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ORIGINAL PAPER

Using Shaping to Increase Foods Consumed by Children with Autism

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Abstract The current study used differential reinforcement and shaping to increase the variety of foods accepted by children with autism who demonstrated significant feeding inflexibility. Participants were introduced to four new food items via a hierarchical exposure, which involved systematically increasing the desired response with the food item. Level of food consumption was evaluated using a combined multiple baseline plus changing criterion design. Following intervention, all participants accepted all foods targeted, expanding upon the number of foods consumed.

Keywords Inflexibility · Food refusal · Shaping · Food variety

Introduction

Children with autism spectrum disorder (ASD) are at a greater risk for feeding problems relative to their typically developing peers. A substantial percentage (46–89%) of children with ASD display feeding problems, including food selectivity, food refusal, oral/motor difficulties (e.g., chewing), and other mealtime behavior problems such as elopement from the table or crying (Ledford and Gast 2006). Parents of children with autism report that they struggle to manage their children's feeding problems and worry about the potential negative effects on health and development (Rogers et al. 2012).

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Feeding difficulties can lead to short- and long-term health consequences. Such consequences involve inadequate energy, malnourishment, weight loss, weight gain, obesity, and failure to thrive (Bolte et al. 2002; Ho et al. 1997; Keen 2008; Matson et al. 2009; Sharp et al. 2014). Previous research has shown micronutrient deficiencies in children with autism relative to typically developing children (Bandini et al. 2010; Zimmer et al. 2011). Because feeding difficulties can pose a serious threat to a child's health and safety, it is important to address and treat these difficulties. One approach of treating feeding difficulties is artificial feeding, such as supplementation, intravenous feeding, and the use of gastrostomy tubes; however, these methods are invasive and undesirable as long-term strategies (Riordan et al. 1984). Feeding interventions based on operant conditioning have strong evidence to support effectiveness in treating feeding difficulties among children with ASD. These interventions might also prevent or terminate the need for more invasive treatments, such as gastrostomy tubes (Marshall et al. 2014; Matson et al. 2009).

A systematic literature review conducted by Marshall et al. (2014) analyzed evidence for interventions to improve feeding difficulties for young children with ASD; they found interventions based on operant conditioning have the strongest evidence base among all pediatric feeding intervention approaches (e.g., Kodak and Piazza 2008; Sharp et al. 2010). However, Marshall and colleagues identified a significant gap in the literature: few studies addressed food variability; instead, the majority addressed increased food volume. Although Marshall and colleagues noted that the majority of studies aimed to treat "food selectivity," implying a desire to increase food variability, only two of the 23 studies reviewed formally measured food variability as a dependent variable.

Food selectivity can be conceptualized as a form of behavioral inflexibility. Individuals with ASD often display behavioral inflexibility, which is often manifested as a strict adherence to routines and insistence on sameness. Moreover, this may lead to disruptive and challenging behavior when a routine is disrupted (American Psychiatric Association 2013; Green et al. 2006; Klin et al. 2007). Such challenges with flexibility may affect many domains of an individual's life, including feeding and eating (e.g., Fodstad and Matson 2008; Ledford and Gast 2006; Nadon et al. 2010; Provost et al. 2010). Behavioral inflexibility can be manifested within feeding routines in several ways. For example, children with ASD are less likely to tolerate the introduction of a new food on their plate than typically developing peers (Nadon et al. 2010) and are more likely to have difficulty eating outside of the home (e.g., schools, restaurants) (Provost et al. 2010). If feeding selectivity is a form of behavioral inflexibility, it is likely behavior analytic interventions to address behavioral inflexibility may also successfully reduce feeding selectivity.

Koegel et al. (2012) targeted feeding inflexibility using individualized reinforcement and hierarchical exposure. Specifically, three children with ASD who demonstrated inflexible mealtime behaviors, defined as disruptive behaviors resulting from offers to try foods outside of a very restricted food repertoire, were presented new foods using a systematic hierarchical sequence. Reinforcement was provided contingent upon the child mastering steps within a hierarchy of food acceptance which began with touching the food and motioning it toward the mouth and ended with accepting the food. This seven-level hierarchy and individual reinforcement resulted in successful expansion of food repertoire among all three participants.

The current study aims to expand the literature supporting the use of operant conditioning to treat feeding difficulties among children with ASD. This study addresses the gap in the current literature by evaluating a treatment to increase feeding variability. Specifically, this study examined the effectiveness of differential reinforcement and shaping, similar to that implemented by Koegel et al. (2012), to increase the number of different foods consumed in children with ASD who exhibit highly selective food repertoires and food refusal.

Method

Participants and Setting

One boy and one girl participated in this study. These children participated in the current study because their presenting feeding problem was food selectivity (i.e., ate only a limited amount of foods), and they had identifiable preferred items to use as reinforcement. Psuedynyms for each participant were selected in order to protect their privacy.

Ian was a 7-year-old verbal male diagnosed with ASD by a qualified individual not associated with the university-affiliated clinic or the research team. He had been receiving ABA therapy since the age of two, and was currently receiving 1 h of group ABA therapy per week as well as speech services for 2 h/week. Ian spoke in complete sentences, and was able to follow multi-step directions. He was recruited for the study based on parent-report of concerns with feeding behavior. Prior to the intervention, his diet consisted of mainly one specific dish of pureed vegetables and chicken prepared daily by his mother.

