

Introduction

Compliance is a foundational requirement for educational programming (Hains, Fowler, Schwartz, Kottwitz, & Rosenkotter, 1989), and a repertoire that is frequently limited across students with a variety of disabilities (Asmus, Ringdahl, Sellers, Call, Andelman, & Wacker, 2004; Iwata, Pace, Dorsey, Zarcone, Vollmer, Smith, et al, 1994; Shoen, 1983). Noncompliance with instructions is one of the most common problems for which children are referred for behavioral treatment (Miles & Wilder, 2009), and has been associated with a variety of behavioral excesses, such as self-injurious behavior (Iwata, Pace, Dorsey, Zarcone, Vollmer, Smith, et al, 1994), aggression (Derby, Wacker, Sasso, Steege, Northup, Cigrand, et al, 1992), and property destruction (Lalli, Casey, Goh, & Merlino, 1994). Alternately, improved compliance has yielded corresponding reductions in levels of problem behaviors, sometimes independent of the functions of those problem behaviors (Lalli, Vollmer, Progar, Wright, Borrero, Daniel, et al, 1999; Parrish, Cataldo, Kolko, Neef, & Egel, 1986; Piazza, Fisher, Hanley, Remick, Contrucci, & Aitken, 1997; Russo, Cataldo, & Cushing, 1981; Steege, Wacker, Berg, Cigrand, & Cooper, 1989).

Interventions addressing noncompliance, or any problematic behavior, can be broadly categorized as “proactive” (i.e., coming before problem behaviors occur) or “reactive” (i.e., coming after inappropriate behaviors or off-task behavior). Several examples of each (e.g., Mace, Hock, Lalli, West, Belfiore, Pinter, et al 1988), usually in combination (e.g., Zarcone, Iwata, Mazaleski, & Smith, 1994), have proven effective in the reduction of problem behaviors associated with noncompliance, whether maintained by escape, attention, or both.

Though proactive measures, such as positive reinforcement, demand fading, and behavioral momentum are critical components of many programs, analyses of compliance contingencies are incomplete without consideration of reactive measures. Students in the process of developing compliance will at least occasionally engage in noncompliance and related behaviors, and whether specifically programmed or not, something happens after those problematic behaviors. In the current paper, we review the role of reactive measures in the treatment of compliance and related behavioral excesses, the relevance of matching treatments to behavioral functions, and some potential side effects of “traditional” escape extinction. We will also provide a framework for comparing various reactive treatments and will describe the rationale for the use of a time out from the opportunity to work (colloquially referred to as a “wait out”).

Most studies, whether or not clear descriptions are provided, have made use of both proactive and reactive measures. Dunlap, Kern-Dunlap, Clarke and Robbins (1991) modified curricula across four dimensions hypothesized to affect one student’s motivation: fine vs. gross motor tasks; short vs. long duration tasks; arbitrary vs. functional tasks; activity choice vs. no choice. When the student was allowed to choose short, functional, gross motor tasks, on-task behavior increased and problem behavior was eliminated. A behavior management system in place prior to

intervention that included, in part, a 3-minute seclusion time out, was maintained during this treatment.

Compliance has been improved with the use of behavioral momentum, sometimes in conjunction with escape extinction. Mace, Hock, Lalli, West, Belfiore, Pinter, et al (1988) used behavioral momentum (which necessarily includes positive reinforcement) to improve the compliance of developmentally disabled adults. The authors did not report on the function(s) of noncompliance. Nor did the authors report on the consequences of noncompliance, so it is unknown whether escape extinction contributed to treatment outcomes. Zarcone, Iwata, Mazaleski, and Smith (1994) used behavioral momentum and escape extinction with physical guidance to decrease escape-maintained self-injurious behavior and increase compliance. These authors showed that behavioral momentum was ineffective without the addition of escape extinction with physical guidance.

Compliance has also been shown to improve with the use of positive reinforcers. Parrish, Cataldo, Kolko, Neef, and Egel (1986) used social praise (and occasional edible reinforcers) to improve the compliance of 4 young children diagnosed with moderate or mild mental retardation, and observed collateral decreases in aggression, disruption, property destruction, and pica. In most conditions, when participants failed to respond to an instruction, researchers repeated the instruction with a gestural prompt one time, and did not take further measures to require compliance. In the few conditions including physical guidance as a consequence of noncompliance, researchers observed increased rates of problem behaviors, suggesting either that physical guidance inadvertently reinforced problem behavior or that this guidance functioned primarily as a “reflexive conditioned motivating operation” (i.e., a stimulus that establishes its own removal as a form of reinforcement) (Laraway, Snyckerski, Michael, & Poling, 2003). Compliance was low, and problem behaviors high, when social disapproval was provided for problem behaviors. This suggests that noncompliance and related problem behaviors were maintained by attention.

