

*COLLATERAL EFFECTS OF RESPONSE  
BLOCKING DURING THE TREATMENT OF  
STEREOTYPIC BEHAVIOR*

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The collateral effects of response blocking were evaluated while treating stereotypic behavior in a woman diagnosed with autism. Blocking stereotypic behavior (head and tooth tapping) was associated with decreases in leisure-item interaction and increases in another stereotypic response (hand wringing). Results suggested that the reduction in item interaction was due to adventitious punishment. Prompts to access an alternative source of reinforcement attenuated the side effects somewhat, but results suggested that the undesirable effects of response blocking may be fairly durable.

DESCRIPTORS: blocking, collateral effects, extinction, punishment, side effects, stereotypic behavior

Research findings indicate that response blocking can be an effective treatment for behavior disorders (e.g., Lalli, Livezey, & Kates, 1996). Blocking may reduce responding via extinction or punishment when problem behavior is maintained by nonsocial consequences (e.g., Lerman & Iwata, 1996; Smith, Russo, & Le, 1999) and thus may be associated with undesirable collateral effects. For example, research findings on extinction and punishment suggest that blocking could induce aggression or lead to increases in other untargeted responses that are in the same response class as the blocked response (e.g., Singh, Manning, & Angell, 1982; Sprague & Horner, 1992). As a form of punishment, blocking also could be associated with decreases in desirable behavior, such as toy play (e.g., Thompson, Iwata, Conners, & Roscoe, 1999).

The collateral effects of response blocking have rarely been evaluated with behavior that is maintained by nonsocial consequences. In a notable exception, Hagopian and

Adelinis (2001) found that blocking pica set the occasion for an increase in aggression with 1 participant. This side effect was eliminated when the participant was prompted to obtain an alternative source of reinforcement (popcorn). The purpose of the current study was to extend the findings of Hagopian and Adelinis to the treatment of stereotypy.

## METHOD

### *Participant and Setting*

Amber was an 18-year-old student who had been diagnosed with severe mental retardation and autism. She had been referred for assessment and treatment of head and tooth tapping, which had produced hair loss and interfered with adaptive behavior. Amber's teachers often placed mechanical restraints on her arms to prevent these behaviors. Amber had poor motor skills and rarely interacted with leisure materials in the classroom. Results of a functional analysis (Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994) indicated that head and tooth tapping persisted in the absence of social conse-

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quences (data available upon request). Treatment with response blocking was evaluated after various reinforcement-based interventions were found to be ineffective. Sessions were conducted in two rooms at Amber's school and in her classroom. The rooms contained tables, chairs, bookshelves, and a variety of other items (e.g., toys, computers) that were kept out of reach when not used during sessions. In addition, three teachers and three to five students were present during sessions in the classroom.

#### *Response Measurement and Reliability*

Responses included head and tooth tapping, defined as contact between a finger and the head or tooth; hand wringing, defined as clasping the hands together and moving them against each other; and item interaction, defined as contact between the hand and leisure materials at least 5 s after a therapist prompt (when prompts were used). Head and tooth tapping typically occurred in rapid response bursts. Amber typically interacted with leisure materials by tapping or shaking them. All data were collected using 10-s partial-interval recording and were expressed as percentage of intervals scored. A second observer independently collected data during 53.6% of sessions, and the data were compared on an interval-by-interval basis. Mean interobserver agreement was 96.0%, 96.6%, and 92.3% for tooth and head tapping, item interaction, and hand wringing, respectively.

#### *Procedure and Experimental Conditions*

First, four brief analyses were conducted to evaluate the effects of response blocking on head and tooth tapping and collateral responses (item interaction and hand wringing). Potential strategies to attenuate the collateral effects also were examined. Conditions were alternated in a multielement design. Three to six 10-min sessions were conducted daily, usually 5 days per week.

Next, a reversal design was used to further evaluate the effects of the final treatment package on the collateral effects. Three to four 10-min sessions were conducted daily, usually 5 days per week. Finally, the effects of treatment were assessed during 60-min sessions in her classroom. One session was conducted per day, usually 4 to 5 days per week.

