Evaluation of renewal mitigation of negatively reinforced socially significant operant behavior☆

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ABSTRACT

Renewal is a relapse phenomenon that occurs when previously treated target behavior re-emerges as a result of context change. Typically, a target response is reinforced in Context A, extinguished in Context B, and then re-emerges in Context A - despite the continuation of the extinction procedure. In the current study, we initially reinforced inappropriate mealtime behavior or aggression in Context A across three children diagnosed with Autism Spectrum Disorder. Next, therapists either differentially reinforced an alternative response or extinguished responding by terminating the relationship between problem behavior and the reinforcer in Context B. Problem behavior re-emerged upon the return to Context A even though treatments continued. Finally, we tested repeated exposure to Context A and pairing Contexts A and B for mitigating renewal. Results suggested that modification of the training conditions can effectively mitigate renewal of responding.

1. Introduction

In behavioral interventions, clinicians often implement treatments that reduce problem behavior and increase appropriate behavior. From an applied perspective, it is critical that treatment gains persist beyond the initial training conditions and maintain over time. Specifically, clinicians seek treatments that persist despite the passage of time, changes in locations, changes in teachers, and various known treatment challenges (such as inadvertent lapses in treatment integrity; DiGennaro DiGennaro Reed, Reed, Baez, & Maguire, 2011; Peter Pipkin, Vollmer, & Sloman, 2010). This persistence in the face of challenges is referred to as treatment generality (Baer, Wolf, & Risley, 1968).

Treatments can be challenged in a variety of ways. For instance, after a successful implementation of differential reinforcement of alternative behavior (DRA), a caregiver may unintentionally place the alternative response on extinction, producing a resurgence of problem behavior (Lieving, Hagopian, Long, & O'Connor, 2004; Volkert, Lerman, Call, & Trosclair-Lasserre, 2009). Alternatively, caregivers may commit *errors of omission* (not reinforcing a response when one is supposed to) or *errors of commission* (reinforcing a response when one is *not* supposed to; Peter Pipkin et al., 2010). These types of errors can induce *treatment relapse*, which generally refers to the re-emergence of a previously treated target behavior (Pritchard, Hoerger, & Mace, 2014).

Treatment relapse can be produced by a number of procedural variations such as resurgence, reinstatement, and renewal (see

Podlesnik & Shahan, 2009). Each procedural variation of treatment relapse focuses on different independent variable manipulations that model ways that an intervention might be challenged (see Wathen & Podlesnik, 2018, in press, for review). In the case of renewal, relapse of behavior occurs as a result of changing stimulus conditions (e.g., Bouton, Todd, Vurbic, & Winterbauer, 2011; Kelley, Liddon, Ribeiro, Greif, & Podlesnik, 2015; see Bouton, Winterbauer, & Todd, 2012; Podlesnik, Kelley, Bouton, & Jimenez-Gomez, 2017, for reviews).

In the standard ABA renewal procedure, a target response is reinforced in Context A. Next, the target response is extinguished in Context B. Finally, in the return to Context A, extinction remains in effect for the target response (e.g., Bouton et al., 2011). The second exposure to Context A is the critical phase because the context previously associated with reinforcement for the target response is placed in direct competition with the recent history with extinction in Context B. The renewal effect is characterized by an increase in target responding upon return to Context A despite the continuation of the extinction contingency (see Podlesnik et al., 2017, for review). The relapse of target responding upon returning to Context A is referred to ABA renewal.

This experimental arrangement mimics treatment conditions under which problem behavior is diminished or completely extinguished in a treatment context (e.g., clinic), but problem behavior re-emerges upon returning to the original context where the problem behavior previously was reinforced (e.g., home, school). For example, consider an individual who is removed from school (context A) for engaging in aggressive behavior to receive treatment in a clinic (context B). Once aggression is treated in context B, the individual might return to school (context A), along with the treatment. However, the renewal literature (e.g., Bouton et al., 2011; Kelley et al., 2015) suggests that change in context itself – regardless of whether treatment is conducted with fidelity in the return to Context A – will produce a re-emergence of target behavior.

