

# Using Video to Bridge the Gap Between Problem Behavior and a Delayed Time-out Procedure

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**Abstract** Treatment plans focused on problem behavior often include punishment contingencies to decrease problem behavior. Immediate punishers are typically more effective than delayed punishers, but immediate delivery of a punisher is not always possible. Strategies need to be developed to increase the suppressive effects of delayed punishers. This study demonstrated the effectiveness of a treatment package involving replaying a video recording of problem behavior immediately before delivering a 15 min delayed time-out. This treatment package may prove to be an accessible and inexpensive strategy when using delayed punishers.

**Keywords** Delayed consequences · Delayed punisher · Video · Time-out

When working with children with autism and attempting to decrease problem behavior, interventions that include both reinforcement and punishment procedures are typically more

effective than programs that include reinforcement alone (Charlop-Christy & Haymes, 1996; Durand, 1982; Foxx & Azrin, 1972, Hagopian, Fisher, Sullivan, Acquisto, & LeBlanc, 1998). Individuals with developmental disabilities have a right to the most effective behavioral treatments available (Van Houten et al., 1988), however, so punishment procedures should be applied when clinically indicated. Although the most effective punishers are those that immediately follow behavior, there are circumstances (e.g., stealing, low-rate behavior, behavior that occurs in public settings) where immediately delivering a punishing consequence is difficult or impossible (Lerman & Vorndran, 2002; Meindl & Casey, 2012). In these situations, the consequence is often delayed which generally decreases the effectiveness of the consequence (Azrin & Holz, 1966). Even a relatively short delay may render the consequence ineffective at changing behavior. As delayed punishers are sub-optimal consequences but are often inevitable in many treatment programs, it is necessary to develop strategies to increase the effectiveness of delayed punishers.

A variety of potential (but relatively under-researched) strategies currently exist in the literature base on delayed punishment (Meindl & Casey, 2012). One strategy is recording audio of the target behavior and then replaying the audio at a later point while simultaneously delivering the punishing consequence. Rolider and Van Houten (1985) investigated this procedure using a multiple baseline across setting design. Audio of a 10-year-old boy's tantrum behaviors was recorded and played back several hours later but immediately before the delivery of a 20-s movement suppression punishment procedure. The procedure produced an immediate reduction in the target behavior across three public settings.

Given that an audio recording procedure was effective, it is possible that a video recording may be effective as well as it includes both audio and video of the behavior. Further,

1. Although immediate punishers are more effective than delayed punishers, some behaviors may not be immediately detected and punishment can only be delivered after a delay.
2. Previous research has demonstrated that recording audio of problem behavior and replaying immediately before a delayed movement suppression procedure decreased behavior.
3. This study found that recording video of problem behavior and reviewing prior to delivering delayed time-out decreased problem behavior.
4. Given the easy access to video recording equipment, this procedure could be adopted in situations where immediate punishment was impractical or impossible.

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whereas an audio recording only represents the auditory patterns of a behavior, video plus audio may allow for greater specificity by displaying the physical actions of the behavior alongside audio. The purpose of this study was to investigate whether a delayed punishment procedure that involved presenting a video clip of target behavior immediately before the delivery of time-out would be effective at suppressing behavior. Given that video recording technology is common and incorporated in nearly any current cell phone device, and given that the punisher (time-out) is also quite common, this strategy could represent an easy and accessible way of bridging delays between behavior and punishing consequences and be easily incorporated into a variety of settings.

## Methods

### Participants, Setting, and Target Behavior

Two children participated in this study which was conducted in a classroom at a private program for individuals with disabilities. Kelly was 7 years old and Angela was 10 years old. Both had a diagnosis of autism spectrum disorder and engaged in problematic tantrum behavior. Both participants had language delays but could communicate their wants and needs and speak in short sentences. Parental consent was obtained for both participants prior to entry into the study.

