The present study extended the literature on feeding disorders by conducting a comparison of sequential and simultaneous food presentation in the treatment of food selectivity. In the simultaneous condition, a highly preferred food was presented in the same bite with a non-preferred food (NPF), and during the sequential condition, a highly preferred food was delivered as a consequence for acceptance and consumption of NPFs. Generalization and maintenance of food consumption was assessed. Although results for two participants indicated that both presentation methods produced an increase in acceptance and consumption of NPFs when combined with an escape extinction procedure, anecdotal observations suggested that participants may have had a preference for eating foods in a sequential fashion. Copyright © 2010 John Wiley & Sons, Ltd.

INTRODUCTION

According to Riordan, Iwata, Wohl, and Finney (1980), 25% of all children exhibit some form of problematic mealtime behavior. Such problems are especially prevalent among children with disabilities. It has been reported that 80% of children with developmental disabilities exhibit problematic mealtime behaviors (Riordan et al.). Maladaptive mealtime behaviors may include any of the following: Food selectivity by type and/or texture (e.g., Munk & Repp, 1994), expulsion of non-preferred foods (NPF e.g., Ahearn, Kerwin, Eicher, Shantz, & Swearingin, 1996), packing (e.g., Gulotta, Piazza, Patel, & Layer, 2005), disruptive or aggressive behavior (e.g., Ahearn et al.), inadequate self-feeding (e.g., Kuhn & Matson, 2004), and total food refusal (e.g., Sevin, Gulotta, Sierp, Rosica, & Miller, 2002). The present study was concerned specifically with the treatment of food selectivity. Food selectivity is characterized by both "consumption of a limited variety of food items as well as the rejection of most novel food items" (Levin & Carr, 2001, p. 444). Selective food preferences, of this
severity, can lead to a number of health problems including insufficient intake of nutrients, insufficient weight gain, and retardation in growth (Riordan et al.).

According to Munk and Repp (1994), inappropriate mealtime behavior may be the result of improper consequences provided by the caretaker conducting the meal (e.g., negatively reinforcing inappropriate mealtime behavior); alternatively, inappropriate mealtime behavior may be related to the properties of the food itself (e.g., texture or type of food). In the former situation, consequence manipulations such as escape extinction (e.g., Dawson, Piazza, Sevin, Gulotta, Lerman, & Kelley, 2003; Patel, Piazza, Santana, & Volkert, 2002; Sevin et al., 2002) and physical guidance (e.g., Piazza, Patel, Santana, Goh, Delia, & Lancaster, 2002) may be necessary components of treatment. However, in the latter situation, it may be possible to obtain positive results through antecedent manipulations. One type of antecedent-based intervention is changing the way in which NPFs are presented. Two common presentation methods in the treatment of food selectivity include simultaneous presentation, in which a NPF is presented with a high-preference food (HPF), and sequential presentation, in which a HPF is delivered following consumptions of a NPF.

**Simultaneous Presentation**

Ahearn (2003) investigated the extent to which simultaneous presentation resulted in increased food acceptance and consumption, in the absence of any consequence-based procedures, with a 14-year-old adolescent with food selectivity. Acceptance of NPFs was defined as food crossing over the plane of the child’s lips. Vegetables such as carrots, broccoli, and corn were used as target foods. A food preference assessment was used to identify HPFs, which included ketchup, barbeque sauce, and Italian dressing. Each of the 3 HPFs was paired with a target food during treatment. Results of the study indicated that consumption (defined as mouth clean following food acceptance) increased with simultaneous delivery of the condiments; however food consumption was not maintained during a return to baseline. Although a 1-year follow-up indicated that consumption of vegetables with condiments was maintained, the HPF was not gradually faded in an effort to determine whether consumption of target foods would maintain in the absence of HPFs.

