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## Effects of the High -Probability Sequence With and Without Extinction in Children With Feeding Disorders.

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**EFFECTS OF THE HIGH-PROBABILITY SEQUENCE WITH AND WITHOUT  
EXTINCTION IN CHILDREN WITH FEEDING DISORDERS**

A Dissertation

Submitted to the Graduate Faculty of the  
Louisiana State University and  
Agricultural and Mechanical College  
in partial fulfillment of the  
requirements for the degree of  
Doctor of Philosophy

in

The Department of Psychology

by

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## Table of Contents

Acknowledgements.....	ii
List of Figures.....	iv
Abstract.....	v
Introduction.....	1
Literature Review.....	5
Feeding Disorders.....	5
High-Probability Instructional Sequence.....	17
Single Subject Designs.....	24
Purpose.....	28
General Method.....	30
Participants.....	30
Setting and Interobserver Agreement.....	31
Response Definitions.....	31
High-Probability Assessment.....	33
Procedure.....	33
Results and Discussion.....	35
High-Probability Evaluation.....	40
Experimental Sequence, Research Design, and Data Analysis.....	40
General Procedure.....	41
Results and Discussion.....	44
General Discussion.....	55
Limitations.....	59
Conclusion and Clinical Implications.....	61
References.....	63
Vita.....	68

## List of Figures

Figure 1. Mary Non-Food Related High-Probability Instructions Assessments.....	36
Figure 2. Mark Non-Food Related High-Probability Instructions Assessments.....	37
Figure 3. Food Related High-Probability Instructions Assessment. 17 foods.....	38
Figure 4. Food Related High-Probability Instructions Assessment (texture).....	39
Figure 5a. Percentage Acceptance of Low-P Foods for Mary and Mark during Non-Food Related High-P Instructional Sequence.....	47
Figure 5b. Combined Inappropriate Behaviors per Minute for Mary and Mark during Non-Food Related High-P Instructional Sequence.....	48
Figure 5c. Percentage Compliance to High-P Instructions for Mary and Mark during Non-Food Related High-P Instructional Sequence.....	49
Figure 6a. Percentage Acceptance of Low-P Foods for Mark and Vic during Food Related High-P Instructional Sequence.....	52
Figure 6b. Combined Inappropriate Behaviors per Minute for Mark and Vic during Food Related High-P Instructional Sequence.....	53
Figure 6c. Percentage Compliance to High-P Instructions for Mark and Vic during Food Related High-P Instructional Sequence.....	54



## Abstract

The effects of the high-probability instructional sequence, with and without extinction, on increasing compliance to eat in three children with severe food refusal and selectivity were evaluated. Pediatric feeding disorders, in which children refuse most or all food and drink, are a rare and life threatening problem that requires intensive treatment. The majority of behavioral techniques used with feeding disordered children manipulate the consequence of food refusal. The use of antecedent procedures in the treatment of food refusal has been limited. One antecedent technique, the high-probability instructional sequence, involves first presenting the individual with a series of instructions that he/she almost always complies with (high-p instructions) and then immediately presenting a task that the individual has a history of low compliance to (low-p instructions). Past research has demonstrated the effectiveness of this technique in increasing compliance to demands, in the absence of competing behaviors. However, in the treatment of feeding disorders and other severe behaviors (where there may be competing refusal behaviors), the addition of an extinction procedure is often found necessary to gain appreciable results. In this evaluation, the high-p sequence was compared against a control sequence (no high-p) under two conditions: extinction and no extinction. Results indicate that the presence of the high-p sequence did not appear to provide beneficial effects in terms of increasing acceptance of food. Although, for two participants, food refusal behaviors were observed to occur less often in phases in which the high-p sequence was utilized. For all participants, increases in acceptance of low-probability foods and decreases in food refusal behaviors were only observed with the addition of the extinction procedure.

## Introduction

“Don’t worry, she’ll eat when she gets hungry” is the common assumption of most practitioners working with pediatric populations. Even though this adage applies to the majority of infants and toddlers, there is a significant minority of children that, without intervention, would become malnourished, dehydrated, and in some cases, die. These children have feeding disorders, a complex and poorly understood problem, which has received increasing attention in the research literature and also in the general media.

Feeding disorders are a heterogeneous set of problems that can be characterized by (a) a failure to maintain weight or to grow, (b) a failure to eat a sufficient variety of food to maintain nutritional status, (c) dependence of alternative types of nutrition (e.g., tube feedings, bottle dependence), and/or (d) inappropriate mealtime behaviors that cause significant stress to the family. Without treatment, children with feeding disorders will eventually require medical intervention to sustain life.

Feeding disorders in children is a relatively new area of both treatment and research in the field of behavior analysis. The recognition of a behavioral component to feeding disorders has occurred in the last two decades and since then, research evaluating the effects of behavioral techniques with this population has been fruitful. To date, research in this area has isolated a few successful methods to increase appropriate eating behaviors and decrease inappropriate behaviors (Shore & Piazza, 1997). However, the research in this area also has suggested that reinforcement procedures, when used in isolation, are not successful in increasing food acceptance and decreasing maladaptive behaviors that often accompany pediatric feeding disorders (Cooper et. al., 1995; Ahearn,

Kerwin, Eicher, Shantz, & Swearingin, 1996; Hoch, Babbitt, Coe, Krell, & Hackbert, 1994). The majority of procedures using contingent positive reinforcement techniques rely primarily on the desired behavior (i.e. a low-probability feeding behavior) occurring before the child can experience reinforcement. By doing this, undesired behaviors, such as crying, batting at the spoon, throwing utensils, and food refusal are given an opportunity to occur.

Conversely, antecedent procedures attempt to change the behavioral pattern before the maladaptive behaviors occur. The high-probability (high-p) instructional sequence is one such procedure. By providing the child with positive reinforcement before the presentation of a traditionally low-p demand (i.e. "take a bite."), a momentum of compliance may be in place that may aid the child in complying with the low-p demand (Davis & Brady, 1993; Mace & Belifore, 1990).

The goal of the high-p instructional sequence is to increase a traditionally low-probability (low-p) behavior, such as compliance, to a stronger behavior that will be more resistant to extinction (Mace et al., 1988). During the high-p intervention, each low-p request is immediately preceded by a short series of well-established tasks that are performed consistently (high-p instructions; Mace et al., 1988). Compliance to each high-p request is praised, allowing the person to experience reinforcement prior to the delivery of a low-p request (Davis and Brady, 1993; Mace et al., 1988; Mace et al., 1990; Horner, Day, Sprague, O'Brien, & Heatherfield, 1991). Thus, the high-p instructional sequence increases response rate, thereby increasing reinforcement rate. The high-p instructional sequence has been used to increase compliance to demands in adults and children with

developmental disabilities. This applied research is based on the theory of behavioral momentum outlined by Nevin in his laboratory research with pigeons (see Nevin, 1974; Nevin, Mandell, & Atak, 1983; Nevin, 1992; Nevin, 1995; Nevin, 1996). Behavioral momentum is a metaphor that likens the persistence of behavior to that of mass described in Newton's law (Nevin, 1996). In physics, the product of mass and velocity determines momentum. In the behavioral momentum metaphor, velocity is the equivalent of the response rate of a given target behavior, force equals the reinforcement contingencies in effect, and mass is viewed as the strength of the target behavior (Nevin, 1996; Nevin et al., 1983). As in physics, behavioral mass cannot be measured directly, but must be inferred from the target behavior's response to change. Applying animal behavior to Newton's law then, suggests that the rate at which a behavior will decrease is directly proportional to the change in reinforcement contingencies and inversely proportional to the persistence of the response or behavior in question (Plaud & Gaither, 1996). Nevin et al. (1983) described behavioral momentum as a way of understanding and predicting why some behaviors persist and why some extinguish in altered reinforcement conditions. The behavioral momentum analogy allows for the conceptualization of two important areas of discussion within the field of applied behavior analysis: (a) establishing increased rates of responding by reinforcement contingencies (e.g., how to increase acceptance of food using reinforcement procedures) and (b) maintaining increased rates of responding when the programmed reinforcement contingencies are altered in some way (e.g., treatment disintegration: when child goes home and caregivers leave out part of the treatment package) (Nevin, 1996).

This high-p sequence can be viewed as a method for indirectly changing the rate of reinforcement, thereby creating a type of momentum of appropriate behaviors that are resistant to change (i.e., a low-p task is presented; Mace et al., 1988). The applied aspect of behavioral momentum (i.e., the high-p instructional sequence) has focused largely on increasing compliance in individuals with some type of developmental disability (see Davis and Brady, 1993 for review). Results of these studies have shown that the use of the high-p instructional sequence has been effective in reducing noncompliance, self-injurious behaviors, aggression, and in increasing compliance (Davis & Brady, 1993; Mace et al., 1988 & 1990; Horner et al., 1991; Davis, Brady, Williams, & Hamilton, 1992). However, researchers have not evaluated the effectiveness of high-p instructions with children who display severe feeding problems, such as food refusal and food selectivity. The high-p instructional sequence may be appropriate for children with feeding problems, because food refusal or food selectivity could be conceptualized as a form of noncompliance to the instruction, "take a bite" or "eat." The purpose of the current study is to use an antecedent procedure, known as the high-p instructional sequence, with a group of children who demonstrate noncompliance with eating. The following is a review of the topics of feeding disorders, the high-probability sequence, and single-case research designs.

## Literature Review

### Feeding Disorders

Definition. The Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) lists several inclusion and exclusion criteria to be considered when diagnosing a Feeding Disorder of Infancy or Early Childhood. A feeding disorder is defined as “a persistent failure to eat adequately, as reflected in significant failure to gain weight or significant weight loss over at least one month” (APA, 1994, p. 99). If a gastrointestinal or any other medical condition is present or if the child has been diagnosed with any psychological problems, the diagnosis cannot be given. Instead, a diagnosis of “Other Feeding Disorder” is given.

DSM-IV definition and criteria for feeding disorders can be helpful in differentiating feeding disorders due to organic versus nonorganic causes (Shore & Piazza, 1997). However, in clinical practice, this dichotomy is often secondary to the assessment and treatment of the presenting feeding problem. Although a child may suffer from a gastrointestinal or medical problem that may have caused the original feeding problem, often times there is an additional behavioral component that maintains the feeding difficulties (Cooper et al., 1995; Budd et al. 1992; Riordan, Iwata, Finney, Wohl, & Stanley, 1984). In general, feeding disorders can best be described as a difficulty with maintaining age appropriate weight or nutritional status as evidenced by refusal to eat or drink or by consuming insufficient amounts (Shore & Piazza, 1997; Babbitt, Hoch, Coe, Cataldo, et al., 1994). An important component to this definition is that even if medical conditions are present that may have initially been responsible for feeding issues, they

usually are not completely responsible for maintaining the feeding difficulties or maladaptive behaviors that often accompany the feeding problem (Werle, Murphy, & Budd, 1998).

Prevalence and Etiology. The prevalence of feeding problems in children has been reported with varying ranges. They are reported to be quite common in children with developmental disabilities; it is estimated that about one third of children with disabilities evidence feeding difficulties (Munk & Repp, 1994; O'Brien, Repp, Williams, & Christopherson, 1991). Some reports have estimated that as many as 80% of children with mental retardation have feeding problems (O'Brien et al., 1991). However, these prevalence rates include a vast spectrum of children from those who refuse food to those who may have difficulties feeding themselves. The number of children requiring treatment for life-threatening feeding disorders is probably between 1-5%. Children who require intensive treatment for their feeding disorders usually do so due to a general pattern of food refusal that leads to malnutrition and other health problems. Even with medical interventions, children with feeding disorders do not start to spontaneously eat. Due to the effects of inadequate intake of caloric and nutritional needs, many feeding disorders are life-threatening (Reid, Wilson, & Faw, 1983). Without intervention, these children will stay dependent on supplemental means of feeding (i.e. receive nutrition through a gastrostomy tube) or will die.

The behaviors that characterize feeding disorders reflect the heterogeneous etiologies of the problem. Feeding disorders in children can be attributed to a variety of factors, both medical and behavioral (Babbitt, Hoch, & Coe, 1994; Shore & Piazza,

1997). The etiology of feeding disorders has most often been reported as organic in nature (see Shore & Piazza, 1997; Babbitt et al., 1994; O'Brien et al., 1991; Jenkins & Milla, 1988). For example, medical problems such as severe gastroesophageal reflux (GER), in which stomach contents are spontaneously regurgitated into the esophagus, can cause eating to be painful. Early experiences with pain during intake can cause the child to stop eating and develop behavior problems (e.g., batting at the spoon, crying), which make it difficult if not impossible for the parent to feed the child. In addition, limited experiences with oral intake result in a failure of the child's oral motor responses to develop normally. Parents also report that these children (a) do not demonstrate hunger, (b) demonstrate aversion to or avoidance of sensory stimulation, and (c) struggle with parents for control during the feeding situation. Each child is different and may present with one or several of these characteristics.

There are a number of medical problems that often lead to feeding problems in children, such as gastroesophageal reflux, physiological abnormalities, and metabolic disorders (Babbitt, Hoch, Coe, Cataldo, et al., 1994). Often times, these medical problems cause pain, discomfort, and/or vomiting when the child eats or drinks. When this occurs, the child can pair the pain or discomfort with food; this can then aid in furthering the feeding problems. Constant pairing of food and pain can lead the child to engage in overt behaviors to avoid food consumption, such as crying, screaming, expelling food, aggression, and disruptions (Babbitt, Hoch, Coe, Cataldo, et al., 1994).

