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EFFECTS OF A HIGH-PROBABILITY INSTRUCTIONAL SEQUENCE ON GENERALIZED FOOD CONSUMPTION

EFECTO DE UNA SECUENCIA INSTRUCCIONAL DE ALTA PROBABILIDAD SOBRE LA INGESTA DE COMIDA GENERALIZADA

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Abstract

The purpose of the current study was to examine the effects of delivering a high-probability instructional sequence on generalized consumption of nonpreferred foods with similar properties to treatment foods. The participant was a 5-year-old, typically-developing child with a history of food selectivity. The participant was asked to complete each step of an instructional sequence in which the final step was consumption of a nonpreferred food. Praise was delivered after compliance to complete each step and a preferred food was delivered after compliance with the

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final step. The high-probability instructional sequence was effective in increasing consumption of nonpreferred foods and generalization was observed to nontarget foods with similar properties. The importance of tailoring procedures to treat food selectivity displayed by typically developing children is discussed.

Key words: Food selectivity, high-probability instructional sequence, typically developing children

Resumen

El propósito del presente estudio fue evaluar los efectos de presentar una secuencia instruccional completa sobre el consumo generalizado de comidas no preferidas con propiedades similares a las comidas bajo tratamiento. El participante fue un niño de 5 años con desarrollo típico con una historia de selectividad en la ingesta. Se pidió al participante completar cada uno de los pasos de una secuencia de instrucciones en la que el paso final fue el consumo de alimento. Se felicitó al participante después de cumplir con cada instrucción y después del consumo del alimento se entregó un alimento altamente preferido. El uso de la secuencia instruccional de alta probabilidad fue efectiva para incrementar el consumo de comidas bajo tratamiento sin utilizar extinción del escape y se observó generalización hacia alimentos con propiedades similares que no estuvieron bajo tratamiento. Se discute la importancia de adaptar procedimientos desarrollados con niños con discapacidad del desarrollo para tratar selectividad en la ingesta de niños con desarrollo típico.

Palabras clave: Selectividad en la ingesta, secuencia instruccional, niños con desarrollo típico

Food selectivity refers to the consumption of a limited variety of foods, refusal to consume foods from at least one major food category, or refusal to consume novel foods (Levin & Carr, 2001). Feeding problems are estimated to occur in upwards of 35% of typically developing children and in approximately 33-80% of children with developmental disabilities (Bachmeyer, 2009). Engaging in food selectivity can result in detrimental health outcomes such as nutritional deficiencies and other medical complications, especially when these problems are persistent and remain untreated. Refusal to eat is generally accompanied by inappropriate mealtime behavior in a variety of forms including, but not limited to, negative vocalizations (e.g., crying, screaming), disruption (e.g., throwing utensils), aggression (e.g., hitting, kicking), and self-injury (e.g., head banging). In addition, picky eating and poor appetite are among the top behavioral problems reported by caregivers to be highly bothersome and difficult to deal with (Friman, 2010); caregivers of children who engage in inappropriate mealtime behavior report mealtimes to be highly stressful (Postorino, et al., 2015).

As evident by extensive research on pediatric feeding disorders (see the Special Virtual Issue on Pediatric Feeding, *Journal of Applied Behavior Analysis*), assessment and treatment procedures based on behavior-analytic principles and methods are highly efficacious (e.g., Addison, et al, 2012; Kerwin, 1999; Piazza, et al. 2003). Although the etiology of feeding disorders can be complex and often require medical interventions or clearance prior to providing behavioral interventions, inappropriate mealtime behavior can persist even when these medical complications are ameliorated. Functional Analysis (FA) methodology has been used to evaluate the environmental conditions under which inappropriate mealtime behavior occurs and is maintained (e.g., Najdowski, 2008; Piazza, et al. 2003). In general, research has identified social-negative reinforcement in the form of escape from the requirement to eat as a common variable maintaining inappropriate mealtime behavior (e.g., Piazza, et al., 2003). For example, caregivers might provide breaks from eating or terminate the meal altogether when their child refuses to eat, which could potentially exacerbate inappropriate mealtime behavior. In addition, inappropriate mealtime behavior might be maintained by social-positive reinforcement in the form of attention or access to tangible items. For example, caregivers might supply attention in the form of reprimands, consoling or coaxing, and encouragement or preferred foods or toys following instances of inappropriate mealtime behavior and might also contribute to the continuation of such behavior. Regarding treatment and in correspondence with the outcomes of FA evaluations for inappropriate mealtime behavior, a large portion of research has found that treatments using an escape extinction component are highly effective and often necessary to increase consumption and decrease inappropriate mealtime behavior (e.g., Piazza, Patel, et al. 2003).

