EFFECTS OF BEHAVIORAL SKILLS TRAINING ON PARENT IMPLEMENTATION OF A TREATMENT PACKAGE TO INCREASE FOOD ACCEPTANCE IN CHILDREN WITH FOOD SELECTIVITY

by

LAURA SEIVERLING

A dissertation submitted to the Graduate Faculty in Psychology in partial fulfillment of the requirements for the degree of Doctor of Philosophy,

The City University of New York

2010

This manuscript has been read and accepted for the Graduate Faculty in Psychology in satisfaction with the dissertation requirement of Doctor of Philosophy

Date

Dr. Peter Sturmey
Chair of Examining Committee

Date

Dr. Maureen O' Connor
Executive Officer

Dr. Robert Lanson
Dr. Alicia Alvero
Dr. Mary Louise Kerwin
Dr. Linda Cooper-Brown

Supervisory Committee

THE CITY UNIVERSITY OF NEW YORK

Abstract

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Advisor: Professor Peter Sturmey

Repeated taste exposure, escape extinction, and fading is a treatment package used to reduce food selectivity, a common problem in children with Autism Spectrum Disorders (ASD). Often studies involving parent-implemented treatment for food selectivity fail to describe training procedures for teaching parents and do not present data on parent performance. This study used behavioral skills training (BST) to teach parents of three children with ASD with food selectivity to conduct repeated taste exposure, fading, and escape extinction in the home. The intervention targeted parents' correct implementation of the procedure during taste sessions and subsequent probe meals. Following training, correct parent performance in taste sessions and probe meals increased while children's latency to accept bites and disruptive responses decreased. Children's accepted bites during probe meals also increased following parent training. All parents reported increases in number of foods eaten by their children following treatment and at 1-month follow-up compared to pre-baseline. Parents rated the BST, feeding intervention, and intervention outcome as acceptable, indicating that this parent-implemented treatment was effective in increasing food acceptance in children with food selectivity.

Dedication

This work is dedicated to Dr. Keith Williams and staff working at the Penn State Pediatric Feeding Clinic. Thank you for all of your help along the way.

Acknowledgements

Thank you to my advisor, Dr. Peter Sturmey, for always pushing me to stick to deadlines and for providing feedback quickly when reviewing my writing over the last few years. I could not have completed the program so efficiently without your ongoing dedication. Also, thank you to my committee members, Dr. Robert Lanson and Dr. Alicia Alvero, for always providing helpful guidance along the way. I would also like to thank my outside readers, Dr. Mary Louise Kerwin and Dr. Linda Cooper-Brown, for taking time to read the dissertation manuscript, providing insightful feedback, and participating in the defense. Further, I would like to thank Dr. Keith Williams, director of the Penn State pediatric feeding clinic. You have been an amazing mentor and inspiration since I was an undergraduate intern at your clinic. It was been a true pleasure having your ongoing support and help during the completion of my dissertation. I hope that we are able to work together in the future. Thank you to Sadie Hart, my graduate research assistant during the dissertation. I never could have done this project without your help. I'd also like to thank my friends from the Learning Processes and Behavior Analysis program. To John Ward-Horner, your assistance over the years has been incredible. I really admire your meticulous work ethic as a student and teacher as well as your dedication as a clinician. I can't express in words how much I've appreciated your friendship and mentorship over the years. To Melody Berkovitz, Mari Watanabe-Rose, Jason Rockwell, Erich Grommet, Kristen Rost, Robert Travis, and Tommy Gianoumis—thanks for always making me laugh and being there for me when I needed your help. Lastly, thanks to my friends and family for putting up with me, keeping me entertained, and always providing me with material.

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Introduction

Food selectivity, defined as a child's insistence on eating a narrow range of foods (Williams & Foxx, 2007), is the most researched feeding problem in children with ASD (Williams & Seiverling, 2010). Further, food selectivity appears to be a more common problem among children with ASD compared to those with other developmental disabilities such as cerebral palsy and Down syndrome (Field, Garland, Williams, 2003). According to Ledford and Gast (2006), between 46% and 89% of children with ASD exhibit selective eating behavior. For a child with food selectivity, in addition to the possibility of malnutrition, food selectivity may lead to stigmatization if the child regularly eats a diet separate from those in the home as well as at school. Food selectivity can be distressing for parents who strive to provide their children with well-balanced diets and who face difficulty during mealtimes because of problem behavior exhibited by their children. Also, parents who have children with food selectivity may be less likely to take their children out to public places to eat. Thus, food selectivity poses problems for those engaging in the behavior as well as for their families.

Researchers have used a variety of treatment packages to address food selectivity in both typically developing children and children with disabilities. Wardle, Cooke, Gibson, Sapochnik, Sheilham and Lawson (2003) and Wardle, Herrara, Cooke, and Gibson (2003) examined the effects of repeated taste exposure alone (i.e. repeated presentations of single bites of a target food) on child rating of a target food in typically developing children in both home and school settings. Parents repeatedly presented a novel food to children for 14 days in the home-based study (Wardle, Cooke, et al., 2003) while teachers repeatedly presented children with the food for eight days in the school-based study (Wardle, Herrara, et al., 2003) to see if increased presentation of foods leads to increased liking of foods. In the home-based study, children in the exposure group showed increased consumption, liking, and ranking of the target vegetable compared to a control group and a group of children in which parents were given nutritional advice and a leaflet. In the school-based study, one group of children was given stickers for tasting a sweet red pepper while another group was just given repeated exposures to the food. A third group was given one pre-test and post-test presentation of the food and was not given stickers for tasting it. Children given stickers for trying the foods and children simply exposed to repeated presentations increased consumption of the red pepper and reported liking the food more than the control group. Thus, mere exposure to novel foods may lead to liking novel foods, regardless of reinforcement contingencies. These studies indicate that repeated taste exposure is a promising strategy to increase child consumption of unfamiliar and non-preferred foods.

Paul, Williams, Riegel, and Gibbons (2007) were the first to use repeated taste exposure in a treatment package to increase food acceptance in two children with ASD. The treatment package included repeated taste exposure, escape extinction, and fading. Each session consisted of the therapist presenting one target bite. To increase compliance, a feeding therapist initially presented a pea-sized bite of food on a spoon in front of the child. The foods presented during treatment were fruits, vegetables, meats, dairy products, and starches that parents reported the children did not currently eat. Therapists presented bites of different foods in a rotating fashion (e.g. fruit followed by starch, etc.). Expulsions led to immediate re-presentation of the same food. After bite acceptance, the therapist allowed the participant to exit the treatment room for a minimum of 5 min to go to an area in which preferred objects or activities were available. Small drinks of various liquids were also available during sessions, but researchers based the reinforcement criterion on eating the target bite. Therapists increased bite size for a particular food to half and finally full spoonfuls when the participant accepted three out of four bites within

30 s of presentation. When children met criterion for three to four foods at full-spoonfuls, the therapists presented probe meals, in which they presented three to four spoonfuls of either previously mastered or novel foods on a plate. Researchers placed foods not consumed in probe meals back into the food rotation for taste sessions. Trained therapists conducted treatment for the first week and then parents implemented the procedure. After 15 days of intensive treatment in which therapists presented children with ongoing taste sessions throughout the day, one participant who accepted two foods prior to treatment, met criterion with 65 foods and the other participant met criterion for 49 foods after being totally dependent on a gastrostomy tube for feedings prior to treatment. Parents reported that children maintained treatment gains at 3-month follow-up. A limitation of this study was that there were only two participants and experimenters only presented parent report data from food inventory questionnaires given before and after treatment, rather than observational data on individual probe meals and taste sessions.

Pizzo, Williams, Paul, and Riegel (2009) recently implemented a modified version of Paul et al.'s (2007) procedure to treat food selectivity in a 4-year-old boy with ASD, a 5-year-old boy with gastroesophagel reflux, and a 9-year-old boy with attention deficit hyperactivity disorder in a multiple-baseline design across participants. Instead of exposing children to repeated taste exposure, escape extinction, and fading for approximately 15 days, the researchers exposed the children to the procedure for four to five days of treatment with parents presenting probe meals in the evening. All participants showed an increase in number of bites eaten during probe meals compared to baseline as well as a decrease in inappropriate behavior across treatment days. In addition, one month follow-up reports from parents indicated that participants increased the number of foods eaten prior to treatment from 23 to 55, 18 to 59, and 23 to 72 respectively. Thus, presentation of the procedure for fewer sessions led to results comparable to those of Paul et al. (2007), indicating that this procedure can be successful when implemented for a shorter period of time. Although Pizzo et al. presented data on number of bites eaten during probe meals and inappropriate behavior across treatment days, they did not provide data on latency to accept bites during taste sessions.

In both Paul et al. (2007) and Pizzo et al. (2009) studies, researchers trained parents to conduct elements of the procedure after trained therapists conducted a majority of taste sessions; however, both studies failed to collect data on parent performance following training and to include an operationalized training procedure for how to teach people to conduct the treatment package. Further, since most training sessions for both studies took place at a feeding clinic, it is unclear if parents could be successful at implementing the entire treatment in the home setting instead of conducting most taste sessions in a clinic by feeding therapists.

Despite parents being responsible for presenting most meals to their children, studies examining interventions to treat feeding problems in children with ASD have not emphasized the importance of parent training and have often failed to provide procedural integrity and to describe the specific techniques used to teach parents and caregivers to implement these procedures. According to Seiverling, Williams, Ward-Horner, and Sturmey (In press), out of eight intervention studies indentified for treating food selectivity in children with ASD that discuss caregiver involvement in treatment (Ahearn, Kerwin, Eicher, & Lukens, 2001; Anderson & McMillan, 2001; Gentry & Luiselli, 2008; Kern & Marder, 1996; McCartney, Anderson, & English, 2005; Najdowski, Wallace, Doney, & Ghezzi, 2003; Patel, Reed, Piazza, Mueller, Bachmeyer, & Layer, 2007; Paul et al., 2007), only two (Anderson & McMillan, 2001; McCartney et al., 2005) reported data on caregiver performance and provided details regarding how caregivers were trained. In both studies, however, researchers gave caregivers continuous feedback on their performance throughout intervention after initial training making it impossible to determine if the initial training package was effective in teaching the procedure since caregivers may have relied on experimenter feedback throughout the intervention to perform the procedure correctly. Thus, it is still unknown whether parents and caregivers would perform the procedure accurately without further feedback following initial training.

Several studies have demonstrated that behavioral skills training (BST), which involves instructions, rehearsal, modeling, and feedback, is an effective technique to train staff and parents. Researchers have used BST to train staff and parents to conduct a variety of procedures such as preference assessments (Lavie & Sturmey, 2002), discrete trial teaching, (Sarakoff & Sturmey, 2004; Ward-Horner & Sturmey, 2008), and chaining vocal responses within Natural Language Paradigm, a manding procedure which involves verbal prompting and modeling of appropriate play responses with a variety of items (Seiverling, Pantelides, Ruiz, & Sturmey, 2010).

