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INCREASING THE VARIETY OF FOODS CONSUMED BY A PICKY EATER: GENERALIZATION OF EFFECTS ACROSS CAREGIVERS AND SETTINGS

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A multiple baseline across settings was used to evaluate the effects of differential reinforcement of alternative behavior, nonremoval of the fork (Hoch, Babbitt, Coe, Krell, & Hackbert, 1994), and stimulus fading on consumption of food rejected previously. The study was conducted in two separate settings, and caregivers were trained in the intervention technique to increase generalization to natural settings. Food variety increased in both settings.

Key words: autism, differential reinforcement of alternative behavior, extinction, food variety, nonremoval of the fork

Studies have shown that behavioral interventions are effective as treatments for selective eating (e.g., Ahearn, 2001; Bachmeyer et al., 2009; Najdowski, Wallace, Doney, & Ghezzi, 2003; Piazza et al., 2002). For instance, Najdowski et al. used differential reinforcement of alternative behavior (DRA), escape extinction, and stimulus fading to increase food acceptance of a young boy with autism in two settings. Our study is a systematic replication of Najdowski et al., in which we increased the variety of foods consumed by a 5-year-old boy with autism. Notable features of our study are the evaluation of the treatment during typically occurring mealtimes with regularly scheduled food types and the inclusion of measures that describe the increase in the variety of food consumed following treatment.

The first two authors are ranked randomly; they contributed equally to the work. This study was a research project toward their BA degree in psychology from the University of Iceland; the third author was their mentor. We are very grateful to the five anonymous reviewers for their extremely helpful comments on a previous version of this paper.

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METHOD

Participant and Setting

John was a 5-year-old boy who had been diagnosed with autism and who had always been reported to be a picky eater (i.e., since he started eating solid food around 1 year of age). Prior to treatment, his diet consisted mainly of dairy products, meatballs, fish balls, fruits, cereal, and one type of bread. John did not eat any vegetables, mashed foods, or mixed dishes, among other things. Growth was within normal limits, and oral-motor skills were normal. According to caregiver report, meal lengths for John were excessive; he disturbed other children at mealtimes by screaming and throwing food; and caregivers had to prepare a separate meal for him.

In the preschool, John was not required to eat if he refused, but he had to sit in his chair until other children finished eating. He was then provided preferred foods in another room. At home, John got preferred foods if he refused the foods presented to the rest of the family.

Baseline, treatment extension, and follow-up measures were conducted in John's preschool and at his home during regular mealtimes. The intervention was conducted in a separate room in both settings in which only the researchers (who served as feeders initially) and John were

present. Following Session 28 in the preschool and Session 44 at home, the teachers and parents also were present and were taught how to feed the meal.

Measurement

Observers recorded the type and number of bites (5 cm^2) of nonpreferred food (food chosen on 0% of opportunities during a descriptive assessment) with a paper and pencil as John consumed them. Consumption was defined as swallowing food without expulsion.

Two team members (researchers, parents, and teachers) independently recorded the number of bites and types of nonpreferred foods consumed in at least 35% of sessions in each phase of the study. An agreement was defined as both observers agreeing on the type and number of bites consumed in a session. Agreement was 100% in all phases in both settings on both type and number of bites consumed.

Experimental Design

A concurrent multiple baseline across settings was used to evaluate the effect of DRA, nonremoval of the fork (Hoch, Babbitt, Coe, Krell, & Hackbert, 1994), and stimulus fading on number and type of bites of nonpreferred foods John consumed.

Procedure

Indirect and descriptive assessments. John's eating behavior was observed for 10 days in the preschool, and his parents were interviewed about his eating behavior at home. Foods that John did not eat during observations and according to the interview were listed as nonpreferred (e.g., vegetables, mixed dishes such as lasagna and goulash, sauces, soups), and foods that he ate were listed as preferred foods (e.g., meatballs, fish balls, fruits, cereal). Experimenters conducted paired-choice food and paired-choice toy preference assessments (Fisher et al., 1992). The feeder delivered items John chose most often during each assessment (cereal, orange soda, chicken legs, muffins, soap bubbles, small toys, a computer, and a board game) as preferred food and material reinforcers during the intervention.

Baseline. The feeder placed a plate of the preferred and nonpreferred foods that were available for the other children or family members at mealtime on the table in front of John and used the same methods as described above if he did not eat. The duration of baseline sessions depended on the duration of the mealtime in the preschool or at home (approximately 30 min). Baseline measurements started at the same time in both settings.

Intervention. The feeder delivered social praise (e.g., "Good job taking a bite") on a fixed-ratio (FR) 1 schedule immediately after John accepted each bite (i.e., when John used the fork to pick up the food and put the bite in his mouth past the plane of his lips) and other reinforcers (fading procedure specified below) and later token reinforcers when John consumed the criterion number of bites of nonpreferred food within 30 min. Preferred foods and material reinforcers were visible to John throughout each session. The feeder told John the number of bites he needed to consume to earn reinforcers prior to each session. The feeder delivered a verbal prompt to take a bite at the start of the meal and every 30 s until the meal ended (i.e., when John had consumed the criterion number of bites of nonpreferred food or 30 min had elapsed). If John did not accept a bite (as defined above) within 30 s, the feeder held a fork with a bite close to John's mouth until he consumed the bite (nonremoval of the fork; Hoch et al., 1994). If John spat out the bite, the feeder replaced it with a new bite.

