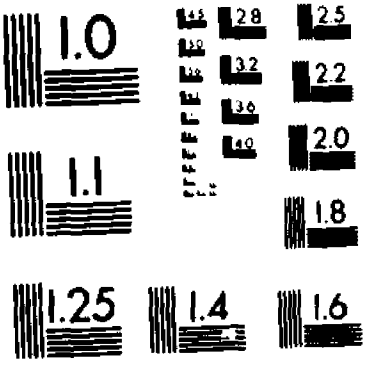

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A BEHAVIORAL INTERVENTION FOR THE TREATMENT OF EATING DISORDERS IN A PEDIATRIC ONCOLOGICAL POPULATION

City University of New York PH.D. 1986

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A BEHAVIORAL INTERVENTION FOR THE TREATMENT OF EATING DISORDERS IN A PEDIATRIC ONCOLOGICAL POPULATION

by

DEBBIE DAVIS

A dissertation submitted to the Graduate Faculty in Psychology in partial fulfillment of the requirements for the degree of Doctor of Philosophy, The City University of New York.

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Abstract

A BEHAVIORAL INTERVENTION FOR THE TREATMENT OF EATING DISORDERS IN A PEDIATRIC ONCOLOGICAL POPULATION

by

Debbie Davis

Adviser: Professor Thom Verhave

This study examined the effects of a behavioral intervention for the treatment of eating disorders in four pediatric oncological patients. The patients were referred by hospital staff as demonstrating refusal to eat or vomiting caused by non-physiological factors. All patients were being fed by artificial means (i.e. total parenteral nutrition) which when given long term can cause serious medical and physiological complications. Assessment included a four day baseline observation of possible antecedents, consequences, or circumstances related to the eating disturbance.

An eating program was designed to include

recognition of observed nutritional, behavioral, and developmental level of the patient within a common behavioral framework. Programs for the three children included the following common behavioral components; oral stimulation, modeling, and social reinforcement. For the adolescent patient, the program included teaching new eating skills and establishment of a reward system structured within a behavioral contract. In addition, all programs drew on principles which emphasized learning to eat in a social context. Parents and nurses were taught to implement the programs to facilitate generalization across individuals and later enhance transfer of eating behavior to the new environment. After discharge, follow-up was done periodically over a minimum of six months to insure continued eating. If necessary, follow-up booster sessions and /or nutritional counseling were provided. The results indicate that a behavioral intervention is effective in promoting normal eating patterns and replacing artificial means of nourishment in a cancer and immune deficient population. At the end of the treatment period all four patients were consuming adequate oral intake for weight maintenance or growth. The intervention presents a useful technique for rapid restoration of normal eating that should be built into the overall rehabilitation of an oncological patient.

Table of Contents

Approval	ii
Abstract	iii-iv
List of Tables	vi
List of Figures	vii
Introduction	1-33
Method	34-38
Method & Results- Subject Shea	39-49
Method & Results- Subject Jon	50-65
Method & Results- Subject George	66-100
Method & Results- Subject Mia	101-120
Discussion	121-133
Appendix 1	134-137
Bibliography	138-145

List of Tables

1. The Sequence of Steps Involved In The Demonstration of Drinking (left column) and Eating (right column): Subject Jon. 54

2. Generalization of Eating with Different People Feeding Introduced Across Days: Subject Jon. 65

3. The Sequence of Steps Involved in the Demonstration of Drinking (left column) and Eating (right column): Subject George. 71

4. Mean Values of Oral Intake: Subject George. 91

5. Significances of Differences Between Means (T-tests): Subject George. 92-93

6. Average Intake Across Phases Versus Age Related Norms: Subject George. 94

7. Breakdown of Oral Intake: Subject George. 95-96

8. Percent of Total Daily Intake by Person Feeding Across Interventions 1 and 2, and Follow-up Periods 1 and 2: Subject George. 97

9. The Sequence of Steps Involved in the Demonstration of Drinking (left column) and Eating (right column): Subject Mia. 104

10. Percent of Total Daily Intake by Person Feeding Across Baseline, Interventions 1 and 2, and Follow-up Periods 1 and 2: Subject Mia. 117

List of Figures

1.	Subject: Shea	Caloric Intake Over Baseline, Intervention, Follow-up	48
2.	Subject: Shea	Mean Intake Across Phases	49
3.	Subject: Jon	Time-Outs/Times Fed Over Intervention	62
4.	Subject: Jon	Time-Outs/Caloric Intake Over Intervention	63
5.	Subject: Jon	Caloric Intake Over Baseline, Intervention, Follow-up	64
6.	Subject: George	Solid Food Consumption in Ounces Across Days	98
7.	Subject: George	Fluid Consumption in Ounces Across Days	99
8.	Subject: George	Time-Outs/Times Fed Over Intervention 1 and 2	100
9.	Subject: Mia	Solid Food Consumption in Ounces Across Days	118
10.	Subject: Mia	Caloric Intake Over Baseline, Intervention, Follow-up	119
11.	Subject: Mia	Mean Intake Across Phases	120

INTRODUCTION

Eating disturbances can represent serious risks to the physical health of individuals which include failure to thrive, electrolyte imbalance, dehydration, and death. With patients already hospitalized for other illnesses, eating disturbances are particularly hazardous and can postpone their discharge. At times, the search for a medical basis is fruitless; thus a non-organic reason is suggested. Due to the severity of this problem, there is a constant search for a procedure which can restore regular eating patterns as quickly as possible (Lavigne, Burns, & Cotter, 1981).

The study of normal eating suggests that learning, experience, and maturation are intertwined in the development of eating. The complex development of eating is one approach to the study of eating disorders. Eating proceeds through its own intricate developmental sequences. During the first years of life, anatomical and physiological changes in the gastrointestinal tract, the reflex functions of rooting, sucking, swallowing, and neuromuscular development govern the infant's ability to tolerate various types of foods (Beal, 1980). If the developmental aspect of the feeding process is interrupted, if experience is absent, learning is prevented, or maturation is delayed, an eating disturbance will most likely be the result.