Although escape extinction-based treatments are a highly effective intervention, both antecedent- and positive reinforcement-based procedures have also been demonstrated to be effective in increasing acceptance and consumption of non-preferred foods (e.g., Patel, et al. 2007; Penrod, Gardella & Fernand, 2012). Antecedent-based procedures refer to manipulations that are conducted before the bite of food is presented to the child and might include alterations to the properties of the food (e.g., blending) or requirements to obtain reinforcement (e.g., decreased number of bites). The high-probability (high-p) instructional sequence is an antecedent- and reinforcement-based procedure that has some small empirical support demonstrating the procedure can be effective in increasing compliance to consume nonpreferred foods (Patel, et al. 2007; Penrod, Gardella & Fernand, 2012). The high-p instructional sequence is a procedure involving the delivery of a sequence of instructions comprised of demands that typically result in high levels of compliance (high-*p instructions)* immediately followed by the delivery of a demand that does not typically result in compliance (low-*p instructions*; Lipschultz & Wilder, 2017).

Penrod, Gardella, and Fernand (2012) used a high-p instructional sequence in combination with demand fading with two children diagnosed with autism to increase consumption of nonpreferred foods. They established a sequence of two high-p responses followed by one low-p response (e.g., touch the food, smell the food, kiss the food) in which new low-p responses were gradually introduced while previously high-p responses were removed as the child complied with the low-p instruction. This sequence and fading procedure continued until the final low-p instruction to consume the food was added to the sequence and compliance with the instruction occurred. The treatment package increased consumption for both participants without the use of an EE component. However, this effect was only demonstrated with target foods, and the researchers did not demonstrate generalization to additional foods. In the present study, we examined generalization effects of the procedure when it was implemented with novel foods that shared similar properties (i.e., consistency, color, taste) to treatment foods.

One component of the high-p instructional sequence that is incorporated in the procedure employed by Penrod et al. (2012) is the gradual presentation of the food to the participant, which could facilitate its ingestion. For example, Tanner and Andreone (2015) implemented a treatment that consisted of a sequence of steps that ended with eating the food with a 3.5-year-old boy diagnosed with Autism Spectrum Disorder. They implemented a 12-step food hierarchy (e.g., tolerate food in the therapy room, tolerate food on therapy plate) and reinforced compliance using tokens that could be exchange for preferred social reinforcement with peers. They gradually moved up the sequence of steps contingent upon compliance. The procedure was effective at increasing consumption from 4 to 50 foods over a 9-month span and consumption generalized from treatment in the clinic to the home setting for some of the foods.

In Penrod, Gardella, and Fernand (2012), the low-p instructions were added as the high-p instructions where faded out, similar to a shaping procedure, whereas in Tanner and Andreone (2015) instructions were presented contingent upon the level of compliance displayed by the participant. In the present study, we evaluated whether the full high-p instructional sequence would increase consumption of nonpreferred foods without the use of demand fading or escape extinction. Also in Penrod et al. and in Tanner and Andreone the participants had a diagnosis of Autism Spectrum Disorder, and we sought to extend the procedure to a typically developing child. Thus, the purpose of the present study was to examine the effects of delivering a full instructional sequence on generalized consumption of nonpreferred foods with similar properties to treatment foods with a typically developing child who engaged in active food refusal.

Method

Participant & Setting

Julio was a 5-year-old, typically developing boy with a history of food selectivity. Julio's diet primarily consisted of PediaSure (from which he met his nutritional needs), crackers, and strawberry yogurt. Julio often engaged in gagging, vomiting, crying, hair pulling (SIB), and negative vocalizations when presented with novel foods. At the time of treatment, a pediatrician had cleared Julio from any medical issues that might influence his feeding problem or the course of treatment, and he was deemed safe to chew and swallow solid foods. It is important practitioners proceed with caution and practice within their scope of competency given that feeding disorders are often multifaceted in nature (Rommel, DeMeyer, Feenstra, & Veereman-Wauters, 2003) and medical issues (e.g., aspiration, allergies) might be undetectable without the assistance of other disciplinary collaboration. Thus, behavior analysts should refer to other professionals to ensure medical problems and oral-motor deficits will not hinder the safety of the clients they treat.

Sessions were conducted in a 4 m by 3 m room at the CEICAH-University of Veracruz. The treatment room contained a table, chairs, feeding utensils and the foods to be used during sessions.