One medical intervention commonly used with children with severe food refusal or selectivity that results in adequate growth, nutrition, and/or hydration is the use of



alternative supplementation (e.g., gastrostomy tube). Tube feedings or supplementation can be vital in improving growth, nutritional status, and hydration for children with severe failure to thrive. Unfortunately, although tube feedings are required medically, these feedings also may contribute to the development or maintenance of a feeding disorder in two main ways (Babbitt, Hoch, Coe, Cataldo, et al., 1994). First, the development of feeding and related behaviors follows a relatively stable and sequential order (Jenkins & Milla, 1988). In a normally developing child, swallowing is mastered at the end of three months and chewing motions begin around four to six months (Jenkins & Milla, 1988). Tube feedings may interfere with the development of typical feeding behaviors. When a child receives his/her nutrition via a g-tube (or similar apparatus), the development of swallowing and chewing skills is often slowed or impaired because the child is not able to “practice” these skills. This exacerbates feeding difficulties that arise when the child is deemed medically competent to take food by mouth (Babbitt, Hoch, Coe, Cataldo, et al., 1994; Illingworth & Lister, 1964). Second, tube feedings may interfere with or suppress hunger and satiety cues. When a child receives all or most of his/her nutritional needs through a tube, the normal hunger and satiety cues do not occur. Consequently, the child does not learn how to recognize and respond to these cues.

Environmental factors also may play a role in either the onset of the maintenance of feeding problems. Parental mismanagement during feeding often plays a role in the maintenance of food refusal behavior and the corresponding corollary food refusal behaviors (Shore & Piazza, 1997; Riordan et al., 1984; Werle et al., 1998; Iwata, Riordan, Wohl, & Finney, 1982). Often times, parents will allow the child to escape meals or give attention to children when they display maladaptive behaviors, such as tantruming, during

meals. The attention provided for these behaviors may lead to positive reinforcement of the child's negative behaviors, thus increasing the probability of these behaviors occurring. Additionally, stopping the meal or removing the spoon, negatively reinforces the food refusal and/or inappropriate mealtime behaviors (i.e. successful escape from the meal situation) (Kerwin, Ahearn, Eicher, & Burd, 1995; Babbitt, Hoch, & Coe, 1994). The parent's behavior during meals also can be negatively reinforced; in that when they allow the child to escape during a meal, the maladaptive behaviors often cease, thus the parents may be more prone to allow escape in future situations (Jenkins & Milla, 1988). Due to the multiple and often co-existing reasons for food refusal in children, a thorough assessment of the food refusal behavior is crucial.

Assessment. Feeding disorders are not the result of a single etiology, which can be treated by a single professional, but a complex interaction between a variety of factors, which warrants assessment and treatment by an interdisciplinary team. Team members should include professionals from disciplines, which have experience in the areas that might contribute to the feeding problem, such as gastroenterology, behavioral psychology, occupational and/or speech therapy, nutrition, and social work. (Babbitt, Hoch, Coe, Cataldo, et al., 1994; O'Brien et al., 1991). Critical program components include (a) evaluation of physiological problems, which may contribute to the feeding difficulties; (b) determination of the child's safety for oral feedings; (c) intervention with respect to oral motor deficits or sensitivities; (d) monitoring the child's intake to insure a balance between adequate calories, growth, and weight gain; and (e) assessment of the families' ability to carry out an intervention program.

The behavioral assessment of feeding disorders consists of a variety of procedures such as (a) gathering information provided by caregivers regarding the history of feeding difficulties, (b) performing direct observations of the child in the eating situation, (c) manipulating the different environmental conditions that may or may not contribute to the feeding problems; and (d) conducting food, texture, or toy preference assessments. (Shore & Piazza, 1997; Babbitt, Hoch, Coe, Cataldo, et al., 1994; Babbitt, Hoch, & Coe, 1994; Fisher, Piazza, Bowman, Owens, Hagopian, & Slevin, 1992). When a child is displaying a motivational deficit, reinforcement procedures and extinction procedures are utilized to increase and decrease inappropriate behaviors. Before implementation of treatment, an additional area that should be addressed is whether the child's feeding problem is a skill deficit, a motivational deficit, or both (Babbitt, Hoch, & Coe, 1994). If a child demonstrates a skill deficit(s) in one or more areas of feeding, procedures such as shaping can be used to increase the skill (Babbitt, Hoch, & Coe, 1994).

Treatment. Research on the treatment of pediatric feeding disorders has been fruitful in the past two decades. The use of positive reinforcement procedures is common in treating feeding problems in children (Hoch et al., 1994; Riordan, Iwata, Wohl, & Finney, 1980; Shore & Piazza, 1997; Babbitt, Hoch, & Coe, 1994). In general, appropriate eating behaviors, such as acceptance and/or swallowing of the food are followed by positive consequences (usually attention or toys). Inappropriate behaviors receive neutral or no consequences. Although most research includes positive reinforcement procedures, in some form, many have found the procedures inadequate when used in isolation (Cooper et al., 1995; Hoch et al., 1994; Shore & Piazza, 1997; Babbitt, Hoch, & Coe, 1994). The limitation of a reinforcement-based treatment is that

the child must emit some appropriate behavior (e.g., acceptance of food) in order to receive reinforcement. This may be problematic in cases where minimal or no appropriate behavior occurs during baseline and thus the child does not experience the reinforcement contingency. In the meanwhile, the child continues to escape the bite, and thus noncompliance is negatively reinforced (Shore & Piazza, 1997; Cooper et al., 1995; Hoch et al., 1994). Consequently, the majority of the literature reports the use of treatment packages, most often incorporating positive reinforcement and escape extinction procedures (Shore & Piazza, 1997). Escape extinction procedures provide cues to the child to open his or her mouth (e.g., touching the spoon to the child's lip or providing gentle pressure to the mandibular joint) while preventing escape: thereby increasing opportunities for the child to accept and swallow food.

Hoch et al. (1994) used an escape extinction procedure known as non-removal of the spoon to increase acceptance of food. A withdrawal design, counterbalanced across subjects, was used. In baseline, the children were presented with bites of food every 30 seconds. If the child did not accept the bite within 5 seconds or if he engaged in an inappropriate behavior (e.g. hitting the spoon), the spoon was removed until the next 30-second interval. No attention was given for either appropriate (i.e. acceptance or consumption) or inappropriate behaviors. Next, a positive reinforcement condition was implemented which was similar to baseline with the following exceptions: positive reinforcement in the form of attention and access to preferred toys was given for acceptance. Additionally, the tip of the spoon was presented to the child's lip and food was inserted whenever the child's mouth opened wide enough. However, the presentation of the spoon was still terminated if an inappropriate behavior occurred. The third

condition consisted of escape extinction (i.e., non-removal of the spoon). This condition was similar to the positive reinforcement condition in that the spoon stayed at the child's lips until he opened his mouth wide enough for the food to be deposited but inappropriate behaviors no longer resulted in removal of the spoon (Hoch et al., 1994).

For both subjects, positive reinforcement alone was not sufficient in increasing acceptance; the addition of nonremoval of the spoon produced an immediate increase in acceptance (i.e., taking bite within 5 seconds of presentation), decreased inappropriate behaviors, and decreased negative vocalizations. When the spoon was removed, during a treatment reversal, both children's levels of acceptance and inappropriate behaviors returned to near baseline levels. When nonremoval was reintroduced, both children's acceptance again increased and inappropriate behaviors decreased. An additional part of this study looked at parental acceptance of the non-removal procedure. At the conclusion of the study, parents rated the procedure as successful and ethical and stated they would continue to use it at home (Hoch et al., 1994).

Results showed that nonremoval of the spoon allowed the child to be brought into more frequent contact with the positive reinforcement contingencies in effect and thus, experience more frequent reinforcement. However, when the child was allowed to escape the bite for inappropriate behaviors, acceptance did not increase, suggesting that the effects of positive reinforcement were not powerful enough when implemented alone. The addition of an extinction procedure was necessary to gain desired effects (Hoch et al., 1994). This may indicate that escape (i.e., negative reinforcement), for the children in this study, served as a more potent reinforcer than verbal praise and preferred toys (i.e.,

positive reinforcement). Hoch et al. hypothesized that when nonremoval of the spoon is utilized, acceptance may actually serve as a negative reinforcer to the child: if the spoon is only removed once the child has accepted the bite, than accepting the bite of food (causing removal of the spoon) will negatively reinforce acceptance (Hoch et al.).

A second escape extinction procedure that is often used in the treatment of food refusal is known as physical guidance (Shore & Piazza, 1997). Physical guidance involves applying gentle pressure to the child's mandibular joint so that the child's mouth opens and food can then be placed in the mouth (Ahearn et al., 1996). Both nonremoval of the spoon and physical guidance aim to increase independent acceptance of food through both positive and negative reinforcement. All independent acceptance of food results in access to preferred toys or attention (i.e., positive reinforcement) and avoidance of physical guidance or the presence of the spoon at the lips (i.e., negative reinforcement) (Kerwin et al., 1995). Ahearn et al. (1996) compared the effects of nonremoval of the spoon with jaw prompting. Both treatments were compared using an alternating treatment design with three children hospitalized for severe food refusal. Results indicated that both procedures were successful in increasing acceptance and decreasing corollary inappropriate behaviors. However, physical guidance resulted in fewer inappropriate behaviors, higher parental acceptance, and shorter meal durations (Ahearn et al.).

Cooper et al. (1995) conducted a component analysis of several treatment packages in use for 4 children with food refusal. Each child's package was individually tailored with a goal of increasing acceptance and decreasing any maladaptive behaviors occurring during meals. For each child, once pre-determined levels outcomes developed

by the multi-disciplinary team were achieved, individual components of the treatment packages were systematically removed and replaced. The use of a component analysis enabled the feeding team to determine which components of the treatment were necessary to maintain success and which components were not. For three of the children, the removal of the escape extinction procedure (i.e. non-removal of the spoon) was associated with a decrease in acceptance of bites presented. The removal of an escape extinction procedure was not evaluated with the fourth child.

Kerwin et al. (1995) analyzed food refusal and feeding problems in children from a behavioral economics perspective. Behavioral economics attempts to explain behavior as a relationship between cost and commodity (Kerwin et al.). Behavioral economics allows for observation of changes in cost (i.e. response requirements) and levels of available commodities (i.e., the payoff) and how they are related (Tustin, 1994). Kerwin et al. hypothesized that children who engage in food refusal do so because of the high cost of eating (i.e. effort must be expended to accept and eat food). The cost of eating can be high for a variety of reasons such as (a) association between eating and gastrointestinal problems, (b) poorly developed oral-motor skills, (c) the reinforcement of food refusal or corollary maladaptive behaviors, in the form of escape or attention, or (d) the hypothesized lack of reinforcement or benefit that results from eating.

In the Kerwin et al. study, the cost of the food (or response effort) was conceptualized as the texture or amount of food on the spoon presented to the child. In experiment one, Kerwin and colleagues (1995) presented three children with total food refusal with varying levels of cost, ranging from low to high response efforts: empty

spoon, dipped spoon, quarter spoonful of food, half spoonful of food, and level spoonful of food. The “payoff” for the varying levels or effort requirements was held constant. That is, a fixed amount of reinforcement (i.e., access to toys and attention for a fixed amount of time) remained the same as the child was systematically required to put forth more effort to earn the reinforcement (Kerwin et al., 1995). Access to these items was not restricted outside of meal sessions. Results indicated that for each child, the point at which he/she stopped accepting the spoon varied, suggesting that each child had his/her own point at which the “payoff” or access to preferable items did not compensate for the effort required. However, results also showed that no child consistently accepted level spoonfuls of food using the differential reinforcement package (i.e. access to preferred toys and attention contingent on accepting food) alone.

In experiment two, the effects of both nonremoval of the spoon or physical guidance (escape extinction) were evaluated at various spoon volumes. In baseline, a bite of food was offered to the child about once every 30 seconds. Differential reinforcement of incompatible behaviors (DRI) was provided contingent on acceptance for the remainder of the 30-second interval. Refusal of food resulted in the bite being taken away (i.e., escape) with no attention provided. Children were randomly assigned to either a nonremoval of the spoon treatment or physical guidance (escape extinction). Escape extinction was used with the smallest spoon volume associated with the highest level of acceptance in Experiment 1. Escape extinction then was used with a higher level of spoon volume with moderate levels of acceptance. A multiple baseline across spoon volumes was used, with one reversal back to baseline conditions. Results indicated that the use of an escape extinction procedure increased independent acceptance (i.e., taking bite within



5 seconds of initial presentation) to over 80% for all children. An additional finding was that acceptance generalized to untargeted higher spoon volumes.

The results of the study suggest that when each child was receiving a constant payoff for varying amounts of work in Experiment 1, response effort decreased (i.e., acceptance decreased). That is, the items that served as reinforcers in low effort conditions (such as an empty spoon) did not produce reinforcing consequences on the target behavior in higher effort conditions. An additional component that may have adversely effected performance was that access to toys or attention was contingent on acceptance of food only during meal sessions, with free access the rest of the day. This greatly lowered the effectiveness of the items. However, when the escape extinction procedures were implemented in Experiment 2, the cost of not accepting food (i.e., the implementation of physical guidance or non-removal of the spoon) outweighed the cost of accepting it. The value of gaining access to toys and attention for acceptance and avoiding the escape extinction procedures was increased (Kerwin et al., 1995).

