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Pediatric Feeding Problems: A Behavior Analytic Approach to Assessment and Treatment

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Although eating is considered an automatic physiologic process, many children experience feeding difficulties. The purpose of this article is to present a behavior analytic conceptualization of feeding problems and to summarize the empirically supported behavioral interventions for these problems. While negative reinforcement appears to maintain food refusal, classical conditioning may contribute to its initiation. Differential reinforcement of alternative behavior with escape extinction is an empirically supported intervention for feeding problems and has been successfully implemented by trained staff or parents, in multiple settings, with maintained gains over time and generalization to new foods for many children. While the efficacy of behavioral interventions has been established, future research should investigate the individual components of these interventions.

Alex is a three-year old boy who eats a total of six foods as his entire diet: Burger King chicken nuggets, McDonald's French fries, macaroni and cheese, pudding, applesauce, and crackers. His parents are not sure whether to be worried about his eating or not; Alex is gaining weight and getting taller. His pediatrician tells them it is typical for children Alex's age to be picky eaters, and she advises them to continue to offer Alex healthier foods. They keep trying to offer him different, healthier foods, but he pushes the new food away and screams "no". If his parents persist in offering the food and get a taste to his lips, Alex often gags uncontrollably for two to three seconds. During some of these gagging episodes, Alex has turned bright red alarming his parents.

Does Alex have a feeding problem? This paper will address issues in defining what is a feeding problem, conceptualization of the origins and maintenance of feeding problems from principles of classical and operant conditioning, behavioral treatment, and future areas of research.

What is a feeding problem?

Severe and persistent feeding problems, which are experienced by 3-10% of children (Dahl & Sundelin, 1992; Jenkins, Owen, Bax, & Hart, 1984; Lindberg, Bohlin, & Hagekull, 1991; Reau, Senturia, Lebailly, & Christoffel, 1996), tend to persist and worsen over time (Lindberg et al., 1991; Marcontell, Laster, & Johnson, 2002; Nicholls, Christie, Randall, & Lask, 2001). Severe feeding problems are more prevalent in children with physical disabilities (26%- 90%); mental retardation (23%-43%); medical illness, prematurity, and low birth weight (10% - 49%) (Crist et al., 1994; Douglas & Bryon, 1996; Palmer, Thompson, & Linscheid, 1975; Reilly, Skuse, & Poblete, 1996; Thommessen, Heiberg, Kase, Larsen, & Riis, 1991).

One way to determine if a behavior is a problem is to assess its impact on functioning. Some children experience severe feeding problems that place the child at risk for aspiration, malnutrition, invasive medical procedures (i.e., placement of a nasogastric or gastrostomy tube), admission to an inpatient unit for treatment of the feeding problem, and/or limitations in social, emotional, and educational functioning and development (Whitten, Pettit, & Fischhoff, 1969; Skuse, 1993). However, other children experience feeding difficulties that may not result in obvious functional limitations.

So does Alex have a feeding problem? At first blush, the answer to this question may appear to be obvious; however, Alex's eating behavior poses an array of unanswered questions about the criteria for defining feeding problems. From a medical perspective, Alex is gaining weight and growing so his eating is not a problem. From a nutrition perspective, Alex may not be getting all his vitamins and minerals; however, this might be addressed with a daily comprehensive multivitamin. From an educational perspective, Alex is able to attend school. He eats what his parents pack him for lunch. Although the teacher worries about his possible boredom with the same foods, she has not noticed any problems with his attention during academic tasks. From his parents' perspective, they are worried about his lack of

interest in trying new foods and gagging; however, they tend to believe the pediatrician. In every other way, Alex is developing typically. So where is the problem?

Historically, feeding problems have been considered to be synonymous with failure to thrive or growth deficiency. Failure to thrive (FTT) is often defined as either not maintaining expected rate of weight gain over time, with weight less than the fifth percentile for age and sex on National Center for Health Statistics growth charts for two or more points of time, or downward deviation in weight of two major percentiles for at least one month duration (Benoit, 1993; Ramsay, 1995). Historically, FTT was classified as organic, having a known medical cause, or nonorganic, an emotional problem caused by the caregiver and expressed in the parent-child relationship (Chatoor & Egan, 1983; Woolston, 1983; 1985). Adoption of the term “feeding problem” in lieu of “eating problem” reflects the perspective that the ingestion difficulties emanate from the parent-child, usually mother-child, relationship and not from the individual child (Woolston, 1983). As a result of the research of nonorganic FTT, the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV) contains the diagnosis of Feeding Disorder of Infancy or Early Childhood (American Psychiatric Association, 1994). The primary criterion for diagnosis of Feeding Disorder of Infancy or Early Childhood includes persistent failure to eat adequately resulting in failure to gain weight or loss of weight, the problem must be present for at least one month and should not be due to medical conditions or lack of available food.

The conceptualization of feeding problems as FTT or growth deficiency is consistent with a medical model of feeding. Based on the results of early studies of eating (Davis, 1928; 1939), the medical profession in general considers variability in eating behavior among young children to be typical or normative. In these studies, hospitalized infants (older than 6 months) and young children who chose from among a variety of healthy foods at three to four meals per day, exhibited daily fluctuations in the composition and caloric density of their diet. However, over six or twelve months, those children consumed sufficient calories to maintain adequate growth despite significant daily fluctuations. Additional research has demonstrated that infants and young preschool children self-regulate their dietary intake in reaction to changes in energy density of the formula or food (Birch & Deysher, 1986; Birch, McPhee, & Sullivan, 1989; Birch, Johnson, Andresen, Peterson, & Schulte, 1991).

Although Davis' (1928, 1939) research has been widely cited to support the theory that children self-regulate food intake, this conclusion may be a function of the methodology employed. Davis herself stated that the “trick” in this research was providing access only to a wide variety of healthy, nutritious foods. In addition, children were given “free access” to variety within a structure; food was presented at the standard mealtimes. Both human and animal research suggests that organisms may be likely to overeat and not self-regulate if offered truly free access to non-nutritious foods. Therefore, many researchers are disavowing this “wisdom of the body” hypothesis (see discussion in Birch & Fisher, 1996).