The psychological and developmental literature has emphasized the detrimental effects of hospital and institutional life on many aspects of infant development (Bowlby, 1951; Spitz, 1945, 1946). When certain developmental sequences are interrupted, repercussions occur. Hospitalized and handicapped children have a higher incidence of eating disturbances and subsequent growth failure. It has been known for years that there are devastating effects of institutionalization or hospitalization on infants and children. Both growth and development have been reported to be delayed (Bakwin, 1949; Bowlby, 1951; Patton & Gardner, 1962; Spitz, 1945, 1946; Talbot, 1963). Growth failure or failure to thrive can be a result of organic illness and/or environmental deprivation (Glaser, Hegarty, Bullard & Pivchik, 1968). Even when an organic disease is present, environmental conditions such as feeding techniques or availability of an adequate diet should be analyzed as to their contribution to growth failure (Finney and Christophersen, 1983).

In the past, the literature on failure to thrive has focused primarily on the deficiencies of the parent or the caregiver. Recently, a parent-child interaction approach has emerged to explain failure to thrive in children. Infants or children who present problems in the basic caregiving requirements (e.g. "soothability") can initiate a disturbance in or impede parent-child

interactions. This is most often found in children who have "difficult temperaments", in premature infants, and in children with neurological impairments, physical illnesses, or malnutrition (Casey, 1983). The child cannot adequately signal his/her needs and the parents or caregiver cannot adequately fulfill the child's needs. This can apply to the basic need of eating.

In addition to the impact of hospitalization and the resulting emotional deprivation in this environment, the illness, cancer or immune deficiency, and the effects of treatment for the illness must be considered in understanding the etiology of an eating disturbance. Nutritional state, itself, can also effect treatment outcome. Effective therapy may be withheld because a patient is malnourished. In addition complications occur with a higher incidence in patients who are malnourished (VanEys, 1982). Not only is treatment outcome effected by nutritional status, but nutritional status is effected by the treatment and the disease itself (DeWys, 1981, 1982; VanEys, 1982.)

In examining this relationship as it applies to cancer and related immune diseases, weight loss or failure to gain weight are some of the results of the disease. The weight loss is drawn in a large part from body muscles. The result is fatigue, weakness, and inactivity. Caloric intake is unbalanced. There is decreased oral intake, inappropriately high calolric

expenditure for activity level, or a combination of both. Decreased caloric intake is a result of localized disease-related effects (e.g. difficulty in swallowing due to the location of the cancer), systemic disease-related effects (e.g. changes in taste and smell), and treatment-related effects (e.g. taste aversions in chemotherapy) (DeWys, 1981). Depression of appetite or of the sensation of hunger is often seen and could be the result of any of the following factors: decreased digestive secretion which might delay digestion, loss of muscle of the stomach wall (which could delay gastric emptying) and changes in metabolism of glucose or increased lactate production of the tumor. These effects of the disease result in nutritional wasting in the adult and poor growth rate in pediatric patients (DeWys, 1982).

Treatment, itself, can have serious adverse effects which inhibit eating, growth rate, and nutritional status. Impaired nutrition after chemotherapy can be due to nausea and vomiting, stomatitis, constipation, diarrhea, malabsorption, dysfunction of major organ systems, or systemic effects from treatment (Ohuma & Holland, 1977). Taste is effected by the illness and by chemotherapy. An elevated taste threshold for sweet and lowered threshold for bitter has been reported in cancer patients (DeWys & Walters, 1975). In addition, the effects from treatment can result in conditioned

aversions. Learned food aversions, which have been defined as aversions to specific foods or tastes have been reported to develop as a result of association of those foods with unpleasant internal symptoms. This theory is based on animal studies and is a variant of classical conditioning (Garcia, Ervin, Koelling, 1966; Garcia, Hankins, and Rusiniak, 1974). This theory has also been confirmed in healthy normal subjects (Garb & Stunkard,1974; Logue,1979; Logue,Logue,& Strauss, 1983; Logue, Ophir, & Strauss, 1981). Subjects learn to associate a conditioned stimulus (the taste) with an unconditioned stimulus (the illness), and therefore will reject the previously acceptable foods. Both the animal studies and the human studies have common findings in regard to taste aversions; (a) aversions are acquired by one trial learning (b) acquisition of aversions involve long delays between exposure to task and subsequent unconditioned stimulus of illness, and (c) the novelty of the food has previously been shown to facilitate acquisition of aversions. An additional new finding for humans, not reported in the animal studies, is the powerful influence exerted by age. The time of highest susceptibility has been reported at 6-12 years (Garb & Stunkard,1974) and 13-20 years (Logue et al., 1981). This suggests a possible "critical period" for the formation of taste aversions in man.

In pediatric cancer patients, food aversion

learning can be achieved in a single trial and is often long lasting (Bernstein, Webster, & Bernstein, 1982). Learned food aversions also occur to a novel food. One study demonstrated that before receiving chemotherapy, children were given a novel ice cream. Those children who received drugs that cause nausea and vomiting were significantly less likely to choose the same novel ice cream given to them prior to treatment than the controls who did not receive gastrointestinal toxic chemotherapy. These results confirm a learned food aversion. Further research suggests that a novel food given prior to chemotherapy may be able to block the formation of learned aversions to familiar diet items (Bernstein et al., 1982). Learned food aversions are essential in considering weight loss and decreased appetite.

Radiation therapy, another common treatment for cancer and immune diseases also has adverse side effects which influence nutritional status and the disease state. Approximately 90% of patients who receive radiation treatment to the head, neck, mediastinum, and abdomen lose weight (DeWys, 1981). This is possibly due to acute mucosal effects and chronic effects such as decreased salivation and altered smell and taste sensations. Of all the effects of radiation, taste changes are believed to have the greatest impact on the patient. Bitter and acid tastes are believed to be most susceptible to impairment with salt and sweet being less

influenced. Most patients, however, have a gradual return of taste within one year of treatment (DeWys, 1981).