There are two potential reasons for why simultaneous presentation may be an effective method for increasing acceptance and consumption of NPFs. If it is assumed that inappropriate mealtime behaviors are maintained by negative reinforcement in the form of escape from NPFs, pairing a HPF with a NPF may not only reduce the aversiveness of the NPF, but the presence of the HPF may reduce the effectiveness of escape as a reinforcer. In other words, pairing HPFs with NPFs may eliminate the motivating operation for inappropriate mealtime behavior. Another explanation for
the effectiveness of simultaneous presentation is related to classical conditioning. According to Piazza et al. (2002), increased acceptance of NPF during simultaneous presentation may occur as the result of flavor–flavor conditioning. Specifically, after repeated associations of the NPF and HPF, the previously non-preferred stimulus may acquire the reinforcing properties of the preferred stimulus.

**Simultaneous versus Sequential Presentation**

Several studies have compared the relative effectiveness of simultaneous and sequential presentation methods in the treatment of food selectivity. For example, Kern and Marder (1996) conducted a study in which effects of simultaneous and sequential presentation methods were compared, when implemented in conjunction with escape extinction. During the simultaneous condition, whole foods were used; a NPF and a HPF were offered at the same time (e.g., a piece of fruit on top of a potato chip). During sequential presentation, the HPF was provided contingent upon acceptance of the NPF. Consequence-based interventions included escape extinction in the form of a non-removal of the spoon (NRS) procedure and representation of all expelled foods. During the NRS procedure, the bite of food was placed on a spoon at the child’s lower lip until s/he accepted the bite. During the intervention, both simultaneous and sequential presentation conditions produced an increase in acceptance of NPFs; however, acquisition of food acceptance occurred in fewer sessions when food was presented simultaneously than when it was presented sequentially. One potential reason for these findings, and a potential limitation of the study, concerns the fact that NPFs were not randomly assigned to the two treatment conditions. Non-preferred fruits were used in the simultaneous condition, and non-preferred vegetables were used in the sequential condition. Thus, it is difficult to ascertain whether the type of treatment or the type of food was responsible for results observed. It is possible that participants had a preference for sweet-tasting foods, in which case the sweet quality of fruits, not the presentation method, may have resulted in the increase in consumption in the simultaneous condition. In addition, because both treatment conditions were combined with a NRS procedure, it is difficult to determine whether simultaneous or sequential presentation would have been effective in the absence of escape extinction.

Piazza et al. (2002) sought to extend the work of Kern and Marder (1996) as well as address the aforementioned limitations by directly comparing simultaneous and sequential presentation methods using a multi-element design, dividing fruits and vegetables evenly among the two conditions, and introducing each treatment component (i.e., presentation method, escape extinction) sequentially in order to evaluate the independent effects of each component. During the simultaneous condition, two bites (one HPF and one NPF) were presented to the participant on the
same spoon. During the sequential condition, one bite of HPF was delivered contingent upon consumption of the NPF, with the HPF visible at all times. Results for one participant indicated that acceptance increased after physical guidance and representation of expelled bites had been introduced; however these results were only observed in the simultaneous condition. In an effort to demonstrate that the effectiveness of the simultaneous condition was due to the procedure itself and not the specific food items used, foods that had been refused during the sequential condition were presented using the simultaneous method. Results indicated that foods previously refused in the sequential condition were consumed when presented simultaneously with HPFs. Results for another participant indicated that simultaneous presentation was initially more effective. The participant also began to accept foods presented in the sequential condition, however significant increases in this condition did not occur until after advances in the simultaneous condition had commenced. Finally, results for the third participant indicated that increases in acceptance only occurred during the simultaneous condition.

Although the study conducted by Piazza et al. (2002) was successful in addressing several of the limitations associated with previous studies, this study is not without its own limitations. One participant was presented with food items in the simultaneous condition in a manner in which the NPF was not visible to the participant. Although the purpose of this study was not to gauge individual preference for the two different presentation methods, it is possible that this individual variation may have favored the simultaneous presentation method. If the NPF is visible in one condition and not the other, it is feasible that one might exhibit preference for the condition in which it appeared as though the request was simply to consume a HPF. In addition to this variation between participants, follow-up data were not collected and the HPF was not faded out in the simultaneous condition, making it difficult to determine if consumption of NPFs would have maintained over time in the absence of HPFs.