In the face of increasing evidence that at least some children are not good at self-regulating their intake, the question becomes do feeding problems exist if the child is gaining weight adequately? The ultimate criterion for diagnosis of Feeding Disorder of Infancy or Early Childhood is not the underlying eating behavior, but the weight outcome. Children who fail to eat but do not experience weight loss or lack of weight gain would not be diagnosed as having Feeding Disorder of Infancy or Early Childhood (Watkins & Lask, 2001).

Few researchers have addressed empirically the question of what constitutes an eating problem regardless of its impact on the child's weight. One significant obstacle affecting this line of research is the paucity of information regarding the patterns of eating observed in typical children. As a result, individual researchers have tended to use their own definitions of feeding problems. For example, children's feeding problem can be categorized into one of three possible patterns: 1) problems with quantity, 2) problems with texture, and 3) problems with range (Douglas & Harris, 2001). This conceptualization operationalizes the various eating problems into observable behavior. More recently, Chatoor (2002) proposed a diagnostic classification of feeding disorders that includes six categories of which growth

deficiency is a criterion for four categories. Chatoor's remaining two categories contain attempt to operationalize specific eating responses; however, there continues to be a tendency to look for an underlying emotional response (e.g., post-traumatic feeding disorder). Researchers in this field continue to be split into two groups regarding the appropriate target of intervention; the feeding problem is the result of an underlying emotional problem camp versus the feeding problem is the problem camp. Despite this split in conceptualization, both groups of researchers rely on behavioral methodology as an important component of their intervention strategy (Benoit, 1993; Chatoor, 2002).

In summary, there has been a tendency among medical professionals to conceptualize growth deficiency as the eating problem assuming that lack of eating results from emotional problems caused by the parent-child relationship and interaction. If the child is growing adequately, many medical professionals do not agree on whether or not this constitutes a feeding problem. Therefore, feeding problems are often defined in the literature as a function of clinical judgment.

BEHAVIOR ANALYTIC CONCEPTUALIZATION OF EATING PROBLEMS IN INFANTS AND YOUNG CHILDREN

From a behavioral analytic perspective, positive and negative reinforcement have been postulated as causing eating problems (Iwata, Riordan, Wohl, & Finney, 1982). Research has provided preliminary support that negative reinforcement is the primary operant principle maintaining feeding problems (Cooper et al., 1994; Galensky, Miltenberger, Stricker, Garlinghouse, & Koegel, 2001; Hoch et al., 2001; Patel, Piazza, Martinez, Volkert, & Santana, 2002). Typically, the child is presented with a food. The child refuses the food by not accepting it, expelling it, not swallowing it, gagging on it or in some other way refusing the food. Given the usual medical advice that most children are picky eaters, most, if not all parents, remove the food from that meal and either do not re-present it again or re-present it at a later date, thus negatively reinforcing refusal. A secondary process of contingent access to attention and/or a preferred food also appears to maintain food refusal behaviors; however, this process seems to be less critical.

Negative reinforcement operates to strengthen the probability of future food refusal behaviors for most children; therefore, an interesting question emerges. Why does negative reinforcement operate to strengthen refusal behaviors of only a few foods for some children, but operates to strengthen refusal behaviors of many foods for other children? The answer to this question quite possibly lies in differentiating the principles underlying the initiation of the refusal behaviors from principles maintaining the refusal behaviors. While negative reinforcement may maintain these refusal behaviors, other mechanisms may contribute to the initiation of the feeding difficulty. To understand principles that may create the feeding problem, a quick overview of the feeding process may help set the stage.

The Feeding Process

During the feeding process, food is presented and delivered to the mouth, either through self-feeding or through being fed. The food enters the mouth and if it is textured (whole food), it is chewed and masticated. The food is then gathered up by the tongue and propelled to the back of the mouth thereby initiating the involuntary swallowing reflex. This process is very automatic and simple for most of us; however, there are many factors that contribute to successful eating (for a comprehensive review of these factors, see Donner, Bosma, & Robertson, 1985; Rudolph & Link, 2002; Stevenson & Allaire, 1991).

Intact anatomical structure and neurological function are important. Any compromise of the anatomy of the alimentary tract or neurology of the child might affect eating. When a child is born with cleft lip or palate, the process of feeding is typically modified to accommodate the resulting structures. Furthermore, gross motor function and trunk stability and rotation also impact feeding. While there are some children who have obvious neurological impairments limiting their feeding success (i.e., children with cerebral palsy), children with more subtle neurological and motor problems may pose problems for the behavior analyst working in the area of feeding. For example, a slight asymmetrical motor pattern that is subtle

during walking may be more pronounced and dysfunctional during oral-motor movements; (e.g., left half of the tongue works better than right half of tongue). The child eats only smooth textured foods (i.e., puddings, yogurt) or soft textured foods in sauces (macaroni and cheese, pasta in meat sauce). When offered plain pasta, the child refuses it. The child's refusal pattern makes sense given the oral-motor skills of tongue lateralization and bolus collection.

Development is also important for eating success. Infants are born with two oral-motor reflexes that assist feeding: suckle (birth to 4-6 months) and phasic bite (6-12 months). Research has demonstrated that there may exist "critical periods" during which the infant needs to have experience using these reflexes for successful eating or the reflex will fade and the infant will no longer be able to engage in that eating response automatically (Ingram, 1962; Illingworth & Lister, 1964). For example, if the infant does not practice the suck-swallow-breathe pattern of sucking as an infant and the suck reflex fades at six months, if offered a bottle, the infant will not be able to successful suck from the bottle.

Other factors that impact feeding success are gastrointestinal and respiratory functioning. One of the most common physiological problems underlying feeding difficulties is gastroesophageal reflux disease (GERD) (Catto-Smith, Machida, Butzner, Gall, & Scott, 1991; Mathisen, Worrall, Masel, Wall, & Shepherd, 1999). Gastroesophageal reflux refers to food that was swallowed and entered the stomach thereby mixing with acid and then backing up out of the stomach into the esophagus. The lining of the esophagus is mucosal. When the food and acid mixture enters the esophagus from the stomach, it may irritate the delicate tissue of the esophagus causing pain and feelings of discomfort. In one recent study, GERD with or without aspiration was diagnosed in 56% of children with neurodevelopmental disabilities who presented with feeding problems (Schwarz, Corredor, Fisher-Medina, Cohen, & Rabinowitz, 2001).