Although BST has been effective in training staff and parents to perform a variety of skills, it has not been evaluated as a training technique to teach parents to implement a feeding intervention for food selectivity in children with ASD. Further, few food selectivity studies provide details for how to train parents to implement interventions to reduce food selectivity and fail to present data on parent performance of the procedure. The studies that have done so are still limited in that parents and caregivers were given ongoing feedback regarding performance throughout intervention. Paul et al. (2007) and Pizzo et al. (2009) found that a treatment package comprised of repeated taste exposure, escape prevention, and fading first implemented by feeding therapists and then implemented by parents was effective in increasing and maintaining child consumption of novel foods; but again researchers did not include specific training details and data on parent performance and only trained parents to conduct the procedure after feeding therapists conducted a majority of treatment sessions. Therefore, the main goals of this study were to: (a) examine the effects of BST on parent implementation of the repeated taste exposure, escape extinction, and fading procedure to treat food selectivity in children with ASD in the home environment, (b) provide an operationalized training procedure for teaching people to conduct the procedure, and (c) determine if parents are able to conduct the procedure correctly without ongoing feedback on performance following training.

Method

Participants

The experimenter selected three mother-child dyads to participate. All families had been previously seen in a hospital-based feeding clinic and were unsuccessful at treating their child's food selectivity when given a written plan to follow in the home after an out-patient visit. The child participants, Tommy, Lance, and Noah were ages 4, 5, and 8 years respectively. All child participants had an ASD diagnosis. Parents completed a food inventory of 86 common foods (See Appendix A) and indicated which foods were eaten by either both the family and or the child. Tommy had stopped consuming all solid foods and had only been drinking milk for five months prior to the study. Parents of Lance and Noah reported that their children's pre-treatment diets included only 11 and 12 foods respectively. In addition to administering the food inventory, the experimenter conducted a direct observation procedure (Ahearn, Castine, Nault, & Green, 2001) to assess food acceptance and selectivity among the participants (discussed below). Tommy and Noah's mothers, ages 33 and 40 years, were homemakers; and Lance's mother, age 41 years, was a special education teacher.

Setting and Materials

All sessions took place at the family's dinner table. Materials included utensils, a plate, a cup, a kitchen timer, and the target foods for each child. The experimenter used a video camera to record treatment and training sessions. After taste sessions, parents allowed children to exit the treatment setting to go to other areas of the home (e.g. the child's room, play area, etc.) where the child accessed preferred items such as toys, games, and television. For Tommy and Noah, most baseline, parent training, and post-training sessions took place between 9 am and 1 pm. For Lance, most sessions began at 4 pm when the mother returned from work and lasted until approximately 6:30 pm.

Dependent Measures

Parent behavior. The dependent measures for parents were the percentage of correct steps performed out of applicable steps for both taste sessions and probe meals (See Tables 1 and 2 for the specific task analyses for taste sessions and probe meals.) Taste session steps included: (a) what bite size to present, (b) where to place the spoon in front of the child, (c) how to ignore the child's disruptive responses, (d) when to increase bite size, (e) when to terminate the session and (f) when to conduct the probe meals and which foods to present during the meals. Probe meal steps specified: (a) which foods to present during the probe meal, (b) what portion size to present, (c) how long to present a food before moving to the next food on the plate, (d) how to ignore the child's disruptive behavior, and (e) when to terminate the meal. Trained observers scored the percentage of correct steps of the procedure out of applicable steps conducted by the parent for each taste session and probe meal. For instance, the step to ignore disruptive responses was not applicable if the child did not engage in any disruptive responses during the session.

Child behavior. Researchers collected data on pea-sized and half-spoonful bites of foods accepted within 30 s and bites of foods with disruptive responses for all taste sessions. Observers marked whether the child ate the bite, accepting the food from the spoon by allowing the food to cross the plane of the child's lips without expelling, and whether the child engaged in disruptive behavior for each bite presented. The experimenter defined disruptive behavior as any negative vocalization (e.g. "No!), crying, pushing the food away, throwing utensils, or gagging following presentation of the food. Expulsions were defined as food the size of a pea or larger outside the

Table 1. Task Analysis for Taste Sessions

1. Refrain from giving your child access to foods for a minimum of 2 hrs before and 2 hrs after taste sessions while always providing access to water.
2. Place a pea-sized bite of food on a spoon.
3. Place extra bites of the same food on a plate within arm's reach (in case your child expels the bite).
4. Place the spoon within 3 cm in front of your child
5. Say "When you take a bite, you can go play." (Repeat once per 30 s until presented bite swallowed by child.)
6. Set a kitchen timer (to determine if bite is consumed within 30 s).
7. If the bite is expelled (i.e. portion of food comes out of mouth following acceptance), present a new bite of the food within 5 s.
8. Ignore inappropriate responses (e.g. yelling, crying, etc.) by turning head away from the child and not saying any verbal statements regarding the child's disruptive response.
9. After the bite is swallowed, say "go play" and allow your child to leave the eating area to other areas (e.g. bed room, play room) in which preferred items (e.g. toys, books, television) are located. You may also praise your child for eating the bite.
10. Set a timer for 3 min to indicate when the next taste session will occur.
11. Mark datasheet indicating the time of the taste session, the food, portion of food, whether the bite was consumed within 30 s, and whether disruptive responses occurred.
12. Present bites of novel vegetables, fruits, starches, dairy products, and meats in a rotating fashion (i.e. fruit, followed by starch, etc.)
13. When your child eats a pea-sized bite of a particular food within 30 s without disruptive responses for three taste sessions, increase the bite size to half spoonfuls.

Table 1 (cont). Task Analysis for Taste Sessions

14. When your child eats a half-spoonful bite of a particular food within 30 s without disruptive responses (e.g. "I won't eat it!") for three taste sessions, replace the food with a new one from the same food group.

15. After 10 taste sessions, present a probe meal.

16. Continue to conduct 10 taste sessions followed by a probe meal until completing approximately 20 taste sessions and 2 probe meals.

Table 2. Task Analysis for Probe Meals

1. Present three full-tablespoons of five foods on a plate within 0.5 m of your child.
2. Present 1/2 oz of a drink in a small cup.
3. Present the five foods for the specified probe meal (e.g. Probe Meal A, B, C, D, or E).
4. Place a half to full spoonful of food on the spoon.
5. Place the spoon within 3 cm of the child's mouth
6. Say, "take a bite" within 5 s of presenting the bite to the child's mouth.
7. Ignore all inappropriate responses by turning head away from the child and not saying any verbal statements regarding the child's disruptive response.
8. If your child takes a bite of food, present praise within 3 s (e.g. "Great job taking your bite!").
9. If your child does not take a bite, remove the bite after 5 s.
10. Present a new bite after approximately 10 s.
11. Rotate from one food to the next food each bite.
12. After 10 minutes (regardless of whether the child has eaten any bites), say "Go take a break."
13. If the child does not eat any bites during the probe meal, present a new taste session after a 5 min break.
14. If the child eats any bites during the probe meal, present a new taste session after 10-15 min break.
15. Rotate probe meals A, B, C, D, and E.

mouth following acceptance. During probe meals, observers collected data on each presented bite by marking whether the child accepted the bite during the 5-20 s in which the bite was presented (using the same definition above) or if the child refused the bite. Observers defined refusal as the child not opening his mouth during the presentation of the bite or if the child accepted the bite and then expelled it.

Data Collection and Analysis

Researchers videotaped all baseline, post-training, and follow-up taste sessions and probe meals as well as all parent training sessions. The experimenter and two graduate students watched all taste sessions and probe meals two times in order to observe and score videotapes of parent and child behavior separately. Measurement for each step of parent performance in both taste sessions and probe meals required observers to mark either an “X” indicating that the parent did not perform the step correctly, a “√” indicating correct performance of the step, or N/A if the step was not applicable. Observers scored child latency to accept the bite during taste sessions by indicating the time that the parent presented the bite within 3 cm of the child’s mouth and the time in which the child accepted the entire bite from the spoon (i.e. no visible remnants of the food on the spoon). Next, observers subtracted the number of seconds elapsed from the start of the video from when the parent presented the bite up to the child’s mouth. When scoring disruptive behavior and whether the child accepted the bite under 30 s during taste sessions, observers wrote “Y” for “yes” and “N” for “no.” Acceptance and disruptive behavior for the same bite were scored independently, as it was possible for the child to accept a bite under 30 s and engage in disruptive behavior for the same bite as well as take longer than 30 s to accept the bite and not engage in disruptive behavior (although unlikely as increased latencies were often due to disruptive behavior). Measurement of child behavior during probe meals required observers to write the food presented and a "√" if the child accepted the bite or an "X" if the child refused the bite.

Researchers averaged correct parent performance during individual taste sessions and probe meals separately across each day of baseline, treatment, and follow-up. They also calculated the child's latency to accept each bite during taste sessions for each food group, the proportion of bites accepted under 30 s, and the proportion of bites with disruptive behavior out of the total number of taste sessions per day. When measuring child behavior for probe meals, researchers averaged the number of bites eaten during probe meals for each day. The researchers also calculated the average number of bites eaten of each food for each probe meal plate presented in baseline, post-training, and the number of bites eaten during each of the three to four plates presented during follow-up.

Experimental Design

This experiment used a non-concurrent multiple baseline design across mother-child dyads. The following phases included: (a) parent-fed baseline taste sessions and probe meals, (b) parent training, (c) post-training parent implemented taste sessions and probe meals, and d) follow-up.

Procedure

Pre-baseline food inventory questionnaire. The experimenter gave parents a list of 86 common foods (Appendix A) and asked them to indicate the foods eaten by the child as well as the family. Researchers and parents determined target foods for each child by selecting foods reported eaten by the family, but not eaten by the child.

Direct observation assessment. Before conducting baseline sessions, the experimenter administered a modified version of Ahearn et al.'s (2001) direct assessment to the participants.

In addition to presenting bites of fruits, vegetables, proteins, and starches (Ahearn et al., 2001), the experimenter also presented dairy products to Tommy and Noah. Experimenters refrained from presenting dairy products to Lance due to purported allergies. During the direct assessment, Tommy and Lance refused to eat all 180 bites (i.e. 12 bites of each of 15 foods—3 foods from each food category) presented and Noah refused 168 foods. He only ate 12 of 12 presented bites of vanilla ice cream.

Parent-fed baseline taste sessions. The experimenter gave parents a written task analysis on how to conduct taste sessions in the home and asked them to conduct the procedure to the best of their abilities. In addition, the experimenter instructed parents to conduct a probe meal (see below) after completion of 10 taste sessions and to refrain from providing food to the child for two hours prior to the first taste session and after the last taste session that day. Restricting access prior to sessions was done to increase the child's appetite while restricting access to foods following sessions was done to ensure the child did not gain access to foods immediately following any taste sessions in which the parent terminated the meal before the child consumed the bite (which occurred frequently in baseline sessions) as well as to ensure that the child did not gain immediate access to foods after exhibiting long latencies to accept target bites during previous taste sessions that day. At the beginning of each session, the experimenter asked the child's mother if she had given him access to food during the two hours prior to taste sessions. In addition, the experimenter instructed parents to limit their child's access to foods during treatment sessions to only those presented during the taste sessions and probe meals. The experimenter instructed parents to conduct approximately 20 taste sessions per day; however, the actual number of taste sessions and probe meals per day varied depending on the child's latency to accept bites during taste sessions. For instance, if long periods of time passed before the child took a bite, parents sometimes conducted fewer sessions during that day.