While the aforementioned studies provide many contributions to the current literature, these studies have several limitations that make it difficult to assess the relative effects of simultaneous and sequential presentation methods. Following procedures outlined by Piazza et al. (2002), the current study compared sequential and simultaneous presentation methods in the absence of escape extinction. In addition, generalization and maintenance of food consumption was assessed.

**METHOD**

**Participants and Setting**

Two children with food selectivity participated in the study. Participants were included in the study based on the following criteria: Their food selectivity...
was not related to a medical or physiological condition and they ate fewer than five foods and/or were refusing foods from at least one of the major food groups (i.e., vegetable, fruit, protein, starch, and dairy). A behavioral feeding assessment developed by Budd (1992/1998), and a pre-treatment nutritional assessment developed by the second author (available upon request), was used to determine whether participants met these criteria. Treatment sessions were conducted during one meal per day, 2–3 times per week, with the specific meal chosen in advance by the participant’s caregiver. For both participants (Emilio and Kevin), feeding sessions were conducted in a research room at California State University, Sacramento (measuring approximately 3.7 m by 4.6 m). The research room was equipped with a table and chairs and materials used for feeding (e.g., plates, paper towels, utensils, etc.). Each session lasted 30 min or until the child finished their meal (whichever occurred first).

**Emilio**

Emilio was a 5-year-old boy diagnosed with an Autism Spectrum Disorder (ASD). At intake, Emilio consistently ate four foods, including pancakes, scrambled eggs, cheerios, and Spanish rice. Snacks and sweets Emilio typically ate included crackers, chips, and cookies. When asked to try new foods, Emilio typically engaged in inappropriate mealtime behaviors such as pushing the food away, negative vocalizations, and running away from the table.

**Kevin**

Kevin was a 4-year-old boy diagnosed with an ASD. At intake, Kevin’s meals consisted of only French Fries. Sweets and snacks Kevin regularly consumed included fruit snacks and Lays® potato chips. When presented with NPFs, Kevin typically engaged in inappropriate mealtime behaviors such as pushing the food away, negative vocalizations, and running away from the table.

Prior to treatment, two 30–45 min preference assessments were conducted across two sessions, following which baseline and treatment sessions commenced. As mentioned previously, feeding sessions were conducted during one meal per day, typically 2 or 3 times per week. Dinner was selected as the target meal for both Emilio and Kevin. Participants were prevented from eating or snacking for at least 2 h prior to the target meal.

**Preference Assessments**

Preference assessments were conducted before treatment to identify both HPFs and NPFs that were used during treatment. NPFs were defined as those foods selected
and consumed less than 10% of trials, and HPFs were defined as those food items selected and consumed more than 80% of trials. The HPF that had the highest percentage of selection during the initial preference assessment was then used in both presentation conditions.

An initial parent interview was used to determine 6 HPFs and 6 NPFs. Prior to treatment, a paired choice preference assessment described by Fisher, Piazza, Bowman, Hagopian, Owens, and Slevin (1992) was conducted to corroborate parents’ reports. A second preference assessment including 10–12 foods reported by the parents to be non-preferred was conducted in order to identify a variety of foods to use during both simultaneous and sequential presentation conditions as well as to use during generalization probes. During the second preference assessment, NPFs were presented to the child singly as described by Pace et al. (1985), in order to verify the anecdotal reports from the parents.

Response Measurement and Interobserver Agreement

During preference assessments, event data were collected on the number of times each food item was selected and consumed. This number was then converted into a percentage by dividing the number of times each food item was selected and consumed, by the total number of times each item was presented and multiplying by 100%.