Ellie was a 8-year-old girl diagnosed with ASD, epilepsy, attention deficit hyperactivity disorder (ADHD) and an intellectual disability. All diagnoses were made by qualified individuals not associated with the university-affiliated clinic or the research team. Her language consisted of one to two word spontaneous utterances, and she followed one-step directions. Ellie was recieving ABA therapy in the home setting for 1 h/week and additional services for approximately 3 h/week (i.e., occupational therapy, physical therapy, and speech therapy) through a partnering service provider. Her therapist at the partnering service provider recommended her for participation in this study. Prior to the intervention, her diet consisted mainly of popcorn, pepperonis, and juice.

Informed consent was obtained from the parents of all individual participants included in the study. Prior to beginning the study, approval from the participants' pediatrician to participate was obtained. This approval sought to confirm there were not any underlying medical causes contributing to feeding difficulties (i.e., gastrointestinal issues, gastroesophageal reflux, etc.) and the participant had no medical issues that would compromise the safety of a feeding intervention (e.g., inability to swallow). The intervention took place at a university-affliliated applied behavior analysis clinic, where sessions were condcuted in a therapy room that was appoximatley 8 by 8 feet and consisted of a child-sized table and chairs. There were approximately ten trials conducted per 1 h session, and sessions occurred twice per week.

Response Definitions, Measurement, and Interobserver Agreement

Dependent measures included the level of food acceptance and the number of new foods consumed. The level of food acceptance, including operational definitions of each hierarchical level, is depicted in Table 1.

Level of acceptance was recorded on a data sheet at the end of each trial. A second observer collected data to

Table 1 Hierarchical level of acceptance scale

Level of acceptance	Description
0	Total refusal
1	Touches food to lips
2	Puts food in mouth, does not swallow food
3	Swallows food

Definitions: (0) Total refusal: defined as the participant not making contact with the food item. (1) Touch "food item" to lips: defined as the participant touching the food item being assessed with their hand and touching it to the lips within 2-min of the presentation of the SD. (2) Put "food item" in mouth: defined as the participant picking up the food with their hand and putting it past the plane of the lips and into their mouth following the SD in under 2-min. (3) Chew and swallow "food item": defined as the participant picking up the food item with their hand, putting it past the plane of the lips and into their mouth, chewing the food by moving the jaw up and down at least once, and then swallowing the entire bolus following the SD in under 2 min

determine levels of interobserver agreement for 30% of trials for Ian and 69% of trials for Ellie. An agreement was scored if both observers recorded the same level of acceptance at the end of the trial. Observers agreed on the level of acceptance 100% of trials for Ian and 96% of trials for Ellie.

A combined multiple baseline across participants plus changing criterion design was implemented to evaluate the effectiveness of the treatment package.

Procedure

Prior to collecting baseline data, caregivers completed a structured informal interview adminstered by the first author with questions regarding aspects of feeding, such as mealtime routines and desired treatment outcomes. Caregivers complied a list of foods they wanted their child to eat that were not currently in the child's repertoire (i.e., they did not currently eat the foods). From the list of foods parents provided, a protein, grain, vegetable, and snack food were selected. Foods were prepared at the clinic and presented to the participants in solid form.

A paired choice preference assessment (Fisher et al. 1992) was conducted to identify which stimuli were presumably the participants' most preferred, and therefore, would potentially serve as effective reinforcers for food consumption. The two highest preferred stimuli for each participant were available during feeding sessions.

Single Food Presentation

The first phase of intervention involved the presentation of a single food reinforcement contingency. Although all four foods were simultaneously presented, each food item was targeted individually; when consumption of the first food was mastered, the next food was targeted. A combined multiple baseline across foods plus changing criterion design was implemented to evaluate the effects of the treatment package.

Baseline Baseline trials were 2 min in duration and consisted of the presentation of the four targeted foods selected in collaboration with the participants' caregiver. A single bite of each food was placed in a white muffin tin liner. All four foods within the muffin tin liners were simultaneously presented to the participant on a single plate. The participant was told "eat your snack". No other instructions were given, and reinforcement was not provided for compliance. Inappropriate behaviors such as throwing food, pushing the plate away, and leaving the table were ignored.

Intervention Intervention trials were identical to baseline sessions with two exceptions: (a) the display of the targeted level of food acceptance behavior resulted in reinforcement, and (b) colored muffin tin liners were used to signal which food was associated with reinforcement. The same four foods were simultaneously presented to the participant. The food targeted for intervention was presented in a colored muffin tin liner while those not being targeted for intervention remained in white muffin tin liners. This was used to signal to the participant which food was associated with the potential for reinforcement (i.e., foods in colored muffin tin liners) and those that were not (i.e., foods in white muffin tin liners). The participants were taught to recognize the importance of the colored muffin tin liners following verbal directions and reinforcement history.

