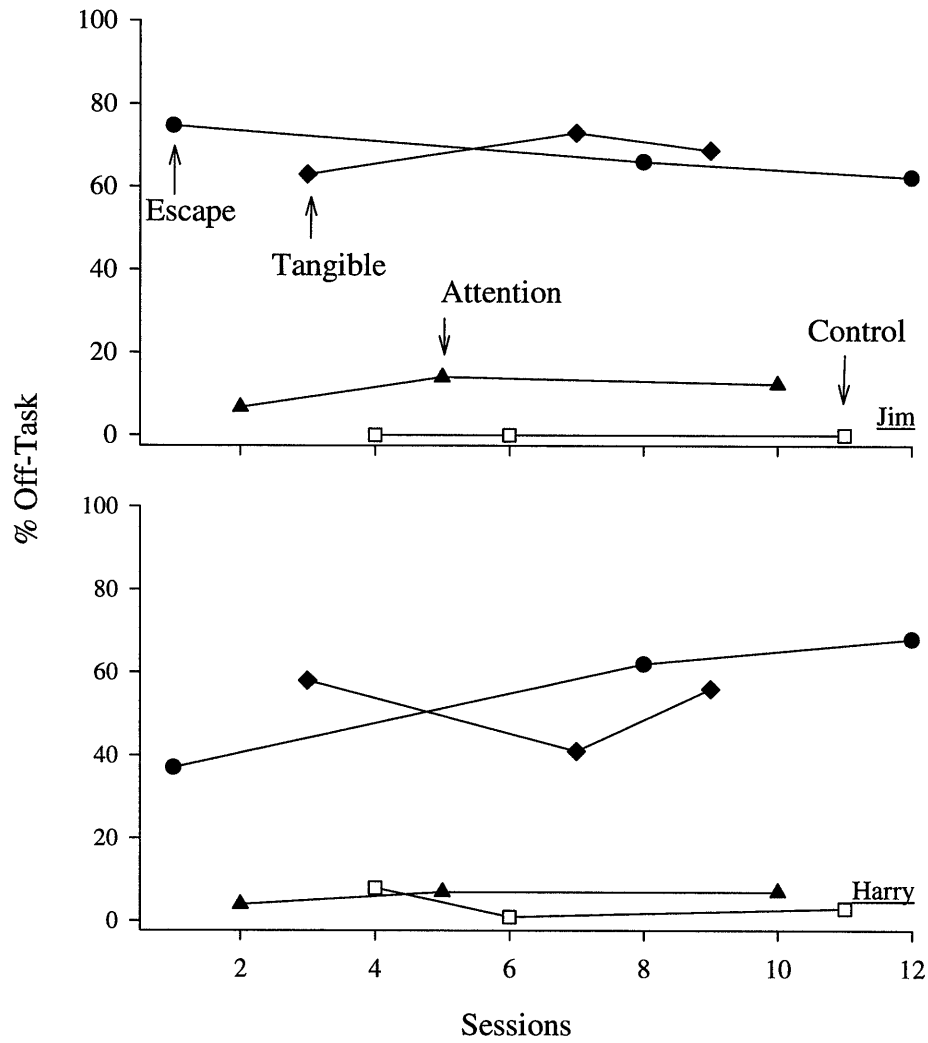


Figure 1. Functional analysis results for Jim (top panel) and Harry (bottom panel). Percentage of session off-task during escape (closed circles), tangible (closed diamonds), attention (closed triangles) and control (open squares) conditions.

