

*AN EVALUATION OF SIMULTANEOUS PRESENTATION AND
DIFFERENTIAL REINFORCEMENT WITH RESPONSE
COST TO REDUCE PACKING*

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We evaluated the effects of multiple treatment procedures, including simultaneous presentation of preferred foods, on the packing behavior of a 9-year-old girl with autism. A reversal design was used to assess the effects of differential reinforcement with response cost alone and with simultaneous presentation. In addition, simultaneous presentation was assessed independent of differential reinforcement with response cost. Results indicated that simultaneous presentation reduced packing and that differential reinforcement with response cost was not necessary to maintain these reductions. Results are discussed in terms of the use of simultaneous presentation for packing as an alternative to consequence manipulations.

DESCRIPTORS: packing, simultaneous presentation, food selectivity

Packing is a specific feeding-related behavior characterized by retention of food in the mouth for protracted durations. Significant health problems such as malnutrition, failure to thrive, or dehydration may occur if packing results in insufficient intake. From a practical standpoint, packing may prolong meal durations excessively, thus undermining potential feeding efforts or interfering with the child's opportunities to participate in learning or social activities.

Despite the potential negative consequences that may be associated with packing, it has received little attention in the research literature. Notable exceptions are studies by Riordan, Iwata, Wohl, and Finney (1980) and Sevin, Gulotta, Sierp, Rosica, and Miller (2002). Riordan et al. used differential reinforcement

to increase acceptance and noted that packing also increased. Therefore, differential reinforcement was used to increase swallowing. However, it is unclear if this contingency change decreased packing.

Similarly, Sevin et al. (2002) observed that packing emerged during treatment of 1 child's food refusal. Sevin et al. used a Nuk® brush to move (redistribute) the packed food from the area between the participant's cheek and gum to the center of his tongue every 15 s until the bite was swallowed. The Sevin et al. study was important because it demonstrated that a consequence-based procedure (redistribution) was effective in reducing packing. However, given the paucity of literature on packing, investigations of alternative procedures to treat packing seem warranted. In the current investigation, we compared the effectiveness of a consequence-based intervention (differential reinforcement plus response cost) with an antecedent-based intervention (simultaneous presentation of preferred and nonpreferred food) and a combination of the two. Both interventions had been used in the literature to increase acceptance (differential reinforcement plus response cost, Kahng, Tarbox, & Wilke, 2001; simultaneous

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presentation, Ahearn, 2003; Kern & Marder, 1996; Piazza et al., 2002), but to our knowledge have not been used to treat packing.

METHOD

Participant and Setting

Maria was a 9-year-old girl with autism who attended a private school for children with developmental disabilities. At the time of the study, she ate only waffles, vegetable soup, bananas, tahini, and halva on a regular basis. She also ate snack foods with less nutritional value, such as crunchy peanut snacks, chocolate cookies, puddings, and chocolate spread. Although Maria's nutritional and caloric requirements were being met by her current diet, her parents referred her to our feeding unit to increase the number of healthier types of foods in her current repertoire. An interdisciplinary team that included Maria's speech pathologist and occupational therapist, as well as reports from her parents, confirmed that no preexisting medical conditions precluded her ability to chew, swallow, or digest any textured item. Maria consumed most of the foods from her existing repertoire without incident, but when she was presented with bites of new or nonpreferred foods (irrespective of texture), she typically packed the bites in her mouth for long periods. On several occasions, classroom staff observed her expelling the bites at various locations of the school. Thus, Maria's packing was directly interfering with ongoing attempts to expand her repertoire. All sessions were conducted once per day in the school's assessment room (3 m by 2.3 m). The mean session duration was 22 min (range, 5 to 73 min).

Response Definitions and Interobserver Agreement

Mouth clean was defined as no visible food in Maria's mouth larger than a grain of rice (without expulsion) at any point following acceptance. *Packing* was defined as any visible food in Maria's mouth equal to or larger than

a grain of rice during any mouth check. Packed intervals per session served as the dependent measure and was scored by summing the number of 30-s mouth checks per session in which packing was observed.