Response Measurement & Interobserver Agreement

Inappropriate mealtime behavior was defined as the participant vocally refusing to eat the food (e.g., No! I don't want it!); throwing food or utensils; blocking access to his mouth; pushing the plate, utensil, or experimenter's arm; head turns defined as moving the head in a 45-degree angle away from the play in any direction; and throwing food. The main dependent variable during the treatment evaluation was the percentage of bites with consumption. Consumption was defined as the bite passing the plane of the lips within 5 s of presentation and no food larger than a grain of rice remaining following a mouth clean check, and compliance was defined as the participant completing the instruction within two prompts. We used a multi-element design (FA) and a multiple baseline design across foods (treatment evaluation).

A second observer independently observed and scored inappropriate mealtime behavior for 44% of FA sessions as well as compliance and consumption for 25% of treatment evaluation sessions. Agreement for inappropriate mealtime behavior was scored using a proportional agreement method across 10-s intervals. For each interval, the smaller number of observed instances from one observer was divided by the larger number of instances from the secondary observer and multiplied by 100 to produce a percentage. If both observers recorded a zero, an agreement of 100% was scored for that interval. The percentage agreement for all intervals were summed and divided by the total number of intervals in a session to obtain an average agreement score per session. Agreements for compliance and consumption were scored on a trial-by-trial basis. Interobserver agreement for the treatment evaluation was calculated by dividing the total number of agreements by the sum of agreements plus disagreements and converting to a percentage. Interobserver agreement for the functional analysis was 95% (range, 87%-100%) and the treatment evaluation was 94% (range, 85%-100%).

Functional Analysis

Sessions were 5 min and were based on the procedures described by Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1994) adapted to inappropriate mealtime behavior (e.g., Najdowski, 2008; Piazza, et al. 2003). We used a multi-element design to evaluate differential rates of inappropriate mealtime behavior across attention, escape, no interaction, and control conditions. Sessions started with the participant seated at the table. A bite of nonpreferred food approximately the size of a pea was presented in front of the participant on a plate for the entire session (see the demand condition described below for an exception). Any acceptance during any condition resulted in praise.

In the Attention condition the experimenter sat in front of the participant without interacting with him. Inappropriate mealtime behavior resulted in attention the form of coaxing, reprimands, and/or statement of concern such as "Are you ok?" or "Come on, it's not that bad!" In the Escape condition a demand to "take a bite" was delivered using a three-step prompting procedure: vocal, model, followed by placing the spoon to Julio's lip. Initially the vocal demand to "take a bite" was provided. If acceptance did not occur within 5 s, the feeder modeled consumption. If acceptance did not occur after an additional 5 s, the feeder scooped the bite and placed it to the participant's lips. If at any point inappropriate mealtime behavior occurred, the bite of food was removed for 30 s. Following the 30-s break, a new bite was presented and this sequence continued until the session was concluded. During the Escape condition, no other programmed consequences were provided for inappropriate mealtime behavior (e.g., attention was not issued). In the No-Interaction condition the feeder did not provide any kind of interaction with the participant (i.e., no demands or programmed consequences for inappropriate mealtime behavior were delivered). Finally, in the Control condition, a preferred food was presented on the plate every 15 s and the experimenter interacted continuously with the participant throughout the session.

Pre- & Post-treatment Preference Assessment

We conducted a paired-choice preference assessment following procedures similar to those outlined by Fisher, et al. (1992). The size of each food used in the preference assessment was approximately the size of a pea. Each of the 15 foods was paired once with every other food. Two foods were simultaneously presented in front of the participant on separate plates for 5 s. The participant was allowed to select one of the foods and consume it. If the participant attempted to reach for both foods at the same time, he was blocked. If the participant did not select either food within 5 s, the food was removed and a new trial began. A hierarchy of food preferences was obtained based on the percentage of selection and consumption for each food. That is, the food that was selected and consumed on a higher percentage of trials was considered to be highly preferred relative to foods selected at a lower percentage of trials or never selected (e.g., nonpreferred foods).

Procedure

Six nonpreferred foods were divided into three groups containing two foods each. The foods in each group shared similar properties in terms of appearance (color) and texture. To evaluate generalization, we sequentially implemented treatment for one of the foods in each group while the second food in the group continued to be presented under DRA contingencies (see description of DRA below). The three food pairs were: apple and pear, pea and green bean, and sausage and ham. Only one type of food was presented during each session and all sessions consisted of 5, single-bite trials. The size of the bite was approximately the size of a pea (i.e., approximately ¼ by ¼ by ¼ in. cube). We asked parents not to present the six foods outside of meal sessions for the duration of the study.