During preference assessments, interobserver agreement (IOA) was calculated by dividing the number of agreements by the number of agreements plus disagreements and then multiplying that number by 100%. Two trained independent observers collected data during 100% of preference assessments. Mean IOA for child selection and consumption was 100%.

Results

Both participants chose 12 or more food items less than 10% of opportunities. Thus, each child had a sufficient number of NPFs to target during treatment and generalization probes. Each child also selected one food item more than 90% of opportunities, and that item was selected to use during both presentation conditions.

Foods identified in the preference assessments were divided into two groups such that each group included one food from at least three of the basic food groups (e.g., Group A might include broccoli, rice, and apple; Group B might include cauliflower, pasta, and peach). Foods assigned to Group A were used in the sequential condition and foods assigned to Group B were used in the simultaneous condition.

For Emilio, hot dog, banana, and bread (chosen 0% of opportunities) were targeted in treatment using simultaneous presentation. Chicken nugget, apple, and pasta
(chosen 0% of opportunities) were targeted in treatment using sequential presentation. Twelve foods chosen 0% of opportunities (yogurt, cheese, cucumber, tomato, carrots, mashed potato, tortilla, fish stick, bacon, corn, grapes, and mandarin oranges) were selected to target during generalization probes. Chocolate cake, chosen 100% of opportunities was selected as the HPF used in both presentation conditions.

For Kevin, cucumber, apple, and bologna (chosen 0% of opportunities) were targeted in treatment using simultaneous presentation. It should be noted that cucumber, evaluated during the second preference assessment, was selected as a target food in order to include a vegetable in both treatment conditions. Carrot, orange, and turkey (chosen 0% of opportunities) were targeted in treatment using sequential presentation. Six foods chosen 0% of opportunities (green bean, corn, bananas, grapes, chicken, and cheese) were selected to target during generalization probes. Potato chips, chosen 100% of opportunities, were selected as Kevin’s HPF in both conditions.

Response Measurement and Interobserver Agreement

During baseline and intervention, data were collected by recording each event of acceptance (defined as food crossing over the plane of the child’s lips), and swallows (defined as mouth clean following acceptance of NPF). Data on the number of accepts and swallows was used to determine the percentage of bites consumed without expulsion. Specifically, the number of trials with one event of acceptance and one swallow were divided by the total number of trials; data are presented as the percentage of bites consumed without expulsion. Number of bites presented during baseline and intervention were based on the average number of bites the child was observed to consume during typical meals consisting of preferred foods. IOA for accepts and swallows was calculated by dividing the number of agreements by the number of agreements plus disagreements and multiplying by 100%.

IOA was collected during 71% of sessions for Emilio. Mean IOA for both accepts and swallows was 100%. IOA was collected during 92% of sessions for Kevin. Mean IOA for the number of accepts and swallows was 98% and 100%, respectively.

Experimental Design

A multi-element combined with a non-concurrent multiple baseline design across participants was used to compare each condition (described below). In order to facilitate discrimination between the two presentation conditions, a red placemat was used during the sequential condition and a blue placemat was used during the simultaneous condition. A multiple probe design was used to periodically assess
generalization of food acceptance and swallowing for NPF items not targeted during treatment.