Decreased salivation from radiation creates difficulties in eating, swallowing, and talking. Salivary substitutes, artificial saliva, and foods that increase saliva are being explored to aid patients in resuming normal eating patterns. Radiation also seems to have an effect on the peripheral olfactory apparatus. Radiation, alone, or radiation in combination with chemotherapy can temporarily compromise nutritional status and ability to eat (Beal, 1980; Donaldson, 1977).

Another treatment for cancer and immune deficient diseases which effects nutritional status is bone marrow transplantation. It is usually performed as a treatment for patients with aplastic anemia, leukemia, and severe combined immune deficiency. Patients are first treated with a high dose of chemotherapy, radiation, or both to suppress immunologic reactivity. The bone marrow is infused intravenously from an appropriate donor (Gauvreau, Lensen, Cheney, Aker, Hutchinson, & Barale, 1981; Thomas, Storb, Clift, Fefer, Johnson, Neiman, Lerner, Glucksberg, & Buckner, 1975). One of the main side effects of a bone marrow transplant is a disease called graft-versus-host disease. It occurs when immunologically competent cells from the donor marrow are introduced into the host who is immunologically

incompetent and incapable of rejecting this foreign invasion. Graft-versus-host disease can occur as soon as the graft begins to grow, usually 7-11 days after infusion of the donor's marrow. It effects several target organs (e.g. skin, gastrointestinal tract, liver, and bone marrow) and can result in increased susceptibility to infection and altered nutritional state. Graft-versus-host disease can be acute or severe and is graded in severity according to the effect on the organ systems. Treatment consists of high dose corticosteroid therapy to inhibit clinical manifestations of the disease. If the disease does not respond to this treatment, administration of anti-thymocyte globulin is initiated (Brown & Kiss, 1981; Gauvreau et al., 1981). In addition, nutritional therapy is advocated. Due to the involvement of the gastrointestinal tract and possible malfunctioning of the gut, intravenous hyperalimentation is initiated periodically or maintained throughout the course of the transplant and post transplant recovery period. The gastrointestinal symptoms include degeneration of the mucosa and mucosal glands which result in diarrhea, and may be accompanied by anorexia, nausea, vomiting, abdominal pain, malabsorption, pralytic ileus, and ascites. Dietary management is suggested to provide adequate nutritional support, minimize the gastrointestinal symptoms, provide healing of the

intestinal lumen with nutrients to allow normal mucosal maturation, and enhance individual dietary requirements. The goal is to help the patient maintain predisease weight through intravenous hyperalimentation and oral intake (Gauvreau et al., 1981).

It is very important to develop techniques for producing behavior that will encourage the patient to maintain his nutritional state (Blackburn & Bistrian, 1983). It has been suggested that whenever possible the gastrointestinal tract should be utilized for digestion, absorption, and assimilation of nutrients. The most natural method is oral intake. If that is not possible, the next most feasible method is via nasogastric or nasoduodenal feeding tubes. For long term nutritional maintenance it might be necessary to insert a gastrostomy or jejeunostomy tube surgically. Optimal nutritional rehabilitation, however, is not restored quickly enough via alimentary tract feedings. Antineoplastic therapy cannot always wait until optimal nutritional status is achieved. During the past twenty years, the primary treatment modality cited in the literature and used clinically is total parenteral nutrition (TPN) (Dudrick, MacFayden, Souchon, Englert, Copeland, 1977). The gastrointestinal tract is bypassed and optimal nutritional status is rapidly restored within 7 to 10 days. One of the earliest successes of this treatment was published in 1944. The patient was a

five month old infant suffering from marasmus and expected to live no more than 1-2 days. He was placed on total parenteral nutrition for five days via the ankle veins, began to show substantial improvement, and ultimately survived (Helfrick & Abelson, 1944).

During the next 20 years, attempts to replicate these positive results were made but without success. Two major problems persisted: (1) the necessity to frequently change peripheral vein sites because of thrombophlebitis and (2) insufficient caloric and protein requirements to meet nutritional requirements. In 1966, Dudrick solved both problems by devising a method that involved the implantation and maintenance of a plastic catheter in the superior vena cava and administering concentrated IV nutrient solutions to meet the high protein and caloric demands. TPN was now viewed as a safe and effective method for nutritional rehabilitation. There are, however, potential complications of TPN. The complications that are related to central venous catheterization include insertion site contamination (e.g. contamination during insertion of routine care), catheter contamination (e.g. use of catheter to administer medications or obtain blood samples), and secondary contamination (e.g. sepsis). The most serious complication of TPN is catheter-related sepsis. Potential metabolic hazards include almost every conceivable type. The major ones are disorders of

glucose metabolism, such as hyperglycemia, glucosuria, osmotic diuresis, and coma. Most of the metabolic complications can be prevented or corrected if detected early by careful and close monitoring by the hyperalimentation team (Dudrick et al., 1977; Heird and Winters, 1983).

There are various psychosocial problems that have been reported as a result of treatment with TPN. The major consistent problems that have been reported in the literature include an early phase of anxiety, depression, fear of death, negative body image, coping disorders, adaptation disorders (marital and sexual problems), sleep disturbances, family alienation, and fear of regular employment. Psychosocical responses, however, depend on medical diagnosis, age, and the length of time on TPN (Dudrick & Englert, 1980; Hall, Stickney, Gardner & Popkin, 1981; MacRitchie, 1978; Malcolm, Robson, Vanderveen, & O'Neil, 1980).