Baseline. All sessions started with the participant seated at the table with the experimenter across from him. A bite of food was presented on a spoon positioned on a plate and placed in front of him. If the participant did not accept the bite of food within 5 s, the experimenter delivered a verbal instruction to eat the food and modeled consumption (i.e., verbal and model prompt). If the participant failed to accept the bite within 5 s of the verbal instruction, the experimenter delivered another instruction plus a model prompt. If the participant did not accept a bite within 5 s of the second verbal instruction, the experimenter removed the bite and presented the next bite 20 s later. Inappropriate mealtime behavior did not result in any programmed consequences (i.e., attention or escape). Praise (e.g. "good job eating the apple") was delivered for consumption. Operational definitions for inappropriate mealtime behavior were the same as previously described.

DRA. Sessions were identical to baseline with a few exceptions. First, the participant was provided access to a bite of preferred food at the start of session. Next, he was told he could obtain one more bite if he consumed a new food. Last, food consumption resulted in both praise and access to a bite of preferred food.

DRA high-p instructional sequence. Similar to the DRA phase, the participant was provided access to a bite of preferred food at the beginning of each session. After this, a bite of nonpreferred food was presented and a hierarchy of instructions was delivered. Each instruction was issued in conjunction with a model prompt from the experimenter. If compliance did not occur after 5 s from the first instruction, the experimenter repeated the instruction a second time. If compliance did not occur after the second instruction, the experimenter moved to the next instruction in the hierarchy and did not require compliance with the instruction. The participant was asked to execute each of the following instructions: a) touch the food, b) pick the food up, c) smell the food, d) kiss the food, e) lick the food, f) balance food on tongue, g) close mouth with food inside, h) bite food into two pieces, i) chew the food, and j) swallow the chewed food. Praise was delivered after compliance with each instruction and a preferred food was delivered after compliance with the final step in the sequence (i.e., consumption). If the participant ate the food

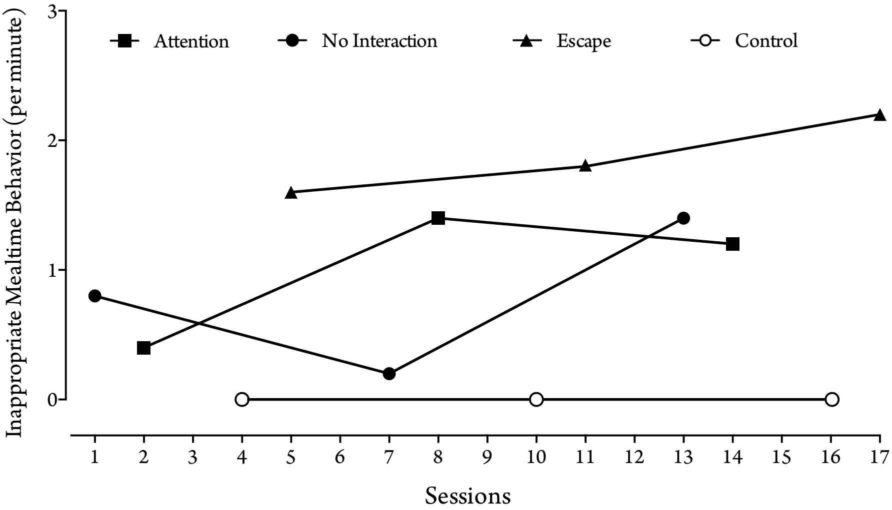

Figure 1. Rate of inappropriate mealtime behavior per minute across attention, escape, no interaction, and control conditions during functional analysis sessions.

immediately, he was given access to a bite of a preferred food and was not required to go through the steps of the high-p instructional sequence. Just as in baseline, inappropriate mealtime behavior did not result in attention from the experimenter or any other programmed consequences; thus, the sequence of instructions and bite presentations continued regardless of inappropriate mealtime behavior. The bite was removed after a complete sequence of instructions was delivered and the next trial started after 20 s and continued until all five bites were presented.

Once 100% of target bites were consumed without any instances of inappropriate mealtime behavior for three consecutive sessions, a reversal to the DRA phase was conducted for the target food in an effort to test for the continued need for the high-p sequence component; thus, all high-p instructions were no longer presented and only the instruction to "take a bite" was issued. After an additional three consecutive sessions at 100% consumption within the DRA phase, the experimenter introduced treatment with another food from the next group.

Results

Figure 1 shows the rate of inappropriate mealtime behavior across FA sessions. Inappropriate mealtime behavior occurred at increased rates across escape, attention, and no interaction conditions relative to the control condition. Overall, the highest rates of inappropriate mealtime behavior occurred in the escape condition and remained at low levels within the control condition. These results indicate that inappropriate mealtime behavior was maintained by both social-negative (escape) and -positive (attention) reinforcement contingencies.