**Baseline**

During baseline, a plate of NPFs was presented to the child using a three-step prompting procedure (e.g., verbal instruction to “take a bite,” model to take a bite, followed by a physical prompt to take a bite). Following 5 s with no response to one prompt level, the subsequent prompt was delivered. Although a plate was presented to the child, food items were presented on a trial by trial basis. In other words, if the child did not select a bite following the verbal prompt, a bite was selected by the therapist to utilize during the model prompt. If still no attempt was made, the same bite selected by the therapist was used during the physical prompt (e.g., therapist would place the bite at the child’s lips, or physically guide the child’s hand containing the bite to the child’s lips). Verbal praise was given for accepting or swallowing NPF and was delivered on a fixed ratio (FR) 1 schedule. In the event that some form of inappropriate mealtime behavior (e.g., expulsions, verbal protest, crying, or attempting to run away) occurred, the child was allowed to escape for 30 s and the refused bite of food was removed from the plate. The number of bites presented was based on the average number of bites the child consumed during meals consisting of preferred foods. To obtain this average, prior to treatment, parents were asked to count the number of bites their child consumed over three consecutive meals (e.g., since Emilio’s target meal was selected to be dinner, his mother was instructed to count the number of bites consumed over the course of three typical dinners). The three numbers were then computed into an average by adding the three figures and dividing that total by three. Each participant’s terminal bite requirement was based on this average.

**Simultaneous presentation**

During the simultaneous condition, one bite of NPF was placed directly on top of the HPF. All bites were presented using a three-step prompting procedure. Verbal praise was given initially for accepting, and then subsequently for swallowing. As in baseline, inappropriate mealtime behavior resulted in a 30 s escape from demands to consume the paired NPF and HPF, and the bite of food was removed from the plate. Contingent on consumption of the entire plate of NPFs, the child was allowed access to preferred foods upon request. In the event that the meal was not finished, the parents were asked to delay giving their child an alternate meal or snack for at least 1–2 hours and any food that was given to the child consisted of foods of neutral preference to the child (i.e., foods that the child would willingly consume with the exception of their identified HPF used exclusively in treatment).
Sequential presentation

During the sequential condition, consumption of NPF was shaped by first reinforcing acceptance. Specifically, one bite of HPF was delivered contingent on accepting one bite of NPF. Following consistent acceptance of NPFs, HPFs were delivered contingent on consumption of NPFs. All bites were presented using a three-step prompting procedure. As in the baseline and the simultaneous condition, inappropriate mealtime behavior resulted in a 30 s escape from demands to consume NPFs, and the refused bite of food was removed from the plate. Contingent on consumption of the entire plate of NPFs, the child was allowed access to preferred foods upon request. In the event that the meal was not finished, the parents were asked to delay giving their child an alternate meal or snack for at least 1–2 h and any food that was given to the child consisted of foods of neutral preference to the child.

Presentation Method + Escape Extinction

Following an evaluation of simultaneous and sequential presentation methods in the absence of escape extinction, escape extinction in the form of an NRS procedure was implemented in conjunction with both presentation methods. When implementing the NRS procedure, the experimenter placed the bite of NPF on a spoon within 1 inch of the child’s mouth. The bite remained in that position until the child opened his mouth naturally (to yawn, speak, etc.), upon which time the bite of food was inserted. Any bites that were expelled were represented until swallowed, or until 30 min passed. If 30 min passed without the child accepting or swallowing a bite, the meal was terminated. During this phase, a bite fading protocol was implemented to minimize any potential adverse side effects associated with the escape extinction procedure. Participants were initially presented with three bites (one bite of each of the three NPFs). Following three consecutive meals in which the child consumed the target number of NPFs without significant expulsions (i.e., 80% consumption without expulsion), the bite requirement was increased according to a bite fading procedure. Specifically, the number of bites presented per session increased by approximately 150% of the previous bite requirement (e.g., 3 bites, 9 bites, and 21 bites). Throughout the phase, verbal praise (simultaneous condition) and HPF (sequential condition) were delivered according to a FR 1 schedule.