Escape-maintained SIB has been shown to improve with escape extinction. Iwata, Pace, Kalsher, Cowdery, & Cataldo (1990) used escape extinction with physical guidance, in conjunction with positive reinforcement, to reduce escape-maintained SIB in six children diagnosed with mental retardation. Piazza, Moes, and Fisher (1996) used escape extinction, primarily in the form of verbal reminders (but used physical guidance in 4 sessions and an additional phase to test for “bursting”), in addition to positive reinforcement and demand fading, to reduce the destructive behavior of an 11-year-old male diagnosed with Autism and mild retardation. Functional analysis suggested that attention was the primary maintaining variable, and escape was the secondary maintaining variable. Physical aggression occurred at a higher rate when physical guidance was used than when escape extinction was implemented with only verbal reminders.

Both Functional Communication Training (FCT) (Carr & Durand, 1985; Durand & Merges, 2001) and demand fading (Pace, Iwata, Cowdery, Andree, & McIntyre, 1993; Pace, Ivancic, & Jefferson, 1994), have been shown to have limited benefit without the addition of escape extinction (Mason & Iwata, 1990; McCord, Thompson, & Iwata, 2001). Extinction procedures have been found to reduce escape-maintained problem behaviors more quickly when not combined with demand fading, though initial “extinction bursts” were avoided when demand fading was included (Zarcone, Iwata, Vollmer, Jagtiani, Smith, & Mazaleski, 1993).

Lalli, Casey, Goh, and Merlino (1994), used escape extinction, predictable routines, and positive reinforcement to reduce escape-maintained physical aggression and property destruction, while increasing compliance. The authors did not indicate whether escape extinction was implemented with physical guidance, with verbal reminders, or both.

Escape extinction

A frequent theme in research on escape-maintained noncompliance is that, proactive measures notwithstanding, some form of escape extinction or punishment is necessary. And, some studies not reporting the use of escape extinction may still owe treatment effects, in part, to escape extinction (Smith & Iwata, 1997).

Literature and clinical experience also indicate that there can be negative side effects associated with the use of escape extinction, and that these side effects may limit the use of escape extinction. Students may demonstrate extinction “bursts” (Lerman, Iwata, & Wallace, 1999) and various forms of counter-aggression (Sidman, 1989), including physical aggression (Lerman & Iwata, 1995), especially when physical guidance is necessary (Piazza, Moes, & Fisher, 1996). Physical guidance and verbal reminders function as negative reinforcers and, as such, can reasonably be thought of as resembling Type 1 punishers (Foxx, 1982a). Child responses to escape extinction can also punish teacher/parent behavior, a phenomenon known as “child effects”, thereby decreasing teacher willingness to use escape extinction (McConnachie & Carr, 1997). Physical guidance becomes a practical impossibility as students grow in size and strength.

The fact that escape extinction can produce negative side effects and can suffer from logistical impediments and limited social validity has led some to almost entirely dismiss the strategy (Carr, Dunlap, Horner, Koegel, Turnbull, & Sailor, et al, 1992; Dunlap, et al, 1991) and others to refine analyses to design treatments reducing or precluding the need for escape extinction (e.g., Athens & Vollmer, 2010). Among other things, these analyses and treatments have benefited from consideration of The Matching Law (Baum, 1974; Herrnstein, 1961), which basically states that the relative rate of responding on one alternative will match the relative rate of reinforcement provided on that alternative. When teaching a replacement behavior, the new behavior must become more efficient for the learner than the existing

problem behavior. Apparent contradictions in research findings may be explained by reanalyzing studies through the lens of The Matching Law.

Horner and Day (1991) showed that participants' aggressive and/or self-injurious behavior was replaced by mands for "break" or "help" when single words were reinforced, and that aggressive/self-injurious behaviors returned when full sentence mands were required, or when 3 mands were required before reinforcement, or when 20-second delays were imposed. As the efficiency of replacement behaviors increased, relative to problem behaviors, appropriate replacements increased. Escape extinction was not used in this study.

Athens and Vollmer (2010) decreased escape-maintained problem behaviors and increased cooperation and mands when appropriate behaviors produced longer breaks than were produced by inappropriate behaviors. They also showed that appropriate behaviors would occur more frequently than inappropriate behaviors when appropriate behaviors produced escape and a greater quantity of highly preferred toys and inappropriate behaviors produced escape and access to a single, less-preferred toy. Escape extinction was not used in this study.