The implementation of escape extinction procedures has been found to be effective in addressing the food refusal and associated behaviors (i.e. batting spoon, head turning). However other inappropriate mealtime behaviors may arise during treatment, which interfere with the acquisition of food consumption. These behaviors may include expulsion of accepted food, packing or holding accepted food in cheek, or emesis (vomiting). When behaviors such as expulsion, packing, or emesis emerge, additional positive or negative reinforcement procedures may be indicated. Procedures that have been used to treat these behaviors include representation of the expelled food, providing

positive reinforcement after the bite is swallowed, or contingent nuking (Ahearn et al., 1996; Cooper et al., 1995; Shore & Piazza, 1997). A nuk is an infant-sized rubber toothbrush with no bristles. When a child packs food in his or her mouth, a nuk is placed in the mouth and the food is redistributed on the child's tongue to facilitate swallowing.

In sum, the research to date has consistently shown that pediatric feeding disorders can be successfully treated using a variety of behavioral techniques (Shore & Piazza, 1997; Hoch et al., 1994; Babbitt, Hoch, & Coe, 1994; Babbitt, Hoch, Coe, Cataldo, et al., 1994; Cooper et al., 1995; Ahearn et al., 1996; Riordan et al., 1980; Iwata et al., 1982). Additional research on the combinations of behavioral procedures and the development of new techniques to further increase successes in treating pediatric feeding disorders are needed (Cooper et al., 1995; Shore & Piazza, 1997). Procedures that attempt to manipulate antecedent variables, prior to the occurrence of the food refusal, are areas worthy of study.

#### High-Probability Instructional Sequence

The effectiveness of the high-probability instructional sequence as an antecedent-based treatment procedure to increase compliance has been demonstrated in the literature. Dunlap and Koegel (1980) used interspersed requests to decrease the amount of aggression displayed in their sample of children with autism. This procedure entailed interspersing maintenance tasks (previously mastered tasks) within new learning situations. Interspersed requesting facilitated the acquisition of new skills and decreased the amount of aggression encountered in learning situations (Dunlap & Koegel, 1980; Dunlap, 1984). In 1983, Engelmann and Colvin designed the "hard task" procedure

where three to five easy requests were made immediately before a hard or new task was presented (Horner et al. 1991). Engelmann listed five criteria that the preceding, easy requests should meet. Requests should: (a) be responses that the person has the ability to perform and does so consistently and correctly, (b) only require responses that can be completed in less than 3-5 seconds, (c) be reinforced with praise immediately after occurrence, (d) be delivered in a short, rapid method, (e) be given immediately prior to the presentation of the hard or low-probability task (Horner et al.). In this manner, all difficult tasks are preceded by tasks that offer a guaranteed chance of success and praise.

Mace et al. (1988) used the high-p instructional sequence in five separate experiments to treat noncompliance in adults with mental retardation. In experiments 1 and 2, Mace et al. presented a series of high-p commands immediately before presenting a low-p command. The high-p commands consisted of behaviors such as "give me a hug," or "show me your wallet." The low-p commands were those that the staff in the group home selected as occurring at low rates, accompanied by other problem behaviors. The results of these two experiments showed that using high-p commands before low-p commands, significantly increased compliance to the low-p commands. In experiment 3, Mace and colleagues used the same procedure as in the earlier two experiments but also gradually increased the time interval between presentation of the last high-p command and the low-p command. Results showed the momentum-like results found in the high-p phases seemed to depend on the time interval used. The longer the interval, the less compliant the subject was to the low-p commands, compared to his performance when a short interval time was used. These results suggest the importance of ensuring a short

latency between presentation of the last high-p instruction and the delivery of the low-p instruction.

Experiments 4 and 5 examined the effectiveness of the high-p sequence as a way to reduce the latency to respond to low-p requests and the duration time to complete the task. Results showed that the use of high-p commands significantly decreased both latency and duration. Experiment 5 also compared the effectiveness of behavioral momentum, contingency management, and simple prompts. All three strategies resulted in decreased duration of task completion. However, the most effective procedure was the high-p instructional sequence, followed by prompts, followed by contingency management.

Horner et al. (1991) used interspersed requests to reduce aggression and self-injurious behavior (SIB) in three children with mental retardation who resided in a group home. Each subject had a history of SIB, aggression, and other destructive behaviors. Staff was asked to compile a list of behaviors that the subjects consistently and correctly performed (easy tasks) and behaviors that the subjects seldom performed correctly without assistance (hard tasks). This study used an A-B-A-B-C-B-C-D-E within subject reversal design for each subject. The first four phases (A-B-A-B) were used as a functional analysis, which showed that the aggression and SIB in all 3 subjects was maintained by escape from hard tasks.

The easy task phases involved the presentation of the tasks that each subject consistently and correctly completed (i.e. following “do this” commands). If any aggression or SIB occurred, the trainer interrupted it and redirected the subject back to the

task. The hard task phases were similar to the easy phase except the tasks used were those rated as seldom independently completed (i.e. sorting silverware, following two step instructions). These phases were used to determine if the use of interspersed high-probability instructions reduced aggression and SIB when training hard tasks. The last two phases (D-E) were used to assess the extent to which the effects of the interspersed instructions were generalized across time, trainers, and tasks. Phase D was introduced two months after the last hard plus interspersed requests phase. This phase involved a new trainer presenting the same hard task. The next phase utilized a new trainer presenting a new hard task to each client.

The authors found that the phases where hard tasks were presented resulted in high levels of aggression and SIB in all subjects. However, when the interspersed procedure was added, the rate of aggression and SIB decreased. They also found that there were much lower rates of aggression and SIB two months later when the new trainer and new trainer plus new task phases were introduced. Additionally, two of the three subjects made low or no attempts to complete a hard task until the interspersed procedure was implemented (Horner et al., 1991).

The authors point out that one crucial aspect of this was the use of the first four phases as a functional analysis. This determined that the aggression and SIB were being negatively reinforced by escape from hard tasks. By manipulating the antecedents of the aggression and SIB, it resulted in a more successful and effective treatment that was not aversive and still reduced the level of aggression and SIB. However, Horner et al. (1991) caution that the use of interspersed requests could in effect serve as a reinforcer for

aggression and SIB. A child may learn that if he/she aggresses, the task will be changed to easier demands. For this reason, it is important that interspersed requests are used at the beginning of and throughout each session and not only after a maladaptive behavior has occurred.

Zarcone, Iwata, Mazaleski, and Smith (1994) found that using the high-p instructional sequence alone was not sufficient in increasing compliance with demands in two men with mental retardation who displayed self-injurious behaviors (SIB). The results of a functional analysis indicated that both men engaged in SIB to escape task demands. The high-p procedure was implemented to increase compliance with demands (Zarcone et al.). In the first phase, the high-p procedure was implemented to increase compliance and escape from the tasks was allowed if SIB occurred. In the second phase, the high-p procedure was again implemented, however an extinction component was added. If a subject engaged in SIB, the trainer continued the task and physically guided the subject through it, no longer allowing escape (Zarcone et al.). The authors found that when the high-p procedure was used alone, it did not increase compliance nor did it decrease the occurrence of SIB. However, when the extinction component was added, compliance increased and SIB decreased.

An additional study by Zarcone, Iwata, Hughes, and Vollmer (1993) compared extinction alone with extinction plus the high-p instructional sequence. Results indicated that there were no differences between the two conditions. Extinction, when used in isolation, was as successful as when the high-p component was added. This suggests that when noncompliance is accompanied by severe behavior problems, it is often necessary

to include extinction procedures, but the addition of the high-p sequence may not be beneficial (Zarcone et al., 1994; Zarcone et al., 1993).

Houlihan and Jones (1990) examined the effects of the high-p instructional sequence to increase compliance with three children; none were developmentally delayed and were reported to have IQ's in the normal range. All three children were labeled with "behavioral handicaps". Results indicated that two of the subjects showed increases in the frequency of inappropriate behaviors concurrent with increases in compliance to "don't" requests (i.e., don't throw the pencil"). One possible explanation for this is that compliance to "don't" requests is negatively reinforcing to caregivers because the undesired behavior stops. When the caregiver reinforces this compliance, over time, the inappropriate behaviors can become an Sd for reinforcement (i.e., engage in inappropriate behavior and receive praise for stopping; Houlihan & Jones, 1990). An additional concern is that the high-p sequence may take on the role of a discriminative stimulus (Sd) for a harder task (i.e., the low-p instruction) so that the high-p chain could actually become an Sd for noncompliance (Houlihan & Jones, 1990; Zarcone et al., 1994).

Davis and Reichle (1996) examined this issue using four children placed in an emotional-behavioral disorders classroom. Davis and Reichle used two types of high-p chains. First, a list of behaviors that each child usually complied with was devised (the high-p instructions). Next, through a multiple baseline technique, each child received variant or invariant high-p chains. An invariant chain consisted of a set number of high-p instructions that were always delivered and in the same order. Variant high-p chains were chains made up of a variety of high-p requests that consistently changed in type and order.

Results indicated that using an invariant chain produced a small increase in compliance, originally, but gains did not hold over time. However, use of variant high-p chains produced noticeable and stable increases in compliance. The authors suggested that in future studies, the high-p chains should be varied so that the child does not begin to associate certain requests with hard tasks (Davis & Reichle, 1996).

Finally, Ducharme and Worling (1994) in their study on stimulus fading, found that the high-p procedure did not increase compliance in one of the subjects when “don’t” requests were used. In this study, the high-p instructions consisted of both “do” and “don’t” instructions (i.e., don’t lie on the floor). They found that the high-p instructions did not affect compliance for one subject, therefore, all “don’t” instructions were changed to symmetrical “do” instructions. For instance, “don’t lie on the floor” was changed to “stand up.” When the “don’t” requests were changed to symmetrical “do” requests, the high-p sequence produced high and consistent levels of compliance, even at 16 weeks follow-up (Ducharme & Worling, 1994).

To date, there is one published account of implementing the high-p instructional sequence with children who have feeding disorders. Babbitt, Hoch, Coe, Cataldo, et al. (1994) briefly mention a case study in which they implemented a “generalized compliance training” protocol in which a series of high-p nonfeeding requests were delivered immediately prior to the delivery of a low-p feeding request. The child was provided access to preferred toys and attention for compliance to the low-p feeding request. A multiple baseline design across all feeders was used to evaluate whether generalization occurred. The authors indicated that the high-p procedure resulted in



increased acceptance to above 75%. Acceptance did not increase for each feeder, until each feeder implemented the procedure (Babbitt, Hoch, Coe, Cataldo, et al., 1994). This study appears to be the first of its kind in the feeding literature, however due to the brevity of the presentation, the methods used and a more detailed analysis of the results were not reported.

Harchik and Putzier (1990) examined the effects of using the high-p instructional sequence with a 23-year-old woman with severe mental retardation, to increase compliance with instructions to take medication. Using an ABAB reversal design, they demonstrated that when the instruction “take your medication” was preceded with five, non-functional high-p instructions (e.g., “clap your hands,” “point to your bed”), they were able to increase compliance to a medication regimen and decrease expelling medication and vomiting. At six months follow-up, the authors reported 100% acceptance and 0% vomiting or expelling. Though, this study did not address feeding issues, it did report success in using high-p instructions to increase acceptance of medication tablets into the mouth, with a corresponding decrease in corollary behaviors (i.e., expelling and vomiting) (Harchik & Putzier, 1990).

### Single-Subject Designs

Research methodology is most often approached in two major ways: group designs and single-case designs. Each approach offers a unique way of evaluating and explaining research questions. In group designs, one group (i.e., the treatment group) is compared with one or more groups (i.e., the control group) on one or more independent variable(s). Effects of a treatment evaluation are collected over multiple subjects and the

similarities and/or differences across groups are compared. The primary contribution of this type of design is the ability to evaluate statistically the various effects of one or more independent variables, on multiple groups of subjects, within one investigation (Kazdin, 1982). Alternatively, single-case designs involve the use of one or a few subjects in which the independent variable is evaluated individually with each subject generally serving as his/her own control. Effects of a treatment evaluation are collected for the individual(s) over time. The primary contribution of this design is the ability to systematically and experimentally examine behavior change within an individual (Kazdin, 1982).

Both types of designs, group and single-case, are effective for evaluating treatment efficacy. The type of design chosen is often based on both the type of behavior that is being studied, as well as the research question. One consideration is the prevalence of the disorder or target behavior that is to be studied. For rare disorders, such as severe feeding disorders, the number of subjects available at any one time is limited and can make group designs difficult. Additionally, in applied research and clinical work single-case designs are beneficial in that the researcher or clinician is able to directly assess how an intervention affects a specific individual (Kazdin, 1982).

In single-case design research, there is one general requirement that must be met in order to draw inferences from the data. This requirement is multiple observations of the target behavior(s) before an intervention or manipulation of independent variables is implemented (i.e., baseline). Presence of a baseline enables patterns or trends in the data to be observed, allowing predictions concerning future behavior, in the absence of intervention, to be drawn (Kazdin, 1982). There are numerous types of designs that can

be utilized when performing single-subject research. Following is a brief description of each of the designs utilized in the current study.

The most basic single-case design is the ABAB reversal design. Within this design two phases (A = baseline and B = treatment) are conducted to evaluate an intervention. The use of the initial baseline phase allows for predictions concerning future behavior. The introduction of treatment (the first "B" phase) provides a preliminary opportunity to evaluate the effectiveness of the intervention. The return to baseline (the second "A" phase) enables the predictions hypothesized in the first baseline phase to be tested. Finally, the reintroduction of the intervention in the second "B" phase is an attempt to replicate the results from the first "B" phase. The replication of these two phases allows one to ascertain whether the behavior change is due to the intervention. Specifically, when similar results are found in the replication phases, one is able to conclude that the treatment was responsible for the observed change in behavior. One advantage to this design is that it allows for within subject direct replication.