Assessment of Maintenance in the Absence of HPF

After the NRS procedure was introduced, both participants began to eat the food presented in the simultaneous condition in a sequential fashion. Specifically, participants would remove the NPF from the paired bite, consume the NPF first, and
would then consume the HPF. As a result of this observation, a decision was made to present foods from the simultaneous condition in a sequential fashion. Once participants reached their terminal bite requirement, the schedule of delivery of HPFs following consumption was thinned by increasing the bite requirement necessary to obtain HPFs. Initially, HPFs were delivered on a FR 1 schedule. Following three consecutive meals with at least 80% consumption of NPFs without expulsion, the bite requirement was increased by approximately 150% of the previous requirement as described by Najdowski, Wallace, Reagon, Penrod, Higbee, and Tarbox (2010). For both Emilio and Kevin, schedule requirements were increased according to the following sequence: FR 1, FR 3, FR 7, and FR 21. Contingent on consumption of the entire plate of NPFs the child was allowed access to preferred foods upon request.

**Generalization Probes**

Generalization probes were conducted throughout each treatment phase and consisted of NPFs identified during the second preference assessment that were not targeted during intervention, and that were selected 0% of opportunities during preference assessments. During generalization probes, the same procedures utilized in baseline were employed, however, only nine trials were presented; specifically three different foods (selected from the second preference assessment) were presented three times each for a total of nine trials.

**Follow-up**

Follow-up sessions began after the schedule of delivery of HPFs had been completely thinned, such that HPFs were only delivered at the end of the meal. Follow-up visits were conducted 2, 4, 6, and 12 weeks following completion of treatment. Procedures used during follow-up approximated those procedures used during the last experimental phase. Specifically, parents were asked to prepare a meal consisting of two of the target or generalization probe foods, and at least one novel food. The child was given the opportunity to feed themselves; however, if the child made no advances toward the food, then the parent delivered a verbal instruction to take a bite. If still no advances toward the food were made, the parent implemented the NRS procedure. Follow-up meals were ended following the consumption of the entire plate of foods, or when 30 min had elapsed (whichever occurred first). In addition to the verbal praise the child received throughout their meal for successful consumption, parents were instructed to provide their child with a preferred dessert or snack following completion of the meal. However, if the child failed to complete their meal, parents were asked to delay giving their child an alternate meal or snack for at
least 1–2 h and any food that was given to the child consisted of foods of neutral preference to the child.

RESULTS

Emilio

The top panel of Figure 1 depicts results during baseline, treatment conditions, generalization probes, and follow-up for Emilio. During baseline, Emilio did not accept any of the NPFs presented (in the simultaneous condition—hot dog, banana, and bread, and in the sequential condition—chicken nugget, apple, and pasta). During the phase in which simultaneous and sequential presentation methods were compared in the absence of escape extinction, 21 bites (seven bites of each of the three foods) were presented; Emilio began to accept and consume bites of the NPF in the sequential condition, however consumption of the NPFs did not maintain.

When the NRS procedure was applied to both presentation conditions, the number of bites presented decreased to three bites, in an effort to minimize potential adverse side effects that may be associated with an escape extinction procedure. Emilio began accepting and swallowing bites of NPF during the first session (sequential presentation) of the NRS procedure. Following six consecutive sessions with 100% consumption without expulsion in both presentation conditions, the target bite requirement increased to nine bites. During the 9-bite requirement, Emilio began to eat foods in the simultaneous condition in a sequential fashion. Specifically, he would remove the NPF from the paired bite, consume the NPF first, and would then consume the HPF. Thus, starting with session 34, foods from the simultaneous condition were presented in a sequential fashion.

Throughout the course of treatment, it was observed that Emilio had a particular aversion to hot dog. Anecdotal observations suggested that he had developed a preference for all of the other target foods, but experienced a significant amount of gagging/vomiting when hot dog was presented. Consequently, hot dog was replaced with fish stick. Fish stick, which was presented successfully during a generalization probe, replaced hot dog in Group B beginning with session 34. Maintaining 100% consumption without expulsion at the 9-bite requirement, Emilio quickly advanced to his terminal bite requirement of 21 bites. Following three consecutive sessions of at least 80% consumption without expulsion, the schedule of reinforcement was thinned from FR 1 to FR 3, FR 7, and finally FR 21. As the schedule of reinforcement was being thinned, Emilio maintained 100% consumption without expulsion. Once the schedule of reinforcement was thinned to one terminal reinforcer presented at the end of the meal (i.e., a piece of cake), feeding sessions were moved to Emilio’s home.
During the first home session, Emilio had an extinction burst of inappropriate mealtime behavior, however once the NRS procedure was implemented, Emilio consumed all items on his plate. Subsequent home meals and all follow-up sessions resulted in 100% consumption without expulsion.