Parent-fed baseline probe meals. During baseline probe meals, the experimenter presented parents with a task analysis for how to conduct a probe meal (see Table 2). The experimenter conducted probe meals in order to assess acceptance when the child was given the choice of accepting a bite and thus, to examine acceptance when the escape extinction contingency was not in place. In addition, baseline probe meals assessed generalization of acceptance to foods not previously presented during taste sessions, unlike previous studies in which only mastered foods were presented (Paul et al., 2007; Pizzo et al., 2009). As done for the foods presented during taste sessions, the experimenter chose a list of foods to present during probe meals from the reported foods eaten by the family and not by the child from the food inventory questionnaire. The experimenter created a list of five probe meals to present to the child with each probe meal consisting of several bites of four to five foods, one for each food category (i.e. 20 to 25 foods total). Parents rotated plates A through E (i.e. plate A after the first 10 taste sessions, plate B after the next 10 taste sessions, etc.) during both baseline and post-training sessions. After presenting plate E, parents presented plate A again and continued to rotate to the next plate in the rotation for the subsequent probe meal. As mentioned earlier, the experimenter instructed parents to conduct approximately two probe meals each day (one after every 10 taste sessions); however, the number or probe meals varied depending on the number of taste sessions completed each day. Table 3 shows the foods presented in each probe meal for each child.

Table 3. Foods presented during each probe meal plate for each child.

Participants	Plate A	Plate B	Plate C	Plate D	Plate E
Tommy	Broccoli Pear Spaghetti Vanilla Pudding Hotdog*	Green Pepper Oranges Rice Cheddar Cheese Sausage*	Celery Blueberries French Fries Vanilla Yogurt Turkey*	Cucumber Mixed Fruit Cupcake Provolone Cheese Bacon*	Green Beans Pineapple Cake Swiss Cheese Ham*
Lance**	Broccoli Pineapple Mashed Potatoes Hotdog	Green Pepper Oranges Bread Sausage	Celery Blueberries Pita Ham	Cucumber Cherries Bagel Hamburger	Green Beans Mixed Fruit Pizza Chicken (not nugget)
Noah	Broccoli Pear Mashed Potatoes Hotdog Vanilla Pudding	Green Pepper Oranges Rice Sausage Cheddar Cheese	Celery Blueberries Bread Turkey Peach Yogurt	Cucumber Peaches Pancakes Hamburger Provolone Cheese	Green Beans Mixed Fruit Vanilla cake Chicken (not nugget) Swiss Cheese

*Removed following baseline due to choking concerns of the parents.
**Dairy products were not presented due to allergies.

Parent Training

Parent training consisted of the experimenter using instructions, modeling, rehearsal, and feedback to train the repeated taste exposure, escape extinction, and fading procedure as well as the probe meals. Training began with the experimenter reading aloud the task analysis of how to conduct taste sessions and answering any questions that the parent had regarding the procedure. Next, the experimenter demonstrated how to perform the procedure by modeling two taste sessions with the child. The experimenter then asked the parent to rehearse a taste session with the child. Following rehearsal, the experimenter provided feedback to the parent based on her performance. Feedback involved providing several comments regarding what the parent did correctly (e.g. "I like how you waited until the child took the bite before you let him go to the play area") and several comments regarding what the parent did incorrectly (e.g. "Next time, try not to respond to your child's yelling and only provide attention after he has eaten his bite"). After providing feedback, the experimenter again modeled two taste sessions with the child and asked the parent to rehearse another taste session and subsequently provided feedback. Following feedback, the experimenter asked the parent to perform a three taste session assessment in which the parent performed three taste sessions without experimenter feedback. If the parent performed an average of at least 90% of the steps correctly during the three session assessment, the experimenter began to train the parent how to conduct the probe meal. The experimenter gave the parent feedback and asked her to perform another three session assessment if she did not meet training criterion following the first assessment.

Researchers considered the step of actually having the child eat the bite (i.e. the escape extinction component) as more important than parent steps such as stating the rule that the child could go and play after taking the bite or presenting the correct bite size to the child. It was also thought that parents failing to implement the escape extinction component would be more detrimental on child behavior than other steps of the procedure. Thus, during parent training, when adding the total number of steps performed correctly out of total steps, the experimenter counted this step twice compared to all other steps, which were counted once so that parents could not meet training criterion of 90% correct steps performed without actually having the child eat the bite. If seven steps were applicable for a taste session, the experimenter calculated correct parent performance out of eight applicable steps because the escape extinction component was added twice. Therefore, if the parent performed all steps correctly except for the escape extinction component, the parent would perform six out of eight steps correctly. But, if the parent performed the escape extinction component correctly and did not perform another step correctly, the parent's correct performance would be seven out of eight steps.

When the parent met the training criterion for taste sessions, the experimenter trained the parent how to conduct the probe meal. After reading aloud the instructions, the experimenter modeled a 3-min probe meal with the child. Next, the parent rehearsed a 3-min probe meal with the child and the experimenter gave the parent feedback based on her performance. Following feedback on parent rehearsal of the probe meal, the experimenter asked the parent to perform a second assessment in which she conducted three taste sessions followed by a 10-min probe meal without providing feedback. If the parent performed an average of at least 90% of the steps correctly during the taste sessions and over 90% of the steps correctly in the probe meal during the second assessment, the parent met training criterion and began post-training taste sessions and probe meals. After training criterion was met, parents did not receive feedback based on their performance by the experimenter.

Post-Training Parent-Implemented Taste Sessions and Probe Meals

Post-training sessions were conducted in the same manner as baseline.

Follow-Up Plan/Sessions

Following approximately one week of treatment, the experimenter gave all parents the same follow-up plan. She instructed parents to: (a) present three foods mastered during taste sessions or eaten during probe meals during each meal, (b) have the child consume at least one bite of each presented food, (c) attempt to present at least 20 different mastered foods during meals to the child each week, and (d) conduct five taste sessions with one non-mastered food per day. The experimenter scheduled weekly follow-up appointments for the first three weeks following treatment. A fourth follow-up session was scheduled with Lance because of a decreasing trend in his follow-up data and because he was sick during the third follow-up session. During follow-up sessions, the experimenter asked the parent to conduct 10 taste sessions followed by one probe meal in order to assess maintenance of treatment gains.

Inter-Observer Agreement

The experimenter and two trained graduate students observed approximately 35% of baseline, post-training, and follow-up sessions for inter-observer agreement (IOA). Observers scored both parent and child behavior. The experimenter calculated IOA separately for each child measure during taste sessions (i.e. latency to accept bite, whether acceptance was under 30 s, and presence of disruptive behavior) and probe meals (i.e. bite acceptance or refusal). In addition, the experimenter calculated IOA for each parent measure, percentage of correct steps performed during taste sessions and probe meals.

The experimenter calculated IOA for each session for both child and parent performance by dividing the total number of agreements by the total number of agreements and disagreements and multiplying by 100%. The experimenter defined an agreement for child behavior during taste sessions as both independent observers indicating that the child did or did not consume a bite within 30 s; for disruptive behavior, both observers had to have marked whether disruptive responses occurred during the bite presentation. The experimenter defined agreement for child latency to accept as both observers scoring the latency to accept within 3 s of each other. Agreement for acceptance during probe meals was defined as both observers marking that child accepted the presented bite and agreement for rejection as both observers marking that the child rejected the presented bite. The experimenter defined an agreement for parent behavior during taste sessions and probe meals as both observers indicating that the parent's performance for each step was either correct or incorrect. IOA was 90% or above for all participants and responses in all phases (See Table 4).

Treatment Integrity

The experimenter provided a trained graduate student with treatment integrity checklists consisting of the experimenter's correct behavior for parent training sessions (See Appendix B). The assistant observed all parent training sessions across all parent-child dyads and scored each component of the BST package (i.e. reading aloud written instructions, modeling, rehearsal, and feedback) as well as the sequence of assessments for taste sessions, probe meals, and both taste sessions and probe meals together. The number of correct steps performed by the experimenter divided by the total number of steps multiplied by 100% determined treatment integrity. Treatment integrity scores averaged 94% (83%-100%) across all parent training components.

Social Validity Measures

Following completion of the study, the experimenter administered social validity questionnaires to parents (see Appendix C). The experimenter asked parents to rate the

Table 4. Inter-observer agreement for child and parent behavior during baseline, post-training, and follow-up sessions.

	Baseline	Post-Training	Follow-up
Taste Sessions			
Tommy	100%	97% (67%-100%)	91% (67%-100%)
Tommy's Mother	93% (71%-100%)	94% (67%-100%)	95% (83%-100%)
Lance	100%	99% (67%-100%)	94% (67-100%)
Lance's Mother	95% (86%-100%)	95% (56%-100%)	93% (71%-100%)
Noah	91% (67%-100%)	91% (33%-100%)	94% (67%-100%)
Noah's Mother	94% (71%-100%)	97% (85%-100%)	97% (83%-100%)
Probe Meals			
Tommy	100%	98% (95%-100%)	96%
Tommy's Mother	99% (97%-100%)	94% (92%-96%)	93%
Lance	100%	98% (91%-100%)	100%
Lance's Mother	97% (92%-100%)	91% (85%-96%)	90%
Noah	100%	99% (93%-100%)	100%
Noah's Mother	92% (88%-97%)	96% (94%-98%)	90%

acceptability of the BST procedure as well as the acceptability of the repeated taste exposure, escape extinction, and fading procedure. The experimenter also asked parents to assess the outcomes of the treatment on child behavior and their overall experience of participating in the study. Five of six questions used a Likert scale from 1 (poor) to 5 (excellent).

Follow-Up Food Inventory Questionnaire

Immediately following treatment and at 1-month following treatment, the experimenter again gave parents a list of 86 common foods (Appendix A) and asked them to indicate the foods eaten by the child.