A multiple baseline design evaluates the effects of a given intervention across multiple behaviors, environments, or individuals. Within this design, the intervention is introduced at varying points of time across people or behaviors and thus controls for time effects. If behavior change only occurs with the introduction of the treatment then the changes can be attributed to the intervention. A multiple baseline design does not require a reversal to baseline. Therefore, an advantage of this type of design is that a withdrawal of treatment is not required to demonstrate experimental control.

A third common single-subject design is the multiple-treatment design. In this design, two or more treatments can be evaluated concurrently within the same subject. The current study utilized an alternating treatments design in which two conditions were administered within the same phase. Each condition is balanced across number of times presented. The strength of this design is that by administering the multiple interventions together order or sequencing effects may be reduced.

## Purpose

The high-probability instructional sequence has been cited as an effective antecedent intervention to increase compliance to low-probability instructions. The purpose of this study was to replicate and expand on the study conducted by Zarcone et al. (1994) by evaluating the extent to which the high-p sequence increased compliance when extinction was present or absent in a novel group of participants- children with severe food refusal and selectivity. Zarcone et al. clearly showed that until an extinction procedure was added to the high-p sequence, compliance did not increase and SIB did not decrease; in effect, competing behaviors decreased the efficacy of the high-p procedure. Similarly, a consistent finding in the feeding disorders literature is that the use of an extinction procedure is almost always warranted to produce an increase in acceptance and a decrease in refusal behaviors. Two extinction procedures, nonremoval of the spoon and physical guidance, have been found to be highly effective in treating severe food refusal.

Given these findings, the utility of the high-p sequence when used in the treatment of feeding disorders needs to answer two questions: (1) does the procedure itself increase acceptance and reduce corollary refusal behaviors, and (2) does escape extinction need to be used in conjunction with the high-p procedure to gain appreciable results? The few studies that have examined the use of the high-p sequence procedure with noncompliant individuals who display competing severe disruptive behaviors when presented with demands have found the inclusion of extinction procedures necessary. These findings are consistent with those in the food refusal literature and necessitate the question, “is the

high-p instructional sequence an integral part of treatment, or are extinction procedures alone responsible and sufficient for the desired change?"

Theoretically, the high-p sequence will provide the child with increased opportunity to experience reinforcement before the delivery of a traditionally low-probability instruction (i.e., presentation of a low-p eating demand). The purpose of this investigation was threefold. Specifically, did increased exposure to positive reinforcement for compliance: a) increase compliance to the low-p instruction in the absence of escape extinction; (b) decrease the need for the extinction procedure; and (c) reduce corollary behaviors associated with the food refusal in the absence of escape extinction. A vast majority of research in the area of feeding disorders has found the inclusion of an escape extinction procedure to be necessary to increase acceptance of food. However, the effects of antecedent manipulations in the treatment of food refusal are not well understood.

## General Method

### Participants

Three children (Mary, Mark, and Vic) admitted to the Kennedy Krieger Institute's Pediatric Feeding Disorders Program for the assessment and treatment of food refusal and inappropriate mealtime behaviors were participants. All participants had been medically cleared to orally consume solid food and demonstrated the oral motor skills required for both the foods and textures. Mary was a 2-year-old female admitted with total food and liquid refusal. Her medical diagnoses included failure to thrive, GER, aspiration on thin liquids, global developmental delay in speech and language, and g-tube dependency. Since birth, Mary reportedly demonstrated a weak suck and was not receiving adequate nutrition via the bottle. Mary required supplemental feeds via a naso-gastric tube until a g-tube was placed at nine months of age. At admission, Mary was receiving 100% of her caloric needs through her g-tube.

Mark was a 3-year 1-month-old male with severe food selectivity by type and texture. His medical diagnoses included stroke in-utero, left-side hemiparesis, GER, global developmental delay in speech and language, and g-tube dependency. Since birth, Mark exhibited poor sucking and vomiting with feedings. Mark's mother reported that, since the introduction of solid foods at about 6 months of age, Mark sporadically accepted small amounts of preferred foods. Upon admission, Mark was receiving about 95% of his caloric needs through his g-tube.

Vic was a 2-year 6-month-old male with severe food selectivity by texture. His medical history was significant for a history of high fevers, self-injurious behaviors (i.e.,

head banging), and global developmental delays in speech and language. Upon admission, Vic inconsistently accepted only stage 2 junior baby foods. When presented with a higher texture, he gagged and expelled the food. Vic's mother also reported that he had periods (1-3 days) of total food refusal. Vic received supplemental nutrition consisting of Pedia-sure through a bottle or cup.

### Setting and Interobserver Agreement

All sessions were conducted in a therapy room (2.5m by 3m) furnished with a high chair, a small table, and chairs for data collectors. Six feeding sessions were conducted daily for each subject fed by one of five or six trained therapists. Session times varied, ranging from 5 minutes to one hour (with a time-cap of one-hour). The length of each session was dependent on which condition or analysis was in place. A second trained observer collected data on target behaviors for each bite offered. Interobserver agreement was collected on 54%, 38%, and 41% of all sessions for Mary, Mark, and Vic, respectively. Exact agreement for target behaviors was automatically calculated by the computer partitioning each session into 10-second intervals and dividing the number of exact agreements on the frequency of behavior by the sum of agreements plus disagreements and multiplying by 100%. All agreement coefficients averaged 87% or higher for all participants for all dependent measures.

### Response Definitions

Throughout all phases, laptop computers were used to collect data for each of the dependent variables described below. A specialized data collection program was used in which all of the dependent variables listed below were assigned to a key on the computer.



Data were collected during all sessions. For the purpose of this evaluation, all corollary food refusal behaviors were combined and presented in one group and labeled "combined inappropriate behaviors". Dependent variables for each child were acceptance of low-p food/texture, combined inappropriate behaviors per minute, and compliance to high-p instructions. Acceptance and compliance were calculated as percentages of the total number of presentations made for each meal. All corollary behaviors are presented as responses per minute. Operational definitions for all dependent variables are provided below:

Acceptance of both high-p and low-p foods/textures was scored when the child opened his/her mouth such that the entire bolus (i.e., amount of food on spoon) could be deposited within 5-seconds of the initial presentation.

Compliance was scored when the child initiated and completed the non-food related high-p instruction within 5 seconds of presenting the demand.

Combined inappropriate behaviors: Disruptions were scored every time any part of the child's body came into contact with the spoon or food, or anywhere on the feeder's hand/arm, from the elbow down, while the feeder presented the bite. Head turns were scored each time the child turned his/her head (and/or body) 45 degrees past midline during the presentation of the bite. Mouth covers were scored whenever the child attempted to block access to his/her mouth by placing the bib, a toy, or one or both of his/her arms/hands on or within 2 inches in front of his/her mouth during the presentation of the bite.

## High-Probability Assessment

### Procedure

Each participant presented with a unique feeding repertoire. Thus, the type of high-p instruction utilized in treatment was based on feeding skills at time of admission. At admission, Mary exhibited total food and liquid refusal. Mark exhibited food selectivity, and Vic exhibited texture selectivity. As a result, different high-p instructions were evaluated for Mary, Mark, and Vic. For each participant, the determination of which instructions, foods, and textures to use in the high-p evaluation were determined through a high-p assessment. Each assessment is described below.

Non-Food Related High-Probability Instructions Assessment. This assessment was conducted for both Mary and Mark. Each child's parent(s) generated a list of behaviors that the child complied with about 80% of the time. These high-p instructions included any behavior that the child was capable of doing such as, "touch your nose", "clap your hands", or "give me five". The high-p instructions did not need to be functional or related to feeding. From the list generated by the parent, a series of instructions were presented, in random order, to each participant according to a (fixed time) FT 30-second schedule. Participants received 5 trials with each instruction. Compliance was scored if the participant initiated and completed the instruction within 5 seconds of presentation. After 30 seconds, the next instruction was presented. To avoid potential treatment confounds, no consequences were provided for compliance, noncompliance, or occurrence of an inappropriate behavior. Based on results of this assessment, a list of high-p demands was developed for each participant. High-p demands

were defined as those instructions that were complied with at least 80% of the time (see results).

Food Related High-Probability Instructions Assessment. This assessment was completed for both Mark and Vic. A list with foods from each food group (protein, starch, fruit, and vegetable) was developed for each subject who, upon admission, exhibited evidence of eating some foods. One food from each group was randomly assigned into groups and presented in ten-minute sessions. Bites were offered every 30 seconds. Sessions continued until each food had been presented five times. Acceptance was scored if the participant took the entire bolus of food into his mouth within 5 seconds of the bite presentation. If the bite was accepted, the participant received approximately 30 seconds to swallow the bite and then the next bite was presented. To avoid potential treatment confounds, no consequences were provided for acceptance, refusal, or any occurrence of an inappropriate behavior. Percent acceptance for each food was calculated and all foods accepted less than 50% of the time were considered low-probability foods. Any food that was accepted at least 80% of the time was considered a high-probability food.

Food Related High-Probability Instructions Assessment (texture). This assessment was completed for Vic. A list with foods from three textures: puree (blenderized smooth table food), junior (blenderized table food with small lumps), and wet ground (ground table food mixed in liquid) from each food group (protein, starch, fruit, and vegetable) was developed. Based on the earlier edible preference assessment which indicated no food preferences: one food from each group was randomly assigned into groups and

presented in ten-minute sessions. To control for the effects of possible food preference, across the assessment, all foods were offered in all textures. Bites were offered every 30 seconds. Sessions continued until each food at each texture had been presented five times. Acceptance was scored if the participant took the entire bolus of food into his mouth within 5 seconds of the bite presentation. If the bite was accepted, the participant received 30 seconds to swallow the bite and then the next bite was presented. To avoid potential treatment confounds, no consequences were provided for acceptance, swallowing, refusal, inappropriate behaviors, packing, or expelling. Percent acceptance for each food was calculated and any texture accepted less than 50% of the time was considered a low-probability texture. Any texture that was accepted at least 80% of the time was considered to be high-probability.

### Results and Discussion

Non-Food Related High-Probability Instructions Assessment. The results of this assessment are ranked from low to high probability instructions. Percentage of compliance is depicted on the y-axis (0 to 100%). Data are presented for both Mary and Mark. For Mary, 20 instructions were evaluated, 13 of which were complied with at least 80% of the times presented. Mary engaged in no Inappropriate behaviors during this assessment. The high-p instructions chosen for use with Mary were: “show shoes”, “touch ears”, “touch head”, “play peek-a-boo”, “stack blocks”, “put in bucket”, “touch blue”, “touch red”, “touch yellow”, “touch cow”, “touch duck”, “wave”, and “push car” (see figure 1).

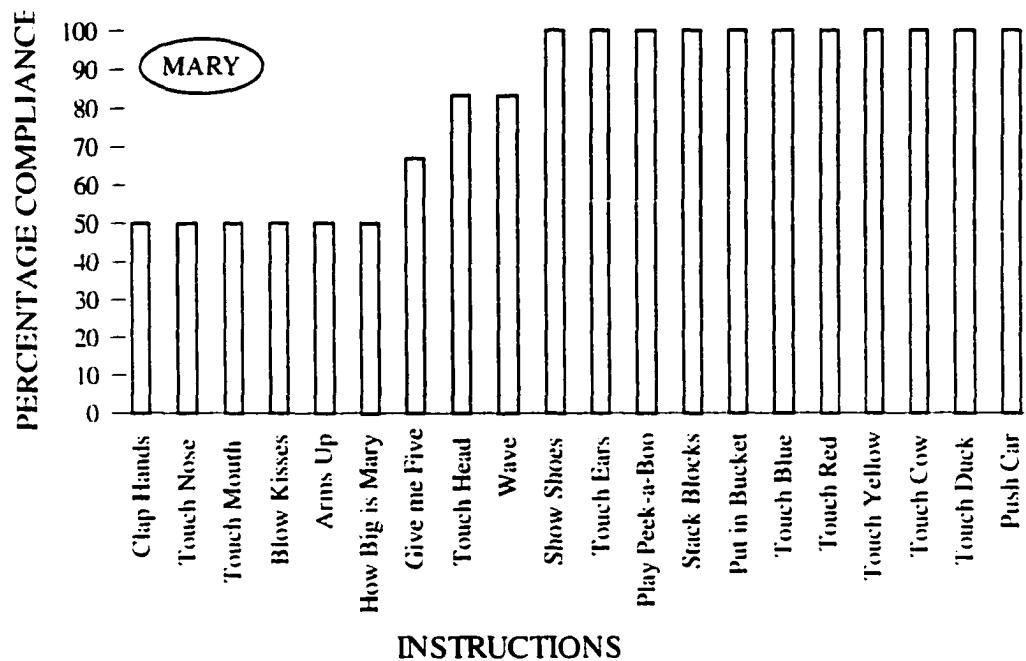


Figure 1: Mary Non-Food Related High-Probability Instructions Assessments

With Mark, 18 instructions were evaluated, 8 of which were complied with over 80% of the time. Mark engaged in very low rates of inappropriate behaviors during this assessment. The high-p instructions chosen for use with Mark were: "give me five", "wave", "blow kiss", "touch yellow", "stack blocks", "touch red", "touch head", and "touch blue" (see figure 2).

Food Related High-Probability Instructions Assessment. Results for this assessment are presented for Mark only. A high-p food assessment was not necessary for Mary, since upon admission, she exhibited total food refusal. A high-p foods assessment was conducted with Vic, although he took all foods offered during at least 80% of all trials, thereby indicating no specific food preferences.