The criterion for the feeder to deliver preferred foods, material reinforcers, and termination of the presentation of nonpreferred food was set prior to each session and was initially only one bite. Following stable responding, the number of bites John was required to consume to earn preferred foods, material reinforcers, and termination of the

nonpreferred food meal was increased (a procedure consistent with stimulus fading; Pace, Iwata, Cowdery, Adree, & McIntyre, 1993). We increased the number of bites we required John to consume to earn reinforcement by 50% (rounded up to the next whole number of bites for each fading step). The feeder faded the material reinforcers and preferred foods throughout the intervention in approximate 25% increments based on visual inspection of the data. For example, in the first session, reinforcement consisted of a big bowl of cereal, a glass of soda, and 5-min access to soap bubbles. At the end of the fading procedure, the feeder gave John a sip of soda, a small bowl of cereal, and 1-min access to soap bubbles. By the end of the study, the feeder used tokens as reinforcement.

Initially, the feeder presented only one type of nonpreferred food in each session, which the feeder selected from what was available for others at mealtime. Following Session 20 in the preschool and Session 33 in the home, the feeder presented multiple types of nonpreferred food in each session to make the meal increasingly similar to the meals of the other children or family members. The number of types of nonpreferred foods the feeder presented in each meal was based on the number of nonpreferred foods available at the regular meal that day (e.g., the feeder served fish stew and potatoes to John if that is what the other children or family members were served). The feeder presented only one or two bites the first time he or she introduced a nonpreferred food in conjunction with the other nonpreferred foods that were presented on the plate. The feeder increased the number of bites of the newly introduced nonpreferred food by 50% the second time he or she presented that food type. At this point, that food was no longer considered a new nonpreferred food.

The feeder introduced tokens when John was consistently consuming 27 bites of nonpreferred foods in the preschool and the home. The tokens were pictures of preferred foods and materials; John chose two tokens prior to each session, one of a preferred food item and one of a material item, and these tokens were visible to John during each session. If he consumed all the nonpreferred foods within the 30-min time limit, he exchanged the tokens for backup reinforcers; the feeder continued to deliver social reinforcers on an FR 1 schedule.

After John was successfully consuming 12 or 18 bites of nonpreferred food (in the preschool and home, respectively) without nonremoval of the fork (i.e., he most often consumed each bite within the 30-s limit), caregivers were introduced into the meal context to increase the probability of generalization to natural settings. The researchers held a workshop after John had consumed 27 bites for five consecutive sessions (i.e., in Session 37 in the preschool and Session 48 in the home) in which caregivers received oral and written instructions about the intervention and watched a video from earlier intervention sessions.

Treatment extension. Observations took place at regular mealtimes in the company of other children, teachers, or parents. Caregivers implemented the treatment; researchers were present to record data and gave performance feedback after each session. The caregiver placed a small amount of everything that was available at the meal (such that John's meal was identical to that of the other children in the preschool or family members at home) on the plate, and the caregiver required John to consume 30 bites (which was a typical portion for other 5-year-olds in the preschool) to earn a token. John chose only one token (picture of a material item) prior to each meal during this phase and received the backup reinforcer if he had consumed all presented bites of preferred food and nonpreferred food within 30 min. The caregiver did not use nonremoval of the fork during these meals so that John's mealtime conditions would be similar to the others during the meal. Caregivers delivered intermittent praise when he consumed nonpreferred food, but they did not deliver prompts.