Kelly's tantrum behavior was defined as crying, statements of refusal, or complaints about tasks (e.g., "I don't like this"), screaming, and rolling on the floor. Angela's tantrum behavior was defined as screaming, kicking, and refusal to complete tasks with a verbal statement (e.g., "I'm not doing this"). No experimental functional analysis was conducted. Behavior function was determined through an indirect functional behavior assessment that involved an open-ended interview with the classroom staff who were routinely involved with the behavior. This interview sought information regarding the antecedents and consequences most commonly associated with the behaviors. Additionally, staff were asked what they thought maintained the behavior. Finally, both participants and target behaviors were directly observed prior to the start of the study. Overall, staff report and observations indicated the problem behaviors were likely maintained by either access to attention or tangible items.

### Measurement Procedures, Interobserver Agreement, and Procedural Fidelity

Behavior was measured by the first author using 1-min partial interval recording. A second independent observer simultaneously recorded behavior across 30% of sessions for Kelly and 22% of sessions for Angela. Interobserver agreement (IOA) was calculated for each session by dividing the number

agreements by the number of agreements plus disagreements and multiplying by 100 for each session. These scores were summed and then divided by the total number of sessions for which IOA was calculated. This generated IOA measures of 70% for Kelly and 80% for Angela. These somewhat low IOA scores are assumed to be related to the verbal statement components of each participant's target behavior definitions. These verbal statement components were difficult to measure as no specific statements were identified before the study began.

A checklist of all procedures was created, and the second independent observer scored procedural fidelity for the same sessions during which IOA was scored. Across both participants, procedural fidelity was measured at 90%.

### Baseline Procedures

During baseline, participants were asked to engage in specific activities for 15 min. Activities were deemed to be relatively neutral (i.e., neither preferred nor nonpreferred) by each participant's caregiver. Kelly's activity was daily homework and Angela's activity was coloring. No consequences were delivered for target behaviors, and the participant was instructed to "keep working" if they stopped engaging in the activity. No other attention was provided. A video recorder was located in the room but was not recording during baseline. Neither participant attempted to leave the area. Following the 15-min session, participants were returned to other activities depending on their daily schedule. Sessions were conducted at approximately the same time of day for each participant with between one and two sessions conducted per day. If two sessions were conducted in a day, there was a delay of at least 1 h between sessions.

### Intervention Procedures—Delayed Video + Time-out

During intervention, participants engaged in the same 15-min activities as during baseline. No consequences or attention were delivered for any target behaviors. If target behaviors did occur, they were recorded using a video recorder placed discretely across the room. Regardless of whether problem behavior occurred or not, the participant was returned to their regularly scheduled daily activity following the 15-min session. If problem had occurred during the session, the participant left the regularly scheduled daily activity 15 min later and was returned to the session area. The participant was then required to watch a 1-min segment of the video recording of the problem behavior. The segment chosen for viewing was one which seemed to most clearly demonstrate the target behavior. In each session where problem behavior occurred, behavior lasted for at least 1 min, so there were no instances where a 1-min segment was unavailable.

After viewing this 1-min segment, the participant was told “now time-out” and physically escorted to the time-out area. No other rationale or explanation for time-out was provided. Time-out lasted 3 min for Kelly and 5 min for Angela and required both participants to sit in a chair in the corner of the room facing the wall. If a participant attempted to leave the time-out area, they were guided back to the chair. All other behaviors were ignored. This was the typical time-out procedure used in the classroom, and both participants had experience with the procedure. After the conclusion of time-out, the participants were returned to their regularly scheduled daily activity.

Time-out was selected as an intervention for both participants because (a) it was a pre-approved classroom management technique with which all classroom staff were familiar, (b) it had been successfully used to decrease other disruptive behavior in the classroom, and (c) both target behaviors had been resistant to previous reinforcement-based interventions implemented by the teacher. Further, as time-out was already a feature of the classroom, it seemed the procedure would likely remain implemented with fidelity following the termination of the study.