Matching Treatment to Function

The need to match extinction strategies to behavioral function has been well documented (Iwata, Pace, Cowdery, & Miltenberger, 1994). Just as "planned ignoring" only functions as extinction when problem behavior is maintained by attention, escape "extinction" only functions as extinction when problem behavior functions for escape. Kern, Delaney, Hilt, Bailin, and Elliot (2002) showed that physical guidance reinforced noncompliance when noncompliance was maintained by attention and decreased noncompliance when maintained by escape.

When treatment is not matched to function, inadvertent reinforcement may occur. Rodriguez, Thompson, and Baynham (2010) noted that "...escape extinction, which involves continued prompting, may inadvertently reinforce attention-maintained noncompliance" (pg. 143). These authors also highlighted the difficulty in distinguishing between escape-maintained and attention-maintained noncompliance. All three participants' noncompliance was maintained, at least in part, by attention, and "attention provided through repeated verbal and physical prompting contributed to noncompliance..." (pg. 147). The concern of inadvertent reinforcement as a function of repeated verbal reminders did not manifest in the study conducted by Piazza, Moes, and Fisher (1996), though attention was identified as the primary maintaining variable of noncompliance in that study.

These findings raise concern regarding analyst capacity to clearly assess the function of a problem behavior. Stereotypy, for example, may function for escape (Iwata, Pace, Kalsher, Cowdery, & Cataldo, 1990), but demands may function as SD's for the availability of attention for stereotypy (Vollmer, Iwata, Smith, & Rodgers, 1992). Likewise, with students for whom negative adult attention functions as a

reinforcer, demands may signal availability of negative attention for various forms of resistance.

To the extent that attention may be at least one of the variables maintaining a problem behavior, it may be more effective to make that attention contingent upon compliance than to make that attention contingent upon noncompliance. “Wait outs”, described in detail later in this paper, accomplish this objective by temporarily withdrawing both access to work materials and attention contingent upon noncompliance.

Intrusiveness of Reactive Measures

Michael (1993) noted that reinforcement is a dynamic process. Reinforcer efficacy is not determined simply via post-compliance conditions, but rather by the transition from pre-compliance conditions to post-compliance conditions. This fact about reinforcer efficacy permits a comparative analysis of various reactive procedures across a single dimension: the degree to which a student’s pre-compliance options are limited. Each of the hypothetical examples provided in Table 1 is simplified by considering only one consequence, such as “allowed to leave the table”, in lieu of consequence compounds, such as “allowed to leave the table and access preferred toys”.

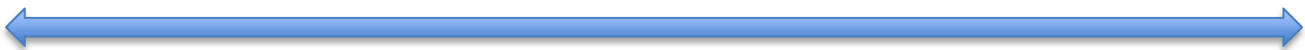
Table 1: Comparing level of intrusion across various stimulus changes

Pre-compliance	Post-compliance
Continual physical guidance	No more physical guidance
Required to stay at the table	Allowed to leave the table
Frequent verbal reminders	No more verbal reminders
No access to iPad	Access to iPad
No PECS board present	PECS board present
Incomplete task remains present	Signs of task completion

Table 2: Research supporting various degrees of intrusion following noncompliance

Most intrusive

Least Intrusive



Escape extinction with physical guidance	Contained within work room, verbal and gestural reminders	Contained at work table, no reminders to cooperate, no reinforcers available	Allowed to leave work area, denied access to attention and other potential reinforcers	Contingent attention
Iwata, Pace,	Piazza, Moes,	<i>Current study</i>	The Timeout	Hall, Lund,

Kalsher, Cowdery, & Cataldo, 1990	& Fisher, 1996		Ribbon (Foxx & Shapiro, 1978)	& Jackson (1968)
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“Traditional” escape extinction usually includes physical guidance and/or frequent verbal reminders. Confinement within a work area, such as implemented in the current study, can also be considered a form of escape extinction, though this form of escape extinction does not include the addition of stimuli to the environment, and therefore does not resemble Type 1 punishment. The two columns on the right side of Table 2 reflect different types of positive reinforcement contingencies, but can be compared with the negative reinforcement contingencies on the left side of Table 2 based upon pre-compliance conditions.

A potential reactive alternative to escape extinction



Time out from the opportunity to work (colloquially referred to as a “wait out”), from a functional perspective, is counter-intuitive in that it resembles the baseline condition in studies treating escape-maintained behavior (Iwata, Pace, Kalsher, Cowdery, & Cataldo, 1990; Repp, Felce, & Barton, 1988). In the baseline conditions of those studies, self-injurious behavior (SIB) produced timeout from educational tasks, and was associated with increases in escape-maintained SIB. Those results are not surprising, because the baseline conditions did not include compliance-contingent positive reinforcement.