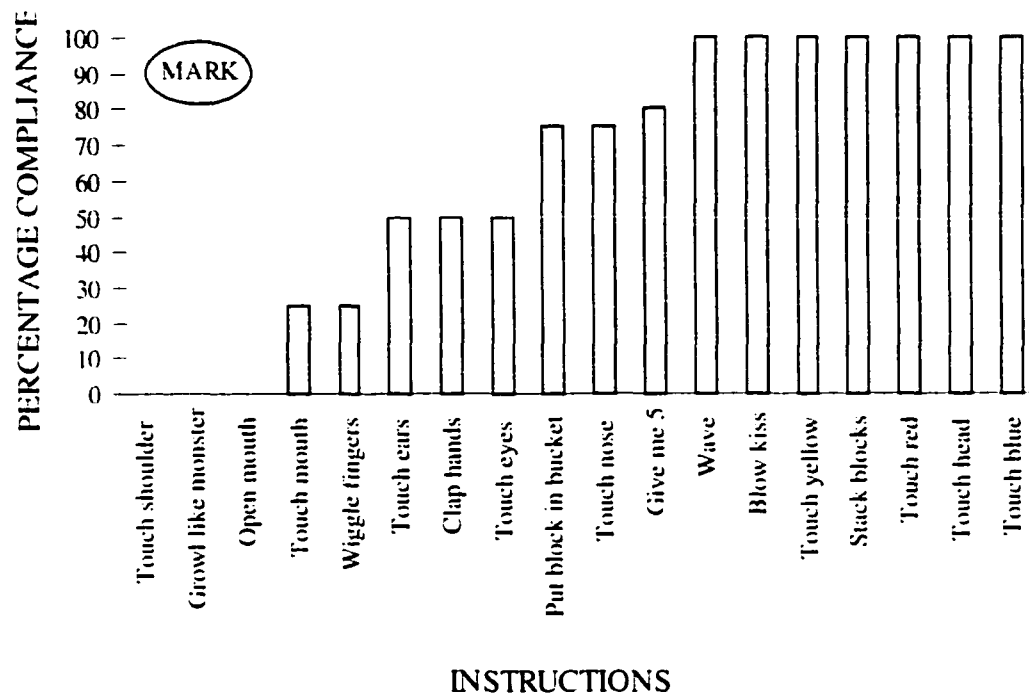


Figure 2: Mark Non-Food Related High-Probability Instructions Assessments

Foods are ranked from low to high preference. Percentage of bites taken is depicted on the left y-axis. Results of the edible preference assessment for Mark indicated that out of the 31 foods assessed, 7 (22.59%) were accepted at least 80% of the time (Mark engaged in only two inappropriate behaviors during presentation of these foods). High-preference foods were peanut butter, beefy mac, chocolate pudding, banana, applesauce, peaches, and carrots. All other foods (77.42%) were accepted less than 50% and were considered low-preference foods (see figure 3). Periodically throughout treatment, edible preference assessments were conducted with Mark to ensure the status of both high- and low-preference foods. During this time, no food had to be reassigned to a different category.

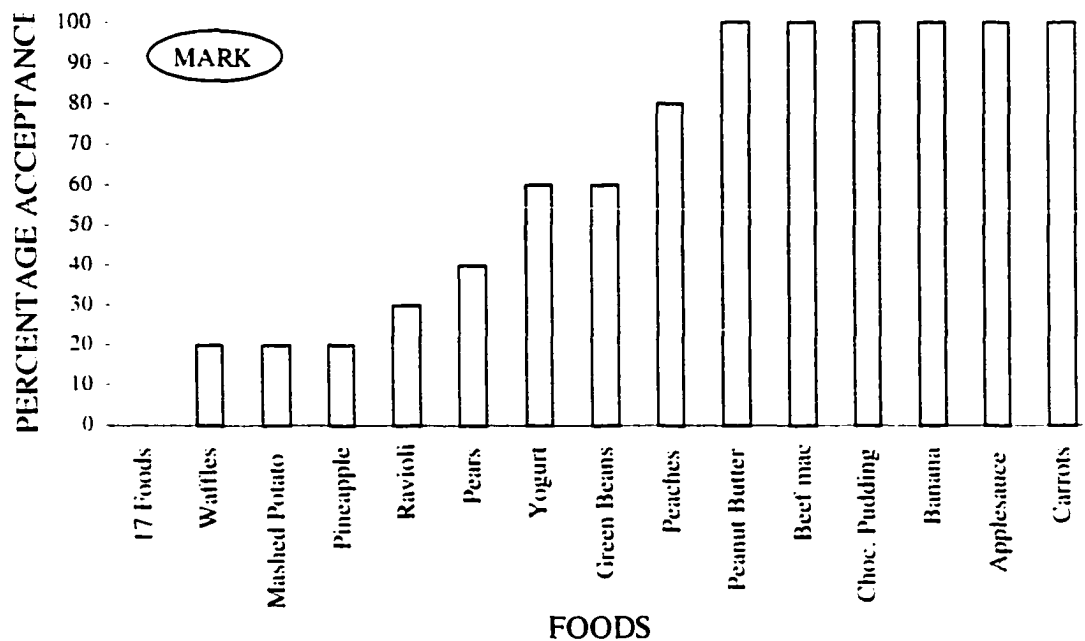


Figure 3: Food Related High-Probability Instructions Assessment. 17 foods assessed were at zero percent acceptance. Foods included chicken nuggets, fish sticks, hot dogs, baked beans, eggs, mac and cheese, cream of wheat, vanilla pudding, rice cereal, oatmeal, apricots, oranges, broccoli, peas, corn, asparagus, and zucchini.

Food Related High-Probability Instructions Assessment (texture). The results of the texture assessment are presented for Vic. Percentage of bites taken is depicted on the y-axis. Results of the texture assessment for Vic indicated that of the three textures assessed, the puree texture was accepted at least 80%. The junior texture was accepted on less than 30% of all trials and wet ground texture was accepted less than 5% of the time. Both the junior and wet ground textures were associated with higher rates of inappropriate behaviors. From this evaluation, it was determined that the puree texture was high preference and the wet ground texture was low preference (see figure 4).

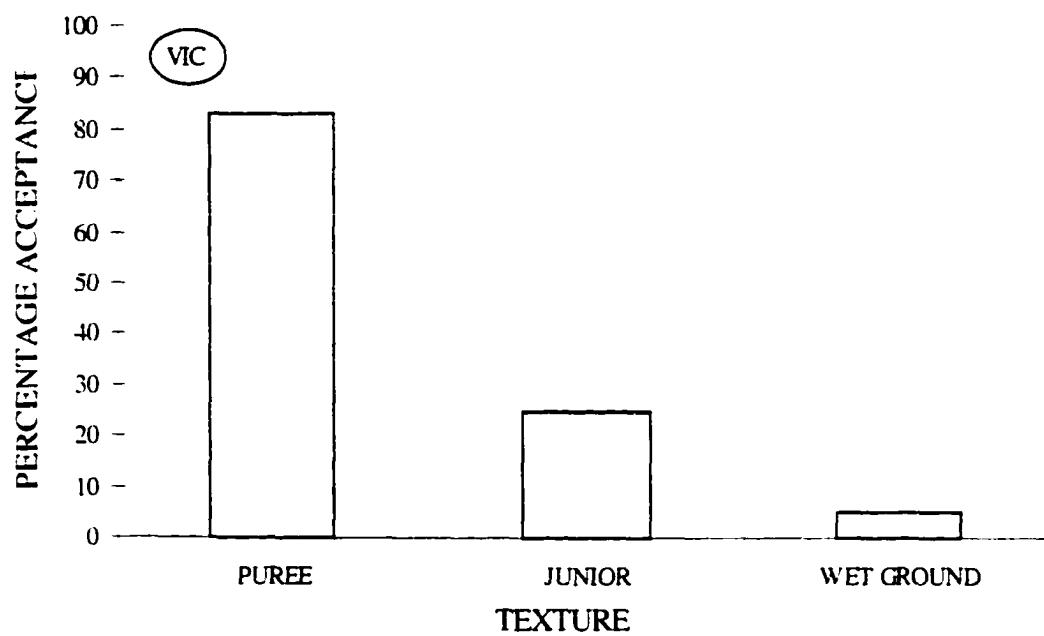


Figure 4: Food Related High-Probability Instructions Assessment (texture)



## High-Probability Evaluation

### Experimental Sequence, Research Design, and Data Analysis

Following all assessment procedures high-p instructions were identified. For each participant, the type of high-p instruction utilized was based on each child's current feeding practices upon admission. Mary exhibited total food refusal indicating that identifying high-p instructions related to food was not likely. Therefore, simple one-step commands that she complied with at least 80%, determined through the non-food related instruction assessment, were used. Initially, Mark began treatment with simple one-step commands as the high-p instructions. This was discontinued before the reversal design was completed due to increasing noncompliance to the high-p instructions, minimal increases in acceptance of low-p foods, and an impending discharge from the program related to insurance issues. Since Mark displayed a number of high-preference foods during the food assessment, a high-p sequence utilizing preferred foods was implemented with him. Vic, upon admission, displayed texture selectivity. Therefore, Vic's high-p instructions were food presented in a puree texture. For both Mark and Vic, the high-p instruction was "take a bite". For Mark, high probability foods were offered and for Vic, foods in the high probability texture were offered. For all participants, the high-p sequence involved presenting 3 high-p instructions, followed by the low-p instruction to "take a bite."

Baseline and treatment conditions were implemented, the effects of which were evaluated with an alternating treatments reversal design. First, low-p alone and high-p sequence sessions were alternated. Second, once a stable level of responding was evident,

low-p plus escape extinction and escape extinction plus the high-p sequence sessions were initiated. Reversals of both phases occurred once responding was stable.

For all participants, data were analyzed by visually inspecting the graphs. Information gathered from the visual inspection addresses the variability or stability of the targeted behaviors throughout the different phases, the absolute value of the targeted behaviors at one time compared to other times, and the overall trend of the data series.

### General Procedures

The low-p instruction for all participants was “take a bite.” At that point, a non-preferred food or texture was presented. In order to control for potential food effects during the evaluation (i.e., child preferred carrots over peas), a list of 3–4 foods from each food group was developed and only these foods were used during the analysis. For each participant, their parents were asked to pick 3–4 foods from each food group from the established list of non-preferred foods determined from the earlier food assessment. Parents were asked to pick those foods that they would most likely eat at home. Each food was offered an equal number of times across each condition and phase of treatment. The foods may have differed across participants, but within each child, the type of food remained constant. Foods served in each session were randomly picked from the list, without replacement, prior to each meal. Throughout the high-p alone and extinction plus high-p phases, the order of the delivery of the high-p demands was random, in keeping with the findings of Davis and Reichle (1996) who found that random variation of high-p chains was essential in increasing compliance.

Low-P Alone. For all participants, the instruction to “take a bite” of low-p food or texture was presented approximately every 30 seconds, rotating through the four food groups. If the food was not accepted after 5 seconds, the bite was removed and the next bite presented at the next 30-second interval. If the child accepted a bite, he/she received brief, enthusiastic verbal praise. Upon acceptance of a bite, each participant was given 25-seconds to swallow the food. If the bite was swallowed within the 25 seconds, he/she received brief, enthusiastic verbal praise and the next bite was presented. All inappropriate mealtime behaviors resulted in termination of the bite, until the next 30-second interval. Expulsion and/or packing of accepted food was ignored. A session was over when 12 bites of food had been presented. If at the end of the session, the subject had food in his/her mouth, he/she was prompted to “swallow the food.” If he/she did not swallow within 5 seconds, he/she was prompted to “spit the food out”.

High-P Sequence Alone. According to a FT 5-second schedule, three high-p demands were delivered, followed by the low-p demand, “take a bite” (either low-p food or texture). The high-p sequence consisted of 3 instructions (non-food instructions for Mary, high-preference foods for Mark, and 3 foods at the high-preference texture for Vic). The delivery of the low-p bite of food was identical to the baseline condition. Once the low-p demand of “take a bite” was presented, the child was given 5 seconds to accept the bite. If the child accepted the bite brief, enthusiastic verbal praise was provided. If the child swallowed the food within 25 seconds of acceptance, brief, enthusiastic verbal praise was given. As in baseline, all inappropriate behaviors resulted in termination of the bite and expulsion or packing of accepted food was ignored. With Mary (and initially Mark), noncompliance to the high-p demands (one-step instructions) resulted in the

implementation of a prompting procedure known as three-step guided compliance. If she/he did not comply with a high-p demand, the feeder repeated the demand while demonstrating the behavior (i.e. "clap your hands like this"). If the child did not comply with the gestural prompt, the feeder again prompted the child using hand-over-hand physical guidance (i.e. "clap your hands like this" and the feeder clapped the child's hands). Brief, enthusiastic verbal praise was provided for compliance to verbal or model prompts. If the child engaged in any corollary behaviors during the prompting sequence, the instruction was terminated for the remainder of the 5 seconds. With Mark and Vic, if the high-p instruction ("take a bite" of preferred food or texture) was not complied with, the bite was removed and the next bite was offered. If at the end of the session, the child had food in his/her mouth, he/she was prompted to "swallow the food." If he/she did not swallow within 5 seconds, he/she was prompted to spit the food out.