Figure 2 shows the percentage of trials with consumption across baseline, DRA and the high-p instructional sequence (treatment; TX). During treatment for apple, delivering the full instructional sequence increased consumption of both the target (apple) and generalization-test (pear) foods even though the instructional sequence was only provided for the target food. Thus, generalization was observed to pear even though the high-p instructional sequence was only implemented with apple. Generalization did not occur to other foods with dissimilar properties (e.g., peas and green bean). During the second implementation of DRA, both apple and pear continued to be consumed without the implementation of the instructional sequence.

For the second pair of foods, pea and green bean, during treatment there was a slight increase in consumption of peas in the third and fourth sessions of treatment but ultimately, consumption dropped to zero levels. When consumption occurred in those two sessions, we observed that early swallowing (i.e., swallowing without chewing) occurred. Early or premature swallowing can pose a safety risk (e.g., aspiration) and several precautions should take place to ensure the participant has the necessary chewing skills to consume table-top textured foods including preassessments to measure chewing skills and ongoing measurement of mastication throughout the course of the intervention. Due to these safety concerns, we made a remedial change to the consistency of this pair of foods, making them softer by cooking them a few minutes longer (the session when we introduced this change is signaled with an asterisk in the graph). After this change was made, chewing and consumption increased for peas. It should be noted that the experimenter also continued to monitor swallowing safety by observing the participant chew these foods. Similar to the effect that was described previously between apple and pear, generalization was observed to green beans even though the high-p instructional sequence was only implemented with peas, and generalization did not occur to other foods with dissimilar properties (i.e., sausage and ham). In addition, consumption remained at 100% for both peas and green beans when the high-p sequence was removed and only the DRA component was in effect.

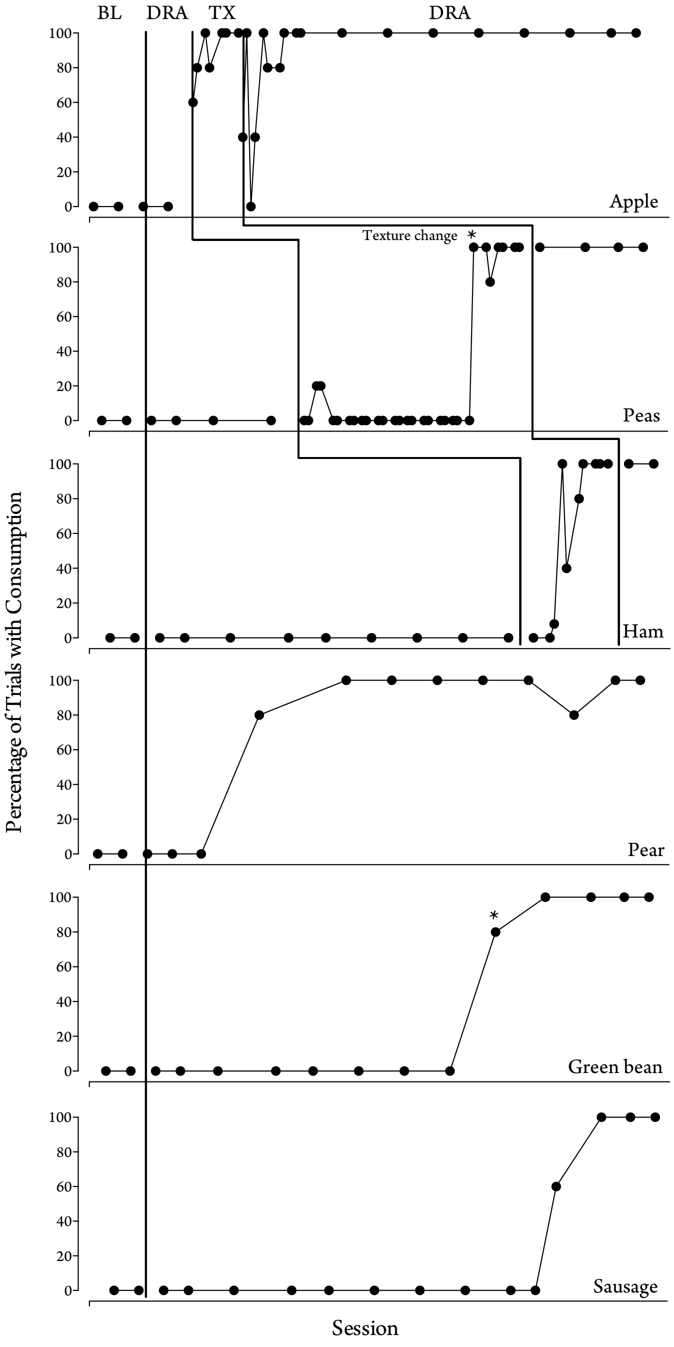

Figure 2. Percentage of trials with consumption during baseline, DRA, and the high-probability instructional sequence (TX)