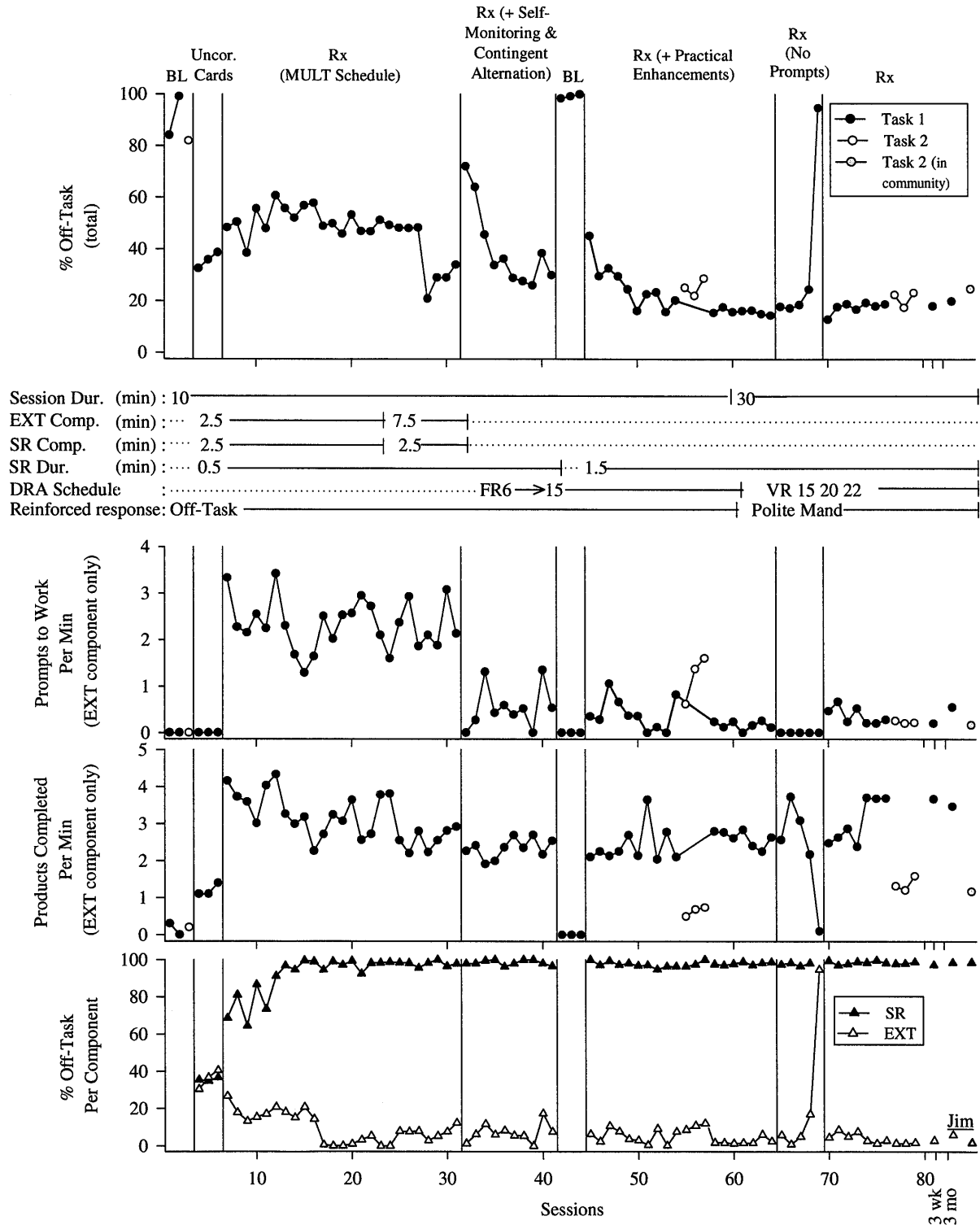


Figure 2. Measures of participant and therapist behavior during the treatment assessment for Jim. Percentage of time off-task per session (top panel), products completed per min during EXT component (second panel), prompts to return to work during EXT component (third panel) and percentage of time off task per component of the multiple schedule (bottom) panel. Phase descriptors below top panel correspond with ongoing schedule changes in session and individual schedule component durations and indicate schedule requirements for reinforcement under both the EXT and reinforcement schedules.

