

A COMPARISON OF SIMULTANEOUS AND DELAYED REINFORCEMENT AS TREATMENTS FOR FOOD SELECTIVITY

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This study compared the relative efficacy of providing simultaneous or delayed reinforcement on food acceptance during meals. The participant was a 7-year-old boy with pervasive developmental disorder and a history of food selectivity. Results indicated that both procedures were effective in increasing acceptance; however, the simultaneous reinforcement procedure produced more rapid behavior change and a higher overall percentage of food acceptance.

DESCRIPTORS: simultaneous reinforcement, delayed reinforcement, food selectivity, food refusal, self-injury

Food refusal and food selectivity occur frequently among children with disabilities (Riordan, Iwata, Finney, Wohl, & Stanley, 1984). Feeding problems of this nature can result in serious health problems, ranging from malnutrition to severe growth and developmental delays. Although the etiology varies and is sometimes unclear, feeding problems may persist as a result of environmental factors. Specifically, permitting escape contingent on resistance and other problem behaviors may exacerbate and maintain food refusal and selective eating.

A small yet growing literature has demonstrated the effectiveness of a variety of behavioral interventions for increasing food acceptance and consumption. Intervention components have included escape-extinction, differential reinforcement of alternative behavior, differential reinforcement of incompatible behavior, choice, and contingent reinforcement in the form of attention, preferred foods, or preferred materials (Cooper et al., 1995; Kerwin, Ahearn, Eicher, & Burd, 1995; Riordan et al., 1984). Although

use of simultaneous reinforcement has been described in the literature, its effectiveness has not been examined thoroughly. Riordan et al. implemented an intervention with 2 children with feeding disorders that consisted of simultaneous presentation of preferred and target foods. However, a 2- to 3-s delay was added after the first few meals, thereby precluding a comparison of simultaneous versus delayed reinforcement procedures. The present study included such a comparison during the treatment of chronic food selectivity.

METHOD

Participant and Setting

The participant, Carlos, was a 7-year-old boy who had been diagnosed with pervasive developmental disorder and a history of food selectivity. When the study began, Carlos was consistently eating only five different food items. When presented with nonpreferred foods, he either refused to accept the item or expelled it after accepting it. Refusal was often accompanied by self-injury and tantrums. The study was conducted in an inpatient hospital setting where Carlos had been admitted for treatment of his feeding disorder and other problem behaviors.

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Behavioral Definitions, Measurement, and Interobserver Agreement

Acceptance was scored when Carlos (a) opened his mouth and allowed the food to be placed inside within 30 s following initial presentation and (b) did not expel the food after the 30-s interval had elapsed. Data were collected by therapists and graduate students using hand-held timers and were summarized as percentage of bites accepted.

Interobserver agreement was assessed during 23% of the meals. An agreement was scored if both observers recorded latency to acceptance occurring at 30 s or less. Agreement was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100%. Mean agreement was 96% (range, 80% to 100%) for vegetables and 99% (range, 90% to 100%) for fruits.

Procedure

General. Sessions were conducted daily at breakfast, lunch, and dinner by one of four therapists and by Carlos' mother during the last three meals. Foods from four groups (starches, proteins, fruits, and vegetables) were presented at each meal (with the exception of four meals during baseline). During each meal throughout the study, a bite of four different items from each food group was presented in random order. This sequence was then repeated 10 times (40 bites total).

Baseline. A spoonful of each food was held in front of Carlos for 30 s. If acceptance did not occur within 30 s, the next food item was presented. Food groups with the lowest percentage of acceptance during baseline were fruits and vegetables. These two groups were randomly assigned to one of two interventions: escape-extinction with simultaneous reinforcement or escape-extinction with delayed reinforcement.

Intervention. A multielement design was

used to compare the two interventions. Fruits were exposed to escape-extinction with simultaneous reinforcement; vegetables were exposed to escape-extinction with delayed reinforcement. Procedures remained the same as in baseline (30-s presentation) for the food groups not exposed to intervention.

During both interventions, escape-extinction was implemented by holding the food in front of Carlos until he accepted it. This procedure was implemented with each bite, regardless of the latency to acceptance. If a bite was accepted and then expelled, it was re-presented. Self-injurious behavior (SIB) and other problem behaviors were ignored.

Corn chips, a food that Carlos ate consistently, were used as the reinforcer for both interventions. During simultaneous reinforcement, the chip and fruit were presented at the same time. For example, a slice of banana was placed on top of a chip and presented to Carlos. During delayed reinforcement, the chip was provided after the vegetable was accepted (i.e., a bite of vegetable was held in front of a chip).