Food placed in a colored muffin tin liner (i.e., targeted for intervention) was associated with differential reinforcement. If the participant responded correctly by emitting the targeted level of food acceptance within 2 min, they received 30 s access to the preferred stimulus (see Table 1 for successively targeted levels). The participant also received reinforcement if they emitted a level of food acceptance above the currently targeted level.

At the start of each session, the experimenter asked the participant select a preferred stimulus among an array of the top two stimuli identified via preference assessment. Once the preferred stimulus was chosen, all four food bites were presented to the participant and the explained the reinforcement contingency (e.g., "Touch chicken to your lips and then you get to build the Titanic!"). Contingent upon displaying the targeted behavior, the participant was praised and received access to the preferred stimulus for 30 s. If the participant did not initiate the targeted behavior, he or she was reminded of the contingency every 15 s ("Remember, first touch the chicken to your lips and then you get

the Titanic!"). Reinforcement was not delivered for any behavior associated with non-targeted foods. If the desired response was not emitted within 2 min, the reinforcer was not delivered, all items were removed, and the trial was ended. The highest level of acceptance was recorded for each trial, even if it was not the targeted level in order to monitor level of acceptance throughout intervention.

Once the participant completed the targeted level of behavior across three consecutive trials, the criterion to obtain reinforcement was increased to the next level within the hierarchy. In this way, the participant was expected to achieve higher levels of food acceptance throughout the intervention, until they reached complete acceptance (Level 3). Once the participant demonstrated the highest level of acceptance for a single food item across three consecutive sessions, a second food item was targeted using the hierarchical sequence, beginning with Level 1. Only one food item was targeted per trial. Trials continued until the participant showed complete acceptance for all four foods.

Maintenance In order to ensure maintenance with mastered foods, maintenance trials were conducted for 2–4 weeks after the participant reached mastery with a particular food. Maintenance trials were identical to intervention trials in which the highest acceptance hierarchy was targeted. In other words, if the child swallowed the food within 2-min of presentation, he or she received praise and 30-s access to the preferred stimulus. For example, the experimenter began the session by saying "Chew and swallow chicken and then you get to build the Titanic!" If the participant displayed the targeted behavior within 2-min, he or she received reinforcement; if he did not display the targeted behavior, the trial was ended and no consequences were provided.

Multiple Food Presentation

Once the participant consistently demonstrated acceptance of each food presented individually, a final phase was implemented in which multiple foods were to be consumed per trial. The purpose of this phase was to target the consumption of all four newly-acquired foods within one mealtime session.

For all multiple food presentation trials, reinforcement was contingent upon the consumption of multiple foods. The duration of multiple food maintenance trials was dependent upon the number of foods to be consumed. The time allotted for completion increased by 2-min for each food item added; thus, the participant had 4-min to consume two foods.

During the first maintenance trial, the first two foods introduced during intervention were presented in the colored muffin tin liners, and the two non-targeted foods were placed in white muffin tin liners. Reinforcement was available to the participant in a manner identical to the previous condition, but was contingent upon the demonstration of complete acceptance of all targeted food items (i.e., food items placed in colored muffin tin liners). Instructions were provided similar to those presented during intervention (e.g., "Chew and swallow chicken and carrots and then you get to build the Titanic!"). Once the participant met this criterion across three consecutive trials, the response requirement increased to acceptance of three foods within 6 min. Upon meeting this criterion across three consecutive trials, the participant was presented with all four foods in colored muffin tin liners and had a total of 8 min to consume all four foods on the plate in any order to access reinforcement. A flow chart of the procedures is shown in Fig. 1.

Results

Figure 2 displays the level of food acceptance for each food for Ian and Ellie, respectively. During baseline, Ian would occasionally put the food item in his mouth and immediately spit it out. Specifically, he refused (Level 0) chicken 83% of trials. He refused carrot 94% of trials. He refused corn 96% of baseline trials. He refused peanut butter cracker 89% of trials. Occasionally he would pick up the food, put it in his mouth, and then spit it out. However, upon introducing the intervention, improvements in terms of the level of food acceptance were quickly demonstrated. Ian met mastery criterion for chicken in 12 trials. He met mastery criterion for carrots, corn, and peanut butter crackers in nine trials for each food. On average, Ian met the final mastery criterion for each food within ten trials.

Ellie's data show positive outcomes as well. During baseline, Ellie refused (Level 0) chicken on all of 15 trials. She refused green bean 95% of trials, corn 87% of trials, and peanut butter cracker 96% of trials, respectively. Occasionally she would pick up the food, throw it, or put it in her mouth and then spit it out. Once intervention began, steady improvements were demonstrated across all food items. Ellie met mastery criterion for chicken in four trials. She met mastery criterion for green beans, corn, and crackers in 4, 3, 3, and 59 trials, respectively. It took her an average of 17 trials to master each food targeted.

Figure 3 depicts the total number of foods completely consumed before and after the feeding intervention. During baseline sessions, participants were provided all four foods simultaneously on a plate, but no participant consumed any of the foods during the baseline condition. Following the feeding intervention, participants increased the number of foods consumed from zero to four in an average of ten trials.