*Environmental enrichment (EE).* Six leisure items (e.g., beads, bells) identified as highly preferred via a stimulus choice preference assessment were available. Because Amber had poor motor skills, each item was tied with string and suspended from a horizontal bar that was mounted to a table, enabling her to interact continuously with the items without having to grasp them. No one interacted with Amber during these sessions.

*EE plus response block (RB).* Procedures were identical to those described above except that the therapist blocked head and tooth tapping after Amber initially touched her head or tooth. The therapist used the least amount of physical effort necessary to guide Amber's hand down away from her head or face. Contact between the therapist's hand and Amber's hand lasted no more than 1 s.

*EE plus conditional response block (CON RB).* Procedures were identical to those described above except that the therapist blocked tapping when it occurred in the absence of item interaction (EE plus CON RB), but did not block head and tooth tapping if Amber was interacting with a leisure item at the same time (EE plus CON unblocked [UB]).

*EE plus prompted item interaction (PI).* Procedures were identical to those in the EE condition. However, the therapist used the least amount of physical effort necessary to guide Amber's hands to an item if no interaction had occurred for 20 s. Item interaction was scored only if Amber interacted

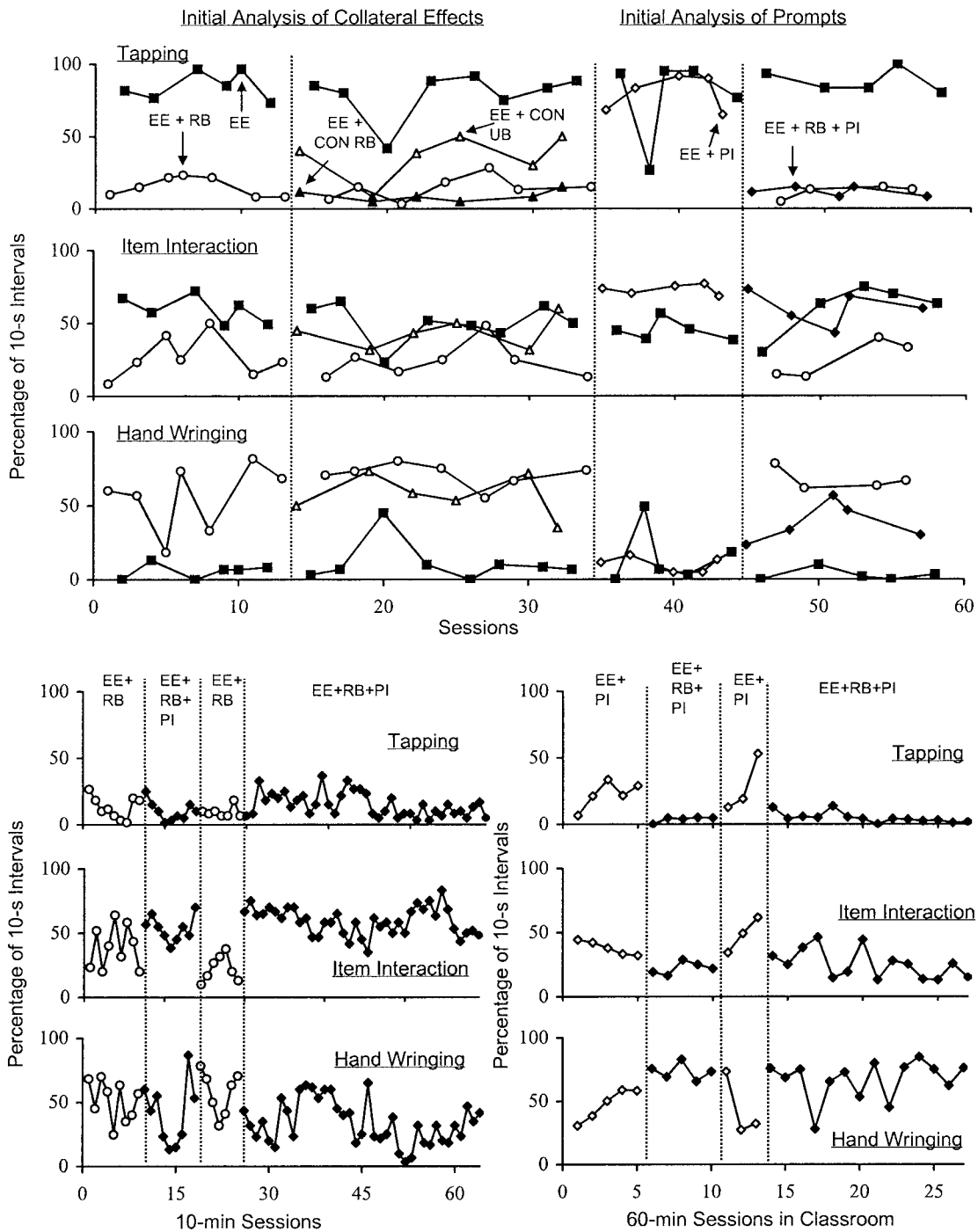


Figure 1. Percentage of 10-s intervals of head and tooth tapping, item interaction, and hand wringing during four brief multi-element analyses (upper three panels), further evaluation of the treatment for attenuating the collateral effects of blocking (bottom left three panels), and analysis of treatment generality during extended sessions in the classroom (bottom right three panels). EE = environmental enrichment, RB = response blocking, CON RB = blocked tapping responses only in the absence of item interaction; CON UB = unblocked tapping responses in the presence of simultaneous item interaction; PI = prompted item interaction.

with the item for at least 5 s after the prompt was removed.

*EE plus RB plus PI.* Procedures were identical to those in the EE plus RB and EE plus PI conditions.

## RESULTS AND DISCUSSION

Data from the first four analyses are displayed in the top three panels of Figure 1. Results of the first analysis (Phase 1) showed that response blocking produced a substantial decrease in head and tooth tapping but was associated with a collateral decrease in item interaction and a collateral increase in hand wringing. The mean probability that response blocking occurred contiguous to item interaction (i.e., in the same 10-s interval) was .30, suggesting that approximately every third interval containing item interaction potentially involved adventitious punishment.