## Results

Figure 1 displays the results for Kelly and Angela. During the initial baseline condition, both participants displayed relatively high rates of target behaviors. On average, Kelly and Angela engaged in target behavior during approximately 50 and 74% of initial baseline sessions respectively. Upon the introduction of the delayed video + time-out intervention, both participants exhibited a decrease in target behavior. For Kelly, behavior slowly decreased during the first two sessions before immediately dropping to 0% for two consecutive sessions. For Angela, the decrease in target behavior was more gradual, but there was a steady and steep downward trend in the target behavior once the intervention was put in place.

Following the decrease in behavior during the intervention condition, both participants were returned to baseline conditions. Upon return to baseline, both participants displayed an increase in target behavior. Kelly’s behavior exhibited a steady upward trend, ultimately returning to levels similar to during the initial baseline. For Angela, the first three sessions showed a decreasing trend before behavior increased to just under initial baseline levels.

## Discussion

Based on the results in Fig. 1, the intervention appeared effective at decreasing target behaviors for both participants despite the delay between the occurrence of the target behavior and

the application of the consequence. These results extend those of Rolider and Van Houten (1985) by providing another demonstration that recording aspects of a target behavior and replaying the recording while delivering delayed punishment may be an effective strategy when punishers cannot be delivered immediately.

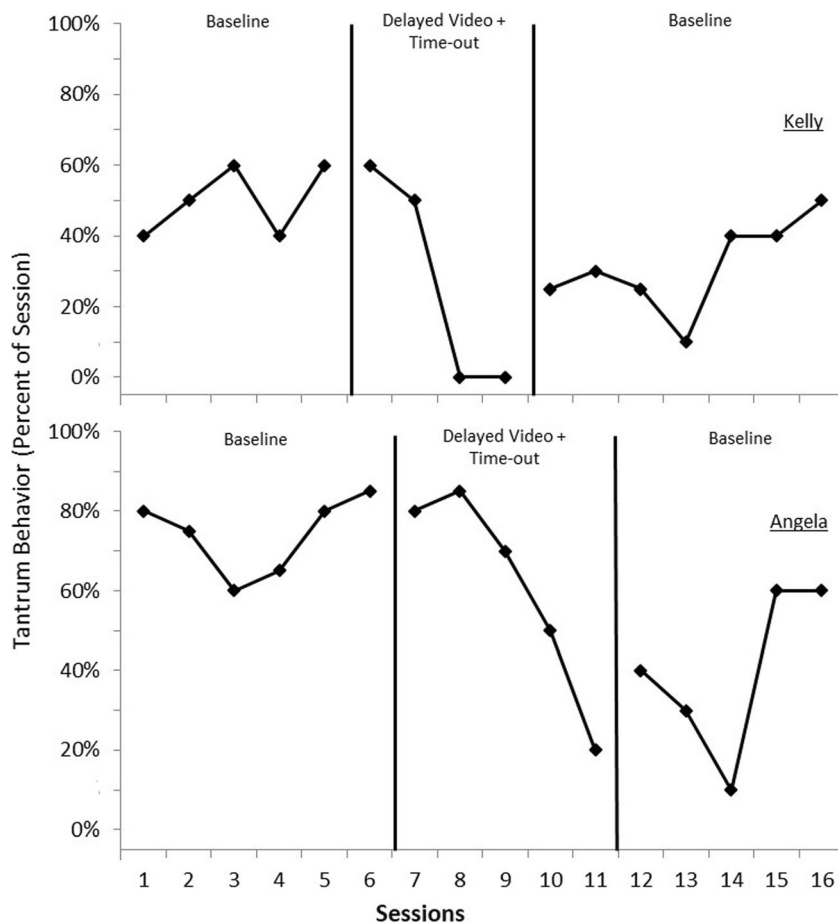
Delayed punishment procedures are relatively uncommon in behavior analytic literature and accounts of behavior change typically focus on the effects of immediate consequences. Theoretically, the effects of the delayed punishment in this study could be explained similarly. In this study, the presentation of the video was immediately followed by the presentation of time-out. It is possible that this arrangement conditioned the auditory and visual stimuli (tantrum behavior) presented in the video as punishers through stimulus-stimulus pairing. If so, future engagement in similar tantrum behavior may immediately produce similar auditory and visual stimuli that have a punishing effect on tantrum behavior. Although this is only a theoretical account, it does allow for the effects of delayed video + time-out to be explained using a traditional behavior analytic paradigm focusing on immediate consequences.