Interventions reported in the literature for nutritional management have included primarily artificial means of feeding, tube feedings or total parenteral nutrition. When a medical basis no longer exists for lack of appropriate oral intake, a search begins for a quick effective intervention to promote normal eating patterns and ultimately replace artificial means. One then begins to look in the psychological realm for explanations and solutions. Eating disorders

in children have been narrowed down to four different types: oppositional non-eating, rumination, pica, and obesity. A retrospective chart review at Memorial Hospital identified several children that may have been suffering from oppositional non-eating and/or rumination. Therefore, these two disorders, their nature, and past treatment attempts are of interest.

Oppositional non-eating is one of the most common eating disturbances in children. It occurs more frequently among young children than adolescents. Under normal conditions, children do refuse food. Much of this refusal or opposition is well within normal limits; e.g. momentary refusal, refusal of low frequency or intensity, or an appropriate response by a child to an insistent parent (Graziano & Mooney, 1984). When it occurs beyond these limits at extremes, it becomes a serious disorder requiring immediate attention. Typically, the child refuses to eat while demonstrating oppositional behaviors. Some of the behaviors include pushing food away, turning the head away, turning whole body, aggression towards anyone who attempts to prompt eating, food holding, etc. These behaviors are elicited by any cue to the eating situation, such as the person feeding, a bottle, a spoon, or food itself (White, 1982).

Rumination is usually observed among infants, but it is also found among older children and retarded

adults. It is a condition characterized by regurgitation of previously swallowed food. Typically, the food is taken into the mouth, swallowed, and subsequently brought back into the mouth, and expelled. It appears to be a voluntary behavior and at times several activities are engaged in to produce vomiting (e.g. inserting fingers into the mouth and throat, rhythmic, chest tongue, or neck movements) (Lavigne et al., 1981). Serious physical repercussions can result from rumination, such as dehydration, malnutrition, emaciation, lowered resistance to disease, and in many cases death. Death rates in ruminative infants have been reported to occur in 10-20% of the cases (Marholin, Luiselli, Robinson, & Lott, 1980). A diagnosis of rumination and/or oppositional non-eating requires attention and intervention.

Historically, eating disturbances have been treated from many different approaches. Treatments for rumination have been widely publicized in the literature. Rumination has been treated in the past from a psychodynamic approach (Richmond, Eddy, & Green, 1958; Stein, Rausen, & Blau, 1959). Two assumptions underlie the psychodynamic approach. First, rumination is considered only a symptom of a broader syndrome in which an underlying disorder of the infant's personality is the cause. The underlying disorder could be related to depression, anxiety, or neurotic tendencies. The

infant can demonstrate this disorder in other personality problems; such as motility patterns. The second assumption states that the interaction between the mother and child is pathological. The mother is believed to be unable to relate to the baby in situations beyond feeding. The mother fails to establish an appropriate attachment with the baby due to problems of her own (e.g., personality problems, marital problems).

The psychodynamic approach involves an extended inpatient treatment by mother surrogates. The goal is for the child to establish a strong, intimate, and nurturing relationship with caretakers. Nurses or volunteers will act as the surrogate mothers. This approach is utilized on an inpatient basis and will incorporate all work shifts, thus involving several adults as surrogate mothers.

Recommendations for "Intensive Care" nurturance, and stimulation has ranged from eight hours of contact each day (Fullerton, 1963; Stein et al., 1959) to involvement throughout the infant's waking hours. The mother is not involved exclusively due to the underlying assumption that rumination is caused by the problematic mother-child relationship. It is also not feasible for the mother to constantly be in the hospital while the child is treated as an inpatient.

Among the disadvantages of this approach are; excessive demands placed upon staff members, reports of

long hospitalizations until rumination has been arrested and, very costly treatment as a result of overburdening of staff and extensive hospital stay (Lavigne et al., 1981).

A variety of other treatment approaches have been beneficial in the control of rumination. These include: dietary changes, surgery, drugs, and mechanical restraints (chin straps). These approaches, however, do not help to teach the patient how to stop vomiting (Marholin et al., 1980).

Behavioral treatments of rumination have been used since the 1960's. Electric shock was one of the first behavioral approaches to be used. The assumption of this treatment approach is that rumination is a learned habit and can be unlearned through counterconditioning. It is recognized (or accepted) that certain aspects of the mother-child interaction may be important but are usually not vital in altering the occurrence of rumination. Electric shock was initially used with mentally retarded adults (Luckey, Watson & Musick, 1968). Shortly, thereafter, this treatment approach was used with a nine month old male infant whose life was in serious danger from chronic rumination (Lang and Melamed, 1969). The onset of persistent vomiting occurred during the fifth month of life and continued until nine months of age, at which time he weighed only twelve pounds. Several other treatments were attempted

without success. Among these were; dietary changes, administration of antinauseants, restraints, and intensive nurturance. The child was being kept alive by feedings through a nasogastric pump. In order to obtain the clearest picture of the sequence of events leading up to the vomiting, electromyograph monitoring and a simultaneous nurses' description of the behaviors was collected over a two day period. Muscular changes in the throat and chin were found to indicate the onset of vomiting. Conditioning procedures were initiated which required a brief and repeated shock to be applied to the child's leg at the first sign of vomiting or reverse peristalsis. After approximately two one-hour sessions the shock was administered more infrequently. Rumination ceased after nine treatment sessions. Weight gain was noted at the beginning of treatment and continued steadily. A one month follow-up reported a 26 pound 1 ounce child and a one year follow-up reported continued thriving.

Other researchers have reported successful treatment results with electric shock in managing rumination in children and retarded adults (Cunningham & Linscheid, 1967; Kohlenberg, 1970; Toister, Condron, Worley & Arthur, 1975; Wright & Thalassinos, 1973). It has the advantages of stopping rumination quickly and requiring a shorter hospital stay. It is however, viewed by staff and parents as a harsh procedure. They

may object to its use or undermine the consistent administration that is necessary for success. Therefore, research into other alternative behavioral approaches has been necessary.