In contrast with traditional forms of escape extinction, “wait outs” entail the temporary discontinuation of tasks contingent upon inappropriate behaviors. After a student has sufficient experience with “wait outs”, including the fact that few, if any, potential reinforcers are available before completion of the task, task removal functions as a Type 2 punisher for the behavior that preceded it, and task representation functions as a conditioned reinforcer for the behavior that preceded it (i.e., self-calming).

“Wait outs” are usually not immediately effective, but instead tend to produce outcomes similar to those produced by traditional escape extinction for problem behaviors maintained by escape. Prior to, and immediately following, the introduction of wait outs:

No task		SD for a variety of more-preferred activities
Task		CMO-R based upon effort and/or decreased availability of other activities

After sufficient experience with “wait outs”:

No task		S-delta for a variety of behaviors (because relevant reinforcers will not be available until the task is completed)
Task		SD for task completion, leading to SD's for more preferred activities

These changes can emerge through one or both of the following processes, depending upon the primary function of noncompliance.

Table 3: The process through which “wait out” effect emerges following an instruction

Escape function	CMO-R outweighs MO's and CMO's for sr+	Active or passive noncompliance	Task withdrawn	Deprivation increases value of potential positive reinforcers	MO's and/or CMO's outweigh CMO-R, and “readiness” is demonstrated	Task reinforces “readiness” when presented
Attention function	Attention-seeking response	Task and attention withdrawn (planned ignoring)	Potential burst of attention-seeking behaviors	Deprivation of attention establishes “Readiness” to comply with original task	Task reinforces “readiness” when presented.	Compliance and attention



The purpose of this paper is to test the efficacy of potential alternative (i.e., wait outs) to escape extinction in the form of physical guidance or repeated verbal reminders.

Method

Three separate studies were conducted, each using the following reactive procedure, in addition to demand fading and positive reinforcement of appropriate compliance. This “time out from the opportunity to work” protocol is also described in Figure 1, below.

1. The student demonstrated protest behavior (e.g., threw materials, whined) or failed to respond to an SD for at least 5 seconds
2. The teacher presented a targeted S-delta (mostly physically, such as by sliding a worksheet away, turning away, and sliding a token strip away). The teacher also said, “That’s not ready”.

3. After at least 5 seconds of relatively calm waiting and 2 seconds of orienting toward the teacher, the teacher asked, "Ready?" while moving work materials slightly closer to the student (targeted SD). If the student indicated "readiness" in any way (e.g., "ready", "yes", nodded, refrained from further protest while glancing toward the teacher), the teacher presented work materials and attention. *The teacher did not offer extra reinforcers at this time, to prevent the student from learning that task resistance, and subsequent cooperation, might result in a thicker schedule of reinforcement than would consistent cooperation.
4. After offering work materials, if the student escalated in any way or if 5 seconds passed without him providing any indication of readiness, the teacher turned away, moved materials away, and returned to step 3.

-----insert Figure 1: "Wait out" flow chart-----

Participants in all three studies were required to wait at the table and were denied access to attention and other potential reinforcers. The three studies differed in terms of participants, antecedent conditions evoking inappropriate behaviors, functions of noncompliance, behaviors upon which "wait outs" were contingent, and dependent measures. These differences are summarized in Table 4.

Table 4: Differences between the three studies

Study	Participants	Antecedent conditions	Functions of noncompliance and/or behavioral excesses	Behaviors upon which "wait outs" were contingent	Dependent Measures

Pilot case study	Adrian, Drew, & Jack. Ages 4-6. Diagnosed with Level 1, 2, or 3 Autism.	Positive reinforcement for compliance with gradually increasing amounts of leveled instruction.	Adrian-escape and attention; Drew-escape/avoidance; Jack-escape/avoidance and automatic reinforcement	Whining, arguing, 5-10 seconds of non-response to instruction	Frequency and duration of "wait outs"
Study 2	Selina-a 9-year-old girl diagnosed with Level 2 Autism.	Stressors-touching her things, touching her, teachers talking with each other.	Escape/avoidance and attention	Verbal aggression	% of appropriate mands
Study 3	Nick-5 year old boy diagnosed with Level 2 Autism.	Verbal instructions to select pictures of people or colors	Escape/avoidance (of effort, manifested by dependence upon repeated prompts)	Incorrect responding on "transfer trial" during correction procedures	% correct responding with listener targets

Preliminary Case Study

Subjects and Settings

Three students new to a special needs clinic participated in this preliminary case study. Sessions were conducted in a 16-by-18 foot room containing play and leisure materials, in addition to a table and chairs.