Gastroenterologists are increasing recognizing the importance of GERD in creating and/or maintaining feeding problems (Mathiesen et al., 1999). Despite its increasing importance as an etiological factor in feeding problems, diagnosis of GERD can be tricky in children. While adults can report feelings of pain and discomfort to their physician, infants and young children, especially those with disabilities and developmental delays, may not have the awareness or verbal skills necessary to describe these feelings. One of the best ways children have to communicate internal states is through behavior (Stallard, Williams, Velleman, Lenton, & McGrath, 2002). While some individuals with GERD vomit, gag and cough, others individuals demonstrate no outward sign or symptom except through feeding behaviors such as food refusal, expelling, eating standing up, and coughing. Historically, however, these responses may not have been recognized as symptoms of an underlying medical process, but rather as inappropriate behaviors. GERD, like pain, is a subjective phenomenon; it is difficult, if not impossible, for anyone other than the individual to assess its impact on the individual.

More recent descriptive studies report gastrointestinal symptoms among participants with feeding problems; however, the clinical significance of these problems is minimized (Marcontell et al., 2002; Nicholls et al., 2001). For example, in a study of six infants with feeding problems, the researchers noted that all infants had mild GER; however, they then discounted its potential influence. "It is possible that GER produced an aversion to oral intake but the mild nature of GER makes this intuitively unlikely" (Lichtman, Maynor, & Rhoads, 2000, p. 469). In a study of 20 selective eaters aged 7-14, all but 6 children evidenced gastrointestinal symptoms including retching (6), vomiting (9), gagging (3), and abdominal pain (4) (Nicholls et al., 2001). In case studies of two adults with food neophobia, their eating difficulties in adulthood were traced back to early childhood (Marcontell et al., 2002), furthermore, as adults they reported statements to suggest the possibility that there had been or still was an underlying physiological component. For example, one participant reported not trying new foods because of a fear of gagging and getting sick, and the other reported feeling as though she might gag and/or her throat would close up precluding swallowing.

If a child is experiencing GERD, classical conditioning may take precedence over operant conditioning in initially causing the feeding problem. If food ingestion is paired with nausea and/or discomfort, the food may then become aversive. Basic research has demonstrated that food aversions can be created in a single

trial, and these food aversions are persistent and strong (Bolles, 1967, 1975; Garcia, Hankins, & Rusiniak, 1974; Riley & Clarke, 1977; Rozin & Kalat, 1971). Garcia (1989) argued that nausea plays a special role in taste aversion acquisition. It has been hypothesized that this quick conditioning may be adaptive from an evolutionary perspective; nausea may be associated with toxic substances and as such, they should be avoided. The co-occurrence of gastrointestinal and eating difficulties in young children support the hypothesis that classical conditioning may cause the initial food refusal and negative reinforcement may then serve to strengthen and maintain the problematic feeding behaviors.

To summarize, although eating is taken for granted as a fairly simple and automatic process, it is actually quite complex. Feeding difficulties may occur when the child has anatomical and physical problems. While some of these problems are obvious and known, others may be subtle and unknown. The child's oral-motor skills, gross motor functioning, and experience with the use of different oral-motor reflexes also may contribute to feeding problems. Other feeding problems may result as a function of classical conditioning occurring primarily between food ingestion and gastrointestinal distress. Once the initial feeding response is initially established, the feeding problem is probably strengthened and maintained through negative reinforcement.

Assessment

Thorough understanding of the feeding process informs assessment. Assessment typically begins with a thorough history of the problem including when the child ate well and when problems began. While taking the history, the behavior analyst needs to be attuned for issues related to development and experience, early history of lack of tolerance of foods (e.g., vomiting frequently as an infant; food and/or milk allergies), and oral-motor skills. Ideally, the behavior analyst would also attend to motor function, especially as it relates to oral-motor skills.

Descriptive analysis and direct observation are the most commonly reported strategies for identifying target behaviors (Cooper et al., 1995). Some researchers have illustrated the use of systematic strategies for varying food type and food texture as a method of identifying the antecedent conditions for problematic eating responses (Munk & Repp, 1994) and/or for identifying which foods to target for intervention as well as which foods could serve as potential reinforcers (Levin & Carr, 2001).

Recent studies have attempted to apply more formal functional analysis methodology to the area of feeding (Galensky et al., 2001; Girolami & Scotti, 2001). The use of the four traditional analog conditions (attention, demand, tangible toy and control) employed for functional analysis revealed similar function of feeding problems for two of three participants; a primary function of escape from the feeding situation contingent on food refusal and a secondary function of access to tangibles and attention. The function of the feeding difficulties for the third participant was a relatively undifferentiated pattern of escape and contingent access to tangibles and attention (Girolami & Scotti, 2001). Interestingly, the two participants for whom escape was the primary function of food refusal had documented gastroesophageal reflux and/or history of symptoms of vomiting and gagging supporting the possibility of classical conditioned food aversion.

This recent interest in more formal assessment strategies in the area of feeding is exciting. Given the physiological nature of eating, future research needs to focus on developing standardized methodologies for assessing all factors that impact feeding. For example, during direct observation, a behavior analyst notices that a two year old child consistently accepts a variety of foods that are smooth in texture but refuses a variety of the same food types that are presented as table food. Suppose further that the behavior analyst observes that when the child accepts the pureed food, the child throws their head back in extension within 2-3 seconds after acceptance of the food. The food is reliably swallowed. Without a clear understanding of the feeding process, the behavior analyst may not recognize that the child is using gravity to initiate the swallowing reflex. Furthermore, if the child is using gravity, she does not have the necessary tongue movements to eat textured foods. Without this hypothesis, the behavior analyst might initiate a behavioral feeding program to introduce textured foods. If successful in increasing acceptance

without concurrently addressing the tongue movement pattern, the frequency of gagging is also likely to increase contributing further to classical conditioned food aversion.

In summary, descriptive and functional methodology have indicated a primary function of escape for the eating problems of most participants. The complexity of the feeding process suggests the need for more research to standardize assessment methods that account for a multitude of factors, not just environmental contingencies.