Aversive taste consequences have also been used as a treatment for rumination. This punishment procedure is based on a similar assumption as the electric shock procedure. Rumination is believed to be a learned habit; an operant that is maintained by a consequence that can be unlearned by eliminating the behavior through punishment, an aversive taste (Lavigne et al., 1981).

Sajwaj, Libet, and Agras (1974) treated life-threatening rumination in an infant by using lemon juice as the aversive taste consequence. The child was six months old, weighed eight pounds, and was suffering from malnutrition and dehydration at the time of the referral. During baseline observation, rumination was found to occur after the initiation of tongue thrusting. No physical reason could account for this disorder. Therefore, the intervention was initiated. The lemon juice therapy involved squirting 5-10cc of lemon juice into the child's mouth via a syringe as soon as tongue thrusting movements were detected. Following an ABAB design, rumination and abnormal tongue thrusting movements were eliminated after 12 treatment days. Weight gain was seen throughout treatment and continued

after discharge and at follow-up, one year later. The authors obtained positive results, but caution that lemon juice therapy can cause two potential medical complications. These include mouth irritation by the acid in the lemon juice and possible aspiration of lemon juice during administration if the head is not held properly.

Lemon juice therapy has also been reported as a successful treatment by other researchers in treating chronic rumination (Beck, Turner & Sajwaj, 1978; O'Neil, White, King & Corek, 1978). Still other researchers have reported success in treating rumination using different tastes as aversive consequences. Murray, Keele, & McCarver (1977) used tabasco sauce on the tongue of a six month old to eliminate rumination. Marholin et al. (1980) used tabasco sauce with one child and lemon juice with another child to eliminate chronic vomiting. Bright and Whaley (1968) used tabasco sauce to reduce rumination but required electric shock to successfully eliminate the behavior in entirety. Lavigne et al. (1981) report similar results with three children in using lemon juice and tabasco sauce as a treatment for rumination.

Aversive procedures using undesirable taste consequences seem to be effective in eliminating rumination. Several problems, however, with this treatment program have been noted. Delivering the lemon

juice or tabasco sauce immediately after rumination begins presents difficulties. The problem is defining onset of rumination. The result is that the child is placed on a variable ratio schedule which delays learning. Secondly, the child may become adapted to the aversive taste, therefore, losing the punishing value and effectiveness in eliminating rumination. Thirdly, parents' and staffs' objections to these procedures as harsh are considerable. Their resistance can possibly lead to a failure to carry out the procedures consistently; therefore preventing the effectiveness of the treatment (Lavigne et al., 1981).

Extinction has rarely been used alone as a technique in treating chronic rumination. Two such cases are reported in the literature (Alford, Blanchard, & Buckley, 1972; Wolf, Birnbauer,Williams, & Lawler, 1965). Wolf et al. (1965) successfully eliminated chronic vomiting in a retarded child by withholding attention when vomiting or closely related behaviors occurred. Alford et al., (1972) report the successful application of an extinction procedure using withdrawal of attention and social contact in treating a 17 year old female with a history of chronic vomiting for ten years. An ABAB design followed by a final phase to build in generalization was employed. A seven month follow-up revealed that the patient had only vomited one time after hospital discharge. It has been pointed out

that a potential danger in using extinction alone is that many nonreinforced trials are needed to extinguish the behavior. This leaves the patient vulnerable to injury due to prolonged vomiting (Graziano et al., 1984).

Extinction, however, has usually been used in combination with other behavioral techniques. Mulick, Schroeder, and Rojahn (1980) compared four different treatment procedures for chronic rumination with a 15 year old Down Syndrome male. The four treatment procedures were counterbalanced over days in a Latin square design: a) Extinction alone, b) Extinction plus reinforcement of other behavior, c) Differential reinforcement of any other behaviors than vomiting (DRO), d) Differential reinforcement of specific behaviors alternative to vomiting (DRI). The results showed that the treatment conditions that emphasized reinforcement of alternative behaviors were more successful in decreasing vomiting than DRO or extinction alone.

An additional aversive procedure used to treat rumination is overcorrection. The logic behind the overcorrection procedure is to educate the patient to assume responsibility for the disruption produced by the inappropriate behavior. The patient must correct the results of the inappropriate behavior and other behaviors closely connected with it. It is punitive or

aversive in that the correction procedure is extreme (Azrin & Wesolowski, 1975; Duker & Sey, 1977). Duker and Sey (1977) used this procedure with a profoundly retarded female who had failed to stop vomiting after various treatments of time-out, extinction combined with DRO, and aversive gustatory stimulation. After vomiting, she was shown the results of the vomiting, accompanied by verbal disapproval and followed by a twenty minute overcorrection procedure. She was required to wash her face, clean the floor where she vomited as well as other parts of the room in which she did not vomit. She was also requested to change her soiled clothes to clean ones. The treatment was based on an ABABAB design. Successful results were obtained as a function of the introduction of the overcorrection procedure as demonstrated by reduction of vomiting in treatment conditions versus reversal conditions.

Azrin and Wesolowski (1975) report favorable results in eliminating rumination in a profoundly retarded woman using a re-educative procedure similar to overcorrection, positive practice and self-correction. Whenever the woman vomited, she was required to clean up the vomit and practice the correct manner of vomiting. The proper reaction to an urge to vomit is to quickly go to a sink or toilet where one can vomit in a non-disruptive fashion. One week after initiation of treatment, vomiting was eliminated and was virtually

absent one year later.