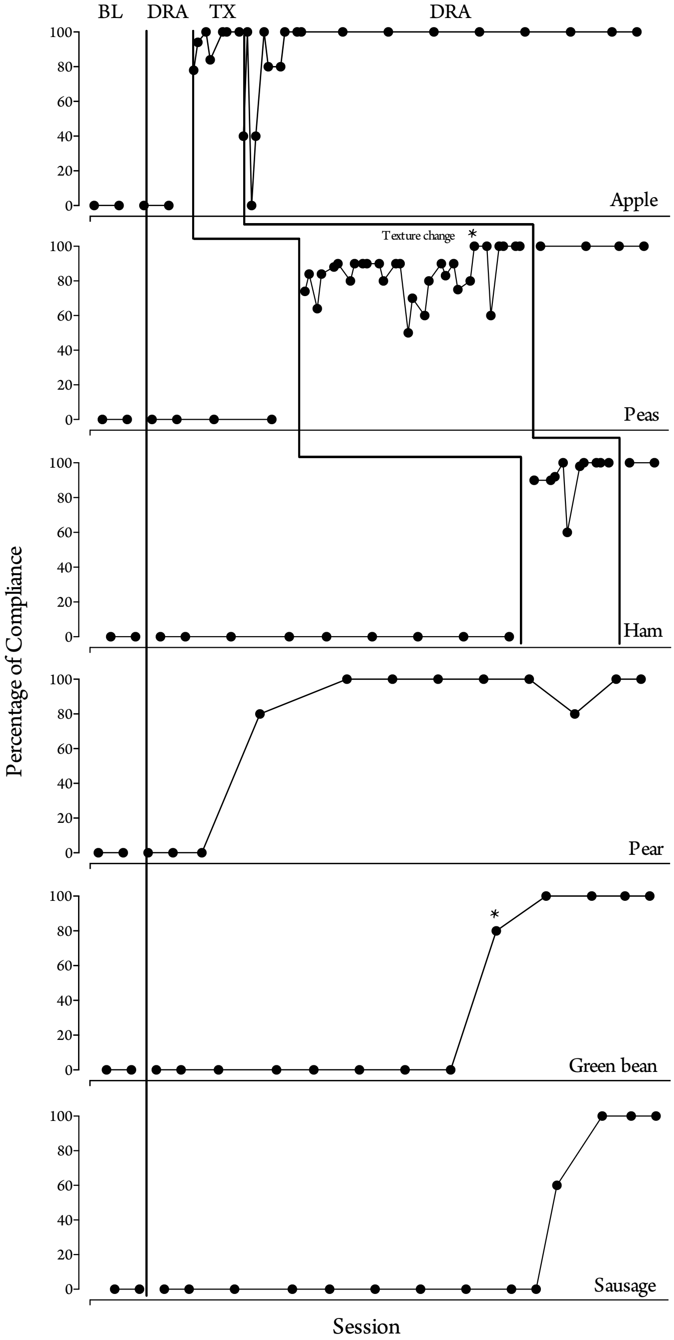

Figure 3. Percentage of compliance during baseline, DRA, and the high-probability instructional sequence.

For the third pair, sausage and ham, consumption of sausage rapidly increased after the second treatment session using the high-p instructional sequence. Furthermore, consumption of the generalization-test food (ham) also increased despite being presented under DRA contingencies and not the full high-p instructional sequence. Consumption of sausage continued and ham maintained when the high-p sequence was removed for sausage and only the DRA component was in effect.

In a similar format to the previous figure, Figure 3 shows the percentage of compliance during baseline, DRA and the high-p instructional sequence (TX). Data for compliance during DRA sessions was identical to the percentage of trials with consumption because in this condition, the high-p sequence was not presented, so we recorded if the participant consumed the food or not. Because of this, we will only describe compliance during the treatment component. The percentage of compliance during treatment was dependent upon on the number of steps (ten in total) completed across the five trials per session.

During the initial baseline and DRA phases, consumption remained at zero across all foods. However, during treatment for apple, compliance rapidly increased from 78% in the first session to 100% for the target and generalization-test food (pear). In addition, compliance to eat the apple and pear remained high when the high-p instructional sequence was removed and the DRA component was continued.