Figure 1. The top and bottom panels of Figure 1 depict results during baseline, treatment conditions, generalization probes, and follow-up for Emilio and Kevin, respectively.

During the first home session, Emilio had an extinction burst of inappropriate mealtime behavior, however once the NRS procedure was implemented, Emilio consumed all items on his plate. Subsequent home meals and all follow-up sessions resulted in 100% consumption without expulsion.
With respect to generalization, Emilio began accepting and swallowing all bites of NPF presented during each generalization probe, with at least 90% consumption without expulsion.

**Kevin**

The bottom panel of Figure 1 depicts results during baseline, treatment conditions, generalization probes, and follow-up for Kevin. During baseline, Kevin did not accept any of the NPFs presented (in the simultaneous condition—bologna, apple, and cucumber, and in the sequential condition—turkey, orange, and carrot). During the phase in which simultaneous and sequential presentation methods were compared in the absence of the NRS procedure, 21 bites (seven bites of each of the three foods) were presented; Kevin did not consume any bites of the NPFs presented in either the simultaneous or sequential conditions.

When the NRS procedure was applied to both presentation conditions, the number of bites presented decreased to three bites, in an effort to minimize potential adverse side effects that may be associated with an escape extinction procedure. Kevin began accepting and swallowing bites of NPF during the second session (sequential presentation) of Phase 2. Following four consecutive sessions with 100% consumption without expulsion in both presentation conditions, the target bite requirement increased to nine bites. During the 9-bite requirement, Kevin also began to eat foods in the simultaneous condition in a sequential fashion. Specifically, he would remove the NPF from the paired bite, consume the NPF first, and would then consume the HPF. Thus, starting with the 21-bite requirement, (session 42), foods from the simultaneous condition were presented in a sequential fashion.

Following three consecutive sessions of at least 80% consumption without expulsion, the schedule of reinforcement was thinned from FR 1 to FR 3, FR 7, and finally FR 21. As the schedule of reinforcement was being thinned, the percentage of consumption without expulsion ranged from 85 to 100%. Once the schedule of reinforcement was thinned to one terminal reinforcer presented at the end of the meal (i.e., a small bag of chips), feeding sessions were moved to Kevin’s home. During all follow-up sessions, Kevin maintained 100% consumption without expulsion. With respect to generalization, Kevin began accepting and swallowing NPFs presented during the first generalization probe and all subsequent generalization probes with at least 55% consumption without expulsion (range: 55–100%).

**DISCUSSION**

Results of this study indicated that both presentation methods resulted in increased food consumption when combined with escape extinction, in the form of a NRS
procedure. Although the two presentation methods were found to be equally effective when combined with the NRS procedure, both participants elected to eat foods presented in the simultaneous condition in a sequential fashion. This observation suggests that some children may be more willing to consume NPFs when the NPFs are presented sequentially (i.e., when there is a reinforcement contingency in place). In contrast to results observed in this study, previous studies have found that simultaneous presentation is effective in increasing food consumption (e.g., Ahearn, 2003; Kern & Marder, 1996; Piazza et al., 2002).