Programs emphasizing positive consequences have been accepted more easily by parents and staff members. Treatment approaches, using social contingencies (e.g. attention and rewards to eliminate vomiting) have reported positive results. Social reward programs are the most common positive approach. They are based on the assumption that eating disturbances are a learned habit maintained by environmental contingencies (Lavigne et al., 1981). For example, chronic vomiting, seen in an infant with no discernible medical basis can possibly be traced back to when it actually became a habit. The neonate often sucks poorly, regurgitates frequently, and consumes small amounts during initial feedings. It is possible that early vomiting is a variant of normal infant regurgitation (Filer, 1982). It can slowly occur more often due to the responses by caretakers. The child is rewarded by attention from parents and a maladaptive chain of behavior develops; the child vomits, parent's attention is given, the child vomits, etc. The task of social reward programs is to change the contingencies. Attention is instead given for eating and not vomiting, but is removed after rumination (e.g. time-out procedure). Wright, Brown, and Andrews (1978) treated a nine month old female child diagnosed with ruminative vomiting, failure to thrive, and malnourishment. She was born prematurely weighing 4.5

pounds. At 3 1/2 weeks of age she began ruminative vomiting. At six weeks of age, she was placed on a seven-up and strained food diet, but rumination continued. Intermittent hospitalization, thereafter, had no effect on rumination. At 9 months of age, she was rehospitalized and referred to the authors. Over an eight day baseline period, it was observed that she did not ruminate at one particular time but intermittently throughout the day. It was determined that immediately after rumination, the nurse would pick her up and wipe her mouth. On the ninth day, the intervention was started. The nurse was instructed to leave the room immediately upon onset of rumination. Before leaving, the nurse was to remove all external stimuli from within the infant's reach. After three minutes had passed, the nurse could return, and clean up the vomitus. If there was no further rumination, the nurse was instructed to interact naturally with her. The results indicate that there was an immediate increase in rumination during the first two days of the intervention. There was an abrupt decrease to zero frequency by the fourth day. On the fifth day, the child was discharged to go home. Follow-up on the 251st and 435th day revealed continued symptom remission. Other researchers have reported successful elimination of chronic vomiting with treatment procedures using social contingencies (e.g. attention and rewards) across varied populations; retarded

children (Barmann, 1980; Bennett, 1983; Mulick et al., 1980; Smith & Lyon, 1976), normal infants (Sheinbein, 1975), and normal adolescents (Ingersoll & Curry, 1977).

In social reward programs, attention is targeted as maintaining eating problems, but in addition other researchers have suggested that the lack of stimulation maintains eating disturbances. Essentially, the lack of stimulation from other sources in the environment is replaced with food holding and/or vomiting. Therefore, special feeding techniques have been developed to compensate for reduced stimulation. Ball, Hendrickson, & Clayton (1974) claim that institutional feeding methods contain one or many characteristics that eliminate necessary stimulation in the eating situation (e.g. no active participation in the feeding process, being fed while laying on the back, pureed foods are introduced by a spoon which is quickly withdrawn scraping the upper teeth). They developed a special feeding method which encouraged the child's active participation in the feeding process as well as gustatory and tactile stimulation. The program included active biting with the nipple, "teasing tug of war games" with the nipple, squirting milk all around the child's mouth, moving the spoon around the mouth to encourage biting, and feeding the child in an upward position. They used this method with two retarded children who had been regurgitating during or after

eating. The "standard" method of feeding was alternated with the "special feeding method." During those meals in which the subjects participated in their own feeding, vomiting decreased and smiling increased. When fed by the standard feeding method, vomiting continued and the children did not smile. Increased stimulation and the special feeding method increased the children's enjoyment in eating and decreased their inappropriate behaviors.

Other researchers have maintained that a change of feeding techniques can reduce or eliminate rumination by interrupting a learned behavioral chain of ingestion, chewing, regurgitation, and at times reingestion of vomit. Jackson, Johnson, Ackron, & Crowley (1975) used a food satiation procedure to decrease rumination by 94% and 50% in two institutionalized retarded individuals. The procedure consisted of permitting the ruminators to eat double portions of the standard meal. The criterion of satiation was the subject's refusal of food twice within a one minute interval between food refusals. The results demonstrated that mean number of vomiting responses decreased during food satiation conditions when compared to baseline conditions. A ten day follow-up procedure implicated that vomiting reduction was maintained.

Foxx, Snyder, & Schroeder (1979) used a food satiation procedure in conjunction with an oral hygiene

punishment procedure to treat two institutionalized profoundly retarded persons. The satiation procedure allowed the clients to continue to consume food until two full meal portions were eaten or the client refused food twice within at least one minute intervals between refusals. The oral hygiene procedure involved cleaning the client's gums and teeth with Listerine for two minutes after each instance of rumination. Three study conditions were carried out for each client; baseline, satiation only condition, and satiation plus oral hygiene, in that order respectively. One client decreased rumination from an average of 89.5% during baseline, to 48.8 during satiation only, to 3% during satiation plus oral hygiene. The other client reduced rumination from an average of 49.9% during baseline to 7.9% during satiation only, and 1.4% during satiation plus oral hygiene. During a sixteen week follow-up, rumination for one client averaged 5% and for the other client 1.6% respectively.

In summary, there are different behavioral methods, aversive and non-aversive, that have been used to eliminate rumination. The severity of rumination should be taken into consideration to justify punishing interventions. For example, the use of contingent electric shock with children is an alternative for treatment where all other treatment attempts have failed to solve a life-threatening situation. The research

also offers, however, viable positive treatment alternatives to gain non-aversive control over rumination (Graziano & Mooney, 1984).

Behavioral approaches have also been used in the treatment of oppositional non-eating. The treatment approaches for oppositional non-eating cited in the literature use some form of positive reinforcement contingencies to increase eating and decrease oppositional behaviors. The assumption is that a reinforcing event (e.g. attention from parents) maintains the disorder of oppositional non-eating. For example, a child is ill and refuses or is unable to eat. Oppositional behaviors may begin at this time, such as pushing food away, turning head away, turning whole body away, aggression towards anyone prompting eating, or foodholding. The task of the program is to change the contingencies for oppositional non-eating. Attention and rewards, positively reinforcing consequences, are now given for eating and withdrawn for not eating and oppositional behaviors (Thompson & Palmer, 1974).