One potential benefit of this procedure is that it may be useful for individuals with limited verbal skills and whose behavior does not consistently change through verbal instructions provided by a therapist. Although explaining the contingency between a behavior and delayed consequence has been shown to increase the effect of a delayed punisher (e.g., Verna, 1977), this effect may be limited by the verbal skills of the listener. For very young or lower functioning individuals with poor verbal skills, an explanation of the contingency may prove insufficient at changing behavior. Viewing a video, however, may not require this same level of verbal skill and may be useful as a means of making the contingency more apparent and effective for these individuals.

There are several limitations of this study. First, our intervention presented participants with both audio and video before exposure to punishment. Rolider and Van Houten (1985) already demonstrated that delayed audio plus punishment was an effective intervention, and it is possible that incorporating video did not enhance the effect. Although one might expect that incorporating more aspects of the target behavior in the recording would enhance a delayed punishers suppressive effect, future research is needed to determine whether video plus audio is superior to audio alone.

Another limitation is that the length of the delay between the emission of the behavior and the consequence was somewhat uncontrolled. Sessions were always 15 min, and behavior could occur at any point within the session. Thus, the delay could range from 15 min (if behavior occurred at the end of the session) to approximately 29 min and 59 s (if behavior occurred once at the beginning of a session and not again). Although the delay lengths were uncontrolled, this fact

**Fig. 1** The results for Kelly and Angela



suggests that the intervention could be effective for delays beyond 15 min. Another limitation that is closely related is that because behavior could occur numerous times but the consequence only occurred 15 min after the end of a session, the contingency in this study could constitute intermittent punishment. Although a limitation of the study, the data show decreases for both participants indicating the intervention was effective.

The poor operational definition related to the verbal component of the target behaviors is also a limitation. For each participant, a typical tantrum included verbal statements of refusal. As these verbal statements were quite loud and were considered part of the same response class as more serious topographies (e.g., kicking, rolling on the floor), they were important to target with the intervention. However, the range of verbal refusal topographies was quite large, making it difficult at times to reliably record and resulting in somewhat low IOA.

A final limitation is that this study used an ABA design rather than an ABAB design which would have left the participant in a final treatment phase. Although the purposes of the study were primarily to demonstrate the effectiveness of a delayed time-out procedure, it would have been beneficial to end with the participant still in treatment and behavior

reduced. The treatment procedures were explained to the classroom teacher upon termination of the study though the degree to which the teacher used these procedures is unknown.

Although the delayed video + time-out intervention proved effective, the dangers of punishment procedures, particularly when delayed, should be mentioned. A delayed punisher may “inadvertently” decrease the behaviors it closely follows in time even when no contingency exists. Certain strategies, such as incorporating rules, can decrease this effect (Meindl, Miller, & Casey, 2017), and it is possible that a video recording may produce similar outcomes. However, this was never tested so this delayed video + time-out procedure should be considered experimental and used with caution.

Although punishment procedures are often employed when working with individuals with autism and attempting to decrease inappropriate or harmful behaviors, implementing these procedures immediately following behavior is often difficult or impossible in many clinical settings. Delaying the delivery of the punisher often decreases the effectiveness of the consequence, which necessitates the development of strategies to make delayed punishers more clinically effective. Although more research is warranted, recording video of the problem behavior, and then replaying the video immediately

prior to the delivery of the delayed punisher, may prove to be an efficient and cost-effective strategy to achieve this outcome.

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#### Compliance with Ethical Standards

**Conflict of Interest** Both authors of this manuscript declare there are no conflicts of interest.

**Ethical Approval** All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

**Informed Consent** All necessary informed consent or assent was obtained from all individual participants included in the study.

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