BEHAVIORAL INTERVENTIONS

Behavioral interventions, either used in isolation or with other treatment components, are frequently cited as empirically supported treatments for feeding difficulties in young children (Douglas & Harris, 2001; Kerwin, 1999). This section will focus on interventions that assume sufficient oral-motor skills for consumption and adequate management of any ongoing medical components to the feeding problems. Behavior analysts working in the area of feeding need to know which behaviors may indicate physiological or motor problems. A full review of these oral-motor and gross motor behaviors is beyond the scope of this paper; however, a behavior analyst should seek the advice and consultation of speech language pathologists and/or occupational therapists when working with children with feeding difficulties.

Consequent Procedures

Based on early conceptualizations that food refusal was negatively reinforced, Iwata and colleagues (1984) designed an avoidance procedure that remains the backbone of behavioral interventions in this area (Figure 1). Each trial typically begins with a clear signal; the presentation of the spoon and a verbal instruction, such as “_____, take a bite” or “Open”. The spoon is presented for 3-5 seconds. If during that time, the child accepts the spoon into the mouth, contingent access to praise, activities, tokens (Linscheid, Tarnowski, Rasnake, & Brams, 1987), a more preferred food (Luiselli, Evans, & Boyce, 1985), or sensory stimulation (Luiselli, 1994) is provided for the remainder of the trial. Each trial is typically 20-30 seconds. If the child does not accept the food within the 3-5 second presentation, extinction of attention or escape extinction is typically employed (Hoch et al., 2001; Kerwin, 1999).

Initially, most researchers operationalize extinction as an ignore procedure in which all behaviors other than food acceptance are ignored. Some researchers have added a response cost contingent on inappropriate behaviors after food is accepted (Kahng, Tarbox, & Wilke, 2001). Differential reinforcement has also been used successfully on other feeding target behaviors, such as expulsion and packing food (Sevin, Gulotta, Sierp, Rosica, & Miller, 2002).

Figure 1. Diagram of a trial in a prototypical behavioral feeding intervention.

If differential reinforcement with extinction as ignoring does not result in an increase in food acceptance, the operationalization of extinction is altered to become an escape extinction procedure as nonremoval of the spoon or contingency contacting (Ahearn, Kerwin, Eicher, & Lukens, 2001; Ahearn, Kerwin, Eicher, Shantz, & Swearingin, 1996; Hoch, Babbitt, Coe, Krell, & Hackbert, 1994; Hoch et al., 2001). With nonremoval of the spoon, the spoon or feeding utensil is held at the child's lower lip or mouth until acceptance occurs. Because nonremoval of the spoon is an escape extinction procedure, the duration of each trial is determined by the child's response. Research has demonstrated that this procedure can be associated with negative side effects (e.g., crying, tantrums); however, if nonremoval of the spoon is combined successfully with either antecedent manipulations or decreased meal termination criterion such as a single bite, the frequency and intensity of these negative side effects are minimized (Ahearn, et al., 1984; Hoch et al., 2001). Another variant of escape extinction is a session termination criterion of eating the entire specified amount of food prior to leaving the session (Farrell, Hagopian, & Kurtz, 2001; Kitfield & Masalsky, 2000; Luiselli, 2000).

A third operationalization of escape extinction is evident in the literature; food acceptance is manually guided contingent on a refusal response (Riordan, Iwata, Finney, Wohl, & Stanley, 1984; Ahearn et al., 1996, 2001; Piazza et al., 2002). While physical guidance of acceptance is typically conceptualized as an escape extinction procedure, it can also be conceptualized as a punishment procedure. As a result, its use should be considered carefully. The research literature demonstrates that this procedure is used when a child exhibits near zero levels of food acceptance after the feeding task demands have been decreased significantly, such as the presentation of an empty spoon (Kerwin, Ahearn, Eicher, & Burd, 1995). In summary, physical prompting, if it is used at all, is typically used as a last resort and is usually used in combination with antecedent manipulations. Because of controversy regarding the use of physical prompting, it is important to differentiate physical prompting of a response from force feeding, in which there is not a clear signal to allow the child to avoid the consequence (Blackman & Nelson, 1987; Ives, Harris, & Wolchik, 1978).

Regardless of the implementation of the differential reinforcement, the behavior analyst needs to be well trained to successfully implement these procedures. For example, because of the risk of aspiration, the behavior analyst should not place a spoon in the open mouth of a crying child. Similarly, most individuals cannot employ effective oral-motor skills when the head is in extension (i.e., the head is tilted backwards). If physical prompting is to be utilized, the behavior analyst needs to understand the anatomy of the jaw and mouth and how to minimize risk of injury.

Antecedent Manipulations

Research has consistently demonstrated that antecedent manipulations, used in combination with consequent procedures described above, can be quite effective in altering feeding difficulties. The most common antecedent manipulations include stimulus fading through altering the amount of food (Kerwin et al., 1995), simultaneous presentation of preferred and nonpreferred foods (Piazza et al., 2002), gradually increasing the texture of the food or the concentration of the liquid (Luiselli & Gleason, 1987; Patel, Piazza, Kelly, Ochsner, & Santana, 2001; Shore, Babbitt, Williams, Coe, & Snyder, 1998), decreasing the texture to reduce inappropriate behavior (Patel, Piazza, Santana, & Volkert, 2002), and gradually changing the type of food and/or utensil (Babbitt, Shore, Smith, Williams, & Coe, 2001; Freeman & Piazza, 1998; Johnson & Babbitt, 1993; Luiselli & Luiselli, 1995). Stimulus fading procedures are usually combined with differential reinforcement of alternative behavior and less frequently with escape extinction.

These antecedent manipulation procedures may help bridge the gap between those researchers who view the target of the intervention as the feeding problem (behavior analysts) and those that view the feeding problem as an expression of an emotional problem and treating the emotional problem as an anxiety

disorder. The stimulus fading procedures of the behavior analyst are similar to the hierarchy of “feared” stimuli presented in systematic desensitization (Chatoor, 2002; DeSilva, 1988).