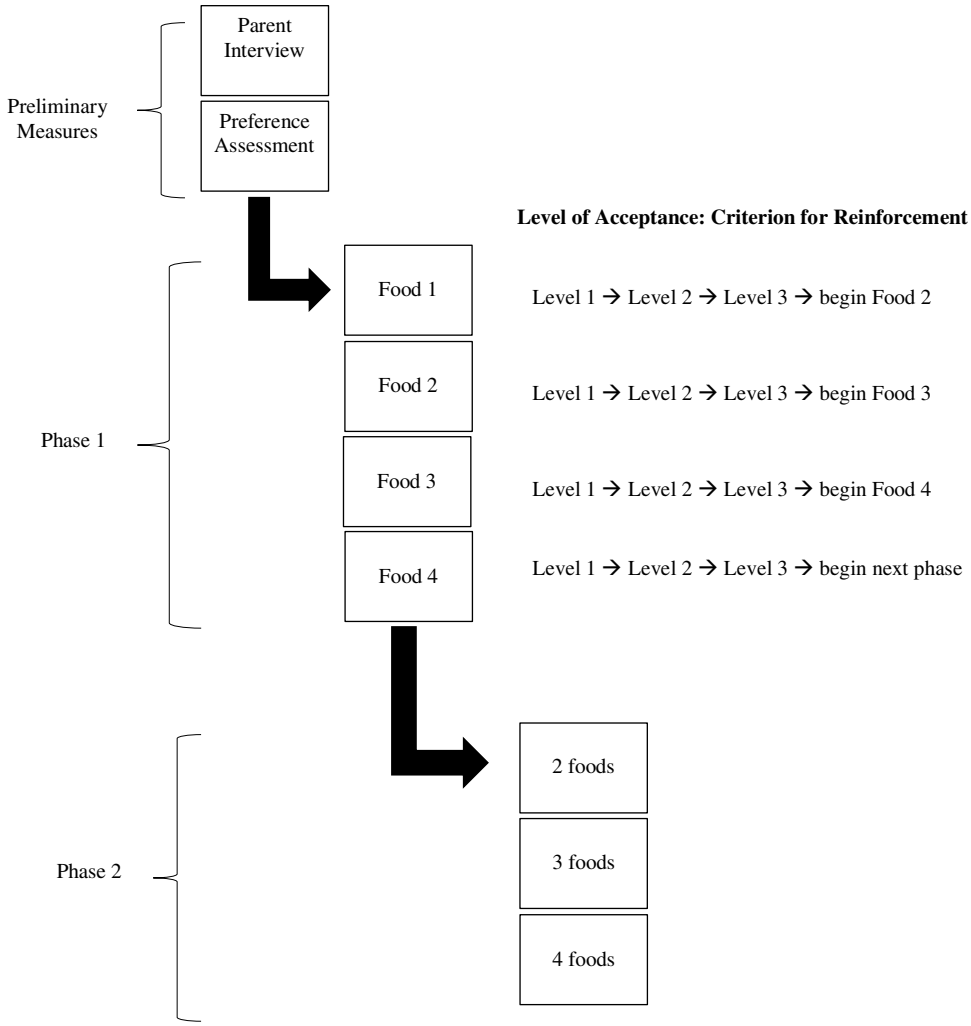

Fig. 1 Explanation of procedures

Discussion

The current study provides a behavioral-based approach to treating food refusal with the intent to foster more appropriate nutritional choices in children with autism by increasing the variety of foods they consume. The response requirement was shaped by systematically increasing the task demand from a seemingly easy response (i.e., touch the food item) to the most difficult response (i.e., chew and swallow the food item) and highly preferred items were provided contingent upon meeting the specific response requirements. Participants showed an increase in the variety of foods accepted, each acquiring four new foods in their repertoire in a relatively short period of time. In fact, on average, participants acquired the additional four foods in the repertoire within only 114 min (almost 2 h) of treatment. The results of this study are consistent with the results found by Koegel et al. (2012), further supporting the effectiveness of a shaping plus differential reinforcement procedure to treat food inflexibility.

Ian had a history of exploring foods by licking them, but not swallowing them, which may have accounted for the variation of responding in baseline trials (i.e., occasionally licking the food). Ellie also would bring the food to her lips or put it in her mouth (i.e., Level 1 and 2, respectively) while in baseline. This appears to be the result of generalization across foods as she fully refused chicken across all baseline measures, but she put the food in her mouth but did not swallow (i.e., Level 2) with the remaining foods only after intervention had begun with chicken. Ellie's data also show significantly more trials to criterion for peanut butter cracker, due to the fact that as she chewed, parts of the bite would oftentimes fall out of her mouth and the full bite was not scored as chewed and swallowed (Level 3).

