

*SUPERIMPOSITION AND WITHHOLDING OF EDIBLE  
CONSEQUENCES AS TREATMENT FOR  
AUTOMATICALLY REINFORCED STEREOTYPY*

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The delivery and subsequent withholding of tangible consequences has been previously investigated as an intervention for stereotypic behavior. The current investigation sought to extend previous research by evaluating its effectiveness and durability as treatment for stereotypy of 2 children who had been diagnosed with autism. Nonsocial functions for stereotypic behavior were identified via functional analysis. Edible items were then delivered contingent on stereotypy and were withheld in a subsequent condition. When the superimposition procedure failed to reduce stereotypy, environmental enrichment was implemented and was found to reduce the stereotypy of both participants.

DESCRIPTORS: stereotypy, reinforcer displacement, environmental enrichment, superimposition procedure

Foxx and McMorrow (1983) introduced a treatment for stereotypy (sometimes referred to as *reinforcer displacement*) in which an arbitrary stimulus is delivered contingent on an aberrant behavior that is likely to be maintained by a qualitatively different stimulus; the delivery of the arbitrary stimulus is then subsequently withheld. The potential applied significance of reinforcer displacement is that it might be used to shift control of a behavior from a difficult-to-manipulate stimulus (e.g., an automatic reinforcer) to an easily manipulated stimulus (e.g., an edible item or toy), allowing a clinician to implement extinction more easily.

The following evaluation method has been used in human studies evaluating reinforcer displacement (Foxx & McMorrow, 1983;

Foxx, McMorrow, Fenlon, & Bittle, 1986; Neisworth, Hunt, Gallop, & Madle, 1985; Schmid, 1986): a baseline phase of no programmed consequences for stereotypy, a period of continuous delivery (superimposition) of edible items, and a return to baseline in which edible items are withheld.<sup>1</sup> Across these investigations, 9 of the 11 participants exhibited lower levels of target behavior during the withheld-edible-items phase; however, reductions for some participants were not substantial. Response reductions were found to be durable for 3 of the 5 participants for whom maintenance was assessed. None of the studies incorporated a functional analysis of aberrant behavior, so it is unclear whether social reinforcement functions played a role in producing different outcomes in terms of effectiveness and maintenance. Finally, some of the studies had methodological limitations (e.g., brief phases) and did not provide sufficient detail to allow the reader to rule out potential confounding variables. The purpose of the current study was to

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<sup>1</sup>Although the terms *reinforcement* and *extinction* have been used in the literature to describe these conditions, we find the procedural terms *superimposed edible items* and *withheld edible items* to be more technically precise. In addition, because the term *reinforcer displacement* implies a mechanism by which this procedure produces behavior change, the term *superimposition* will be used here.

replicate and extend previous research on the superimposition and withholding of tangible consequences by evaluating their effectiveness and durability for reducing stereotypy of children with autism following pretreatment functional analysis.

## METHOD

### *Participants and Data Collection*

Two 6-year-old girls who had been diagnosed with autism participated in the study. Both Rose and Libby displayed severe deficits in language, social interaction, and motor skills.

Sessions were conducted in a quiet area of each child's home 4 to 5 days per week and were 15 min in duration. All behaviors were recorded from videotape using a noncontinuous partial-interval recording system (10-s observation, 5-s recording). Rose's and Libby's target stereotypic behavior was *scratching*, which was defined as movement of the fingertips or fingernails across a surface (e.g., furniture, wall, toy) without using the same fingers to grasp the item. Rose's definition was amended to also include her toes. During the environmental enrichment intervention, data were also collected on *toy engagement*, which was defined as touching a toy without scratching it, although specific definitions of toy engagement were developed for each toy. Interobserver agreement on the occurrence of scratching and toy engagement was assessed using the point-by-point method for at least 30% of each participant's sessions and averaged at least 93% for each topography.