Low-P Plus Escape Extinction. This condition was identical to the previous low-p alone condition except that inappropriate mealtime behaviors and refusal to take the bite no longer resulted in termination of the bite (escape). The spoon was presented to the child's lips, touching the upper lip. If the child did not accept the bite within 5 seconds of initial presentation, an escape extinction procedure was implemented. The escape extinction procedure used was determined by parent acceptability of two commonly used procedures. In physical guidance (Mary and Mark), gentle pressure was applied at the mandibular junction and the food was inserted inside the mouth. In nonremoval (Vic), the spoon was held to the child's upper lip until his mouth opened wide enough for the food to be deposited. During both procedures, expelled food was scooped up and represented. If the child swallowed the food within 25 seconds of acceptance, brief, enthusiastic verbal

praise was given. Acceptance (within 5 seconds) resulted in brief, enthusiastic verbal praise. All inappropriate behaviors were ignored. Expelled food was represented. Both vomiting and packing of food were ignored and the bites continued to be presented approximately once every 30-seconds. Bite presentations continued until 12 bites were presented or 20 minutes had elapsed whichever came first. At that time, whatever bite the feeder was currently on, the session was not over until the child accepted the bite or one-hour had passed. If at the end of the session, the child had accepted a bite but still had food in his/her mouth, he/she was prompted to swallow. The child was required to sit in the chair until he/she swallowed the bite or until one hour has passed. No session was longer than a total of one hour (from start to finish).

High-P Plus Escape Extinction. This condition was identical to the low-p alone escape extinction condition except that three high-p instructions were delivered prior to the presentation of the bite. For Mary and Mark, three-step guided compliance was used for noncompliance to high-p instructions. For Mark and Vic, refusal to accept the high-p food or texture resulted in physical guidance and non-removal, respectively. Again, occurrence of corollary behaviors no longer resulted in escape.

### Results and Discussion

To aid in interpretation of the data, results for all non-food related instructions (Mary and Mark) are presented in a multiple baseline across subjects. Subsequently, results for the high-p sequence utilizing food-related instructions (Mark and Vic) are presented in a multiple baseline across subjects.

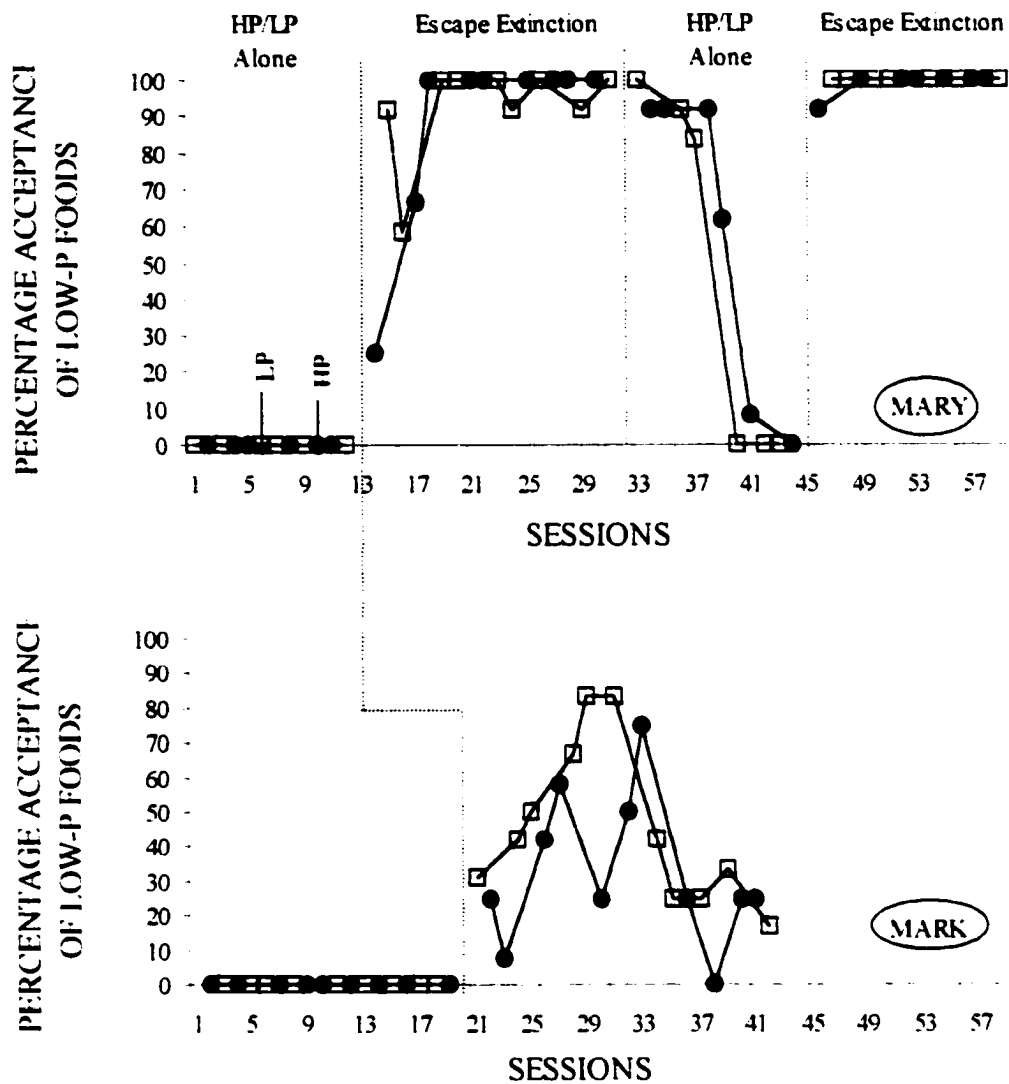
Non-Food Related High-P Instructional Sequence. Data are presented in a multiple baseline design across both participants. A reversal to baseline and treatment was conducted with Mary to demonstrate functional control over the escape extinction procedure. A reversal was not conducted with Mark, as explained previously, but data from the initial phases of the high-p instructional sequences are presented.

Mary: During phase 1, acceptance of food was at zero levels in both the low-p alone and the high-p alone conditions and compliance to the high-p instructions was variable. Percentage of compliance ranged from 64% to 97% (M=86%). Combined inappropriate behaviors were low across both conditions, averaging 1.01 per minute in the baseline condition and 1.03 per minute in the high-p condition. In Phase 2, escape extinction, percentage of acceptance of low-p foods rapidly increased to between 90% and 100%, across both conditions. Percentage of compliance to high-p instructions remained variable, ranging from 62% to 100% (M=84%). Combined inappropriate behaviors decreased to an average of .76 per minute, in both conditions. Phase 3 was a reversal back to low-p and high-p sessions, with removal of all escape extinction procedures. Percentage of acceptance quickly dropped to zero for Mary, across both conditions. (However, acceptance maintained at higher levels initially in the high-p condition.) Compliance to high-p instructions also decreased (M=64%). Combined inappropriate behaviors increased slightly to .97 per minute in the low-p alone condition but decreased in the high-p alone condition to .20 per minute. During phase 4, escape extinction contingencies were replaced in the meal. Percentage of acceptance immediately increased back to 100% across both conditions, indicating the necessity of the escape extinction procedures to increase acceptance of low-p foods.

Mark. During phase 1, acceptance of food remained at zero levels in both the low-p and high-p alone conditions, and compliance to the high-p instructions was variable ( $M=81.97\%$ ). Combined inappropriate behaviors were high across both conditions, averaging 9.80 per minute in the low-p alone condition and 5.25 per minute in the high-p condition. In Phase 2, the percentage of acceptance of low-p foods was variable for Mark across both conditions: 16% - 83% ( $M=41.43\%$ ) of the bites offered in the physical guidance alone condition and 7% - 75% ( $M=35.77\%$ ) of the bites in the high-p plus physical guidance condition. The percentage of compliance to high-p instructions was variable and continued on a downward trend. Compliance ranged from 34% - 87% ( $M=66\%$ ). Combined inappropriate behaviors decreased to .97 per minute in the physical guidance alone condition and 1.71 per minute in the high-p plus physical guidance condition. For both Mary and Mark, increased acceptance was only attained with the addition of an escape extinction procedure. Figure 5a depicts acceptance of low-p foods; figure 5b depicts the number of inappropriate behaviors per minute; and figure 5c depicts the percentage of compliance to high-p instructions for Mary and Mark.

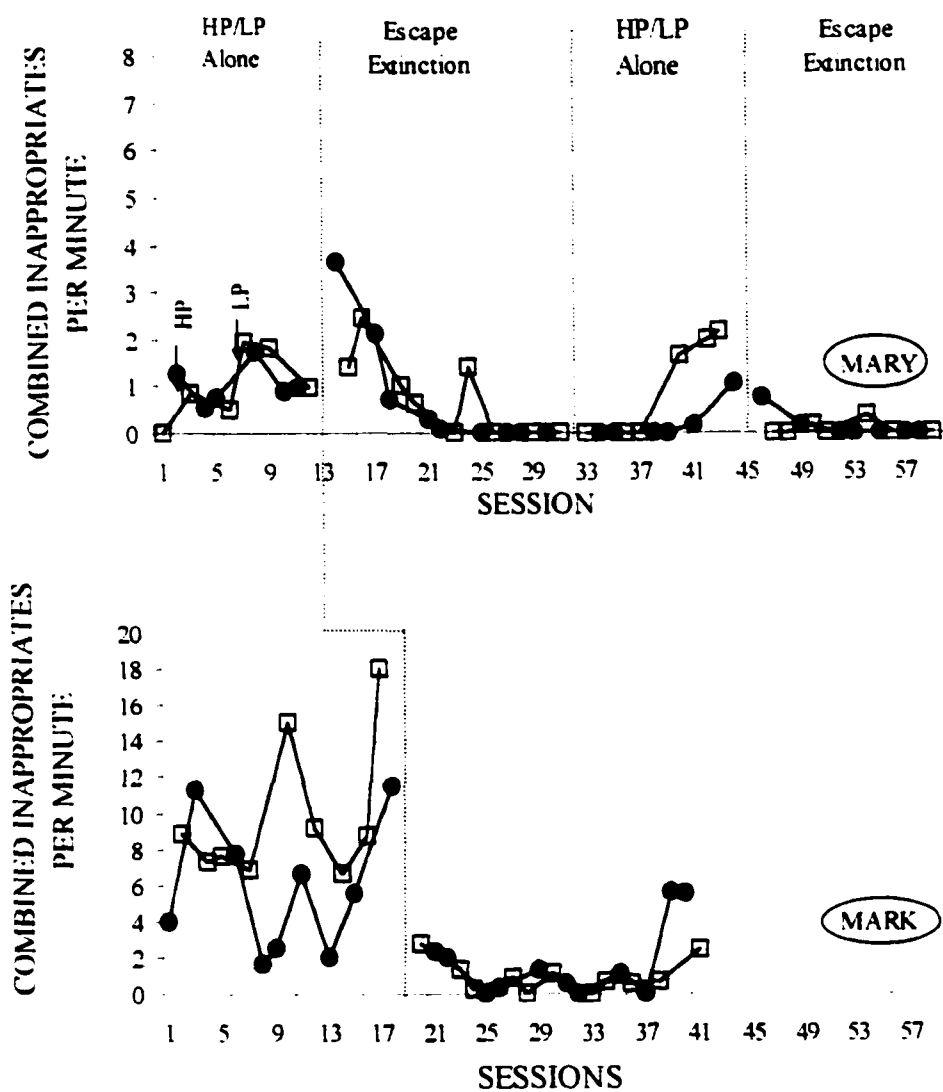
Food Related High-P Instructional Sequence. Data are presented in a multiple baseline design across both participants. A reversal to baseline and treatment was conducted with both Mark and Vic to demonstrate functional control over the escape extinction procedure.

Mark: During phase 1, acceptance of low-p foods was zero in both the low-p and the high-p alone conditions. Acceptance of high-p foods ranged between 21% and 44% ( $M=32.94\%$ ).



**Figure 5a: Percentage Acceptance of Low-P Foods for Mary and Mark during Non-Food Related High-P Instructional Sequence**





**Figure 5b: Combined Inappropriate Behaviors per Minute for Mary and Mark during Non-Food Related High-P Instructional Sequence**

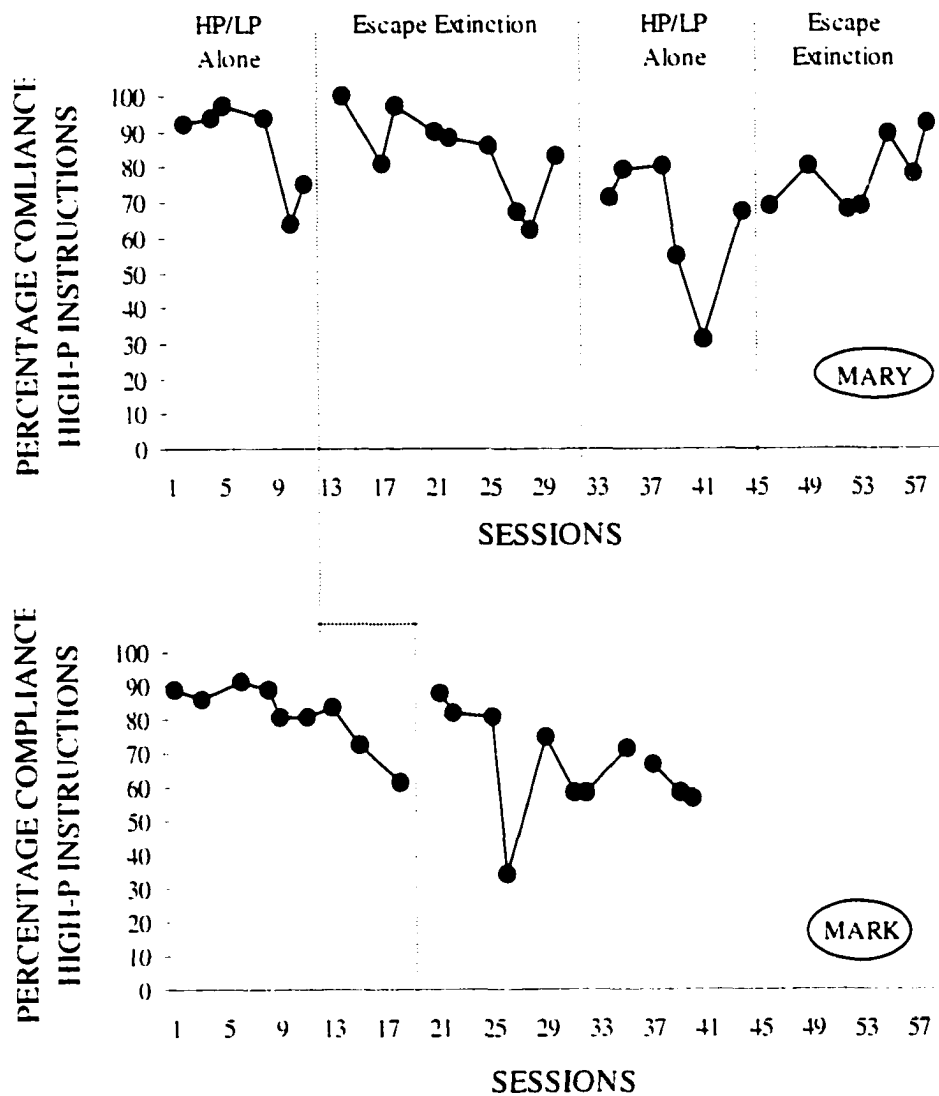


Figure 5c: Percentage Compliance to High-P Instructions for Mary and Mark during Non-Food Related High-P Instructional Sequence