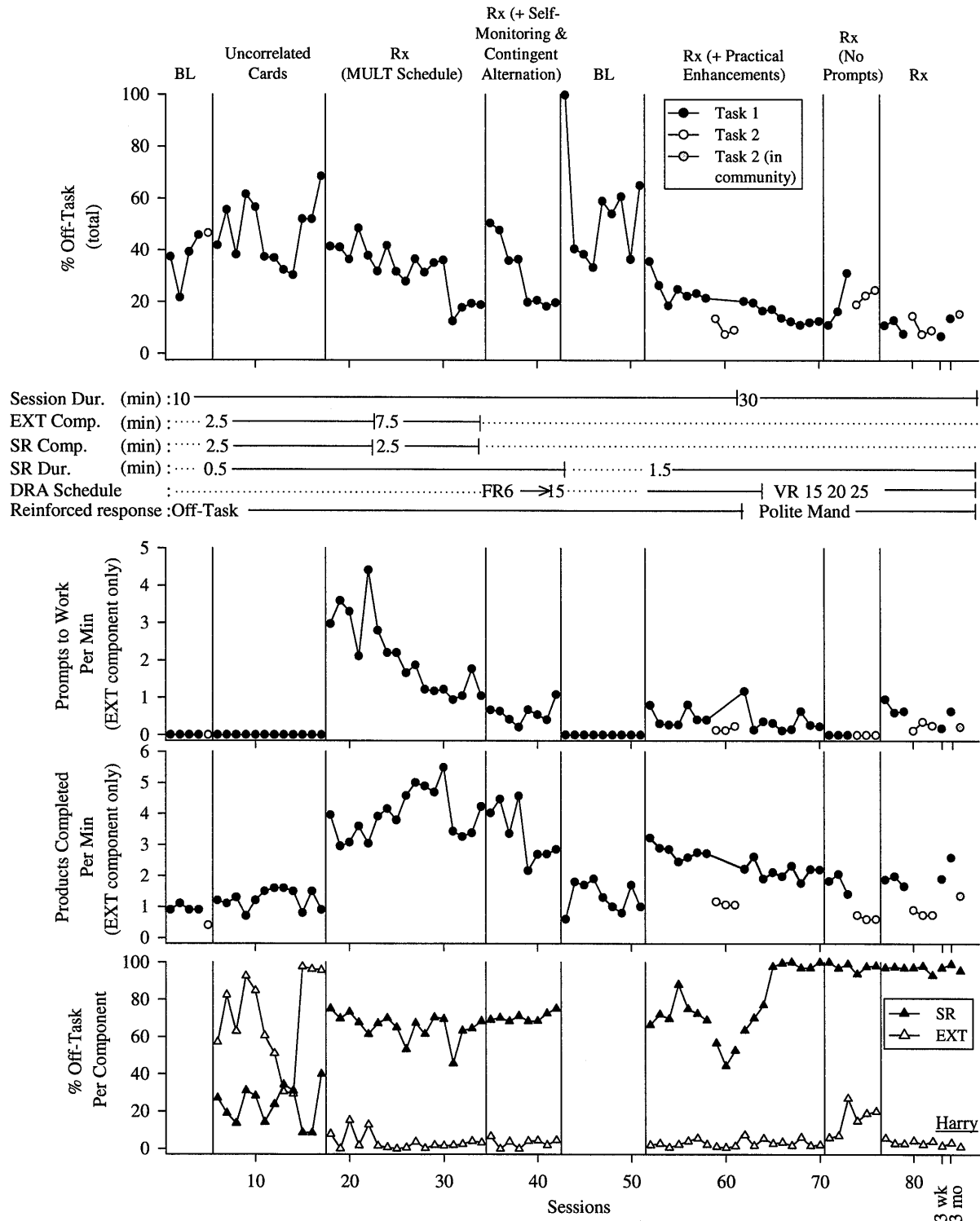


Figure 3. Measures of participant and therapist behavior during the treatment assessment for Harry. Percentage of time off-task per session (top panel), products completed per min during EXT component (second panel), prompts to return to work during EXT component (third panel) and percentage of time off task per component of the multiple schedule (bottom) panel. Phase descriptors below top panel correspond with ongoing schedule changes in session and individual schedule component durations and indicate schedule requirements for reinforcement under both the EXT and reinforcement schedules.