A second independent observer recorded data separately on all target responses. Interobserver agreement was obtained on 28% of all sessions distributed evenly across all conditions of the study and was calculated by dividing the number of mouth-check agreements by the number of agreements plus disagreements multiplied by 100%. Mean agreement was 99% (range, 93% to 100%).

Procedure

A reversal design (ABACBCDAD) was used to assess the effects of differential reinforcement plus response cost, simultaneous presentation, and differential reinforcement plus response cost plus simultaneous presentation on packing. Following baseline (A), differential reinforcement plus response cost (B) was introduced. After a return to baseline, differential reinforcement plus response cost was reintroduced with (C) and without (B) simultaneous presentation. Finally, simultaneous presentation (D) was introduced by itself in a reversal format. Sessions were conducted once per day (midway between breakfast and lunch) with each session consisting of one bite of each of four foods chosen as goal items by Maria's parents (ground beef, pasta, carrot, and apple). These items were randomly rotated during each session and remained consistent throughout the study. All bites were presented at a ground texture in attempts to approximate the texture of common items that Maria regularly consumed at home (e.g., tahini, halva).

Baseline

The therapist held a bite (2.5 cm by 2.5 cm) of the target item on a spoon 5 cm from Maria's mouth and said, "Take a bite." After Maria accepted the bite, mouth checks were conducted every 30 s (via verbal request) until no visible evidence of the presented bite (smaller

than a grain of rice) was observed in her mouth. Maria complied with these requests almost 100% of the time; however, a couple of mouth checks required the therapist to repeat the request. If packing was observed, the therapist provided brief verbal instructions to swallow the bite. Brief verbal praise was given for mouth clean. Because Maria accepted all presented bites without rejection or expulsion, no additional procedures were included in the treatment.

Differential Reinforcement plus Response Cost

Differential reinforcement plus response cost consisted of positive reinforcement for mouth clean and response cost for packing. Bites were presented as in baseline except that Maria had access to a preferred video (determined via staff reports, parent responses to an item preference survey, and informal observations) 30 s prior to the first presented bite. Throughout the meal, the video was removed following packing and was returned with verbal praise following a clean mouth.

Simultaneous Presentation and Differential Reinforcement plus Response Cost

This condition was identical to differential reinforcement plus response cost except that a bite of a ground chocolate cookie was placed on the spoon behind the target food. The cookie was determined to be a highly preferred food item based on parent and staff reports and through the direct observations made by classroom staff and both authors of this study.

Simultaneous Presentation

This condition was identical to baseline except that a bite of the ground cookie was placed on the spoon behind the target food and presented simultaneously to Maria.

RESULTS AND DISCUSSION

Figure 1 shows packed intervals per session during baseline, differential reinforcement plus response cost, differential reinforcement plus response cost with simultaneous presentation,

and simultaneous presentation alone. Packing decreased from baseline ($M = 90$) during differential reinforcement plus response cost ($M = 48$) and decreased further when differential reinforcement plus response cost with simultaneous presentation was introduced ($M = 7$). Packing increased ($M = 47$) when simultaneous presentation was removed from differential reinforcement plus response cost plus and decreased ($M = 12$) when it was reintroduced. Packing reductions were maintained when simultaneous presentation was used alone ($M = 13$), increased during the return to baseline ($M = 46$), and finally decreased again during simultaneous presentation ($M = 9$).

The current study represents a pilot investigation on the effects of multiple treatment procedures designed to reduce packing. The results indicate that simultaneous presentation produced superior reductions in packing relative to differential reinforcement plus response cost, and thus may be a viable treatment option to reduce packing. It extends the existing research by being the first study to evaluate the effects of simultaneous presentation on packing, a much-understudied topography. Moreover, the study offers an antecedent-based alternative to the consequence manipulation used by Sevin et al. (2002). The results are also consistent with previous research that has shown that reinforcement-based procedures alone may be insufficient to increase consumption of target foods (Patel, Piazza, Martinez, Volkert, & Santana, 2002) and extend these findings to the treatment of packing.