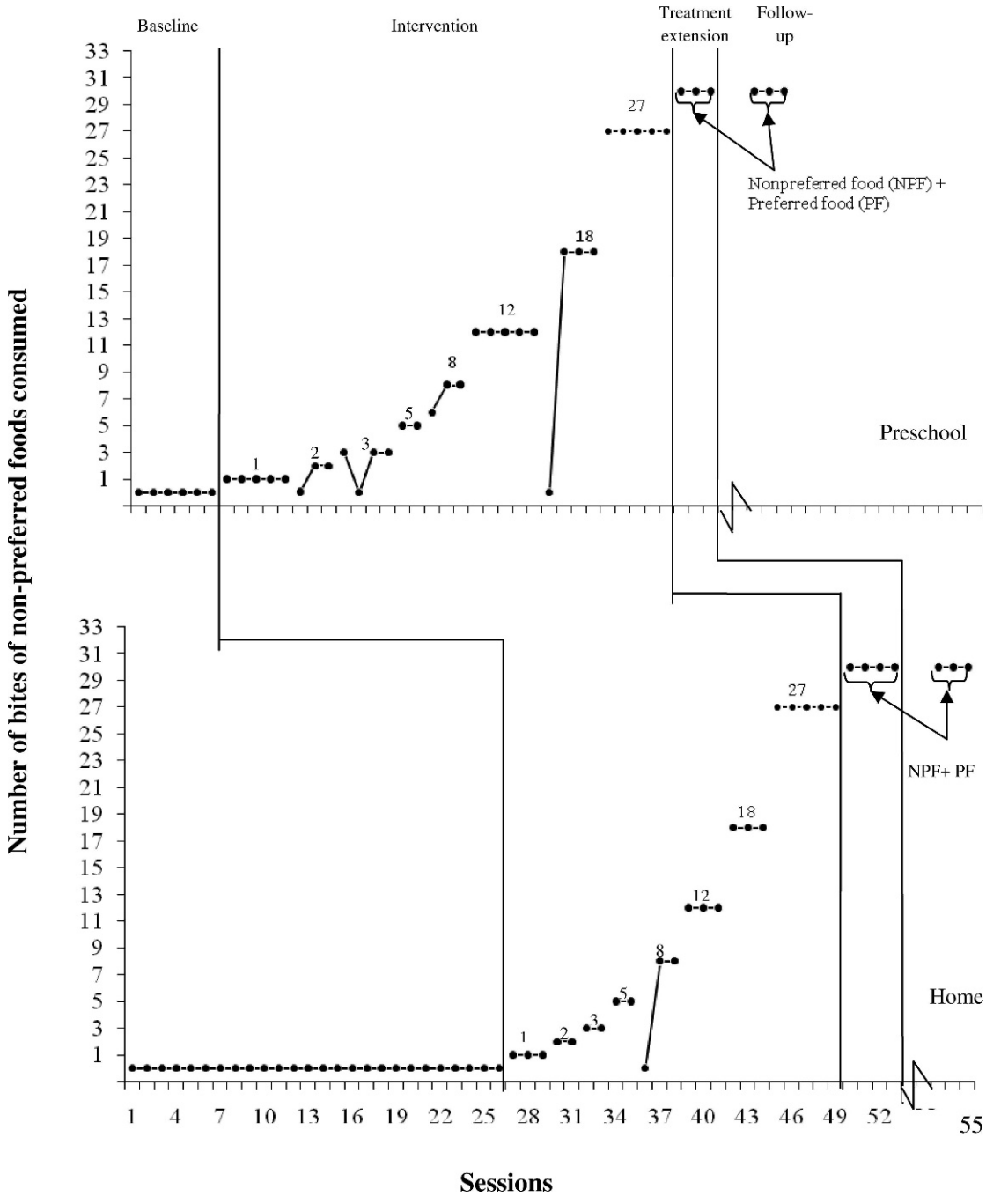

Figure 1. Number of bites of nonpreferred foods John consumed during baseline and intervention sessions, and number of bites of nonpreferred and preferred foods consumed in treatment extension and follow-up. The numbers above the data path indicate the change in the reinforcement criterion in the intervention phase.

Follow-up. Experimenters observed three follow-up meals 25 and 19 days after data collection was terminated in the preschool and home, respectively.

RESULTS AND DISCUSSION

Figure 1 shows the number of consumed bites of nonpreferred foods in both settings. John did not consume any nonpreferred food in baseline phases. When the intervention phase started in the preschool, John always consumed the required number of bites except on four occasions. Even though he had started eating a few types of nonpreferred food in the preschool setting, he did not eat these same nonpreferred foods at home before intervention started there (i.e., his performance did not generalize across settings). John always consumed the required number of bites of nonpreferred food during the intervention phase at home except once. At the end of the intervention phases in both settings, he consumed 27 bites composed of up to seven different nonpreferred foods presented together. Eventually, he consumed at least 30 bites of everything offered at each meal, as was expected of other 5-year-olds in the preschool.

John's variety of nonpreferred foods consumed increased during the intervention sessions in both settings. When the intervention ended, John had consumed 39 food types that had been listed by his caregivers as nonpreferred foods in the indirect and descriptive assessments, 20 in the preschool, and 25 at home, and his consumption was maintained at follow-up. For example, John ate 14 types of vegetables, 4 kinds of sauces, and 10 different mixed dishes. Most important, he participated in the regular meals at school and at home and did not demand the extra time and effort from the preschool teachers and parents.

The results of the present study replicate the findings of Najdowski et al. (2003) with regard to the effect of using DRA, nonremoval of the fork, and stimulus fading to increase variety of food intake. The study extends previous findings by showing that the intervention package was effective independent of who fed the child. The effect of our treatment on John's consumption of nonpreferred foods did not generalize across settings in the absence of intervention in the home, but multisetting training led to transfer across settings and caregivers. Our study also shows that the treatment package described by Najdowski et al. was effective during typically occurring mealtimes with regularly scheduled food types, and that the treatment was effective for increasing the number and variety of originally nonpreferred foods.

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