Whereas most studies in the behavior analytic literature aim to increase the volume of foods consumed, few studies target increasing food variability (Marshall et al. 2014). This study contributes to the literature by demonstrating that behavior analytic approaches to feeding interventions

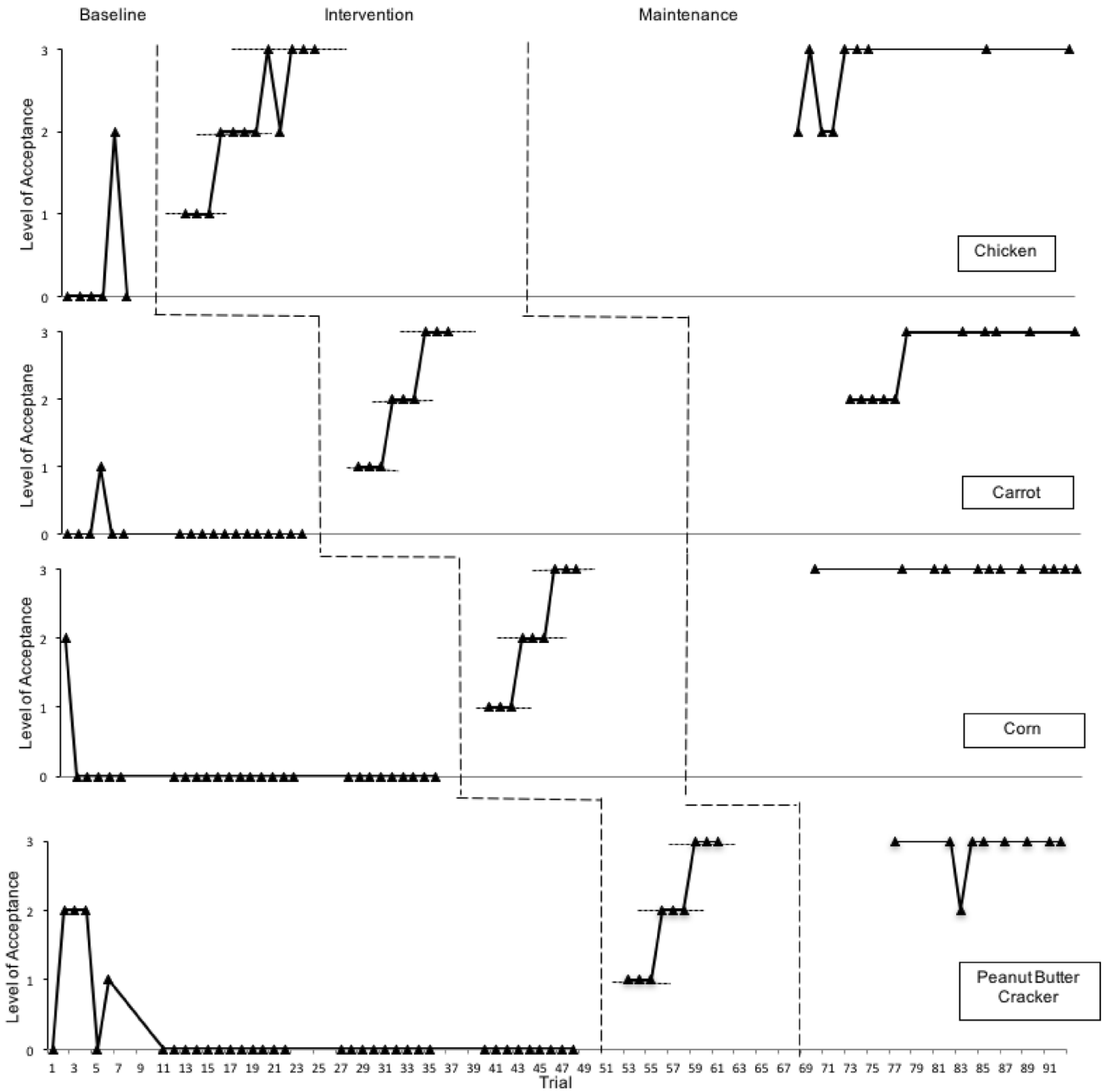

Fig. 2 Level of acceptance across novel foods for Ian (*top*) and Ellie (*bottom*)

can also improve the variety of foods children with ASD consume.

While increasing food volume is clearly beneficial to a child, increasing food flexibility has unique benefits. These unique benefits include nutritional variety and increased social opportunities. First, increasing food repertoire also increases opportunity for more balanced nutrition. In other words, if a child's repertoire is limited to specific food group, increasing only the volume consumed may not fully address the gaps in the child nutrient intake. On the other hand, in this study participants increased the variety of foods consumed including the addition of proteins and vegetables, thus increasing the variety of nutrients consumed. Second, increasing feeding variety may also increase opportunities for social and community participation. Families of children with food inflexibility may have to adjust daily routines to ensure the child has access to his or her limited food repertoire during meal times. Increased food flexibility provides increased social opportunities by increasing the child's ability to eat out of the home, such as restaurants, friend's homes, birthday parties, vacations, and field trips.