Adrian was a 4-year-old male, diagnosed with Level 3/severe Autism by a neuropsychologist, based upon a battery of tests, including the ADOS-II. He could follow simple instructions and imitate a variety of gross motor movements. He was able to mand 10 different reinforcers through a combination of sign language and vocal approximations. Adrian's team reported whining and slow responding across both mastered and acquisition activities. A functional behavior assessment showed that Adrian's whining and slow responding were maintained primarily by escape, but with a secondary function of attention, in the form of verbal correction.

Drew was a 6-year-old male, diagnosed with Level 1/mild Autism by a neuropsychologist based upon a battery of tests, including the ADOS-II. Drew vocally communicated wants and needs, and was fluently conversational. Drew struggled with all areas of academics and frequently whined or protested when presented with academic tasks. A functional behavior assessment showed that Drew's whining and verbal protests were maintained by escape/avoidance.

Jack was a 6-year-old male diagnosed with Level 2/moderate Autism by a neuropsychologist based upon a battery of tests, including the ADOS-II. Jack was able to request reinforcers vocally, sometimes with short phrases. Jack engaged in high rates of vocal scripting and off-task behaviors. He had difficulty with any area of instruction requiring him to respond to complex SD's and usually required repeated SD's before cooperating or accepting prompts in all settings. A functional behavior assessment showed that Jack's scripting and off-task behaviors were maintained both by escape/avoidance of tasks and by automatic reinforcement.

Response Definitions, Measurement, and Reliability

For all three participants, "noncompliance" was defined as 5 seconds of non-responsiveness to an instruction or 10 seconds of non-responsiveness during an independent task. For Adrian and Drew, "whining" was defined as producing vocalizations of relatively high pitch or volume, in comparison with vocal manding. For Drew, "arguing" was defined as vocalizing 5 or more words incompatible with compliance with an instruction.

Noncompliance, whining, and arguing resulted in implementation of the "wait out" procedure. Teachers recorded handwritten data for each episode, starting a timer on "count up" at the beginning of the episode, and turning the timer off after the student complied with the original instruction. "Readiness" was defined as 5 seconds of relative calm, with at least 2 seconds of orientation towards the teacher. Subjective ratings of readiness are empirically validated by student acceptance of teacher offers to return to work.

Reliability measures were gathered by two independent observers, primarily by video review, for 100% of sessions for all three participants. Percentage agreement scores were calculated based upon interval-by-interval comparison of the observers' records and dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100. There was 100% agreement on the frequency with which participants demonstrated noncompliance. For duration data, the same calculation method was used, with 10-second interval recording, producing 100% agreement on wait out duration for Adrian and Jack, and 99.7% agreement on wait out duration for Drew.

Treatment

No baseline data are available for the participants in this preliminary case study because "wait outs" were incorporated from the beginning of their work at the clinic.

For all three participants, after whining, arguing, or failing to respond to instruction within 5 seconds, the teacher said, "That's not ready", moved the work materials 1 foot away, and withheld attention and access to other potential reinforcers.

Students were required to wait at the table. No physical guidance or verbal reminders were necessary to teach any of these 3 participants to remain at the table during a “wait out”. For Adrian, on 2 occasions, it was necessary to provide a “shadow block” (i.e., the teacher placed an arm in the way of a student, without touching the student) and a gestural prompt to remain in his seat.

Results and Discussion

All three participants showed improved compliance, manifesting in reductions in the frequency and duration of “wait outs”. Drew and Jack required “wait outs” at levels resembling the initial phases of extinction procedures. Drew was waited out for 3 minutes on the first day of treatment, and required more than 18 minutes of waiting out on the 3rd day of treatment. After the 3rd day of treatment, Drew required only 5 wait outs, totaling less than 5 minutes, over the following 2 weeks.

Figure 2: Frequency and Duration of “wait outs” for Adrian

Figure 3: Frequency and Duration of “wait outs” for Drew

Figure 4: Frequency and Duration of “wait outs” for Jack

This pilot case study was implemented in the context of on-going behavioral instruction, and with no baseline condition. Activities were appropriate to each student’s current level (i.e., a balance of mastered and acquisition tasks), and were advanced according to traditional data based customs, but were not specifically controlled for the purposes of this pilot study. The relative impacts of task selection, demand fading, and positive reinforcement verses the impact of “wait outs” cannot be determined. Further, since there was neither a baseline condition nor a comparison to other treatments, no functional relationship can be asserted between wait outs and compliance. It can be observed that, though noncompliance functioned primarily for escape for each of the 3 participants in this pilot case study, temporary withdrawal of task materials, in conjunction with other reactive treatment components, did not lead to increases in noncompliance.