Results

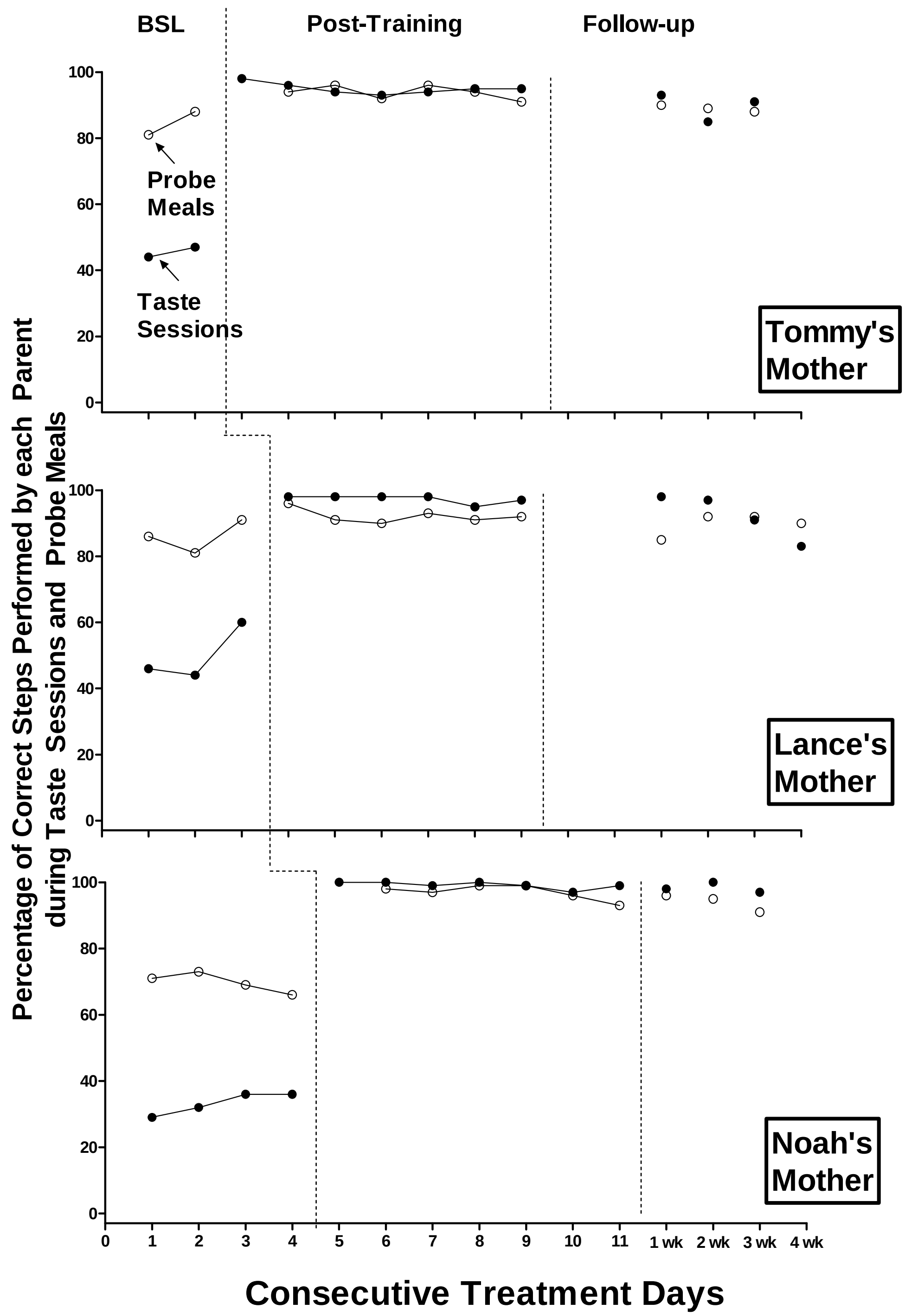
Correct Parent Performance

Figure 1 shows the percentage of correct steps performed by each parent during the taste sessions and probe meals performed each day in baseline and post-training as well during each follow-up session. In baseline, all mothers showed a low percentage of correct steps performed during taste sessions, but higher percentages of correct steps performed in baseline probe meals, during which children did not have to consume bites. Given the higher performance of all mothers in baseline probe meals, the experimenter implemented training based on parent performance during baseline taste sessions, not probe meals.

During baseline, Tommy and Noah's mothers' percentage of correct steps performed for taste sessions per day was low and relatively stable across baseline sessions. Lance's mother's correct performance was stable across the first two days of baseline, but her percentage of correct steps performed increased during the last day of baseline sessions. Both Tommy and Lance's mothers' percentages of correct steps performed for probe meals were over 80% across baseline days. In addition, both mothers also showed slight increasing trends in their percentage of correct steps performed during baseline probe meals. Noah's mother showed stable performance during baseline probe meals with a lower percentage of correct steps performed compared to the other mothers.

During training, Tommy's mother met training criterion of performing an average of at least 90% of steps correctly following one assessment of three consecutive taste sessions with 100% of steps performed correctly. She also met criterion for the second assessment of completing three taste sessions followed by a probe meal with 100% of correct steps performed for taste sessions and 95% of steps performed correctly during the probe meal. Lance's mother

Figure 1. Percentage of correct steps performed by each parent during taste sessions and probe meals across consecutive days of baseline, post-training, and follow-up sessions.



met criterion for the three taste session assessment following the first assessment with an average of 91% of correct steps performed. She met training criterion for the second assessment of three taste sessions followed by a probe meal with an average of 95% of correct steps performed during the taste sessions and 97% of correct steps performed for the probe meal. Noah's mother met training criterion after two assessments of three consecutive taste sessions and one assessment of completing three taste sessions followed by one probe meal. During the first assessment of three taste sessions, in which her performance averaged 88% of correct steps performed, she did not meet training criterion because she often verbally responded to her son's disruptive behavior and thus, had to conduct another three taste session assessment, in which her average performance increased to 100% of correct steps performed before moving on to probe meal training. During her assessment of three taste sessions followed by a probe meal, she met criterion following one assessment with an average performance of 100% of correct steps performed for taste sessions and 98% of correct steps performed during the probe meal.

Across post-training sessions for both taste sessions and probe meals, the percentage of correct steps performed for each mother remained stable and above 90%. During follow-up, parent responding was a bit more variable. Tommy's mother's percentage of correct steps performed during taste sessions fell below 90% during the 2-week follow-up session. Her performance during probe meals also decreased slightly below 90% of correct steps performed during the 2-week and 3-week follow-up sessions. Lance's mother showed a decreasing trend in percentage of correct steps performed during follow-up taste sessions with her percentage of correct steps performed falling under 90% during the 4-week follow-up session. Several factors may have led to this decrement in Lance's mother's correct performance. During the third follow-up session, her child was sick and she provided more attention to his disruptive behavior compared to earlier days of treatment. Second, in the fourth follow-up session, she often forgot to set the timer to measure her child's latency to accept bites during taste sessions. Lance's mother's percentage of correct steps performed during probe meals fell below 90% during the 1-week follow-up session. During this session, she often failed to perform the step of telling the child to take a bite or to reinforce the child's acceptance of bites. During follow-up, Lance often opened his mouth right away, in which case, it was difficult for his mother to give the child the instruction prior to each bite.

Child Behavior

Taste sessions. As mentioned earlier, the experimenter instructed all parents to conduct approximately 20 taste sessions and two probe meals each day during baseline and post-training. During each follow-up session, all parents conducted 10 taste sessions and one probe meal; however, during baseline and post-training days, this number varied due to the child's latency to accept bites. If latencies were long, some parents were not able to conduct 20 taste sessions. If latencies were short, parents sometimes conducted more than 20 taste sessions. Tommy's number of taste sessions per baseline and post-training day ranged from 6 to 25. Lance's number of taste sessions conducted ranged from 20 to 30 per day while Noah's ranged from 1 to 51. Both Tommy and Lance's mother conducted exactly 120 total taste sessions while Noah's mother performed a total of 148 across post-training days. Noah exhibited longer latencies and more non-compliance across the first several days of post-training sessions compared to the other children. Consequently, his mother insisted on performing additional taste sessions during the last several post-training days when his compliance increased and his latencies to accept bites decreased.

Figure 2 shows the proportion of accepted bites eaten under 30 s and the proportion of bites with disruptive behavior for each child during baseline, post-training, and follow-up taste sessions while Table 5 provides each child's latency to accept taste session bites during parent training sessions. In baseline, no child consumed bites under 30 s during taste sessions. In fact, no parents successfully completed the escape extinction component of the treatment package and thus, no children accepted any bites during baseline taste sessions. All children also engaged in disruptive behavior during all baseline taste sessions. As shown in Table 5, during modeling and rehearsal BST sessions, children exhibited some of the longest latencies to accept bites; however, all children demonstrated an increase in proportion of bites accepted in less than 30 s as well as a decrease in proportion of bites with disruptive behavior throughout post-training sessions.

During parent BST sessions, Tommy's longest latency to accept a bite during a taste session was 4007 s (1 hr 6 min 47 s) (See Table 5). It is important to note that during parent training sessions, Tommy's parents expressed concern about Tommy choking on meats that he had to chew. This was a legitimate concern considering the child had not eaten solid foods for five months prior to the study. Therefore, the experimenter removed meats from subsequent taste sessions and probe meals. Across post-training days, Tommy showed an increasing trend in his proportion of bites accepted under 30 s as he exhibited a decrease in his proportion of bites with disruptive behavior. During follow-up sessions, his behavior was more variable. During the 1-week follow-up visit, Tommy's proportion of bites accepted under 30 s sharply decreased as his proportion of bites with disruptive behavior increased; however, during his second and third week follow-up sessions, his proportion of bites consumed under 30 s again increased while his proportion of bites with disruptive behavior decreased compared to his first follow-up session. One reason for Tommy's variability in responding during follow-up may be due to

Figure 2. Proportion of accepted bites eaten under 30 s and proportion of bites with disruptive behavior during baseline, post-training, and follow-up taste sessions.

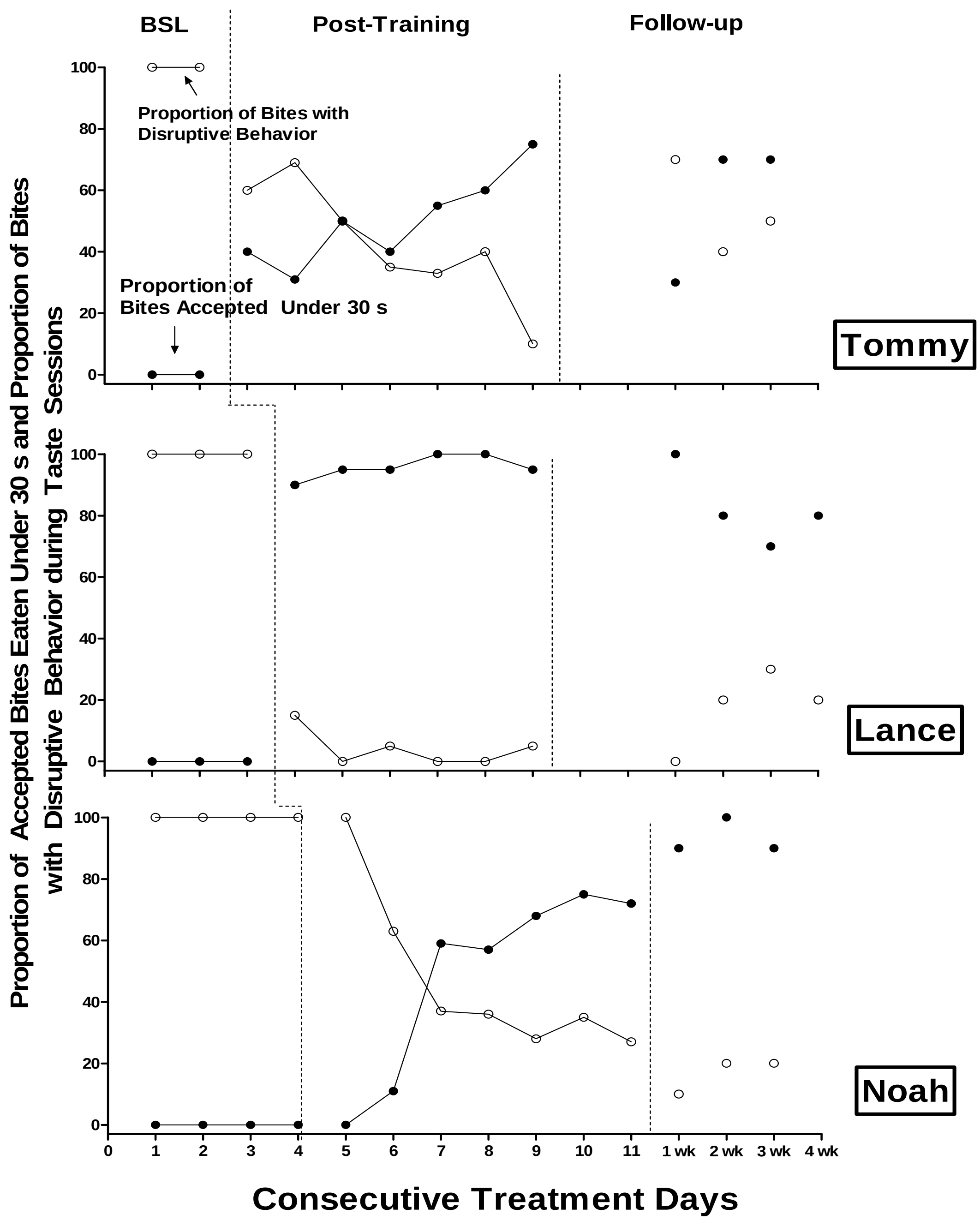


Table 5. Child Latency to Accept Taste Session Bites during Parent Training.