### *Functional Analysis*

A functional analysis was conducted with each participant using procedures based on those described by Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1994). The functional analysis was evaluated using a multielement design, after which several consecutive no-interaction sessions were conducted to assess behavioral persistence in the absence of social consequences.

Functional analyses for both participants included attention, demand, no-interaction, and control conditions. Rose's functional analysis also included a tangible condition (contingent access to a satin ribbon). Test conditions were selected based on prior informant and direct-observation assessments.

### *Treatment Evaluation*

The effects of the superimposition procedure on scratching were evaluated using a nonconcurrent multiple baseline design across participants. Stimulus preference assessments were conducted to identify highly preferred foods to be used as programmed consequences during the superimposed-edible-items condition. Each participant was exposed to baseline, superimposed-edible-items, and withheld-edible-items conditions in an ABA sequence. Environmental enrichment was then implemented as the final treatment condition for both participants.

*Baseline and withheld edible items.* During all sessions, an experimenter remained near the participant without talking or making eye contact to ensure that behaviors were not unintentionally reinforced. Although a bag containing the food was present during all sessions, no programmed consequences were delivered for scratching.

*Superimposed edible items.* During this condition, a small piece of a highly preferred food was placed directly into the participant's mouth contingent on scratching. If the participant continued to scratch while consuming and swallowing the food, another piece was delivered after the previous piece had been swallowed. This phase continued for at least 25 sessions and until stability was observed.

*Environmental enrichment.* Prior to this condition, preference assessments were conducted using toys that matched hypothesized sensory functions of scratching (i.e., auditory and tactile stimulation). The purpose of this assessment was to identify toys associated with low levels of scratching and high levels of toy engagement. During environmental

enrichment, free access to three toys was provided to evaluate their effects on scratching. The room was arranged as in baseline, with the

toys placed around the room. Upon entering the room, the experimenter prompted the participant to touch one of the toys. For the