Combined inappropriate behaviors averaged about 1.88 per minute in the low-p alone condition and .92 per minute in the high-p alone condition. In phase 2, an escape extinction procedure, physical guidance, was implemented in conjunction with either the low-p or high-p sessions. During this phase, the percentage of acceptance of low-p foods increased but remained variable across both conditions. In the low-p plus physical guidance condition, acceptance ranged from 33% - 83% ( $\underline{M}$ =52.18%). Acceptance in the high-p plus physical guidance condition ranged from 16% - 66% ( $\underline{M}$ =41.86%). Percentage of compliance to high-p instructions was high, ranging from 71% - 100% ( $\underline{M}$ =91.57%). Combined inappropriate behaviors decreased to an average of .04 per minute in the low-p plus physical guidance condition and .19 in the high-p plus physical guidance condition. Phase 3 was a reversal back to low-p and high-p alone sessions, with removal of all escape extinction contingencies. The percentage of acceptance decreased immediately to zero across both conditions. Acceptance of high-p foods also decreased immediately to zero. Combined inappropriate behaviors increased to initial rates of about 1.91 per minute in the low-p alone condition and 1.19 in the high-p alone condition. During phase 4, escape extinction contingencies were replaced in the meal. The percentage of acceptance immediately increased. Although acceptance varied between 36% -91% across both conditions (low-p plus physical guidance  $\underline{M}$ = 61.17%; high-p plus physical guidance  $\underline{M}$ =58.33%), the escape extinction procedure was necessary to increase acceptance from zero.

Vic: During phase 1 acceptance of low-p foods was zero in both conditions. Acceptance of high-p texture foods ranged between 0% and 21% ( $\underline{M}=17\%$ ). Combined inappropriate behaviors were higher in the low-p alone condition ( $\underline{M}=4.16$  per minute) when compared to the high-p alone condition ( $\underline{M}=1.55$  per minute). In phase 2, an escape extinction procedure, nonremoval of the spoon, was implemented in conjunction with either the low-p or high-p conditions. The percentage of acceptance of low-p foods increased and remained high across both conditions. In the low-p plus nonremoval condition, acceptance ranged from 66% -100% ( $\underline{M}=87.5\%$ ). Acceptance in the high-p plus nonremoval condition increased immediately to 100% and remained stable. Percentage of compliance to high-p instructions was high ( $\underline{M}=99\%$ ). Combined inappropriate behaviors decreased to an average of 1.73 per minute in the low-p plus nonremoval condition and to .95 in the high-p plus nonremoval condition. Phase 3 was a reversal to low-p and high-p alone conditions, with removal of all escape extinction contingencies. The percentage of acceptance gradually decreased to zero across both conditions. Acceptance of high-p foods also decreased and remained low ( $\underline{M}=40\%$ ). Combined inappropriate behaviors rapidly increased to above baseline rates for the low-p alone condition ( $\underline{M}=17.73$ ). However, combined inappropriate behaviors increased only slightly to about 1.54 per minute in the high-p alone condition. During phase 4, escape extinction contingencies were replaced in the meal. Percentage acceptance immediately increased and remained high across both conditions and CI's dropped to zero levels, indicating the necessity of the escape extinction procedure. Figure 6a depicts acceptance of low-p foods; figure 6b depicts occurrence of inappropriate behaviors per minute and figure 6c depicts percentage compliance to high-p instructions for Mark and Vic.

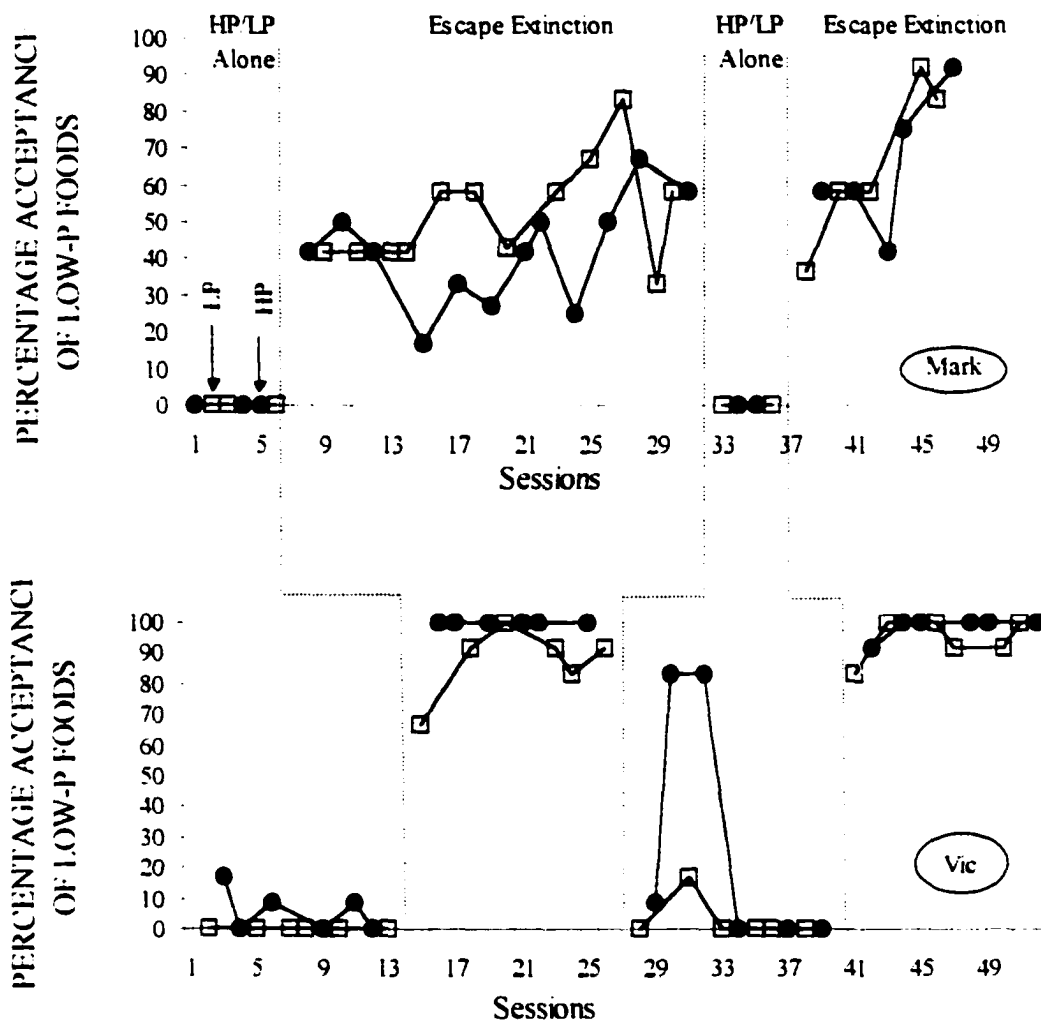


Figure 6a: Percentage Acceptance of Low-P Foods for Mark and Vic during Food Related High-P Instructional Sequence

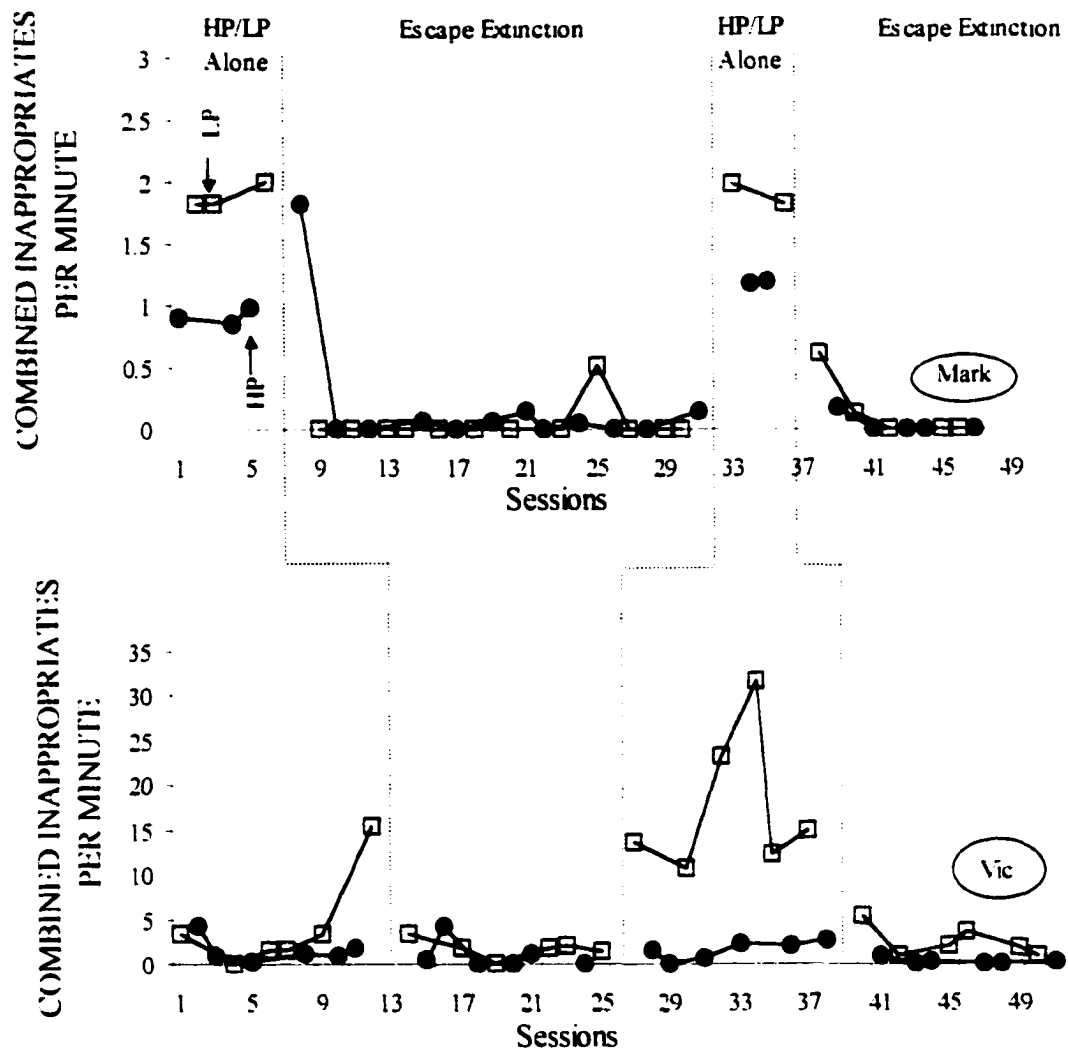


Figure 6b: Combined Inappropriate Behaviors per Minute for Mark and Vic during Food Related High-P Instructional Sequence