	Tommy	Lance	Noah
Modeling[1]	4007 s (1 hr 6 min 47 s)	2212 s (36 min 52 s)	1572 s (26 min 12 s)
Modeling[2]	510 s (8 min 30 s)	2495 s (41 min 35 s)	300 s (5 min)
Rehearsal[1]	502 s (8 min 22 s)	520 s (8 min 40 s)	2309 s (38 min 29 s)
Modeling[3]	122 s (2 min 2 s)	851 s (14 min 11 s)	440 s (7 min 20 s)
Modeling[4]	147 s (2 min 27 s)	932 s (15 min 32 s)	406 s (6 min 46 s)
Rehearsal [2]	32 s	137 s (2 min 17 s)	1092 s (18 min 12 s)
TS Assessment 1			
TS 1	202 s (3 min 22 s)	33 s	139 s (2 min 19 s)
TS 2	462 s (7 min 42 s)	340 s (5 min 40 s)	507 s (8 min 27 s)
TS 3	53 s	738 s (12 min 18 s)	6983 s (1 hr 56 min 23 s)
Assessment 1 (cont)			
TS 4	N/A	N/A	4318 s (1 hr 11 min 58 s)
TS 5	N/A	N/A	3520 s (58 min 40 s)
TS 6	N/A	N/A	326 s (5 min 26 s)
TS/PM Assessment 1			
TS 1	43 s	592 s (9 min 52 s)	3420 s (57 min)
TS 2	18 s	311 s (5 min 11 s)	528 s (8 min 48 s)
TS 3	117 s (1 min 57 s)	251 s (4 min 11s)	3775 s (1 hr 2 min 55 s)

Superscripts = taste session modeling and rehearsal trial numbers
TS = Taste Session
PM = Probe Meal

Tommy's mother not adhering to the follow-up plan as closely as the other mothers participating in the study. His mother admitted that she began to offer starches more frequency than other foods following treatment.

While Lance's longest latency, 2495 s (41 min 31 s), was shorter than the other participants, Lance engaged in the most aggressive behavior during parent training sessions. He attempted to bite, scratch, kick, and pinch the experimenter as well as his mother during taste sessions; however, Lance showed an immediate reduction in proportion of bites with disruptive behavior and an immediate increase in proportion of bites accepted under 30 s during his first day of post-training sessions and throughout the remaining post-training days. During the first three weeks of follow-up, Lance showed a decreasing trend in his proportion of bites accepted under 30 s and an increasing trend in proportion of bites with disruptive behavior. During the 3-week follow-up session, he had been sick for five days prior to the session and had been kept home from school due to illness the day of the follow-up visit. Due to his decreasing trend in performance, the experimenter scheduled a 4-week follow-up session in which his proportion of bites accepted under 30 s increased and his proportion of bites with disruptive behavior decreased compared to his 3-week follow-up session.

Noah exhibited the longest latencies to accept bites during parent training sessions. His longest latency to accept a bite during a training taste session was 6983 s (1 hr 56 min 23 s). During his second day of post-training sessions, Noah began to exhibit an increase in the proportion of bites eaten under 30 s as well as a decrease in proportion of bites eaten with disruptive behavior. Similar to Tommy, Noah showed an increasing trend in his proportion of bites accepted under 30 s as well as a decreasing trend in his proportion of bites with disruptive behavior across post-training days. Noah showed additional gains during follow-up taste sessions with at least 90% of bites eaten under 30 s and 20% or less of presented taste session bites with disruptive behavior during each follow-up session.

Probe meals. In addition to showing gains during treatment taste sessions, all children showed an increase in their number of bites eaten during probe meals, in which parents presented foods not previously presented during taste sessions, compared to baseline sessions. Figure 3 shows the average number of accepted bites during probe meals across baseline and post-training as well as the number of bites eaten during each follow-up probe meal (only one probe meal was presented during a follow-up session). Table 6 shows the average number of eaten bites per food on each probe meal plate during post-training and follow-up sessions. By comparing acceptance of different foods on each plate, the experimenter could assess preference for particular foods. It is also important to note that in addition to preference for particular plates of foods during probe meals, motivating operations may have also influenced acceptance, particularly in probe meals presented later on during the treatment day (i.e. onset of satiation after consuming taste session bites and bites during earlier probe meals).

Tommy was the only child to eat a bite of food during a baseline probe meal in which he ate several bites of yogurt. During his second day of baseline sessions, he did not accept any bites during probe meals. Across all post-training days, Tommy showed an increase in his average number of bites eaten during probe meals compared to baseline. During all except one post-training day, Tommy ate an average of over 10 bites per meal. He also ate over 10 bites during each follow-up meal. Tommy demonstrated preference for starch and dairy products in that he ate a greater average number of bites for those food categories compared to others during probe meals. His average number of bites was not greater than 0 for any vegetables and fruits presented during probe meals.

Figure 3. Average number of bites accepted for each probe meal plate across baseline and treatment days and number of bites accepted during follow-up probe meals.

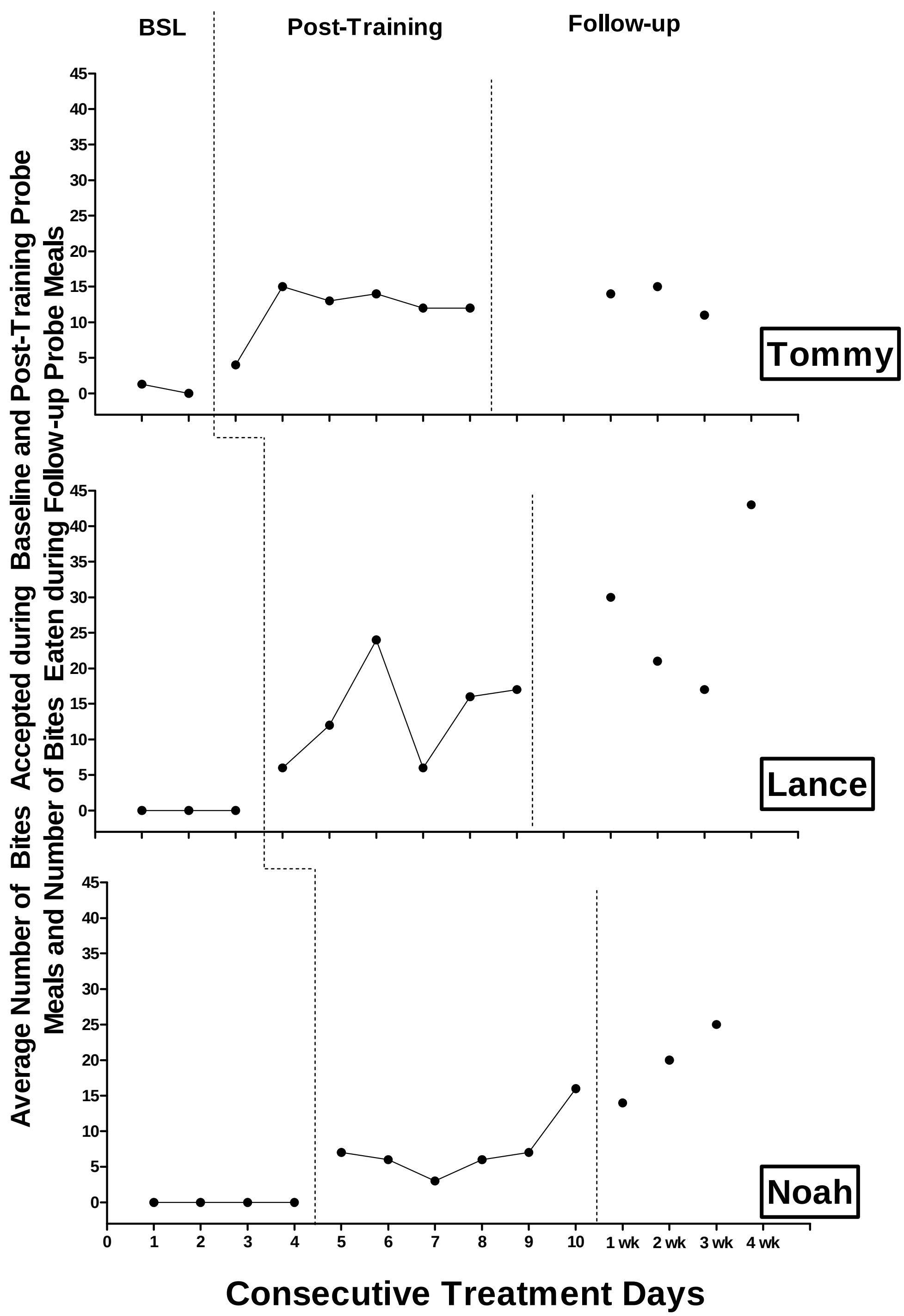


Table 6. Average number of bites eaten by each child for each food per probe meal plate across treatment and follow-up sessions.