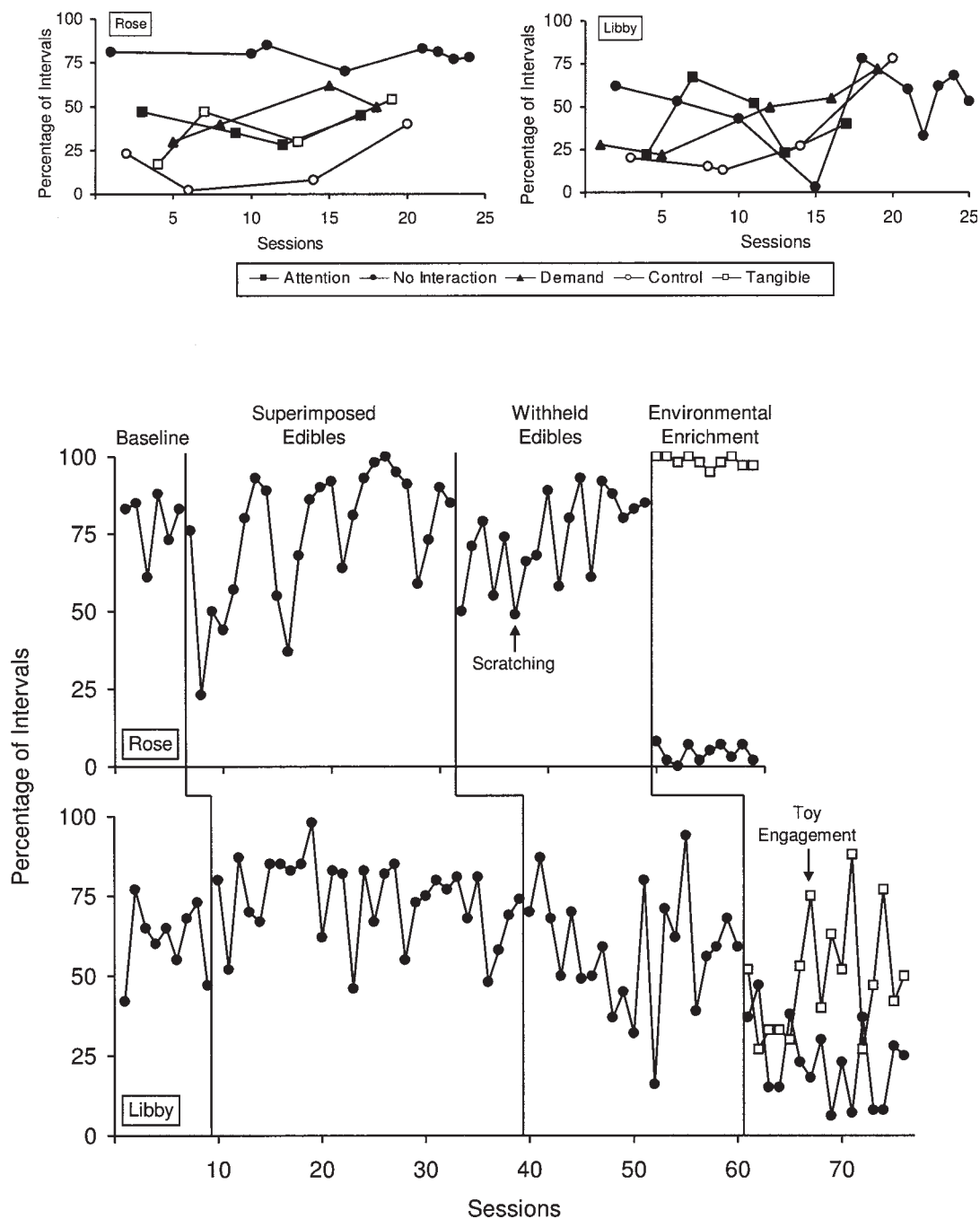


Figure 1. Functional analysis results for Rose and Libby (top panel). Treatment evaluation results for Rose (middle panel) and Libby (bottom panel).

remainder of the session, procedures were identical to those used in baseline.

## RESULTS AND DISCUSSION

The differentially high responding in the no-interaction condition for Rose and undifferentiated functional analysis pattern for Libby suggested that their scratching was maintained independent of social consequences (see Figure 1). Rose's scratching occurred at a mean of 79% of intervals during baseline and a mean of 75% of intervals during the superimposed-edible-items condition in which 2,338 edible items were delivered. When edible items were withheld, scratching occurred at an overall mean of 73% of intervals. Libby's scratching occurred at a mean of 61% of intervals during baseline and increased slightly to a mean of 74% of intervals during the superimposed-edible-items condition in which 2,801 edible items were delivered. When edible items were withheld, scratching briefly decreased in a gradual and orderly progression before becoming more variable and returning to the baseline level ( $M = 61\%$ ). Unlike the superimposition procedure, environmental enrichment was effective in decreasing scratching for both Rose and Libby ( $M = 4\%$  and  $23\%$ , respectively), demonstrating that both participants' scratching was amenable to behavioral treatment. The results of our evaluation of the superimposition procedure showed that any reductive effects of this procedure were limited and brief. The finding was replicated across participants who were similar on variables of response topography, function of stereotypy, age, and language and adaptive skills.

A limitation to consider in evaluating these findings is that neither participant's scratching increased during the superimposed-edible-items condition. Because a clear reinforcement effect was not demonstrated, it cannot be determined from the data if edible items came to control the participants' scratching in any way. However,

evidence for tangible control of scratching was observed during the withheld-edible-items condition for Libby in the orderly decrease in trend and increased variability. Future research evaluating the superimposition procedure might employ reinforcer assessments and lengthier superimposition phases to establish more firmly a reinforcement effect prior to the withholding of tangible consequences. It may be that the superimposition procedure does not produce a robust, reliable, or persistent decrease in behavior. Given the data from evaluations of the superimposition procedure thus far, this may be the most plausible explanation for the inconsistent findings on this phenomenon. Taken together, these data suggest that the search for treatments for automatically reinforced aberrant behavior should focus on more direct intervention strategies.

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