In the next analysis (Phase 2), low levels of tapping were observed when it was blocked in the absence of item interaction (EE plus CON RB). Tapping occurred at unacceptably high levels when it was not blocked (i.e., when it occurred simultaneously with item interaction; EE plus CON UB). In addition, hand wringing occurred at high and unacceptable levels when tapping was blocked conditional on the absence of item interaction in EE plus CON. Thus, both continuous (Phase 1) and conditional (Phase 2) blocking of one stereotypic response (tapping) produced collateral increases in another stereotypic response (hand wringing).

The effects of prompting item interaction were evaluated in the next two analyses (Phases 3 and 4). When prompts were combined with response blocking (EE plus RB plus PI), the effects of blocking were substantially attenuated for item interaction and moderately attenuated for hand wringing. Results were replicated for item interaction

but not for hand wringing when the treatment was evaluated in a reversal design across an extended number of brief sessions (bottom left three panels of Figure 1). Attempts to reduce hand wringing via response blocking were unsuccessful (data available upon request). Although head and tooth tapping remained low during 60-min sessions in the classroom (bottom right three panels of Figure 1), item interaction appeared to decrease gradually across treatment.

These findings replicate and extend those of Hagopian and Adelinis (2001) by demonstrating several undesirable side effects of response blocking during the treatment of stereotypic behavior and evaluating a similar strategy to attenuate these effects. Although the side effects decreased somewhat when the participant was prompted to obtain an alternative source of reinforcement, the beneficial effect of this procedure appeared to wane over time. These results suggest that collateral effects of procedures like response blocking may be relatively enduring.

We hypothesized that item interaction decreased due to adventitious punishment or to the collateral increase in hand wringing. Results of the second analysis are consistent with the former account in that item interaction increased when blocking no longer occurred contiguous to item interaction even though levels of hand wringing remained high. Hand wringing may have increased because the behavior was in the same response class as head and tooth tapping. Subsequent research could further examine the mechanisms associated with the collateral effects of blocking, as well as strategies to attenuate these effects.

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