Participants	Plate A	Plate B	Plate C	Plate D	Plate E
Tommy	Broccoli (0) Pear (0) Spaghetti (3) Vanilla Pudding (7) Hotdog*	Green Pepper (0) Oranges (0) Rice (0) Cheddar Cheese (9) Sausage*	Celery (0) Blueberries (0) French Fries (14) Vanilla Yogurt (0) Turkey*	Cucumber (0) Mixed Fruit (0) Cupcake (7) Provolone Cheese (6) Bacon*	Green Beans (0) Pineapple (0) Cake (11) Swiss Cheese (0) Ham*
Lance**	Broccoli (0) Pineapple (9) Mashed Potatoes (6) Hotdog (11)	Green Pepper (0) Oranges (4) Bread (1) Sausage (0)	Celery (4) Blueberries (5) Pita (5) Ham (4)	Cucumber (2) Cherries (1) Bagel (6) Hamburger (5)	Green Beans (3) Mixed Fruit (8) Pizza (0) Chicken (not nugget) (9)
Noah	Broccoli (2) Pear (2) Mashed Potatoes (0) Hotdog (0) Vanilla Pudding (7)	Green Pepper (1) Oranges (2) Rice (1) Sausage (2) Cheddar Cheese (9)	Celery (0) Blueberries (1) Bread (1) Turkey (0) Peach Yogurt (2)	Cucumber (0) Peaches (0) Pancakes (3) Hamburger (0) Provolone Cheese (8)	Green Beans (0) Mixed Fruit (0) Vanilla cake (4) Chicken (not nugget) (0) Swiss Cheese (2)

*Removed following baseline due to choking concerns of the parents.
**Dairy products were not presented due to allergies.

Lance did not accept any bites during baseline probe meals. While he increased his acceptance during post-training days, his average number of bites per day was variable. Lance showed an increasing average number of bites during probe meals during his first three post-training days followed by a decrease in his average number of bites during his fourth post-training day. Again, his average number of bites during probe meals increased during his last two post-training days. During follow-up probe meals, Lance ate more bites during his 1-week follow-up compared to all post-training sessions; however, he showed a decreasing trend in his number of bites eaten during his second and third follow-up meal. As with his follow-up taste sessions, his reduction in acceptance may have been associated with his illness. During his fourth follow-up meal, he accepted more bites than any previous probe meal. When comparing his acceptance of different foods during post-training and follow-up probe meals, Lance showed acceptance of a wider variety of foods compared to Tommy. He ate bites of foods from all food groups, but his average number of bites was greater for fruits and meats compared to starches and vegetables.

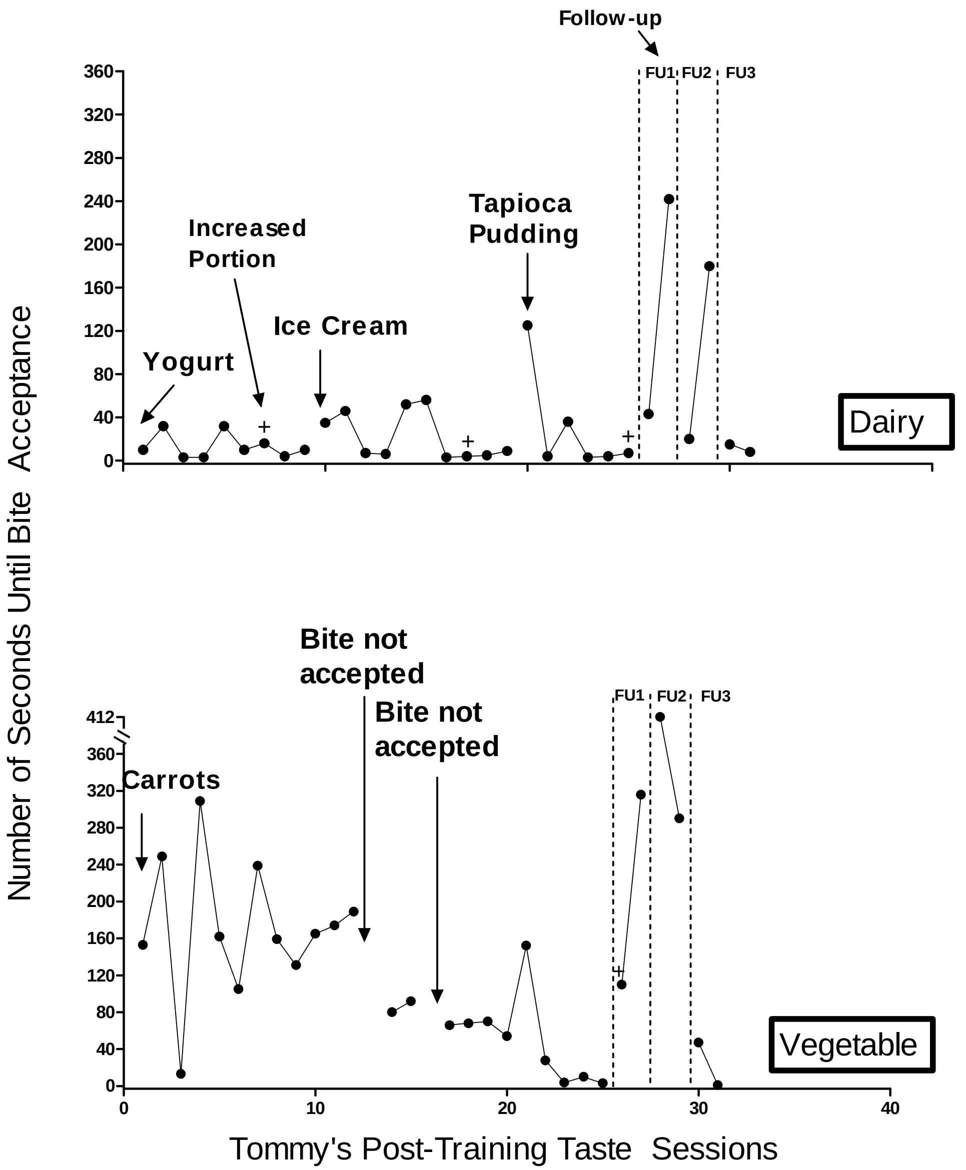
Like Lance, Noah did not accept any bites during baseline probe meals. He gradually increased his average number of bites consumed during probe meals across post-training sessions. During follow-up sessions, Noah showed additional increases in his number of bites eaten during probe meals. When comparing Noah's acceptance for different foods on each probe meal plate during post-training and follow-up, like Lance, Noah did eat bites of foods from all food categories; however, he showed a greater average number of bites eaten for dairy products compared to all other food categories.

Individual taste-session bites by food category. Figures 4-6 present the number of seconds to accept each bite presented for two different food categories for each participant during post-training and follow-up sessions. The "+" symbol represents when the parent increased portion sizes to half spoonful (following acceptance of three pea-sized bites under 30 s without disruptive behavior) and the "*" indicates that the bite was the first bite presented for a treatment day. Children met mastery criterion faster for certain food categories (e.g. starches) than others (e.g. vegetables). Also, children often exhibited an increase in latency to accept the first bite of a new food presented for each category or when portion size increased. Further, children often met mastery criterion for subsequent foods more quickly compared to the first foods presented for each food category.

Figure 4 shows Tommy's number of seconds to accept taste session bites for dairy products and vegetables. In general, Tommy's latency to accept a bite of a particular dairy product decreased as the parent repeatedly presented the bite. For example, during post-training sessions, Tommy's latency to accept the tapioca pudding was highest during the first presentation of the bite. His latency to accept dairy products increased during follow-up sessions. His mother suspected that his resistance to accept bites of dairy products increased as he began to form preferences for starches. Further, his mother's offering of starches more frequency than other foods following treatment may have contributed to his increase in latencies to accept the bites of dairy and other food categories. Tommy exhibited most disruptive behavior when presented with bites of carrot. Vegetable was the only food category in which he did not master a food during treatment.

Further, Tommy's mother was the only mother to allow her child to escape eating a bite during post-training taste sessions. For two taste sessions with carrot, she allowed the child to leave the eating area without accepting the bite. These bite presentations are indicated on the graph. Although Tommy did not meet mastery criterion for the carrot, his latency to accept

Figure 4. Tommy's latency to accept each bite of dairy and vegetable during post-training and follow-up taste sessions



the bite decreased with repeated presentations. As with dairy, his latency to accept the bite increased during his first and second follow-up session; however, his follow-up sessions coincided with an increase in portion size, which also may have led to an increase in his latency to accept the bite. For both tapioca pudding and carrot, his latency to accept the bites decreased during his third follow-up session compared to earlier follow-up sessions.

Figure 5. Lance's latency to accept each bite of starch and fruit during post-training and follow-up taste sessions.