Study 2

Subjects and Setting

Selina was a 9-year-old girl diagnosed with Level 2/moderate Autism by a neuro-psychologist based upon a battery of tests, including the ADOS-II. Selina communicated wants and needs vocally and demonstrated emerging conversational skills. She attended a full day general education classroom with minimal support. Selina engaged in high rates of verbal aggression, angry faces, and physical aggression when presented with non-preferred activities, or when required to share attention or materials with others. A functional behavior assessment showed that, though occurring primarily when presented with tasks and other non-preferred

stimuli, verbal/physical aggression was maintained both by escape/avoidance and by attention.

Response Definitions, Measurement, and Reliability

“Verbal aggression” was defined as any swearing, rhyming words with swear words, or insistence on stopping an activity. “Physical aggression” included hitting, biting, and pinching. “Stressors” were defined as idiosyncratic teacher behaviors to which Selina was averse, as identified by a history of verbal/physical aggression following those teacher behaviors. Specific examples of “stressors” included in this study were: touching Selina’s things; touching Selina; teachers talking to each other near Selina.

If Selina engaged in verbal or physical aggression when confronted with a stressor, researchers discontinued the stressor and scored “-” for that opportunity. If Selina used an appropriate phrase (e.g., “Please don’t touch that”), or if Selina calmly tolerated the stressor for 3-5 seconds, researchers discontinued the stressor and scored “+” for that opportunity.

“Readiness” was defined as 5 seconds of relative calm and subjective ratings of readiness are empirically validated by student acceptance of teacher offers to return to work.

Reliability measures regarding Selina’s (in)appropriate responses to stressors were gathered on 100% of sessions. Percentage agreement scores were calculated based upon a trial-by-trial comparison of the observers’ records, dividing the number of agreements by the number of agreements plus disagreements, and multiplying by 100. Inter-observer agreement was 100% throughout all conditions of this study.

Treatment and Design

Prior to her inclusion in the current study, Selina was introduced to “wait outs” during work sessions, in the same manner as for the participants in Study 1. In Study 2, Selina was engaged with academic and language tasks, and 4 times per session, approximately once every 2 minutes, her teachers engaged in a behavior that Selina disliked (i.e., touching her things, touching her, talking to each other). Using a multiple baseline across stressors design, teachers introduced wait outs contingent upon inappropriate responses to stressors.

In baseline, stressors were terminated within 3-5 seconds and Selina maintained access to work materials regardless of whether Selina responded appropriately or inappropriately.

During treatment, if Selina politely asked her teachers to stop presenting a stressor, they stopped immediately and Selina maintained access to her work materials. On a few occasions, Selina calmly tolerated the stressor for 3-5 seconds without manding

or verbally aggressing. On those occasions, teachers terminated the stressor and Selina maintained access to her work materials. If Selina aggressed verbally or physically, teachers still terminated the stressor within 3-5 seconds, but also implemented a “wait out” procedure by saying “That’s not calm” and temporarily moving Selina’s work materials away from her. After Selina calmed, she was offered access to her work materials. Stressors were terminated regardless of Selina’s response in order to isolate task interruption as the consequence responsible for behavior change.

Results and Discussion

During baseline, Selina quickly engaged in verbal aggression when presented with any of the three stressors. “Wait outs” were introduced first for “touching her things”, then for “touching her”, and finally for “talking to each other”, as displayed in Figure 5 below.

-----insert Figure 5 here-----

Selina’s treatment design allowed a test of the value of work materials following an introduction to the “wait out” protocol. If “wait outs” are effective, then the representation of work materials should function both as an SD for on-task behaviors and as a conditioned reinforcer for the behavior that preceded representation (i.e., self calming). And, if representation of materials has become a conditioned reinforcer, then the contingent temporary removal of work materials during a wait out procedure should function as a conditioned punisher for the behaviors that preceded material removal. Selina’s data suggest that wait outs did function as a conditioned punisher for verbal aggression.

When teachers introduced “wait outs” for intolerance of touching Selina’s things, Selina’s tolerance and appropriate requesting improved. Selina verbally aggressed during all 4 opportunities in the first treatment session, and reached 100% requesting/tolerance by the 5th session.

Interestingly, when teachers touched Selina (the second stressor), Selina immediately demonstrated appropriate requesting in lieu of verbal aggression. It is possible that being touched was less aversive to Selina than was having her things touched, though both stressors evoked verbal aggression during 100% of baseline opportunities.

Strictly from consideration of the first 2 treatment conditions, it seems more likely that the immediate appropriate responsiveness reflected in this second treatment condition reflects a sequence effect. Relevant aspects of the second training context may have resembled training in the first treatment condition, and performance may have reflected stimulus generalization.