The quantity of reinforcement was modified in both interventions depending on the occurrence or nonoccurrence of SIB. Initially, a whole chip was provided. Beginning with Meal 38, each chip was decreased by one eighth of the original size following the absence of SIB for three consecutive bites. Likewise, if self-injury occurred during three consecutive bites, the next chip was increased to the previous size.

RESULTS AND DISCUSSION

During baseline, acceptance within 30 s occurred for 2% of the fruit presentations and 11% of the vegetable presentations. During intervention, the simultaneous reinforcement procedure implemented with fruits resulted in a rapid increase in acceptance within 30 s, with a condition mean of

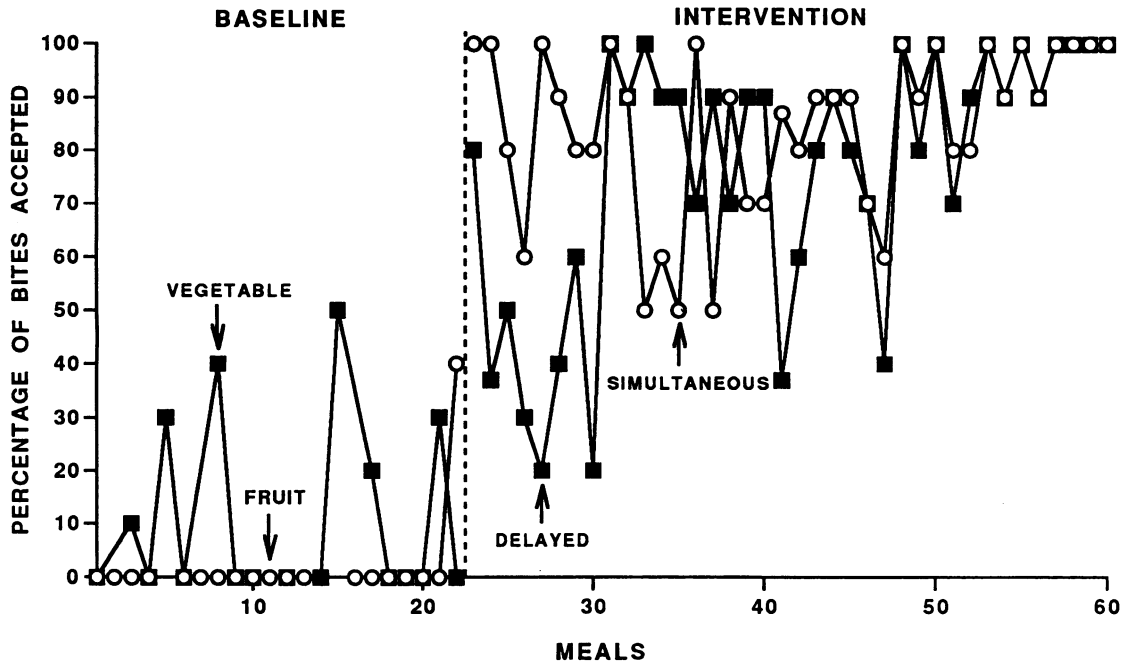


Figure 1. Percentage of bites accepted within 30 s of each presentation.

85%. Exposure to the delayed reinforcement procedure resulted in a mean of 76% acceptance for vegetables (Figure 1).

Data were collected on SIB only during the intervention phase. Data on the total frequency of SIB indicated that there were fewer total occurrences during the simultaneous reinforcement procedure ($M = 5.2$ per meal) than during the delayed procedure ($M = 10.2$ per meal). These data, however, must be interpreted cautiously because of the absence of comparative baseline data.

The results of this study showed that both interventions resulted in increased acceptance. In addition, reinforcement was completely faded at the same time (by Meal 58) with both interventions, indicating equivalence in terms of treatment duration. However, the simultaneous reinforcement procedure was slightly superior with respect to initial treatment effects and overall mean percentage of food accepted within 30 s.

A possible explanation for the effective-

ness of the simultaneous reinforcement procedure is that the presence of the preferred food masked the control exerted by the non-preferred food. This is somewhat of a departure from previous uses of the term *masking* (Mackintosh, 1977), in which loss of stimulus control results from simultaneous presentation of multiple discriminative stimuli. In the present case, loss of stimulus control may have resulted from simultaneous presentation of an S+ (corn chip) and S- (fruit), with the S+ masking the discriminative properties of the S-.

The results of this study suggest the advantage of an intervention package consisting of simultaneous reinforcement. This may be important when selecting interventions for individuals whose health is at risk because of food selectivity. Further research is necessary to determine whether similar results are observed across individuals and to clarify the effects on associated problem behavior.

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