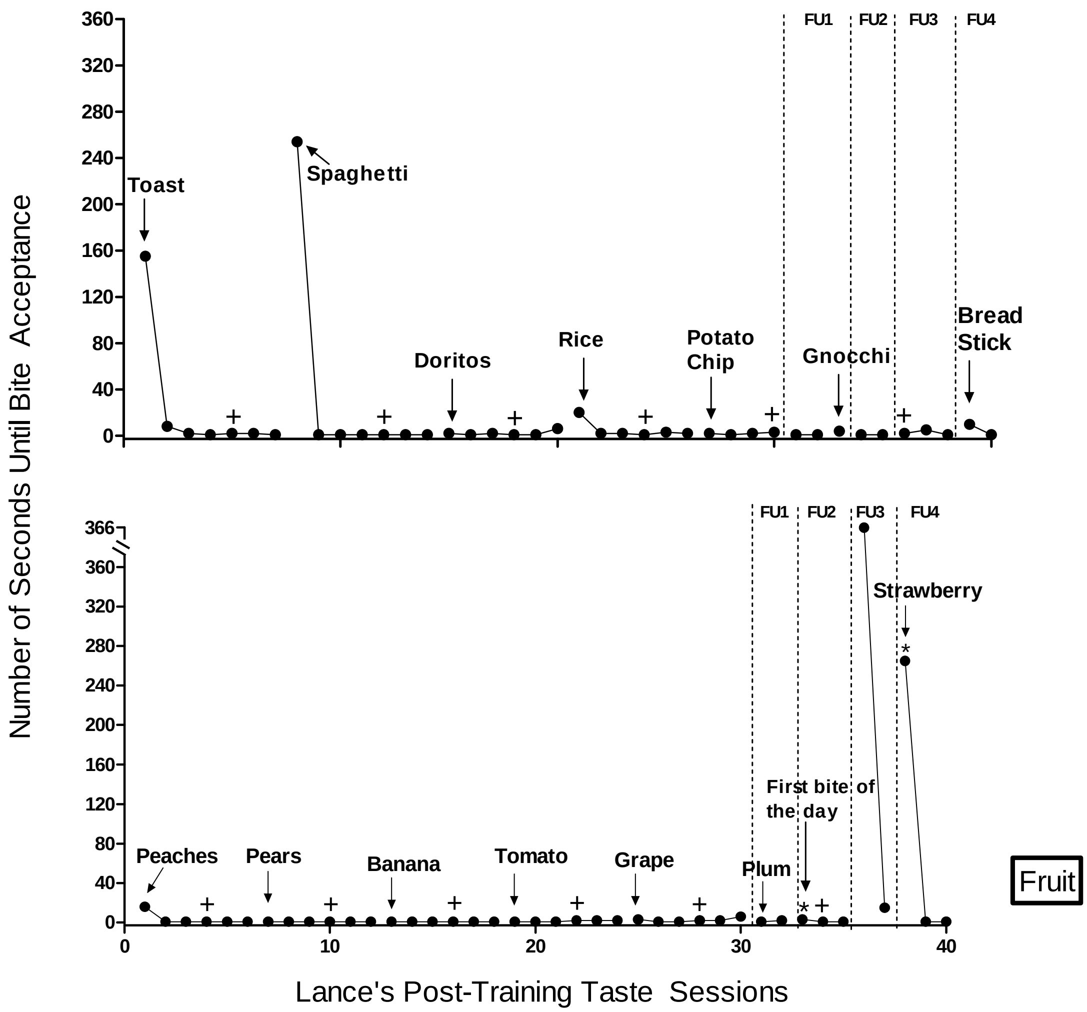
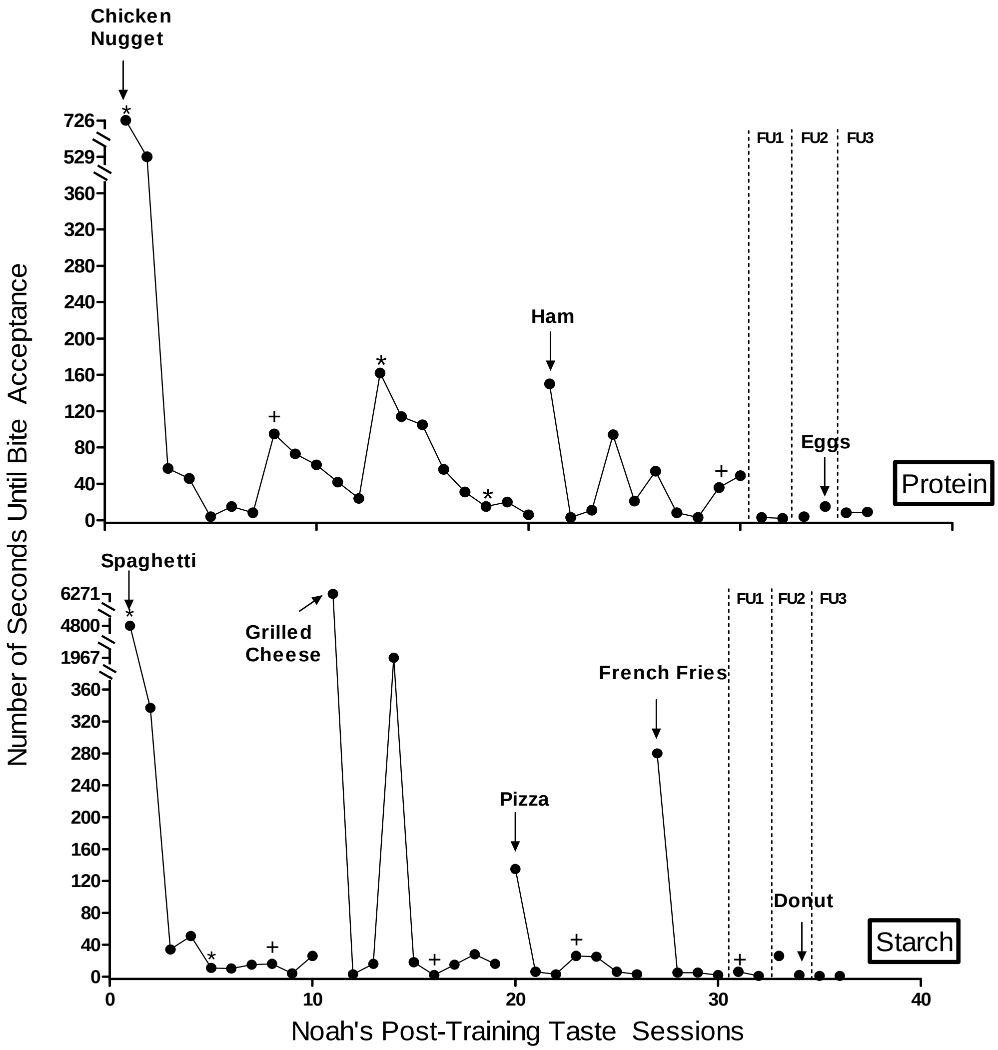


Figure 5 shows Lance's latency until bite acceptance for starches and fruits during post-training and follow-up taste sessions. For starches, Lance's longest latencies to accept bites were for his first bites of toast and spaghetti. He accepted all remaining bites of starches under 30 s, even during follow-up sessions. For fruits, after parent training, Lance accepted all bites under 30 s until follow-up sessions, in which he showed an increase in latency to accept a bite of plum and to accept his first bite of strawberry. As mentioned earlier, his increase in latency to accept during follow-up may have been influenced by his sickness. His mother did mention that during the five days that he was sick, she mostly fed him starches and liquids.

Noah's latency to accept bites of proteins and starches during post-training and follow-up taste sessions is shown in Figure 6. As with the other children, his latency to accept the bite increased when his mother presented a new food; however, with subsequent presentations of the same bite, his latency to accept the bite decreased. While Noah's latency to accept bites decreased with repeated presentations of bites of protein, he met mastery criterion faster for bites of starches. In fact, all children in the study mastered starches more quickly than other food groups. In follow-up, Noah continued to show short latencies to accept bites even when his mother presented new foods.

Noah's latency to accept bites of proteins and starches during post-training and follow-up taste sessions is shown in Figure 6. As with the other children, his latency to accept the bite increased when his mother presented a new food; however, with subsequent presentations of the same bite, his latency to accept the bite decreased. While Noah's latency to accept bites decreased with repeated presentations of bites of protein, he met mastery criterion faster for bites of starches. In fact, all children in the study mastered starches more quickly than other food groups. In follow-up, Noah continued to show short latencies to accept bites even when his mother presented new foods.

Figure 6. Noah's latency to accept each bite of protein and starch during post-training and follow-up taste sessions.



Food Inventory Questionnaire

Table 7 displays the number of foods reported eaten prior to treatment, immediately following treatment, and at 1-month follow-up for each participant. Foods are also broken down by food category. Each parent reported an increase in the number of foods eaten by their child immediately following treatment. Tommy's mother reported that he increased the number of

Table 7. Number of foods reported eaten prior to treatment and at one month follow-up.

Participant	Prior to treatment	Following Treatment	1-Month Follow-up
Tommy	1	20	26
Dairy	1	7	6
Fruit	0	2	3
Protein	0	2	2
Vegetable	0	0	0
Starch	0	9	13
Lance	11	34	51
Fruit	2	7	11
Protein	3	9	15
Vegetable	1	8	10
Starch	5	10	15
Noah	12	25	39
Dairy	3	5	7
Fruit	0	4	6
Protein	2	3	7
Vegetable	0	2	7
Starch	7	11	12

foods in his diet from only milk prior to the study to 20 foods immediately following treatment. Lance's mother reported an increase of 23 foods eaten by her son after approximately one week of treatment. Noah's mother reported that her son ate an additional 13 foods immediately following treatment. Further, all parents reported an additional increase in the number of foods eaten by their children at 1-month post-treatment compared to immediately following treatment. Tommy's mother reported that her son ate an additional five foods 1-month following treatment while Lance and Noah's mothers reported that their child added an additional 15 and 14 foods respectively. When given follow-up questionnaires, Tommy's mother reported that of the foods eaten by her son, a majority of them were starches and dairy. Noah's mother reported that her son ate approximately twice as many starches compared to other food groups. Lance's mother reported that her son ate similar numbers of foods from each food category.

Social Validity Measures

Table 8 shows the answers from each mother for each question on the social validity Likert rating scale. All mothers rated the effectiveness of the BST package as well as their experience participating in the research as excellent. When asked to report which component of the package they found most helpful, all mothers marked modeling. It is important to note that while all mothers rated modeling as the most effective component, their ratings may have been influenced by the taste session training sequence in which the experimenter modeled the first two taste sessions for each parent. Some of the longest child latencies to accept bites and some of the most disruptive behavior occurred when the experimenter conducted the taste session with the child during the initial modeling taste sessions in which the child was not able to leave the eating area until he accepted the bite without expulsion. Therefore, parents' ratings of modeling as the most helpful training component may have been due to the experimenter modeling all steps of

Table 8. Social Validity Questionnaire answers reported by mothers.

1 = Poor 2 = Fair 3 = Good 4 = Very Good 5 = Excellent

1) How would you rate child disruptive behavior during meal times at homes following treatment completion?

Tommy and Lance's Mothers: 3
Noah's Mother: 5

2) How would you rate child acceptance of new foods following treatment completion?

Tommy's Mother: 2
Lance and Noah's Mothers: 3

3) How would you rate the effectiveness of the Behavioral Skills Training (Instructions, Rehearsal, Modeling, and Feedback) that you received during the study?

All mothers: 5

4) Which of the following training components did you find most helpful? (Instructions, Rehearsal, Modeling, and Feedback)

All mothers: Modeling

5) How would you rate the overall effectiveness of the food selectivity intervention (Repeated Taste Exposure, Escape Prevention, and Fading) on child behavior?

Tommy and Noah's Mothers: 5
Lance's Mother: 4

6) Overall, how would you rate your experience participating in the research?

All mothers: 5

the taste session correctly, but also may have been related to observing the children engage in potential extinction bursts—in which the children engaged in an increase in disruptive behavior and waiting to accept presented bites, responses which had previously led to the children getting out of eating non-preferred or novel foods. Mothers rated the effectiveness of the food selectivity procedure as either very good or excellent. Lance and Tommy's mothers rated their children's disruptive behavior during mealtimes at home following treatment as good while Noah's mother rated her son's behavior during mealtime as excellent. Noah and Lance's mothers rated their sons' acceptance of new foods following treatment as good while Tommy's mother rated her son's acceptance as fair. One perhaps surprising finding was that while Tommy's mother rated the treatment package as excellent, but she only rated her son's acceptance of new foods as fair. Prior to the study, Tommy had a more limited diet compared to the other children (i.e. only drinking milk) and his mother had lower expectations than the other parents. Thus, while his acceptance was still low, Tommy's mother reported that she was still happy with the treatment outcome because her son ate foods—which he had not done for five months prior to the study. A further indication of acceptability of procedures is the fact that no parents called to cancel or reschedule any treatment sessions or withdrew participation, which allowed treatment sessions to run for six to seven consecutive days.

Discussion

This study showed that BST was effective in training parents to implement repeated taste exposure, escape extinction, and fading to increase food acceptance in their children with food selectivity in the home setting. Following parent training, all parents showed an increase in correct performance during taste sessions and probe meals while children showed an increase in proportion of bites accepted under 30 s and bites eaten during probe meals. Children also showed a decrease in proportion of bites with disruptive behavior and latency to accept bites. These findings support those of Paul et al. (2007) and Pizzo et al. (2009) in that the treatment package led to an increase in the number of foods eaten by each child participant.

This study also extends previous findings in numerous ways. First, this study showed that parents could implement this procedure in the home instead of having trained feeding therapists conduct most treatment sessions in a clinic setting. Further, this study adapted the Pizzo et al. (2009) procedure, in which trained feeding therapists conducted the procedure for the majority of sessions each day across a 1-week span, by restricting the number of treatment sessions to approximately 20 taste sessions and two probe meals per day across the span of 1-week—making the procedure more feasible for parents to implement in the home setting.