Skill Acquisition

Successful eating requires effective oral-motor patterns. The behavior analyst can be instrumental in assisting members of other disciplines in teaching children these skills. For example, many speech pathologists and/or occupational therapists implement oral stimulation programs and/or oral-motor therapy (Morris, 1989). The goal of oral stimulation programs is the child’s increase tolerance of foreign stimuli in and near the oral cavity. The goal of oral-motor therapy is to facilitate the tongue and muscles around the oral cavity to move the appropriate way. With each type of program, the child might gag during the implementation of these procedures. Members of these disciplines are often taught to stop the program at this point; however, stopping the procedure has the potential to negatively reinforce gagging. The skilled behavior analyst can begin educating members of the other disciplines about operant principles and work with them to continue the program at a level that reduces or minimizes gagging. Because behavior analysts are skilled in task analyses, they can also help members of the other disciplines task analyze their interventions and learn to look for and document specific responses that they expect from each procedure (see Kumin, Von Hagel, & Bahr, 2001 for example of task analysis of oral-motor treatment).

Some behavior analysts have researched procedures for prompting children to initiate the involuntary swallowing reflex (Hagopian, Farrell, & Amari, 1996; Hoch, Babbitt, Coe, Duncan & Trusty, 1995; Lamm & Greer, 1988). After task analyzing the swallowing process, the behavior analyst facilitated the swallowing reflex through backward or forward chaining. Although this approach is promising (Kerwin, 1999), the procedures can pose risks for the child. The swallowing reflex is automatically initiated when the food bolus is propelled towards the faucal arches. Unfortunately, food cannot be delivered directly to the back of the mouth without risk of aspiration; therefore, these procedures often initiate the swallowing reflex by prompting the gag reflex. The behavior analyst needs to realize, however, that the gag reflex is a protective mechanism against aspiration. If the child’s gag is physically prompted too often, the gag may become desensitized thereby placing the child at risk for aspiration. More recent research is discovering that the tongue movements need to be the target of intervention, not the involuntary swallowing reflex.

Treatment Packages and Ancillary Issues in Feeding

Some researchers have conceptualized feeding difficulties, especially dysphagia (lack of swallowing) as an anxiety disorder (Chatoor, 2002; Culbert, Kajander, Kohen & Reaney, 1996; Singer, Ambuel, Wade, & Jaffe, 1992) or conversion disorder (Koon, 1983). Using case study methodology, cognitive-behavioral treatment packages have been reported to be successful. These treatment packages contain the following components: progressive muscle relaxation, systematic desensitization, education, contingency management, shaping, and cognitive restructuring. Stark and colleagues have applied a cognitive behavioral treatment package approach to children with cystic fibrosis (Stark et al., 1996). A combination of nutritional education, relaxation, and contingency management was demonstrated to be effective in increasing calorie consumption for children with cystic fibrosis.

Because feeding is primarily a physiological process, behavior analysts are often members of an interdisciplinary health team. Behavior analysts not only assist in direct interventions of target behavior, they can also assist the other members of the team to accomplish their goals. Behavior analysts can assist medical professionals in preparing children for medical procedures. Some medical procedures require that the child be awake and cooperate with the procedure; however, children with feeding problems tend to be medically fragile and/or developmentally delayed making cooperation potentially more difficult. For example, during a barium swallow test, the child must accept and swallow either a food or liquid substance laced with barium. The success of the test is compromised if the child cries while trying to swallow or refuses the barium-laced substances. A behavior analyst may take the child to the “test room” and feed them their regular food until the child’s behavior comes under stimulus control.

FUTURE AREAS FOR RESEARCH

Behavior analysis can contribute significantly to the assessment and treatment of feeding difficulties. Research suggests that negative reinforcement appears to be the critical underlying operant principle maintaining, and perhaps initiating, feeding problems, and differential reinforcement of alternative behavior combined with escape extinction is an empirically supported intervention for food refusal and other feeding behaviors. The positive results of these behavioral interventions are achieved with trained therapists or parents, in multiple settings (Anderson & McMillan, 2001; Stark, Powers, Jelalian, Rape, & Miller, 1994; Werle, Murphy, & Budd, 1998). Furthermore, these gains are maintained over time and generalize to new foods for many children.

Despite the established effectiveness of behavioral interventions for feeding problems in infants and young children, there remain many more unanswered questions. A primary area of research involves further delineation of what constitutes a feeding problem. This answer requires greater understanding of the parameters of typical eating in children of different ages. Although we know that behavioral interventions work for a variety of feeding problems, we don't know why. Some research suggests that positive reinforcement of acceptance may be a necessary component (Hoch et al., 2001), while other research suggests escape extinction is a necessary component (Cooper et al. 1994; Patel et al., 2002). More recent research suggests that the choice of food may be especially sensitive to the quantity and quality of positive reinforcers; however, the amount of food consumed may be affected by escape extinction procedures (Cooper et al., 1999).

Many of the interventions are implemented in a similar manner without a known empirical basis for their use. For example, is a verbal prompt necessary when physical prompting is not used? What is the ideal intertrial interval for children with different feeding problems and age? When should edible reinforcers be used and when will they be less effective? Are different behavioral treatment approaches more successful with children with different histories or presenting problems? What is the appropriate criterion for meal termination? Should it be time, number of bites, or amount of food consumed?

One important factor that has been relatively under-investigated is the role of "hunger" and its impact on the effectiveness of behavioral interventions. Again, many researchers control the child's access to food and liquid when implementing these interventions; however, food and liquid deprivation has not been researched systematically. One notable exception is a study demonstrating that limiting premeal access to preferred food served as an establishing operation for food acceptance of nonpreferred foods using the Premack principle (Levin & Carr, 2001).

In short, despite different theoretical orientations about the causes of feeding difficulties, researchers agree that behavioral interventions are a critical component in the treatment of feeding problems (Chatoor, 2002; Kerwin, 1999). Behavior analysts need to now direct their attention to understanding more about what causes these problems as well as what factors facilitate and hinder treatment progress.

References

- Ahearn, W. H., Kerwin, M. E., Eicher, P. S., & Lukens, C. T. (2001). An ABAC comparison of two intensive interventions for food refusal. *Behavior Modification*, 25, 385-405.
- Ahearn, W. H., Kerwin, M. L. E., Eicher, P. S., Shantz, J., & Swearingin, W. (1996). An alternating treatments comparison of two intensive interventions for food refusal. *Journal of Applied Behavior Analysis*, 29, 321-332.
- American Psychiatric Association. (1994). *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.). Washington, D.C.: Author.