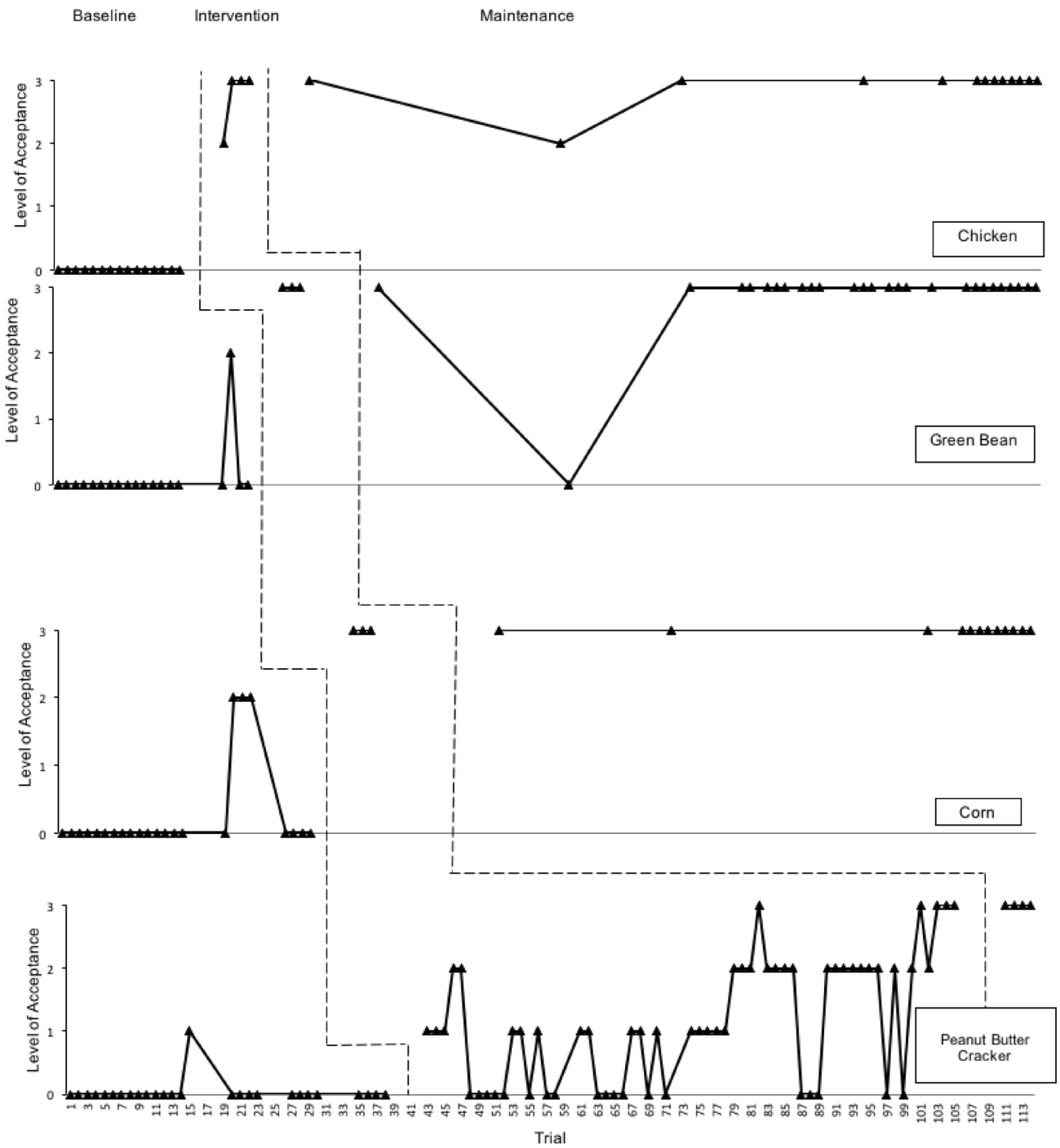

Fig. 2 (continued)

Food selectivity in ASD is oftentimes assumed to be influenced by impairments in sensory processing (Dominick et al. 2007; Keen 2008). The current study provides some evidence that this may not be the case for at least these two participants, in that the implemented intervention manipulated motivation to consume new foods, but did not treat potential underlying sensory processing impairments. The results indicate that feeding inflexibility can be addressed via interventions based on operant conditions in at least some cases, providing evidence to support alternative explanations of food inflexibility.

Food inflexibility may be better conceptualized within the larger umbrella of behavioral inflexibility. Insistence on sameness and restricted patterns of interests are