Another contribution of this study was the use of probe meals with foods not presented during taste sessions. In previous studies using this procedure (Paul et al., 2007; Pizzo et al., 2009), therapists and parents primarily conducted probe meals with foods that had been mastered in previous taste sessions. The probe meals in this study not only assessed acceptance when the child participants did not have to take bites, but acceptance to foods in which the child had not eaten during previous taste sessions. Because acceptance during these probe meals was much lower than acceptance during the probe meals used by Paul et al. and Pizzo et al., it appears important not only to assess acceptance when the child does not have to take a bite of foods previously presented during taste sessions, but also to assess acceptance to foods that the child had not been exposed to in previous taste sessions. Another interesting finding of these probe meals showed that two out of three children demonstrated preferences for particular food categories when mothers presented the probe meals during post-training and follow-up sessions.

The finding that children often met mastery criterion for foods more and more quickly across post-training sessions supports the findings of Williams, Paul, Pizzo, and Riegel (2008) in which they found that the number of exposures required for consumption of new foods decreases as more foods are added to a child's diet. Thus, although parents who implement procedures to reduce food selectivity in their children may face challenging child behavior during the initial presentation of foods for each food category, child willingness to try new foods appears to become better over time.

This study showed that in addition to teaching other skills (Lavie & Sturmey, 2002; Sarakoff & Sturmey, 2004; Seiverling et al., 2010; Ward-Horner & Sturmey, 2008), BST can be effective in training parents to implement a treatment package to increase acceptance of foods in their children with food selectivity. Following BST, parents, all of whom had been previously unsuccessful at following a written plan to treat food selectivity in their children, were able to implement the entire treatment procedure in the home setting without ongoing feedback by the experimenter and assistance from trained feeding therapists throughout treatment. In previous studies that discussed how parents were trained to implement treatment packages (Anderson & McMillan, 2001; McCartney et al., 2005), researchers gave parents ongoing feedback throughout treatment, making it difficult to determine the efficacy of the initial training package to teach parents to implement the procedure.

While the number of feeding programs continues to grow, many families often must wait months for treatment in an intensive setting. At the feeding program through which the research was conducted, it is not uncommon for a family to wait six months for intensive day treatment. Therefore, clinicians could first train parents using a form of BST to implement a home-based intervention such as the one used in this study prior to admitting the child for intensive treatment services and/or while the child is on a waiting list for this type of treatment. Also, given the demonstrated efficacy, clinicians may want to provide parents with BST instead of just written instructions when giving parents a plan to follow at home when clinicians see families on an out-patient basis.

Although there were several benefits of the probe meals used in this study compared to the ones conducted by Pizzo et al. (2009) and Paul et al. (2007), there was also a limitation of implementing the same five plates of foods throughout the study. When a child ate a particular food in a probe meal, the experimenter was not able to remove that item when that particular plate was to be presented again in order to assess generalization of the other foods on the plate when that food was not present. The use of the same foods was problematic because Tommy and Noah often accepted several bites of one food and rejected all other foods on the presented probe meal plate. It would have been helpful to examine acceptance of other foods on the plate if the food that these children often selected was removed during subsequent presentation of the plates. An additional limitation of the probe meals used was the use of a time-based instead of trial-based format for the meal. The number of bites varied from probe meal to probe meal because of various factors such as the number of bites accepted by the child, how quickly mothers rotated through the foods, and how long it took for children to chew accepted bites. Another limitation of the study deals with how the experimenter administered the social validity questionnaire. The experimenter gave parents the questionnaire on the same day as the last post-training session. All parents mentioned that they were a bit confused with the question regarding their children's acceptance of new foods following treatment. One reason why parents may have rated their children's acceptance of new food as 2 (fair) or 3 (good) was because they were unsure whether to rate their child's acceptance compared to other children or to their own child's acceptance prior to the study. Further, they all mentioned that it was difficult to assess their child's acceptance to new foods following treatment because they had not had time to assess their child's acceptance since the social validity questionnaire was given to them immediately following the last day of treatment. Thus, the experimenter should have waited until after follow-up sessions to have parents assess their child's acceptance of new foods following treatment. The experimenter plans to administer this question again at 3-month follow-up. Nevertheless, parents' ratings of their child acceptance of new foods indicate that parents did not consider their child's food selectivity problem to be completely eliminated after intervention and that they still had more work to do, such as adhering to the follow-up plan, after the completion of post-training sessions to improve their child's acceptance of new foods. This finding is not surprising as this procedure was less intense than the 1-week intervention conducted by Pizzo et al. (2009) in which they implemented the intervention for a majority of the day. By implementing the procedure for a shorter duration each day and thus less intensely, parents will most likely need to continue to work on increasing acceptance for a longer period than one week. Further evidence of this notion is the variability in Tommy's follow-up data, during which his mother did not adhere to the follow-up plan as closely as Lance and Noah's mothers.

An additional limitation of this study was the use of a training package (i.e. instructions, rehearsal, modeling, and feedback) used to train parents as well as the use of a treatment package (i.e. repeated taste exposure, escape extinction, and fading) to increase food acceptance. Although all parents reported that modeling was the most helpful teaching component, it remains unclear as to which components of the BST package were actually responsible for post-training behavior change. It may also be the case that different components may be more effective depending on what type of skill is being taught. For instance, the most effective BST component for teaching someone how to treat a child's food selectivity may be different than the most effective BST component when training someone how to improve a child's oral motor deficits (i.e. inability to chew). Different BST components may also be more effective for different learners (e.g. modeling may be more effective when teaching one learner compared to another person learning the same skill). Similarly, although the experimenter weighted the escape extinction component of the procedure more than other components during parent training feedback, it remains unclear which of the food selectivity intervention components may have been responsible for changes in child behavior.

Future researchers should examine the use of a specified number of bites presented for each probe meal food as well as various ways to present probe meals—perhaps by comparing mastered and unmastered foods within probe meals or only assessing acceptance to one food per probe instead of five. Future researchers should also examine the effects of this procedure for different durations of time, such as having parents conduct the same number of taste sessions and probe meals for perhaps a two week period of time instead of one. They should also examine the effects of implementing various follow-up plans for parents to follow. Last, researchers should conduct component analyses in order to determine the effects of individual components of both the BST package as well as the food selectivity treatment package used in this study.

APPENDIX A
Food Inventory Questionnaire

FOOD INVENTORY QUESTIONNAIRE: Please indicate whether your child or you will eat at least one tablespoon of each of the following foods. Check the texture box if your child will take a bite, but only if the food has a specific texture (e.g. puree form)

Food	Texture	Child	You	Food	Texture	Child	You
Milk (white of flavored)				Cauliflower			
Yogurt				Brussel Sprouts			
Cottage Cheese				Lettuce			
Cheese (any type)				Green Pepper			
Chocolate				Sauerkraut			
Ice Cream or Sherbet				Greens (collard, chard)			
Pudding				Beans (pinto, kidney)			
Soy Milk				Tofu, soybeans			
Soy Yogurt				Peanut Butter			
Apple				Peanuts, nuts, sunflower seeds			
Applesauce				Muffin, bagel, roll			
Apricot				Cold Cereal			
Banana				Oatmeal or Hot Cereal			
Cranberry Sauce				Poptart or Breakfast Bar			
Grapes				Bread or Pita			
Grapefruit				Rice, white or brown			
Kiwi				Pasta (spaghetti, noodles)			
Mango				Crackers			
Nectarines				Pizza			
Oranges/Tangerines				Stuffing or filling			
Peaches				Candy (not chocolate)			
Pears				Donuts or Sweet rolls			
Strawberries				Pie			
Other berries				Cake			
Pineapple				Potato Chips			
Plums				Corn/tortilla chips			
Raisins				Cheese puffs/curls			
Watermelon				Pretzels			
Other melon				Cucumbers			
Chicken nuggets/fingers				Carrots			
Chicken, turkey				Broccoli			
Ground beef, hamburger				Coleslaw, Cabbage			
Sausage				Zucchini			
Hot dogs				Squash			
Bacon				Tomato			

Lunch Meat				Peas			
Ham, Pork				Lima Beans			
Beef (steak, roast)				Corn			
Eggs				Celery			
Tuna, fish				Onion			
Shellfish (shrimp, lobster, clams)				Eggplant			
				French Fries/tater tots			
				Potato (baked, boiled)			
				Sweet potato, hams			

Please list any foods that your child eats that are not specified on the list:

APPENDIX B

Treatment Integrity Checklists

TREATMENT INTEGRITY DATASHEET

BEHAVIORAL SKILLS TRAINING (Taste Session Training)

Evaluator: ________________

Participant: ________________

INSTRUCTIONS

a) **Experimenter reads out loud ALL of the components of the written task analysis. _____**

MODELING

a) **The experimenter models TWO taste sessions with the child _____ _____**

REHEARSAL

a) **Experimenter instructs the parent to conduct ONE taste session with the child _____ _____**

FEEDBACK

b) **The experimenter provides several comments about the parent's correct performance _____ _____**

c) **The experimenter provides several comments about the parent's incorrect performance _____ _____**

The experimenter completes this sequence two times ______

The experimenter asks the parent to complete three consecutive taste sessions (assessment) _____

TREATMENT INTEGRITY DATASHEET

BEHAVIORAL SKILLS TRAINING (Probe Session Training)

Evaluator: _______________

Participant: _______________

INSTRUCTIONS

b) **Experimenter reads out loud ALL of the components of the written task analysis. _____**

MODELING

b) **The experimenter models ONE 3-min probe meal with the child _____**

REHEARSAL

a) **Experimenter instructs the parent to conduct ONE 3-min probe meal with the child _____**

FEEDBACK

b) **The experimenter provides several comments about the parent's correct performance _____**

c) **The experimenter provides several comments about the parent's incorrect performance _____**

The experimenter completes this sequence one time ______

TREATMENT INTEGRITY DATASHEET

BEHAVIORAL SKILLS TRAINING (Taste Session/Probe Meal Training)

Evaluator: _______________

Participant: _______________

The experimenter asks the parent to complete THREE taste sessions followed by ONE 10-min probe meal_____

APPENDIX C

Social Validity Questionnaire

Name: ____

Date: ____

Please rate each of the following items by circling your answer to the questions below. When finished, please return the questionnaire to the experimenter. Use the following scale to answer all questions except 4.

1 = Poor 2 = Fair 3 = Good 4 = Very Good 5 = Excellent

1) **How would you rate your child's disruptive behavior during meal times at home following treatment completion?**

   1 2 3 4 5

2) **How would you rate your child's acceptance of new foods following treatment completion?**

   1 2 3 4 5

3) **How would you rate the effectiveness of the Behavioral Skills Training (Instructions, Rehearsal, Modeling, and Feedback) that you received during the study?**

   1 2 3 4 5

4) **Which of the following training components did you find most helpful?**

   Instructions Rehearsal Modeling Feedback

5) **How would you rate the overall effectiveness of the Food Selectivity Intervention (Repeated Taste Exposure, Escape Prevention, and Fading) on Child Behavior?**

   1 2 3 4 5

6) **Overall, how would you rate your experience participating in the research?**

   1 2 3 4 5

Thank you very much for participating.

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