Anderson, C.M., & McMillan, K. (2001). Parental use of escape extinction and differential reinforcement to treat food selectivity. *Journal of Applied Behavior Analysis*, 34, 511-515.

Babbitt, R. L., Shore, B. A., Smith, M., Williams, K. E., & Coe, D. A. (2001). Stimulus fading in the treatment of adipsia. *Behavioral Interventions*, 16, 197-207.

Benoit, D. (1993). Failure to thrive and feeding disorders. In C. H. Zeanah (Ed.), *Handbook of infant mental health* (pp. 317-331). New York: Guilford.

Birch, L. L., & Fisher, J. A. (1996). The role of experience in the development of children's eating behavior. In E. D. Capaldi (Ed.), *Why we eat what we eat*. (pp. 113-141). Washington, D.C.: American Psychological Association.

Birch, L. L. & Dreysher, M. (1986). Caloric compensation and sensory specific satiety: Evidence for self-regulation of food intake by young children. *Appetite*, 7, 323-331.

Birch, L. L., Johnson, S. L., Andresen, G., Peterson, J. C., & Schulte, M. C. (1991). The variability of young children's energy intake. *New England Journal of Medicine*, 324, 232-235.

Birch, L. L., McPhee, L., & Sullivan, S. (1989). Children's food intake following drinks sweetened with sucrose or aspartame: Time course effects. *Physiological Behavior*, 45, 387-395.

Blackman, J. A., & Nelson, C. (1987). Rapid introduction of oral feedings to tube-fed patients. *Journal of Developmental and Behavioral Pediatrics*, 8, 63-67.

Bolles, R. C. (1975). *Learning Theory*. New York: Holt.

Catto-Smith, A.G., Machida, H., Butzner, J. D., Gall, D. G., & Scott, R. B. (1991). The role of gastroesophageal reflux in paediatric dysphagia. *Journal of Pediatric Gastroenterology and Nutrition*, 12, 159-165.

Chatoor, I. (2002). Feeding disorders in infants and toddlers: Diagnosis and treatment. *Child and Adolescent Psychiatric Clinics of North America*, 11, 163-183.

Chatoor, I., & Egan, J. (1983). Nonorganic failure to thrive and dwarfism due to food refusal: A separation disorder. *Journal of the American Academy of Child and Adolescent Psychiatry*, 22, 294-301.

Cooper, L. J., Wacker, D. P., Brown, K., McComas, J. J., Peck, S. M., Drew, J., Asmus, J., & Kayser, K. (1999). Use of concurrent operants paradigm to evaluate positive reinforcers during treatment of food refusal. *Behavior Modification*, 23, 3-40.

Cooper, L. J., Wacker, D. P., McComas, J. J., Brown, K., Peck, S. M., Richman, D., Drew, J., Frischmeyer, P., & Millard, T. (1995). Use of component analyses to identify active variables in treatment packages for children with feeding disorders. *Journal of Applied Behavior Analysis*, 28, 139-153.

Crist, W., McDonnell, P., Beck, M., Gillespie, C. T., Barrett, P., & Mathews, J. (1994). Behavior at mealtimes and the young child with cystic fibrosis. *Journal of Developmental and Behavioral Pediatrics*, 15, 157-161.

Culbert, T. P., Kajander, R. L., Kohen, D. P., & Reaney, J. B. (1996). Hypnobeavorial approaches for school-age children with dysphagia and food aversion: A case series. *Journal of Developmental and Behavioral Pediatrics*, 17, 335-341.

Dahl, M., & Sundelin, C. (1992). Feeding problems in an affluent society. Follow-up at four years of age in children with early refusal to eat. *Acta Paediatrica Scandinavia*, 81, 575-579.

Davis, C. M. (1928). Self-selection of diet by newly weaned infants. *American Journal of Diseases of Childhood*, 36, 651- 679.

Davis, C. M. (1939). Results of the self-selection of diets by young children. *Canadian Medical Association Journal*, 41, 257-261.

DeSilva, P. (1988). The modification of human food aversions: A preliminary study. *Journal of Behavior Therapy and Experimental Psychiatry*, 19, 217-220.

Didden, R., Seys, D., & Schouwink, D. (1999). Treatment of chronic food refusal in a young developmentally disabled child. *Behavioral Interventions*, 14, 213-222.

Donner, M. W., Bosma, J. F., & Robertson, D. L. (1985). Anatomy and physiology of the pharynx. *Gastrointestinal Radiology*, 10, 196-212.

Douglas, J. E., & Bryon, M. (1996). Interview data on severe behavioural eating difficulties in young children. *Archives of Diseases in Childhood*, 75, 304-308.

Douglas, J., & Harris, B. (2001). Description and evaluation of a day-centre-based behavioural feeding programme for young children and their parents. *Clinical Child Psychology*, 6, 241-256.

Farrell, D. A., Hagopian, L. P., & Kurtz, P. F. (2001). A hospital-and home-based behavioral intervention for a child with chronic food refusal and gastrostomy tube dependence. *Journal of Developmental & Physical Disabilities*, 13, 407- 418.

Freeman, K. A., & Piazza, C.C. (1998). Combining stimulus fading, reinforcement, and extinction to treat food refusal. *Journal of Applied Behavior Analysis*, 31, 691-694.

Galensky, T. L., Miltenberg, R.G., Stricker, J. M., & Garlinghouse, M. A. (2001). Functional assessment and treatment of mealtime behavior problems. *Journal of Positive Behavior Intervention*, 3, 211-224.

Garcia, J. (1989). Food for Tolman: Cognition and cathexis in concert. In T. Archer & L. G. Nelson (Eds.), *Aversion, avoidance, and anxiety*, (pp.45-85). Hillsdale, NJ: Erlbaum.

Garcia, J., Hankins, W. G., & Rusiniak, K. W. (1974). Behavioral regulation of the *milieu interne* in man and rat. *Science*, 185, 824-831.

Girolami, P. A., & Scotti, J. R. (2001). Use of analog functional analysis in assessing the function of mealtime behavior problems. *Education and Training in Mental Retardation and Developmental Disabilities*, 36, 207-223.