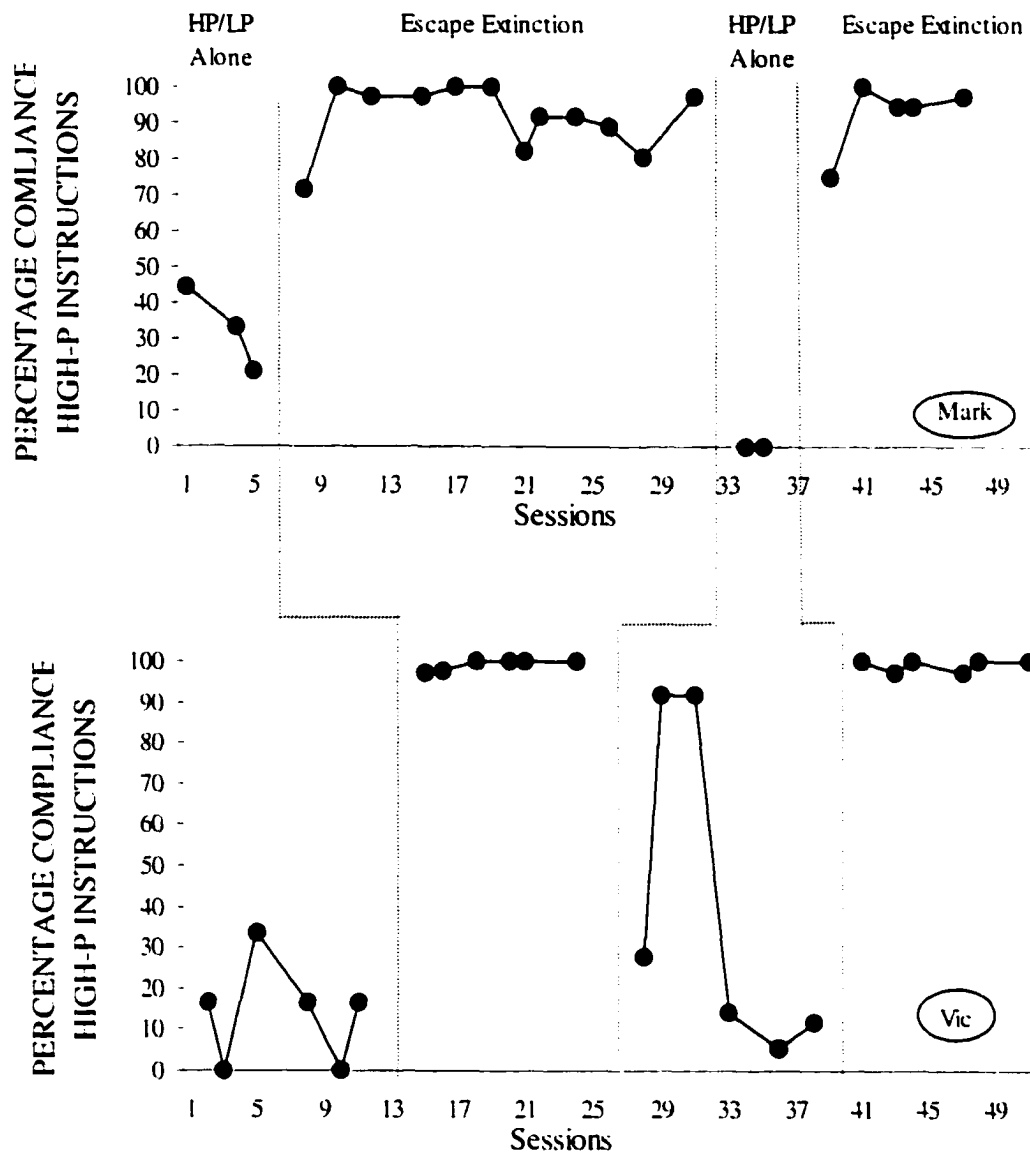


Figure 6c: Percentage Compliance to High-P Instructions for Mark and Vic during Food Related High-P Instructional Sequence

## General Discussion

The utility of the high-p sequence as an antecedent procedure for increasing initial acquisition of low-p foods or textures was not supported in this study. Previous research has demonstrated that compliance to low-p tasks can be successfully increased using the high-p sequence. Though some studies have suggested that when there are competing inappropriate behaviors, the addition of an extinction procedure may be necessary to gain appreciable results. The majority of research supporting the efficacy of the high-p procedure concentrates on increasing compliance to simple one-step demands. However, in feeding, the instruction to “take a bite” requires follow-through of multi-step demands.

The current study was designed to evaluate the effectiveness of the high-p sequence as an antecedent intervention for 3 children with severe food refusal and selectivity. It has been suggested that it is the increased exposure to positive reinforcement for compliance to high-p instructions that may be responsible for increasing compliance to low-p instructions. Past research has suggested that the high-p sequence should result in: (a) increased compliance to the low-p instruction; (b) decreased need for extinction procedures; and (c) reduced corollary behaviors associated with the food refusal. For all three participants, the inclusion of the high-p sequence did not aid in increasing acceptance of low-p foods. The addition of an escape extinction procedure (i.e., physical guidance or nonremoval) was found to be necessary to increase acceptance, regardless of whether the high-p procedure was used or if only low-p foods were offered in isolation. Finally, for all participants, the corollary inappropriate behaviors did not significantly decrease until the extinction procedure was implemented.



However, for Mark and Vic, the occurrence of inappropriate behaviors was less during the high-p conditions.

These results are in line with those of Zarcone et al. (1994) who found that the addition of the high-p procedure did not affect the target behaviors, when the target behavior was maintained by escape. This situation was illustrated in the current study. Although not a part of the investigation, a functional analysis was performed with each participant prior to the start of treatment. From this, it was determined that all the participants in this study were maintained, at least in part, by escape from feeding demands. Mary's functional analysis indicated escape as the primary maintaining variable. Mark's functional analysis indicated that he was multiply maintained by escape from feeding demands and access to attention and toys. Vic's functional analysis was undifferentiated but he did exhibit high rates of negative vocalizations in both the escape and attention conditions. The results of the current evaluation suggest that for escape maintained food refusal, a treatment that does not address the escape function may not be effective.

The high-p procedure is an antecedent treatment that focuses primarily on increasing compliance by creating multiple opportunities for an individual to receive positive reinforcement. This may be problematic when a child's target behavior (i.e., food refusal) is maintained by negative reinforcement, in which escape from a demand is more potent than access to positive reinforcement. In addition, when the competing escape behavior continues to produce escape from the feeding demand, the functional reinforcer is still contacted, which may prove more motivating than an arbitrary reinforcer (access to

positive reinforcement). Although each participant was offered brief verbal praise contingent on compliance to the high-p instructions, the effectiveness of praise as a reinforcer was not evaluated prior to the start of treatment. It is possible that brief praise did not function as a reinforcer and that access to preferred toys or longer intervals of social interaction would have provided a reinforcement effect. Mace, Mauro, Boyajian, and Eckert (1997) found that for some children, implementation of the traditional high-p sequence (i.e., using brief verbal praise) did not result in treatment gains. Rather, Mace et al. found that with the addition of food to the praise or the presentation of food alone for compliance to high-p instructions, resulted in increased compliance to low-p instructions. Mace et al. suggests that the quality of the reinforcer used may impact the success of the high-p treatment.

In the current study, only the addition of escape extinction (i.e., physical prompting or nonremoval) was associated with increased acceptance for all participants. Although the high-p procedure did not appear successful in increasing initial acquisition of the low-p foods, it was associated with lower rates of inappropriate food refusal behaviors for Mark (with non-food and food related instructions) and Vic. The addition of highly preferred foods and textures, as well as simple one-step commands, may have altered the aversiveness of the low-p foods. In spite of this, the rate of combined inappropriate behaviors, although lower during high-p sessions, did not decrease to near zero levels until the addition of the extinction procedure. The presence or absence of the high-p procedure was arbitrary and did not appear to provide beneficial effects over and above those associated with the extinction procedures. In fact, even though the

inappropriate behaviors were generally lower during high-p conditions, compliance to the high-p instructions degraded over the course of treatment for all participants.

At the start of treatment, compliance and acceptance of high-p instructions immediately decreased. For both Mary and Mark, compliance to the non-food related instructions was variable and decreased during treatment. Additionally, both Mark's and Vic's acceptance of high preference foods or textures immediately decreased with the onset of treatment. Across all participants, only those instructions (non-food and food-related) that produced compliance at least 80% of all times offered were selected for use in the high-p sequence. Although all instructions utilized in the high-p sequence were those associated with high compliance, the manner of presentation in the initial assessment versus presentation in the final treatment differed in one main way. During the initial high-p instructional assessment, each instruction was presented every 30 seconds to each participant. However, with the start of treatment, the pre-determined high-p instructions were presented at a rate of every 5 seconds. If the instructions been presented at this shorter interval during the initial assessment, it is possible that compliance to these instructions would have been lower.

An alternative or additional explanation for increased noncompliance to the high-p instructions is that there may have been negative carry-over effects by the constant pairing of the high-p demands with the low-p foods. In effect, the high-p instructions may have become discriminative stimuli for the presentation of an aversive, low-p food.

Zarcone et al. (1994) reported that when extinction was added to the high-p sequence, SIB decreased to near zero rates and that compliance to both high and low-p

instructions increased. They attributed the reductions in SIB to the extinction procedure but stated that the concurrent increase in compliance may not have necessarily been due to extinction. It has been proposed that the increase in compliance might have been due solely to extinction plus DRA for compliance or to an increased sensitivity to the high-p procedure once the escape behavior had been extinguished. Results of the current study suggest that extinction alone may have been responsible for both the decrease in inappropriate behaviors and increase in compliance to both high-p and low-p instructions. Two conditions (low-p foods with the high-p sequence and low-p foods alone) were compared for each participant across all phase of treatment. If the high-p sequence was responsible for increasing compliance, once escape extinction was in effect, a difference in acceptance of the low-p food/texture when the high-p sequence was not presented should have been observed. This did not occur. Support was not provided for increased sensitivity to the high-p sequence when escape maintained behavior is placed on extinction.

### Limitations

Although the current study provides systematic evidence on the effects of the high-probability sequence in the treatment of pediatric feeding disorders, only three children participated. All three children exhibited severe and life-threatening food refusal, which was maintained by escape from feeding demands. It is possible that with a sample of children with less severe feeding disorders, the high-p sequence may have been more effective. Additionally, due to the escape function of each participant's food refusal, an

antecedent procedure such as the high-p sequence may not have been robust enough to counteract the maintaining escape function.

A second limitation to this study is the degradation of compliance to high-p instructions observed with all participants. This degradation suggests the possibility that the instructions used were not true high-probability instructions. Given this, some may argue that the current evaluation was an unfair test of the effectiveness of the high-p treatment. Replications of the current study with instructions determined to be high-probability may aid in supporting the current findings. Additionally, based on the fact that the rate of presentation of the instructions differed in assessment and treatment (see above discussion) further studies examining presentation rate of high-p instructions in both the assessment and treatment phases are warranted.

A final limitation to this evaluation is that there was no structured reinforcement interval provided for compliance to either the high or low-p instructions. If the efficacy of the high-probability sequence were due to increased exposure to reinforcement, then perhaps a formal reinforcement component would have aided in highlighting the beneficial effects of the high-p sequence. Mace et al. (1997) found that the use of food as a reinforcer for compliance to the high-p instructions significantly increased compliance versus when praise was used in isolation. However, Mace et al. did not explain or provide data to demonstrate why food was used as a reinforcer. Future research in this area should focus on not only the addition of a reinforcement component to the high-p sequence when extinction is present or absent but also on the assessment of potential reinforcers.

## Conclusion and Clinical Implications

In this investigation, the utility of the high-p sequence with and without the use of escape extinction in the treatment of pediatric feeding disorders was examined. For each of the three participants, the high-p sequence was manipulated to match each child's level of food acceptance upon admission. For Mary, who accepted no food upon admission, non-food related high-p instructions were used. Initially, non-food related high-p instructions were also introduced with Mark. However, due to decreasing compliance to the high-p instructions and low acceptance of the low-p foods, the non-food related high-p instructions were discontinued. Alternatively, since Mark exhibited food preferences upon admission, the high-p sequence was rearranged to utilize high-preference foods. Lastly, Vic exhibited texture preferences. With Vic, the high-p sequence consisted of using a high-p texture. This approach enabled the effectiveness of the high-p procedure to be evaluated within three of the primary types of food refusal exhibited: total food refusal, food selectivity, and texture selectivity. Recent research has posed the question as to whether the high-p sequence is as effective when there are competing escape behaviors present (Zarcone et al., 1994). Within this analysis, the utility of the high-probability sequence as an effective intervention to increase acceptance of escape maintained low-probability foods was not supported.

To date, the behavioral treatment of feeding disorders has largely focused on identifying treatments to increase acceptance of food and decrease food refusal behaviors by manipulating the consequences of refusal or acceptance. The treatment procedures with which a large percentage of success has been reported are escape extinction (i.e.,

nonremoval or physical guidance). Fewer studies have examined the effects of manipulating antecedent variables that may influence acceptance of solids.

The current study evaluated the utility of the high-probability instructional sequence as an antecedent procedure to increase acceptance of food and decrease food refusal behaviors. Support for the use of this procedure was not found. Current results of this study mirror previous research in the finding that the escape extinction procedures were both necessary and sufficient in increasing initial acceptance of food and decreasing food refusal behaviors. Future research should continue to evaluate new options in the treatment of pediatric food refusal. However, until new interventions are identified, escape extinction procedures are efficient and reliable methods to successfully increase acceptance and decrease food refusal behaviors.

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## Vita

Jennifer Eileen Dawson received both her master of arts and doctoral degrees from the Department of Psychology at Louisiana State University in Baton Rouge, Louisiana. Prior to this, she completed a bachelor of arts degree in psychology at West Chester University in Pennsylvania. Jennifer is currently employed as a Case Manager with the department of Behavioral Psychology on the Pediatric Feeding Disorders Unit at the Kennedy Krieger Institute at the Johns Hopkins School of Medicine in Baltimore, Maryland. Her professional interests include the assessment and treatment of pediatric feeding disorders, autistic disorder, and severe behavior disorders.

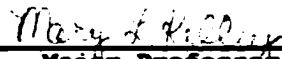
# DOCTORAL EXAMINATION AND DISSERTATION REPORT

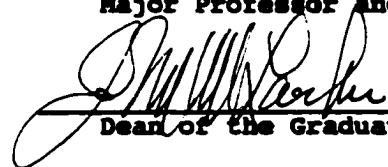
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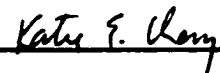
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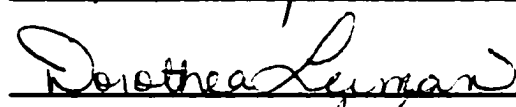
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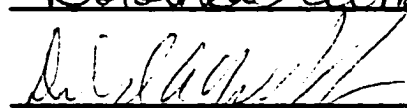
  
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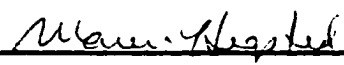
  
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**Date of Examination:**

March 20, 2001

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