Two recent studies suggest that renewal may play an important role in the assessment and treatment of problem behavior. Kelley et al. (2015) exposed both pigeons and children diagnosed with Autism Spectrum Disorder (ASD) to ABA renewal arrangements. Participants engaged in responding reinforced on an FR-1 (children) or fixed-interval 10-s (pigeons) schedule in Context A during baseline. Next, children's academic behavior and pigeons' keypecking were placed on extinction in Context B. Finally, in the return to Context A, extinction remained in place. For all subjects, responding re-emerged in the return to Context A, despite the continuation of extinction. Similarly, Pritchard et al. (2016) exposed an adult male diagnosed with an intellectual disability to a two-component multiple schedule in which obtained reinforcement consisted of 120 reinforcers per hour in one component and 30 reinforcers per hour in the second component in Context A. Reinforcement was discontinued during both components in Context B. Next, extinction continued and problem behavior re-emerged in the return to Context A, demonstrating ABA renewal in a clinical setting (see also Saini, Sullivan, Baxter, DeRosa, & Roane, in press). Moreover, problem behavior re-emerged at higher levels and for longer in the component previously associated with the denser reinforcement.

The results of Kelley et al. (2015) and Pritchard et al. (2016) are consistent with previous renewal literature (e.g., Bouton et al., 2011; see Podlesnik et al., 2017, for a review) and suggest human operant behavior maintained by positive reinforcement is susceptible to the renewal effect. Further, the generality of the renewal effect has been demonstrated extensively under a range of respondent conditioning procedures in nonhumans (e.g., Bouton & Bolles, 1979; Laborda & Miller, 2013; see McConnell & Miller, 2014, for a review) and humans (Dibbets, Havermans, & Arntz, 2008; Glautier, Elgueta, & Nelson, 2013). In addition, Alessandri, Lattal, & Cançado, 2015 demonstrated renewal of negatively reinforced operant behavior with human participants. During Phase 1 in Context A (green computer screen), they maintained key pressing on a keyboard in university students according to a variable-ratio (VR) schedule by providing 3-s timeouts from an effortful response of holding a finger on a force cell. During Phase 2 in Context B (blue computer screen), pressing the key no longer provided timeouts (i.e., extinction). During Phase 3, key pressing increased when returning to Context A despite pressing continuing to produce no timeouts comprising the renewal effect.

Understanding renewal of negative reinforcement is important for understanding renewal of problem behavior reduced by behavioral treatments (Geiger, Carr, & LeBlanc, 2010; Iwata, 1987; Piazza et al., 2003). Furthermore, previous assessments of renewal examined a simple extinction contingency as a model of clinical treatment throughout Phases 2 and 3. In contrast, behavioral treatments such as DRA maintain an alternative source of reinforcement contingent upon some appropriate behavior (see Tiger, Hanley, & Bruzek, 2008, for a review). With the exception of instances of threats to treatment integrity, alternative reinforcement is available within and outside the treatment context (see Podlesnik et al., 2017, for a discussion). Therefore, previous demonstrations of renewal are limited in their applicability to behavioral treatments for problem behavior when only assessing extinction of target responding when changing contexts.

The purpose of the current study was threefold. Firstly, we sought to establish a replication of the renewal effect with clinically relevant problem behavior maintained by negative reinforcement. We chose aggression and inappropriate mealtime behaviors (IMB) as common examples of problem behaviors exhibited by children diagnosed with ASD. Secondly, we sought to extend renewal to differential reinforcement (as opposed to extinction alone) for one participant, as it more closely resembles the clinical situation where treatment remains in place during the return to the original context. The final goal of the present study was to assess methods to mitigate renewal of problem behavior while an intervention remained in place.

2. Method

2.1. Participants and setting

Participants included three boys diagnosed with Autism Spectrum Disorder (Drew, aged 3 years; Stephen and Jules, aged 5 years) who presented problem behavior maintained by negative reinforcement. Stephen and Jules were monozygotic twins, and were also diagnosed with Avoidant/Restrictive Food Intake Disorder (ARFID). Stephen and Jules's pediatrician ruled out any general medical