Hagopian, L. P., Farrell, D. A., & Amari, A. (1996). Treating total liquid refusal with backward chaining and fading. *Journal of Applied Behavior Analysis*, 29, 573-575.

Hoch, T. A., Babbitt, R. A., Coe, D. A., Duncan, A., & Trusty, E. M. (1995). A swallow induction avoidance procedure to establish eating. *Journal of Behavior Therapy and Experimental Psychiatry*, 26, 41-50.

Hoch, T. A., Babbitt, R. A., Coe, D. A., Krell, D. M., & Hackbert, L. (1994). Contingency contacting: Combining positive reinforcement and escape extinction procedures to treat persistent food refusal. *Behavior Modification*, 18, 106-128.

Hoch, T. A., Babbitt, R. L., Farrar-Schneider, D., Berkowitz, M. J., Owens, J. C., Knight, T. L., Snyder, A. M., Rizol, L. M., & Wise, D. T. (2001). Empirical examination of a multicomponent treatment for pediatric food refusal. *Education & Treatment of Children, 24*, 176-198.

Illingworth, R. S. & Lister, J. (1964). The critical or sensitive period, with special reference to certain feeding problems in infants and children. *Journal of Pediatrics, 65*, 839-848.

Ingram, T. T. (1962). Clinical significance of the infantile feeding reflexes. *Developmental Medicine and Child Neurology, 4*, 159-169.

Iwata, B. A., Riordan, M. M., Wohl, M. K., & Finney, J. W. (1982). Pediatric feeding disorders: Behavioral assessment and treatment. In P. J. Accardo (Ed.), *Failure to thrive in infancy and early childhood*. Baltimore: University Park Press.

Ives, C. C., Harris, S. L., & Wolchik, S. A. (1978). Food refusal in an autistic type child treated by a multi-component forced feeding procedures. *Journal of Behavior Therapy and Experimental Psychiatry, 61-64*.

Jenkins, S., Owen, C., Bax, M., & Hart, H. (1984). Continuities of common behaviour problems in preschool children. *Journal of Child Psychology and Psychiatry, 25*, 75-89.

Johnson, C. R., & Babbitt, R. L. (1993). Antecedent manipulation in the treatment of primary solid food refusal. *Behavior Modification, 17*, 510-521.

Kahng, S. W., Tarbox, J., & Wilke, A. E. (2001). Use of multicomponent treatment for food refusal. *Journal of Applied Behavior Analysis, 34*, 93-96.

Kerwin, M. L. (1999). Empirically supported treatments in pediatric psychology: Severe feeding problems. *Journal of Pediatric Psychology, 24*, 193-214.

Kerwin, M. L., Ahearn, W. H., Eicher, P. S., & Burd, D. M. (1995). The costs of eating: A behavioral economic analysis of food refusal. *Journal of Applied Behavior Analysis, 28*, 245-260.

Kitfield, E. B., & Masalsky, C. J. (2000). Negative reinforcement-based treatment to increase food intake. *Behavior Modification, 24*, 600-608.

Koon, R. E. (1983). Conversion dysphagia in children. *Psychosomatics, 24*, 182-184.

Kumin, L., Von Hagel, K. C., & Bahr, D. C. (2000). An effective oral motor intervention protocol for infants and toddlers with low muscle tone. *Infant-Toddler Intervention, 11*, 181-200.

Lamm, N., & Greer, R. D. (1988). Induction and maintenance of swallowing responses in infants with dysphagia. *Journal of Applied Behavior Analysis, 21*, 143-156.

Levin, L., & Carr, E. G. (2001). Food selectivity and problem behavior in children with developmental disabilities. *Behavior Modification, 25*, 443-470.

Lichtman, S. N., Maynor, A., & Rhoads, J. M. (2000). Failure to imbibe in otherwise normal infants. *Journal of Pediatric Gastroenterology and Nutrition, 30*, 467-471.

Lindberg, L., Bohlin, G., & Hagekull, B. (1991). Early feeding problems in a normal population. *International Journal of Eating Disorders, 10*, 395-405.

- Linscheid, T. R., Tarnowski, K. J., Rasnake, L. K., & Brams, J. S. (1987). Behavioral treatment of food refusal in a child with short-gut syndrome. *Journal of Pediatric Psychology*, 12, 451-459.
- Luiselli, J. K. (1994). Oral feeding treatment of children with chronic food refusal and multiple developmental disabilities. *American Journal on Mental Retardation*, 98, 646-655.
- Luiselli, J. K. (2000). Cueing, demand fading, and positive reinforcement to establish self-feeding and oral consumption in a child with chronic food refusal. *Behavior Modification*, 24, 348-358.
- Luiselli, J. K., Evans, T. P., & Boyce, D. A. (1985). Contingency management of food selectivity and oppositional eating in a multiply handicapped child. *Journal of Clinical Child Psychology*, 14, 153-156.
- Luiselli, J. K., & Gleason, D. J. (1987). Combining sensory reinforcement and texture fading procedures to overcome chronic food refusal. *Journal of Behavior Therapy and Experimental Psychiatry*, 18, 149-155.
- Luiselli, J. K., & Luiselli, T. E. (1995). A behavior analysis approach toward chronic food refusal in children with gastrostomy-tube dependency. *Topics in Early Childhood Special Education*, 15, 1-18.
- Marcontell, D. K., Laster, A. E., & Johnson, J. (2002). Cognitive-behavioral treatment of food neophobia in adults. *Anxiety Disorders*, 16, 341-349.
- Mathieson, B., Worrall, L., Masel, J., Wall, C., & Shepherd, R. W. (1999). Feeding problems in infants with gastro- esophageal reflux disease: A controlled study. *Journal of Paediatric Child Health*, 35, 163-169.
- Morris, S. E. (1989). Development of oral-motor skills in the neurologically impaired child receiving non-oral feedings. *Dysphagia*, 3, 135-154.
- Munk, D. D., & Repp, A. C. (1994). Behavioral assessment of feeding problems of individuals with severe disabilities. *Journal of Applied Behavior Analysis*, 27, 241-250.
- Nicholls, D., Christie, D., Randall, L., & Lask, B. (2001). Selective eating: Symptom, disorder, or normal variant. *Clinical Child Psychology and Psychiatry*, 6, 256-270.
- Palmer, S., Thompson, R. J., & Linscheid, T. R. (1975). Applied behavior analysis in the treatment of childhood feeding problems. *Developmental Medicine and Child Neurology*, 17, 333-339.
- Patel, M. R., Piazza, C. C., Kelly, M. L., Ochsner, C. A., & Santana, C. M. (2001). Using a fading procedure to increase fluid consumption in a child with feeding problems. *Journal of Applied Behavior Analysis*, 34, 357-360.
- Patel, M.R., Piazza, C. C., Martinez, C. J., Volkert, V. M., & Santana, C. M. (2002). An evaluation of two differential reinforcement procedures with escape extinction to treat food refusal. *Journal of Applied Behavior Analysis*, 35, 363-374.
- Patel, M. R., Piazza, C. C., Santana, C. M., & Volkert, V. M. (2002). An evaluation of food type and texture in the treatment of a feeding problem. *Journal of Applied Behavior Analysis*, 35, 183-186.
- Piazza, C. C., Patel, M. R., Santana, C. M., Goh, H., Delia, M. D., & Lancaster, B. M. (2002). An evaluation of simultaneous and sequential presentation of preferred and nonpreferred food to treat food selectivity. *Journal of Applied Behavior Analysis*, 35, 259-270.