For the second pair of foods, pea and green bean, delivering the full instructional sequence with peas resulted in variable compliance across the first 24 sessions (range, 50-90%), and compliance never reached 100% because he rarely ate any of those foods. Compliance remained at zero for the generalization-test food (green bean). Once the foods were softened, compliance rapidly increased for both peas and green beans. Compliance to eat both foods remained high when the high-p instructional sequence was removed and the DRA component was continued.

For the third pair of foods, ham and sausage, delivering the full instructional sequence with ham resulted in high levels of compliance from the beginning (range, 60% to 90%) and after a few sessions compliance stabilized at 100%. Compliance also generalized when sausage was presented under the DRA contingency. Just as with the previous pairs of food, compliance to eat both foods remained high when the high-p instructional sequence was removed and the DRA component was continued.

Figure 4 displays the results of the pre- and post-treatment preference assessments. Prior to treatment, the participant only consumed his highly preferred foods

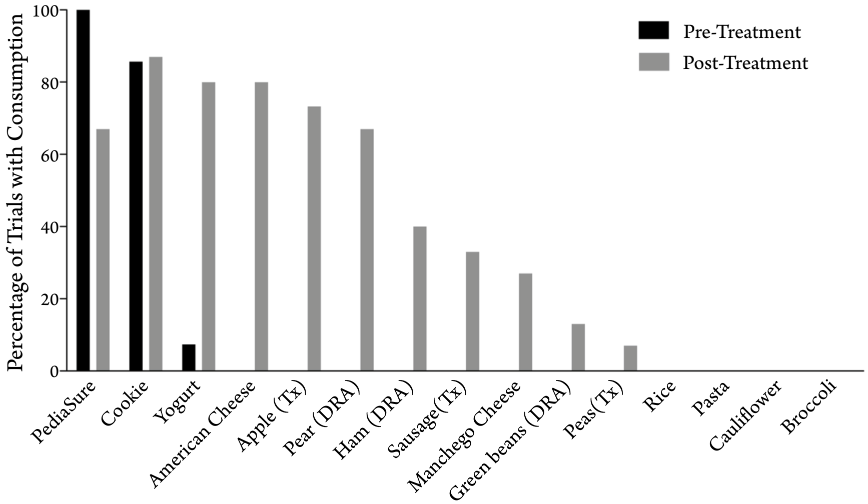

Figure 4. Percentage of trials with consumption during the pre- (black) and post-treatment (gray) preference assessments.

during the preference assessment: PediaSure and cookies. He also consumed yogurt albeit inconsistently, resulting in a low percentage of consumption during his pre-treatment preference assessment. The remaining 12 foods were never consumed during the pre-treatment preference assessment. However, consumption of treatment foods (apple, pea, and sausage) and generalization-test foods (pear, green bean, and ham) were selected and consumed at increased percentages following treatment relative to pre-treatment. In addition, selection and consumption, on average, was higher for foods used in treatment relative to novel foods the subject was not exposed to during the current evaluation. However, both American and manchego cheeses were selected and consumed in the post-treatment preference assessment despite not having been exposed to those foods for the duration of the study.

Discussion

The purpose of the present study was to examine the effects of delivering a full high-p instructional sequence on generalized consumption of nonpreferred foods with similar properties to treatment foods with a typically developing child who engaged in active food refusal. The implementation of a high-p instructional sequence resulted in compliance to consume previously non-preferred foods; results consistent with those obtained by Penrod, Gardella, and Fernand (2012). In addition, use of the high-p instructional sequence resulted in generalization across foods with similar properties to treatment foods but not to foods with different properties. Even though we did not directly observe generalization across food pairs during the treatment evaluation, consumption of both American and manchego cheeses during the posttreatment preference assessment is an encouraging outcome; future studies should evaluate methods to promote generalized consumption. This last point is especially important since it would be extremely difficult to have to directly treat all of the possible different foods that a child might be expected to consume.

One departure from the current study relative to Penrod, Gardella, and Fernand (2012) is that we did not use a demand-fading procedure in which the initial steps in the sequence were faded as new and more difficult low-p instructions were added to the instructional sequence. However, delivering the full high-p instructional sequence without fading the initial steps increased both compliance and consumption. Although we did not directly compare the effects of high-p instructional sequences with and without demand fading, the current results showed that fading was not necessary in obtaining compliance to consume nonpreferred foods. It should be noted that we did observe independent fading of the steps over time. That is, the participant began to eliminate some steps in the sequence and favored directly picking up, chewing and consuming the food without the need for all modeled instructions within the sequence or the particular sequence we established. Future research might examine high-probability instructions that more closely resemble the sequence of steps involved in eating relative to the steps outlined in the current evaluation.