These results should be interpreted in light of three potential limitations. First, only 1 participant was used in this investigation. Second, the study employed a relatively small number of bite presentations per session and food quantity per bite. Further research is needed to assess the generality of the results with larger meal requirements, which may be a consideration when packing presents more significant con-

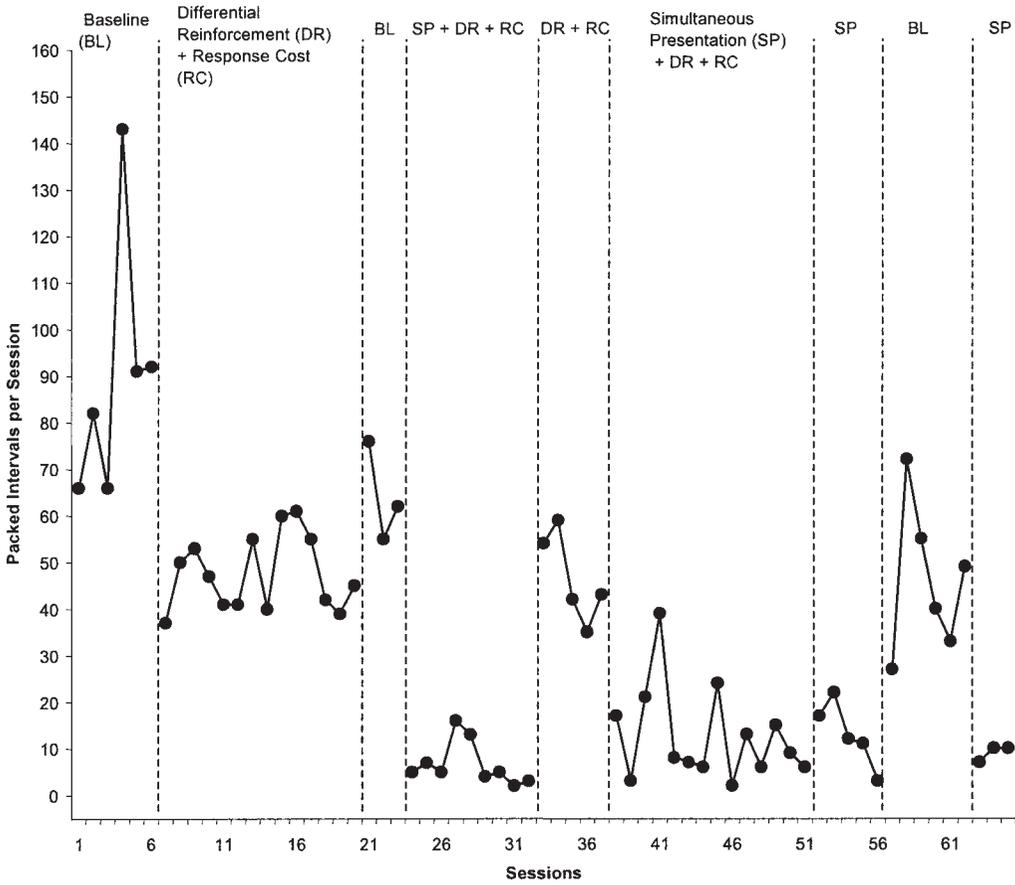


Figure 1. Number of packed intervals per session for Maria during baseline (BL), differential reinforcement plus response cost (DR + RC), simultaneous presentation (SP), and SP + DR + RC conditions.

cerns (i.e., failure to thrive). The third potential limitation is that the study did not control for the possibility that order effects may have influenced the results (because simultaneous presentation was not presented in isolation until the later sessions of the study and immediately subsequent to its combination with the multi-component treatment procedure). Future research should directly assess the effects of simultaneous presentation on packing without evaluating additional interventions.

These potential limitations notwithstanding, the results of this study are reasonably clear in terms of the effects of simultaneous presentation; not so clear is the mechanism responsible for those results. Previous research on simulta-

neous presentation has offered explanations such as flavor-flavor conditioning (Piazza et al., 2002) or reductions in the aversive properties (i.e., establishing operations) of target food items (Ahearn, 2003) to account for improvement in other feeding topographies (e.g., acceptance). However, additional research is needed to determine the extent to which these (or other) mechanism-based explanations extend to reductions in packing.

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