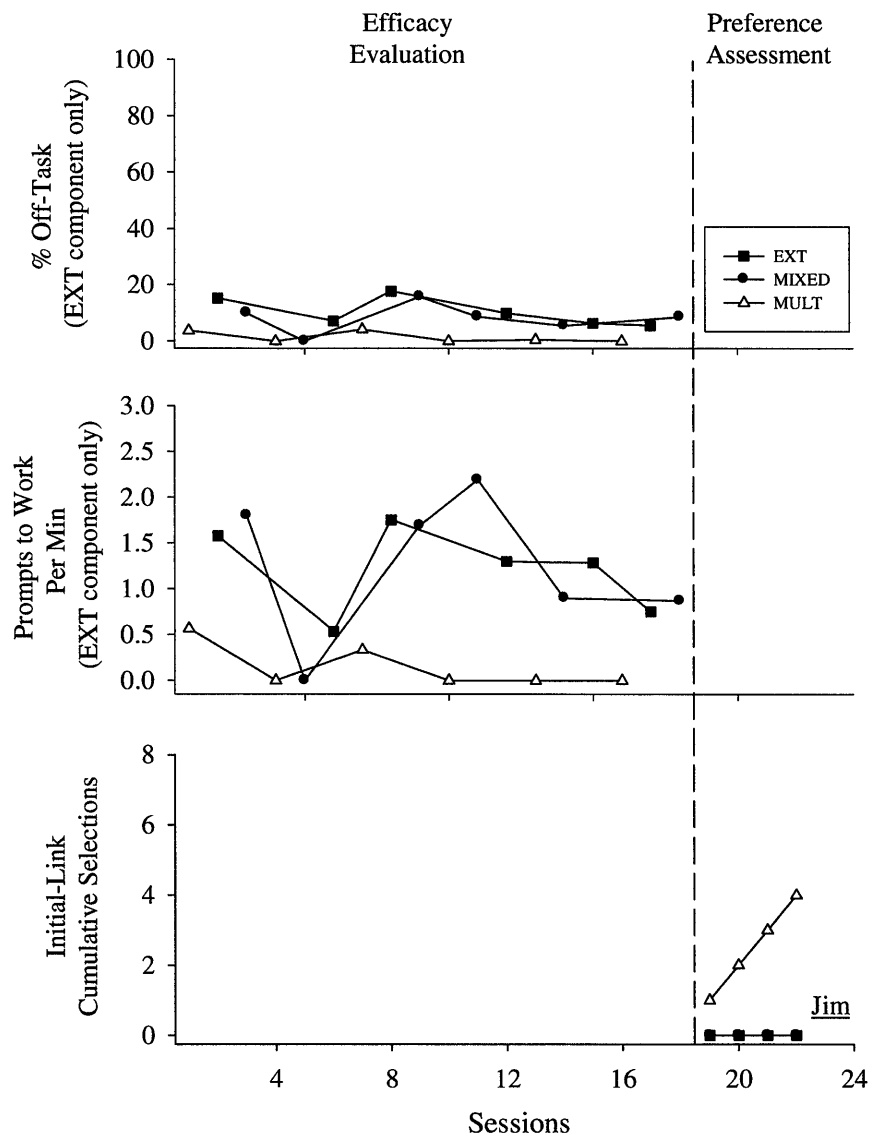


Figure 4. Efficacy evaluation and preference assessment results for Jim. Percentage of session off-task (top panel) and prompts to work per min (middle panel) during exposure sessions with EXT (closed squares), Mixed (closed circles), and Multiple (open triangles) schedule arrangements. Bottom panel depicts the cumulative initial-link selections during the preference assessment phase.