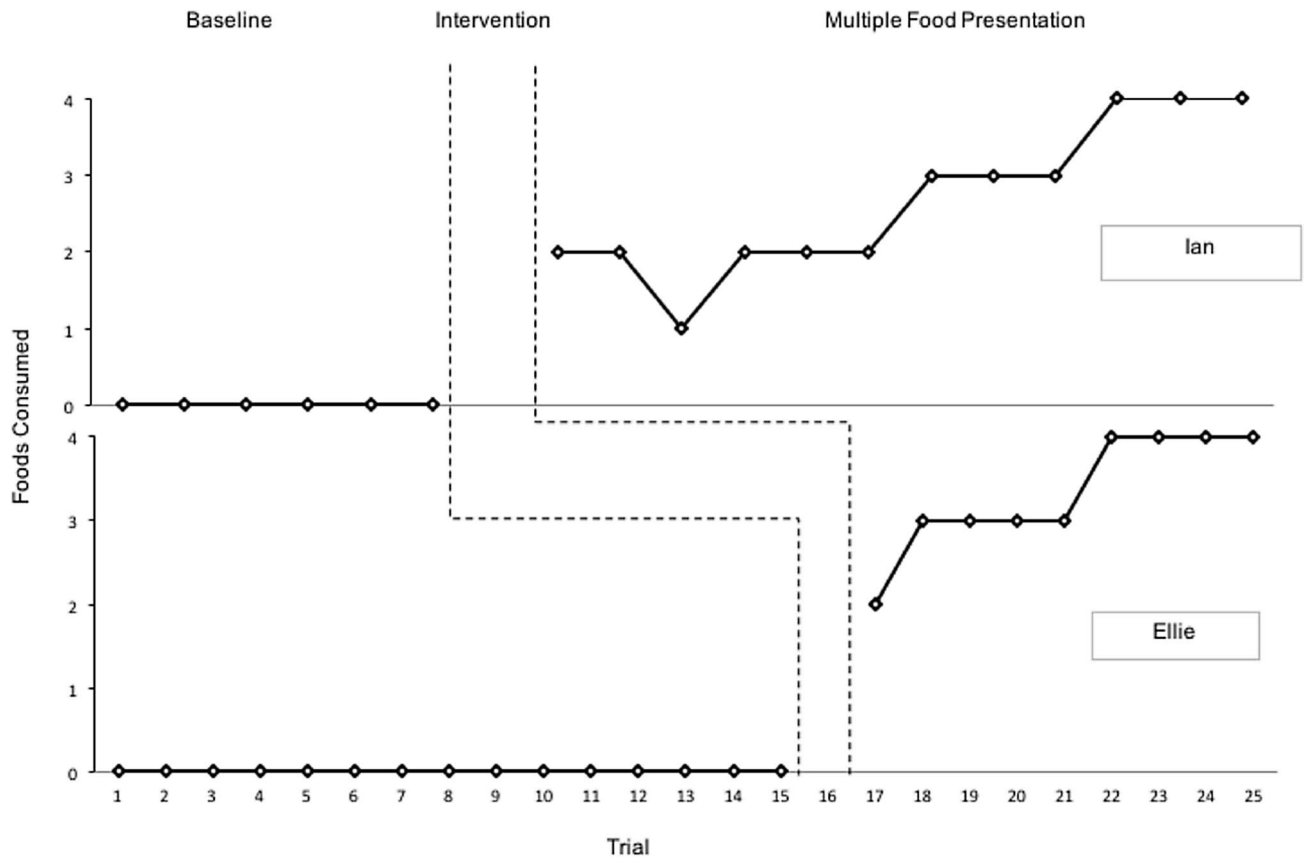

Fig. 3 New foods consumed following intervention for both participants

characteristics of ASD (American Psychiatric Association 2013). Food inflexibility is essentially insistence on same foods and/or restricted patterns of interest in particular foods. A myriad of behavior-analytic approaches have been effective in treating behavioral inflexibility, including differential reinforcement (e.g., Kuhn et al. 2009; Sigafoos et al. 2009). The results of this study suggest that manipulation of motivation to consume new foods may be a successful approach. Shaping provided participants with presumably less aversive tasks associated with food acceptance (e.g., touch the food) which were systematically increased and differential reinforcement provided motivation to complete the targeted behavior. Moreover, the results of this study suggest that treatments proven effective at treating other manifestations of behavioral inflexibility may also be effective in treating feeding inflexibility.

Limitations

This study is limited by the number of participants. While the shaping intervention was successful with Ian and Ellie, interpretation of the results is limited due to the small number of participants. Moreover, Ian and Ellie shared many characteristics, including similar age and language abilities; therefore, it is unknown if a similar intervention would be successful with children of different ages and developmental levels.

Additionally, the trials were limited to a clinical setting therefore it cannot be determined whether these behaviors generalized to the home environment.

Future Research

This study should be replicated across participants as well as across a variety of foods. Future research could also explore the optimum number of levels within a food acceptance hierarchy, identifying if participants would master foods faster with fewer levels or if more levels are necessary as the response is systematically increased to ensure the participants access reinforcement. Additionally, future research should address how to better accommodate participants who do not understand vocal explanation of contingencies. Researchers should consider utilizing procedures such as live modeling, video modeling, or using peers to model the desired response.

Author Contributions AH contributed to the design, coordination, implementation, and preparation of the manuscript. TD contributed to the design and preparation of the manuscript. MC contributed to the implementation and coordination of the study in terms of data collection and analysis. LP contributed to data collection and analysis. RW helped with manuscript preparation. All authors read and approved the final manuscript.

Compliance with Ethical Standards

Conflict of interest All authors declare no conflicts of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants in the study.

References

American Psychiatric Association (2013). *Diagnostic and statistical manual of mental disorders* (5th edn.). Washington, DC: American Psychiatric Association.

Bandini, L. G., Anderson, S. E., Curtin, C., Cermak, S., Evans, E. W., Scampini, R., et al. (2010). Food selectivity in children with autism spectrum disorders and typically developing children. *Journal of Pediatrics, 157*, 259–264.

Bolte, S., Ozkara, N., & Poustka, F. (2002) Autism spectrum disorders and low body weight: Is there really a systematic association? *International Journal of Eating Disorders, 31*, 349–351.