If the results in the second treatment condition do reflect sequence effects, then Selina is apparently much more averse to teachers talking to each other than she is to being touched. In the first session of the third treatment condition, Selina appropriately tolerated teachers talking to each other on only 1 out of 4 opportunities. Appropriate requesting and tolerance improved to 100% by the third session.

Finally, since Selina's treatment included non-contingent stressor termination, verbal/physical aggression was reinforced by stressor termination. The effects of "wait outs" were sufficiently robust to decrease verbal/physical aggression despite the fact that aggression resulted in escape from stressors.

Study 3

Study 3 was an investigation of the impact of "wait outs" on the efficiency of correction procedures. A wide variety of error correction procedures are available, and there is a recognized need for these to be individualized by student and by skill (Carroll, Joachim, Peter, & Robinson, 2015). For some students, error correction procedures may owe as much of their effect to avoidance as is owed to practice (Rodgers & Iwata, 1991), best analyzed through comparison of the relative efficiencies of "thoughtful" and "thoughtless" responding.

Subjects and Setting

Nick was a 5-year-old male diagnosed with Level 2/moderate Autism by a neuropsychologist based upon a battery of tests, including the ADOS-II. He was able to request his wants and needs using vocal approximations and signs for approximately 15 items, and was able to follow 1-step instructions in and out of context.

Though Nick demonstrated strong visual performance skills and was quickly acquiring LRFFC (Listener Responding by Function, Feature, or Class), he struggled with receptive identification of people and colors, and was not making progress with either program. Nick did not consistently scan the field before responding and, during correction procedures, tended not to respond correctly after gestural prompts were faded. The following correction procedure was used:

1. Incorrect response
2. Represent the SD with a prompt
3. Shuffle the array and represent the SD without a prompt
4. Present distracter trials
5. Shuffle the array and represent the SD without a prompt

Nick tended to respond incorrectly on the 3rd step of this procedure and, in baseline, his teacher followed these errors by returning to the 2nd step of the procedure. She continued to repeat steps 2 and 3 until Nick responded correctly at the 3rd step,

sometimes proceeding to steps 4 and 5, and sometimes abandoning the correction procedure after Nick responded correctly to step 3. Most often, given the number of errors preceding an independent correct response, Nick's teacher abandoned the correction procedure after step 3.

In Nick's case, it was hypothesized that careful listening and looking was less efficient than prolonged sessions of prompted responding. "Wait outs" were added as a consequence of incorrect responding to "transfer trials" (i.e., step 3 in the correction procedure above) to decrease the efficiency of careless selecting. These "wait outs" can be seen as Type 2 punishment of "thoughtless" responding, or the contingency can be stated in the positive (i.e., continued access to work materials was contingent upon "thoughtful" responding).

Response Definitions, Measurement, and Reliability

Nick's teachers scored "+" only when Nick responded correctly on the first opportunity for each target. If first attempts were incorrect, Nick's teachers scored "-" and conducted the correction procedure outlined above. Reliability measures were gathered on 25% of sessions, and, using the agreement divided by agreement plus disagreement, multiplied by 100, method, there was 100% agreement regarding the (in)accuracy of Nick's responses.

Treatment and Design

Accuracy of listener responding was studied in a multiple baseline across instructional targets (receptive colors and receptive people). In baseline, when Nick selected the incorrect picture, he was prompted to select the correct picture. The target picture was then moved within the array, and when he again selected the incorrect picture, he was again prompted to select the correct picture. Nick stayed in this correction loop until he selected the picture correctly without a prompt.

In the "wait out" condition, when Nick selected the incorrect picture at step 3, he was told, "that's not ready", and the pictures were moved away. He was required to wait at the table without attention or access to potential reinforcers. When Nick demonstrated readiness (i.e., folded his hands and oriented toward his teacher for at least 2 seconds), his teacher moved the pictures slightly closer and asked, "Are you ready?" If Nick confirmed readiness in any manner, his teacher represented the pictures and the opportunity to work.

Results

During baseline instruction in receptive colors and receptive people, Nick responded with variable accuracy, failing to reach mastery criteria with either program after 8 and 6 sessions, respectively. Accuracy improved, and variability decreased, with each program after wait outs were introduced for inaccurate responses at step 3 of the correction procedure.

-----insert Figure 6 here-----

These results demonstrate that “wait outs” were an effective consequence for the reduction of Nick’s errors during correction procedures, thereby increasing the accuracy of his responding. Temporary removal of tasks functioned as a Type 2 punisher and access to tasks functioned as a conditioned reinforcer.