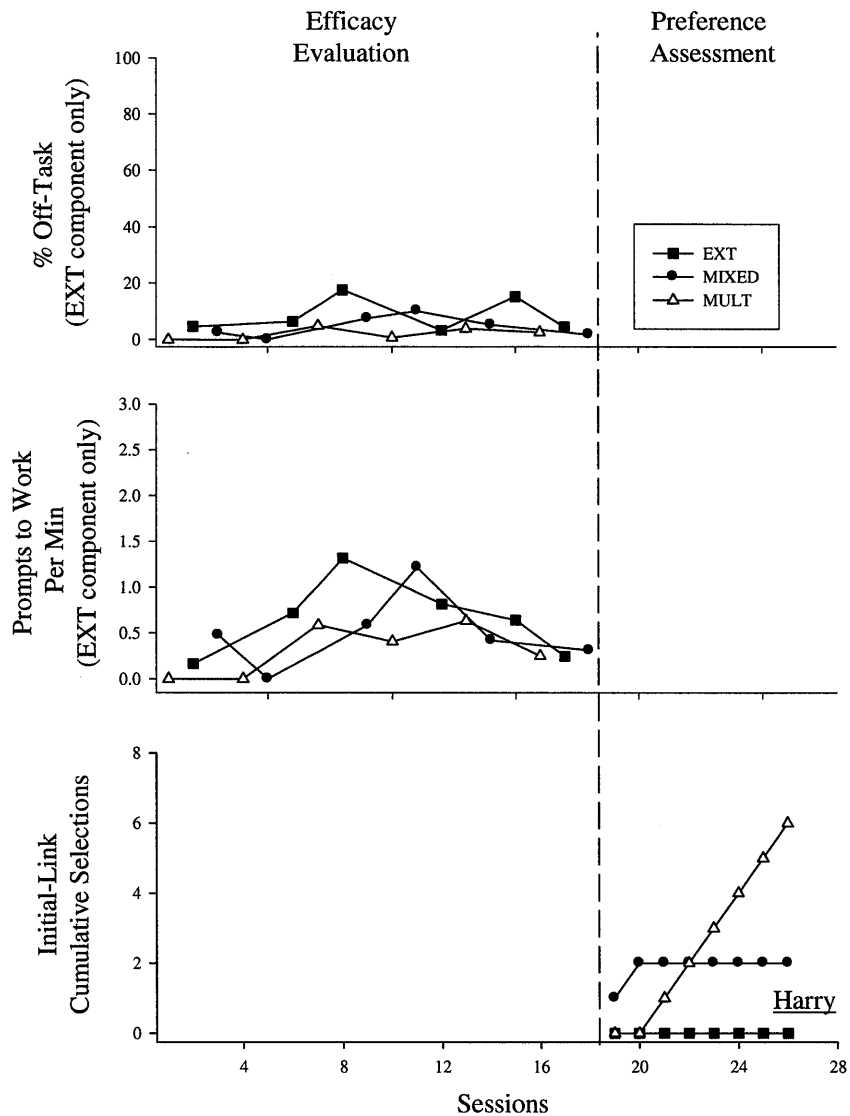


Figure 5. Efficacy evaluation and preference assessment results for Harry. Percentage of session off-task (top panel) and prompts to work per min (middle panel) during exposure sessions with EXT (closed squares), Mixed (closed circles) and Multiple (open triangles) schedule arrangements. Bottom panel depicts the cumulative initial-link selections during the preference assessment phase.

Appendix A

*Social Validity Sample Questionnaire.***Program Goals**

1. Would you consider the ability to work independently a valuable skill for Jim?

1 2 3 4 5 6 7
Strongly No Strongly
Disagree Opinion Agree

2. Do you agree that promoting persistent work performance is likely to increase Jim's job success?

1 2 3 4 5 6 7
Strongly No Strongly
Disagree Opinion Agree

After Viewing Pretreatment Video

3. Do you think this sample of Jim's work performance would be appreciated at a job?

1 2 3 4 5 6 7
No Unsure Yes

4. Are you satisfied with Jim's performance?

1 2 3 4 5 6 7
No Unsure Yes

5. Why or why not?

6. Based on what you just saw, would you hire him?

1 2 3 4 5 6 7
No Unsure Yes

After Viewing Post-treatment Video

7. Do you think this sample of Jim's work performance would be appreciated at a job?

1 2 3 4 5 6 7
No Unsure Yes

10. Based on what you just saw, would you hire him?

1 2 3 4 5 6 7
No Unsure Yes

After debriefing

11. Would you agree the instruction provided to Jim would be acceptable in a work setting?

1 2 3 4 5 6 7
No Unsure Yes

12. Would you recommend this intervention process to others?

1 2 3 4 5 6 7
No Unsure Yes

13. Is there anything else you would like to add that may make the intervention more valuable?
Are there any changes you would like to see or any concerns you'd like addressed?