Several behavioral programs have rested on the Premack principle. This states when high frequency behaviors are made contingent on low frequency behaviors, there is an increase of low frequency behaviors. Hatcher (1979) followed this approach in treating a two year old female child with congenital dwarfism who demonstrated solid food refusal since early

infancy. The child had a complex medical history which led to multiple hospitalizations. At one year of age she was admitted for failure to thrive and it was uncovered that the mother had been force feeding the child. The mother was advised to stop force feeding, but it was determined that she was unable to follow the directions. At 26 months, the child was readmitted for severe weight loss and refusal of solid foods. A behavioral program was designed to capitalize on the Premack principle. The child was given liquids (high frequency behaviors) and praise only when she accepted a bite of food (low frequency behavior). Whenever she refused food, liquids and verbal attention were withheld. The program produced successful results by increasing weight and acceptance of a variety of solid foods. The mother was trained in the treatment procedure before discharge so that the program could be continued at home. The follow-up monthly visits at home showed weight increases and reports of increases in appetite and solid food preferences. A two-year follow-up revealed continued weight gain and solid food consumption.

Palmer, Thompson, and Linscheid (1975) had similar successful results with a six year old developmentally delayed paraplegic male child who had a history of force feeding as well. The program entailed time-out for refusal to eat, praise and offering of preferred food

for eating only designated food. A videotape of treatment sessions was used to teach the mother to successfully implement these techniques at home. The child increased food quantity and variety and gained weight. These results were sustained at a 4 month and a 12 month follow-up. Thompson, Palmer, and Linscheid (1977) used a similar technique with success to increase the range of foods accepted by a 30-month old male child with a history of complex medical problems.

Butterfield and Parson (1973) report a case study of an eight year old Down syndrome child who would not bite down on or chew any solid foods. At home, the parents and at school, the teacher spent a great deal of time attempting to get the child to chew solid foods. A treatment plan was devised in which attention was removed for not chewing; but modeling, shaping, and reinforcement were used to teach appropriate chewing behavior. The sequence of events were as follows; (a)attention removed for not chewing (b)a model demonstrated chewing behavior (c)the model was reinforced with the subject's favorite food (d)successive approximations to chewing were reinforced (e) the reinforcement schedule was attenuated. The child achieved successful chewing by the sixth session. In a 42-week follow-up, the authors reported maintained chewing of solid foods.

Carson and Morgan (1974) successfully used a

shaping procedure in reestablishing appropriate eating and eliminating food aversion in a 17 year old profoundly retarded female. The authors used a secondary reinforcer (bell ringing) to reestablish eating by using a gradual shaping procedure. A one year follow-up revealed that the subject had regained and maintained normal body weight and did not demonstrate any eating difficulties.

White (1982) used a similar program with a thirteen year old deaf retarded boy. Their treatment, however, was carried out entirely on an outpatient basis with the child's family applying the program procedures. The evening meal was made the focus of the intervention. Two reinforcing events were made contingent upon appropriate eating; (1) the opportunity to remain seated with the family at the dinner table and (2) free access to desired non-nutritive foods. The child was ignored when inappropriate behaviors occurred. Results show that his daily caloric intake rose, specifically his nutritious food intake. Weight increased from 27 kg. during baseline to 30.5 kg. by the end of the twelve week treatment period. At a twelve month and twenty-four month follow-up after baseline, his weight increased to 36 kg. and 46 kg. respectively. This case study demonstrated that behavioral programs for oppositional non-eating can be taught to parents and implemented on an outpatient basis.

Thompson and Palmer (1974) utilized a behavioral procedure emphasizing positive consequences with a 34 month old developmentally delayed male who showed oppositional non-eating. Oppositional behaviors, such as crying, throwing food, and spitting out food were reduced through extinction and time-out procedures. Appropriate eating was increased with reinforcement. The mother was successfully trained in the procedures using videotaped teaching tapes. She was able to help in the generalization of new feeding skills and patterns to the home environment.

Palmer et al. (1975) point out that oppositional non-eating is difficult to treat and is usually referred to and approached differently by professionals from various disciplines. They advocate an interdisciplinary approach and emphasize the necessity of considering the developmental, behavioral, and nutritional needs of each child.

Oppositional non-eating and rumination are two eating disturbances that have been observed to occur quite often in cancer and immune deficient populations. A thorough review of the literature reveals that there is little published research for treatment of these disorders in this population. The earliest report published was done by Wright and Thalassinos in 1973 to eliminate vomiting in a 5 1/2 year old female diagnosed with acute lymphocytic leukemia three years earlier.

The treatment approach combined shock for vomiting and social reinforcement for eating and not vomiting. Successful eating and elimination of vomiting continued until her death from leukemia five months later. As mentioned earlier, electric shock has proved successful in the treatment of rumination but is judged as a harsh treatment by parents and professionals.

Cairns and Altman (1979) report the treatment of an 11 year old anorexic pediatric oncological patient using positive social reinforcement, access to play activities, and a token system to reverse weight loss. The authors report successful results and continued weight gain followed by weight maintenance over an eight month period.

Dalton (1981) reports a case study of a 16 month old immune deficient child living in reverse isolation whose eating skills were delayed. It is mentioned that an intervention to enhance eating was successfully carried out but a lack of procedural details prevent replication.

It can be concluded that the research concerning eating problems (specifically rumination and oppositional non-eating) in the cancer and immune diseased populations has been scant. Due to the abundance of behavioral research previously cited that has been successful in treating these disorders, further research to utilize these techniques in the cancer and

immune diseased population is needed and warranted. The present project examines the efficacy of a behavioral intervention for eating disorders, specifically oppositional non-eating and rumination in this population. In doing so, it will attempt to manage a life threatening complication of prolonged illness, that of poor nutrition.

Method

Subjects

Four pediatric inpatients, two females and two males, selected from the inpatient population at a cancer hospital served as subjects. They were referred by hospital staff as having difficulties with eating. The patients were required to be pediatric oncological patients between birth and sixteen years of age.