Several studies have evaluated the implementation of high-p sequences to increase food consumption (Dawson, et al. 2003; Patel, et al., 2007; Penrod, Gardella & Fernand, 2012). Evidence currently suggests that instructional sequences involving motor responses related to eating are an important factor in increasing compliance to eat (Penrod, Gardella & Fernand, 2012). That is, high-p instructions unrelated to eating largely have been shown to be ineffective in increasing consumption of nonpreferred foods (Dawson, et al, 2003). Although we did not directly compare instructional sequences related and unrelated to eating, our results lend additional support to the importance of maintaining a similarity between the topography of eating and the instructions provided in the sequence.

Relating to the last point, one additional component that may be presented in studies that use high-p instructional sequences related to eating is that they may be gradually exposing the participant to the physical properties of the food (e.g., taste, smell). Exposure to foods has proved to be effective with some children (Anzman-Frasca, Savage, Marini, & Fisher, 2012; Tanner & Andreone, 2005) but, because neither the present study or Penrod et al. (2012) were designed to directly answer that question, future studies should determine if that's an important component when using high-probability sequences with steps related to eating.

The present results also lend further support to the effectiveness of antecedent- and reinforcement-based procedures to increase food consumption in the absence of escape extinction. As mentioned before, EE procedures can be highly effective, but can also be difficult to implement and should certainly only be used by individuals who have received training. Also, it may not be safe to implement EE procedures with children after a certain age due to size, potential severity of the problem behavior, as well as environmental restrictions that limit the ability to implement the intervention with fidelity. This last point highlights the importance of tailoring procedures developed for children with specific behavioral characteristics (e.g., age, diagnosis, severity of feeding problem, level of verbal behavior) to treat food selectivity with a specific individual. In the present case, we worked with a typically developing child who was able to understand a wide array of rules and instructions. A fruitful direction for future research might be that of analyzing the match between types of treatments and various characteristics to determine if certain populations (typically developing) or skillsets (e.g., verbal ability) might be predictive of less-intrusive interventions having a higher likelihood of success relative to their use with alternate populations or skillsets.

Finally, there are some potential limitations with the current study. First, it was necessary to change the consistency of both peas and green beans to obtain proper consumption (i.e., acceptance, mastication, and swallowing); so, it is possible that the increase in consumption was an effect of both changes in consistency and the implementation of the instructional sequence. Although the participant had been cleared as having the necessary skills to chew and swallow safely, we did not conduct a more thorough evaluation of his mastication skills and we did not directly measure chewing and mastication throughout the study; although the experimenter was aware of up and downward motions of the jaw and looking for inadequate chewing motions throughout the evaluation, directly checking for thorough mastication prior to swallowing or decreasing texture (e.g., presenting purees) might be warranted for children who at risk of early swallowing. It could be the case that early swallowing with the current participant occurred with peas due to escape from tasting the food by swallowing quickly without chewing. Pureed foods have a few possible advantages over solid (tabletop) textured foods including: a) they do not need to be chewed, potentially aiding in increased consumption for children with skill deficits, and b) they result in the child tasting the food and facilitate rapid swallow more readily than solid foods, potentially aiding in increased consumption for children with motivational deficits by increasing the likelihood of contacting the reinforcement contingencies associated with consumption. Future research might determine if the reported effects could be replicated with other participants and further examine potential differences between purees and solid textures in the treatment of pediatric feeding problems. In a similar line, another limitation of this study is that treatment was implemented to only one participant, although we observed generalization between target and non-target foods, it will be important to replicate this procedure with more participants to evaluate the generality of our findings.

Despite the potential limitations noted, this procedure resulted in rapid increased in novel foods without the use of escape extinction. In addition, the high-p instructional sequence was faded out such that the DRA contingency remained effective, even though initially the DRA contingency proved ineffective. It is possible the use of the high-p instructional sequence was effective in placing appropriate behavior (consumption) in contact with reinforcement and aided in the effectiveness of DRA when the high-p instructional sequence was removed. Future research should continue to examine procedures that might facilitate the efficacy of both antecedent- and reinforcement-based interventions or whether certain prerequisite skills or experiences increase the likelihood of those interventions being successful. Finally, it is important to mention that treatments for pediatric feeding problems should be implemented within the scope of competence and referrals for medical and oral-motor assessments are critical components of practice within this area.

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