General Discussion and Future Directions

The studies described in this paper provide no comparison of the relative efficacies of “wait outs”, verbal reminders, or physical guidance. Taken together, these studies do demonstrate that “wait outs” can be an effective reactive measure for treating noncompliance and related behavioral excesses, as well as for treating “low effort”. This study contributes to a growing body of literature regarding alternatives to escape extinction (e.g., Athens & Vollmer, 2010), and is unique in its analysis and application of reactive treatment components.

Literature (Parrish, Cataldo, Kolko, Neef & Egel, 1986; Piazza, Moes & Fisher, 1996; Sidman, 1989) and experience suggest that more intrusive measures are more likely to evoke counter-control and may be less likely to be implemented accurately by a variety of teachers (McConnachie & Carr, 1997). As such, if a less intrusive measure is effective (e.g., wait outs), it may be favored over a more intrusive measure (e.g., escape extinction).

The wait out procedures implemented in the current studies differed from escape extinction with verbal reminders in two potentially important ways. First, offers to return to work for the participants in these studies were not provided until a student demonstrated “readiness” (e.g., calmed and oriented towards teacher). Though not specifically documented in each study reporting on the use of verbal reminders, reminders to “do your work” are usually delivered on a dense schedule (e.g., every 3-10 seconds). In that arrangement, it is likely that the most relevant reinforcer earned is escape from verbal reminders. Since verbal offers during wait outs are only provided when a student demonstrates “readiness” to work (e.g., calms and orients towards teacher), verbal offers to return to work may be interpreted as SD’s for work responses and as conditioned reinforcers for self-calming. This arrangement decreases the likelihood that teacher verbalizations become conditioned aversives, and increases the likelihood that teacher verbalizations become conditioned reinforcers.

Second, and perhaps less importantly, teachers using the wait out procedure offer a student a chance to return to work rather than directing a student to return to work. For some students, the latter creates a situation in which the student demonstrates noncompliance to most verbal reminders, thereby rehearsing noncompliance.

The students in the current study were required to wait at the table until they were ready to comply. In some cases, this is not possible without extensive physical blocking. It is frequently possible to allow a student to leave the work area while limiting access to a number of potential reinforcers, and if this is nearly as effective as remaining at a table for a particular student, it would be recommended in lieu of physical blocking.

Problems, such as disruption of peers, can arise when students are allowed to leave the work area during wait outs. Additional challenges involve stimulus control and motivation as it relates to the efficiency of noncompliance. As students are allowed to wander, they may be allowed to approach people and items in a non-sterilized environment, and may need to be told that each item is unavailable, thereby potentially inviting further conflict. The ability to make a teacher move to block access to an item may function as a reinforcer. But if not prevented from interacting with a variety of potential reinforcers during a wait out, students may have little reason to comply with instruction.

For wait outs to be effective, relevant S-delta's must be established. This was achieved effectively with The Timeout Ribbon (Foxy & Shapiro, 1978), which included systematic conditioning of a ribbon as a reinforcer and as an SD for a variety of behaviors (though use of The Timeout Ribbon was not limited to noncompliance). Foxy & Shapiro (1978) conditioned ribbons as reinforcers by providing frequent reinforcement when students were wearing their ribbons, and by removing student ribbons following problem behaviors.

Similarly, for students using PECS (Frost & Bondy, 1994) or a token system, access to those systems should function as an SD for a variety of pro-social behaviors, and temporary removal of either system should function as a conditioned punisher and an S-delta for a variety of behaviors. When working with students using PECS and/or tokens, those materials are turned upside down when initiating a wait out.

Students engaging in very high rates of self-stimulatory behavior tend to present the greatest challenge to the use of wait outs, presumably because it is more difficult to restrict access to pre-compliance reinforcers (i.e., the automatic consequences of self-stimulatory behaviors). Students engaging in high rates of self-stimulatory behavior tend to require some response blocking or response interruption during wait outs, which has been most effectively implemented in a graduated fashion (i.e., rather than attempting to block or interrupt every response, blocking or interruption is provided every 10-15 seconds). These students may require a more traditional form of escape extinction, such as verbal reminders or physical guidance and/or more careful implementation of proactive measures.

One challenge in both the current study and in clinical applications of wait outs is that student "readiness" is a subjective measure. Teachers are required to observe whether students are relatively calm and whether representation of work materials might currently function as a conditioned reinforcer.

Future research should be conducted on the efficacy of various forms of wait outs, such as arrangements in which a student is allowed to leave the work area during the wait out.

Compliance with Ethical Standards

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Conflict of Interest: Author A declares that he has no conflict of interest. Author B declares that she has no conflict of interest. Author C declares that she has no conflict of interest.

Ethical approval: All procedures were in accordance with the ethical standards of the agencies involved and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent was obtained from the parents of each individual participant included in the study.

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