Discrepant outcomes between the current results and results of previous studies may be explained by a number of procedural differences. One such difference was the manner in which foods were presented in baseline and throughout the course of treatment. In the current study a plate of NPFs was presented to the child. The number of bites presented on the plate was based on the average number of bites the child consumed during meals consisting of preferred foods; during baseline and during the phase in which simultaneous and sequential presentation methods were compared in the absence of the NRS procedure, 21 bites were presented on the plate for both participants. When the NRS procedure was introduced, the number of bites presented on the plate equaled the bite requirement (initially three bites) which was gradually increased. This is in contrast to previous studies which have only presented one bite at a time; however, similar to previous studies, food items from the plate were still presented on a trial by trial basis. One advantage of presenting foods in this manner is that it is more naturalistic and could possibly promote generalization; however, this procedural difference precludes a direct comparison between the current study and previous studies.

Another difference between the current study and previous studies relates to the types of foods presented. It is possible that the effectiveness of simultaneous presentation hinges on the types of foods that are paired together. Ahearn (2003) paired NPF vegetables such as carrots and corn with high-preferred condiments such as Italian dressing, barbeque sauce, and ketchup. Piazza et al. (2002) paired non-preferred fruits and vegetables with apple for one participant, chips for another, and salad dressing for the third participant. These food combinations may have been more appealing to participants than food combinations used in the present study such as hot dog and cake for Emilio. Future research should evaluate the efficacy of simultaneous presentation using food pairings in which the HPF and NPF are complimentary, versus food pairings in which the HPF and NPF do not compliment one another.

In the present study, a preference assessment was conducted to identify a HPF to utilize during treatment, whereas in other studies (e.g., Ahearn, 2003) participants were given a choice of which HPF they wanted to pair with their NPF. Future studies may want to evaluate the efficacy of simultaneous presentation when a variety of foods are used rather than only using one HPF as was done in the current study.
In the study conducted by Kern and Marder (1996), acquisition of food acceptance occurred in fewer sessions when food was presented simultaneously than when it was presented sequentially, whereas in the current study there was no difference between simultaneous and sequential presentation methods. Discrepancies between results of these two studies may be related to differences in the types of foods included in the two presentation conditions. Recall that in the study conducted by Kern and Marder, novel fruits were used in the simultaneous condition, and novel vegetables were used in the sequential condition, making it difficult to determine if results observed were a function of the presentation method or the type of food. In the current study, different types of foods (i.e., foods from different food groups) were distributed equally across the two presentation conditions, which may explain why no differences were observed between the two conditions.

As mentioned previously, one possibility for discrepant results between the current study and the study conducted by Piazza et al. (2002) is the possibility that food combinations used in the current study were not as appealing or complimentary as those used in the study conducted by Piazza et al. In addition, NPF was hidden in the simultaneous condition for one of the participants in the Piazza et al. study and for this same participant only one food item was targeted; in the current study, NPFs were made visible across both presentation conditions, and three different food items were targeted. Future research should explore whether these differences impact the effectiveness of the simultaneous presentation method.

With respect to the visibility of NPF, future research could investigate simultaneous presentation, in one condition in which the NPF is visible, and in another condition in which the NPF is completely embedded. Although lack of visibility of the NPF was noted as a limitation of previous research (e.g., Piazza et al., 2002), it may be interesting to evaluate whether acquisition of food consumption would occur more rapidly if the food was completely embedded.

Although previous research has found that simultaneous presentation is effective in increasing food consumption (e.g., Piazza et al., 2002; Ahearn, 2003) the HPFs that were paired with the target foods were not faded in these studies, making it difficult to determine if consumption of the target foods would have maintained over time in the absence of HPFs. In the event that simultaneous presentation would have been effective in increasing acceptance and consumption of NPFs in the present study, there was a plan to gradually fade out the HPF. Specifically, following three consecutive meals with at least 80% consumption of the paired bite without expulsion, the HPF would have decreased in size by a gradual reduction of the ratio of HPF to NPF as follows: 75% HPF + 25% NPF, 50% HPF + 50% NPF, 25% HPF + 75% NPF, and finally 100% NPF. Future investigators employing simultaneous presentation methods should evaluate whether increases in food consumption maintain after the HPF has been faded out.
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