Dominick KC, Davis NO, Lainhart J, Tager-Flusberg H, Folstein S. (2007). Atypical behaviors in children with autism and children with a history of language impairment. *Research in Developmental Disabilities, 28*, 145–162.

Fisher, W., Piazza, C. C., Bowman, L. G., Hagopian, L. P., Owens, J. C., & Slevin, I. (1992). A comparison of two approaches for identifying reinforcers for persons with severe to profound disabilities. *Journal of Applied Behavior Analysis, 25*, 491–498.

Fodstad, J. C., & Matson, J. L. (2008). A comparison of feeding and mealtime problems in adults with intellectual disabilities with and without autism. *Journal of Developmental and Physical Disabilities, 20*, 541–550.

Green, V. A., Sigafoos, J., Pituch, K. A., Itchon, J., O'Reilly, M., & Lancioni, G. E. (2006). Assessing behavioral flexibility in individuals with developmental disabilities. *Focus on Autism and Other Developmental Disabilities, 21*, 230–236.

Ho, H. H., Peabody, D., & Eaves, L. C. (1997). Nutrient intake and obesity in children with autism. *Focus on Autism and Other Developmental Disabilities, 12*, 187–192.

Keen, D. V. (2008). Childhood autism, feeding problems, and failure to thrive in early infancy: Seven case studies. *European Child and Adolescent Psychiatry, 17*, 209–216.

Klin, A., Danovitch, J. H., Merz, A. B., & Volkmar, F. R. (2007). Circumscribed interests in higher functioning individuals with autism spectrum disorders: An exploratory study. *Research and Practice for Persons with Severe Disabilities, 32*, 89–100.

Kodak, T., & Piazza, C. C. (2008). Assessment and behavioral treatment of feeding and sleeping disorders in children with autism spectrum disorders. *Child and Adolescent Psychiatric Clinics of North America, 17*, 887–905.

Koegel, R., Bharoocha, A., Ribnick, C., Ribnick, R., Bucio, M., Fredeen, R., & Koegel, L. (2012). Using individualized reinforcers and hierarchical exposure to increase food flexibility in children with autism spectrum disorders. *Journal of Autism and Developmental Disorders, 42*, 1574–1581.

Kuhn, D. E., Hardesty, S. L., & Sweeney, N. M. (2009). Assessment and treatment of excessive straightening and destructive behavior in an adolescent diagnosed with autism. *Journal of Applied Behavior Analysis, 42*, 355–360. doi:10.1901/jaba.2009.42-355.

Ledford, J. R., & Gast, D. L. (2006). Feeding problems in children with autism spectrum disorders: A review. *Focus on Autism and Other Developmental Disabilities, 21*, 156–166.

Marshall, J., Ware, R., Ziviani, J., Hill, R. J., & Dodrill, P. (2014). Efficacy of interventions to improve feeding difficulties in children with autism spectrum disorders: A systematic review and meta-analysis. *Child: Care, Health, and Development, 41*, 278–302.

Matson, J. L., Fodstad, J. C., & Dempsey, T. (2009). The relationship of children's feeding problems to core symptoms of autism and PDD-NOS. *Research in Autism Spectrum Disorders, 3*, 759–766.

Nadon, G., Feldman, D. E., Dunn, W., & Gisel, E. (2010). Meal5me problems in children with autism spectrum disorder and their typically developing siblings: A comparison study. *Autism, 15*, 98–113.

Provost, B., Crowe, T. K., Osbourn, P. L., McClain, C., & Skipper, B. J. (2010). Mealtime behaviors of preschool children: Comparison of children with autism spectrum disorder and children with typical development. *Physical & Occupational Therapy in Pediatrics, 30*(3), 220–233.

Riordan, M. M., Iwata, B. A., Finney, J. W., Wohl, M. K., & Stanley, A. E. (1984). Behavioral assessment and treatment of chronic food refusal in handicapped children. *Journal of Applied Behavior Analysis, 17*, 327–341.

Rogers, L. G., Magill-Evans, J., & Rempel, G. R. (2012). Mothers' challenges in feeding their children with autism spectrum disorder—Managing more than just picky eating. *Journal of Developmental and Physical Disabilities, 24*(1), 19–33.

Sharp, W., Burrell, T. L., Jaquess, D. L. (2014). The autism meal plan: A parent-training curriculum to manage eating aversions and low intake among children with autism. *Autism, 18*(6), 712–722.

Sharp, W., Jaquess, D., Morton, J., & Herzinger, C. (2010). Pediatric feeding disorders: A quantitative synthesis of treatment outcomes. *Clinical Child and Family Psychology Review, 13*, 348–365.

Sigafoos, J., Green, V. A., Payne, D., O'Reilly, M. F., & Lancioni, G. E. (2009). A classroom-based antecedent intervention reduces obsessive-repetitive behavior in an adolescent with autism. *Clinical Case Studies, 8*, 3–13.

Zimmer, M. H., Hart, L. C., Manning-Courtney, P., Murray, D. S., Bing, N. M., & Summer, S. (2011). Food variety as a predictor of nutritional status among children with autism. *Journal of Autism and Developmental Disorders, 42*, 549–556.