- Ramsay, M. (1995). Feeding disorder and failure to thrive. *Child and Adolescent Psychiatric Clinics of North America*, 4, 605-616.
- Reau, N. R., Senturia, Y. D., Lebailly, S. A., & Christoffel, K. K. (1996). Infant and toddler feeding patterns and problems: Normative data and a new direction. *Journal of Developmental and Behavioral Pediatrics*, 17, 149-153.
- Reilly, S., Skuse, D., & Poblete, X. (1996). Prevalence of feeding problems and oral motor dysfunction in children with cerebral palsy: A community survey. *Journal of Pediatrics*, 129, 877-882.
- Riley, A. L., & Clarke, C. M. (1977). Conditioned taste aversions: A bibliography. In L. M. Barker, M. R. Best, & M. Domjan, (Eds.), *Learning mechanisms in food selection*. Waco, TX: Baylor University Press.
- Riordan, M. M., Iwata, B. A., Finney, J. W., Wohl, M. K., & Stanley, A. E. (1984). Behavioral assessment and treatment of chronic food refusal in handicapped children. *Journal of Applied Behavior Analysis*, 17, 327-341.
- Rozin, P., & Kalat, J. W. (1971). Specific hungers and poison avoidance as adaptive specializations of learning. *Psychological Review*, 78, 459-486.
- Rudolph, C., & Link, D. T. (2002). Feeding disorders in infants and children. *Pediatric Clinics of North America: Pediatric Gastroenterology and Nutrition*, 49, 97-112.
- Schwarz, S. M., Corredor, J., Fisher-Medina, J., Cohen, J., & Rabinowitz, S. (2001). Diagnosis and treatment of feeding disorders in children with developmental disabilities. *Pediatrics*, 108, 671-676.
- Sevin, B. M., Gulotta, C. S., Sierp, B. J., Rosica, L. A., & Miller, L. J. (2002). Analysis of response covariation among multiple topographies of food refusal. *Journal of Applied Behavior Analysis*, 35, 65-68.
- Shore, B. A., Babbitt, R. L., Williams, K. E., Coe, D. A., & Snyder, A. (1998). Use of texture fading in the treatment of food selectivity. *Journal of Applied Behavior Analysis*, 31, 621-633.
- Singer, L. T., Ambuel, B., Wade, S., & Jaffe, A. C. (1992). Cognitive-behavioral treatment of health-impairing food phobias in children. *Journal of The American Academy of Child and Adolescent Psychiatry*, 31, 847-852.
- Skuse, D. (1993). Epidemiological and definitional issues in failure to thrive. *Child and Adolescent Psychiatric Clinics of North America: Eating and Growth Disorders*, 2, 37-59.
- Stallard, P., Williams, L., Velleman, R., Lenton, S., & McGrath, P. (2002). Brief Report: Behaviors identified by caregivers to detect pain in noncommunicating children. *Journal of Pediatric Psychology*, 27, 209-214.
- Stark, L. J., Mulvihill, M. M., Powers, S. W., Jelalian, E., Keating, K., Creveling, S., Byrnes-Collins, B., Harwood, I., Passero, M. A., Light, M., Miller, D. L., & Hovell, M. F. (1996). Behavioral intervention to improve caloric intake of children with cystic fibrosis: Treatment versus wait list control. *Journal of Pediatric Gastroenterology and Nutrition*, 22, 240-253.
- Stark, L. J., Powers, S. W., Jelalian, E., Rape, R. N., & Miller, D. L. (1994). Modifying problematic mealtime interactions of children with cystic fibrosis and their parents via behavioral parent training. *Journal of Pediatric Psychology*, 19, 751-768.
- Stevenson, R. D., & Allaire, J. H. (1991). The development of normal feeding and swallowing. *Pediatric*

Clinics of North America, 38, 1439-1453.

Thommessen, M., Heiberg, A., Kase, B. F., Larsen, S., & Riis, G. (1991). Feeding problems, height and weight in different groups of disabled children. *Acta Paediatrica Scandinavia*, 80, 527-533.

Watkins, B., & Lask, B. (2002). Eating disorders in school-aged children. *Child and Adolescent Psychiatric Clinics of North America*, 11, 185-199.

Werle, M. A., Murphy, T. B., & Budd, K.S. (1998). Broadening the parameters of investigation in treating young children's chronic food refusal. *Behavior Therapy*, 29, 87-105.

Whitten, C. F., Pettit, M. G., & Fischhoff, J. (1969). Evidence that growth failure from maternal deprivation is secondary to underfeeding. *Journal of American Medical Association*, 209, 1675-1682.

Woolston, J. L. (1983). Eating disorders in infancy and early childhood. *Journal of the American Academy of Child and Adolescent Psychiatry*, 22, 114-121.

Woolston, J. L. (1985). Diagnostic classification: The current challenge in failure to thrive syndrome research. In D. Drotar (Ed.), *New directions in failure to thrive: Implications for research and practice* (pp. 225-235). New York: Plenum.

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