Appendix B

Social Validity Assessment (Jim): Stakeholder's Open-ended Responses.

	Vocational Director	Program Director (current)	Program Director (previous)	Job Coach/ Teacher	Human Resources Director	Parent (mom)
After Viewing Pre-Treatment Video:						
5. (Are you satisfied with Jim's performance?) Why or why not?	Only completed 2 items in 5 min. Off-task most of 5 min session	no productivity, engaging in mouth play, tasks that were completed were sloppy	He didn't accomplish anything although it was clear he could do the task	In the pre-intervention video Jim only completed 2 finished products in the allotted time, his performance would look poor to his employer	long pauses in task performance, doesn't appear interested in the task	he seems totally unmotivated and unproductive
After Viewing Post-Treatment Video:						
9. (Are you satisfied with Jim's performance?) Why or why not?	On task and completed work correctly for 5 min with interruptions and traffic in work environment, maintained on task behavior	consistent work production, good personal appearance, little/no stereotypy, maintains neat and organized work space, engaging in self monitoring	on task consistently	Jim's work performance has tripled with the intervention that has been placed. His on-task performance is remarkable	Check system was unobtrusive	He is working steadily, pleasantly and independently
After Debriefing						
13. Is there anything else you would like to add that may make the intervention more valuable? Are there any changes you would like to see or any concerns you'd like addressed?	I want a copy of the program	options to utilize package in settings/activities other than strict tabletop	his performance slowed down and I would like to see SR+ schedule thinned	I feel that the intervention procedure is very effective with this individual. I felt it was amazing to see how on task Jim was in the post intervention with all the different distractions in the room.	very nice	no changes

Appendix C

Social Validity Assessment (Harry): Stakeholder's Open-ended Responses.

	Vocational Specialist	Program Director	Job Coach/ Teacher	Human Resources Director	Parent (mom)	Parent (dad)
After Viewing Pre-Treatment Video:						
5. (Are you satisfied with Harry's performance?) Why or why not?	Only completed a few, although neatly and thoroughly. Within time sample, a lot of pausing & stimming.	he is able to complete the task but is extremely slow at the job and spending the majority of the time engaging in stereotypy-long pauses between each envelope	Over the course of a 5min period, he folded 4 or 5 envelopes and that is too slow for a paying job. Higher volume of envelopes folded is needed an less stereotypy as to not distract others	Harry was distracted and did not stay on task. His job coach did not assist or prompt him.	I think he can do better.	Stereotypy would not be tolerated in a regular work setting possibly in a work supported environment
After Viewing Post-Treatment Video:						
9. (Are you satisfied with Harry's performance?) Why or why not?	Completed task quickly, neatly and thoroughly (with a smile on his face). He also got more materials when he ran out.	working independently, improved rates of production without need for adult/job mentor	productivity was much higher, there was less stereotypy and the student was very focused	He was much more focused. If I were an employer I'd like him to work more quickly but there was a dramatic improvement from his pre-intervention performance.	better	needs to work harder
After Debriefing						
13. Is there anything else you would like to add that may make the intervention more valuable? Are there any changes you would like to see or any concerns you'd like addressed?	The clicker was a great idea- very unobtrusive in a work setting. Was there a reinforcement component?	No comment	None that I can think of. The use of wallet sized colored cards is a great idea as it is less likely to be noticed in public and therefore less stigmatizing	No comment	No comment	Keep pushing him. Can it be paired with a reinforcer following the task? My main concern is his continuing stereotypy. Thank you for all your hard work.