Procedure

General Procedure

Assessment

A behavioral checklist developed for baseline observation of antecedents, consequences, or circumstances related to a feeding disturbance was developed (see Appendix 1). The checklist was only used during baseline observations and served to identify behaviors to be changed during the intervention. This observation continued for up to four days to identify the characteristics of an eating disturbance. Eating disturbances were defined in two ways: 1)the appearance of specific behavioral manifestations (i.e. rumination or regurgitation of food) and oppositional non-eating (refusal to eat accompanied by oppositional behaviors). Frequency of occurrence to prevent adequate caloric

intake for survival constituted an eating disturbance. 2)caloric intake below what is necessary for weight maintenance.

A medical assessment was carried out in consultation with the patient's physician to rule out a medical basis for the eating disturbance. During hospitalization, daily food records were kept by the child's parent(s), the staff, or the patient if an adolescent. The dietitian analyzed these records concerning caloric intake and daily nutritional adequacy. If inadequate, nutritional counseling was provided. Weekly weights were plotted on a growth curve.

Intervention

An eating program was designed for each patient taking into consideration the patient's likes, dislikes, interests, and family needs. The plan included recognition of the observed nutritional, behavioral, and developmental level of the patient, including her/his cognitive and linguistic abilities. Behavioral level was determined through the behavioral checklist (Appendix 1). Nutritional level was determined by the dietitian's intake assessment. The developmental level including cognitive and linguistic abilities were gleaned from informal observations and medical person-

nels' notes and observations. The plan was carried out by the researcher, the nursing staff, and the parents.

For the infant or young child to be fed, parents and nurses were taught the eating plan through in vivo modelings sessions with the patient. For all subjects, resulting consequences for appropriate and inappropriate responses were demonstrated. Instructions in the application of behavioral techniques for each individual patient were given.

The eating plan was intended to demonstrate that eating and drinking would result in pleasurable consequences. For the younger child; at each meal, teaching eating skills was incorporated within a socially rewarding context. Eating and drinking without vomiting or refusal to eat was encouraged with praise or material rewards. Failing to eat or drink, or vomiting was ignored, therefore, not resulting in social rewards. Instructions and social rewards were adjusted to the age of the child. The following general outline served as a framework for all children's plans.

Feedings were constructed initially five times a day to accustom the child to eating and drinking, as well as establish a set schedule. At the beginning of each session, the child was instructed in facial and mouth exercises to reduce tension in these areas and initiate modeling.

In small steps, the child was taught to eat and

drink. The feedings began with small amounts of liquid, such as juice or water. Type and amount of liquids were gradually varied upon success. Consistency of foods offered were gradually changed from liquids to semi-solids, and finally solid food. The act of eating or drinking was modeled, taught, and reinforced. A vocal and gestural description occurred throughout the procedure. For those patients on TPN, as oral consumption increased, total parenteral nutrition was adjusted.

For the adolescent, teaching basic eating skills was not one of the main issues. Teaching new eating skills to help adjust to treatment or illness consequences was necessary. For example, learning how to eat at a slower pace, or how to gradually increase oral intake were at times major obstacles. Learning how to eat within a socially rewarding context was one of the major goals. Arranging an extrinsic and intrinsic reward system with the patient was essential. A behavioral contract was prepared by the patient and therapist to the satisfaction of both. The guidelines proposed by Martin and Pear (1983) were followed:

(1) a clear statement of the target behaviors
(2) the method of data collection
(3) reinforcers to be used, their schedule of delivery, and who will deliver them
(4) potential problems and their resolution
(5) bonus and/or penalty clauses

(6) a schedule of review for progress

In addition, the contract was open to negotiation at any time, just as any intervention is open to reevaluation and adjustment.

Follow-up

At discharge, the outpatient dietitian advised the parents or patient (if an adolescent) regarding further adequate nutrition and calorie intake. After discharge, a follow-up was done (if possible) periodically over a minimum of six months. In some cases, the follow-up was not feasible due to attrition or death. Whereas, in other cases, follow-up was possible for a period longer than six months. The follow-up included periodic phone calls to determine continued eating, trouble shooting any eating difficulties, follow-up sessions if necessary, recording of food intake, weight and height status, and nutritional counseling.

Method

Subject Shea

Medical History

Shea, a white female adolescent, was diagnosed with synovial sarcoma at 15 years of age. She was started on a chemotherapy protocol which called for multiple chemotherapeutic agents to be administered in four phases. Three months later, Shea was readmitted to the hospital for en bloc knee resection and insertion of a knee prothesis. The histology report at this time revealed a diagnosis of malignant fibrous histocytoma. A new treatment regimen was initiated for the new diagnosis. During the following month, at outpatient clinic visits, the patient was warned by the doctor that her weight was not satisfactory and she would be admitted for TPN when a bed became available. Two to three weeks later she was readmitted for chemotherapy and TPN for approximately one month. The following month, 3 weeks later, she was readmitted for two days of chemotherapy. Then, the next month, 4 1/2 weeks later, she was readmitted for chemotherapy and TPN. At this time, she was seen by the psychiatrist and given Elavil for depression. In approximately three weeks, Shea had lost 2.2 kg. (about 4.8 pounds). Her nutritional status was evaluated as poor. During and after chemotherapy

she could not maintain body weight or caloric intake by oral ingestion. In addition, vomiting occurred often. Her admission weight was evaluated at the 5th percentile for her age while her height was evaluated at the 95th percentile. During this admission, Shea received her final phase of chemotherapy. Discharge depended upon nutritional status. A controversy existed among the staff as whether to discharge her on total parenteral nutrition or nasogastric tube (NG) feedings. Shea had three alternatives to choose from for discharge: total parenteral nutrition, nasogastric tube feedings, or increased oral intake.

Personal History

The personal, recreational and educational aspects of Shea's life had been disrupted with the onset of her illness. She was just entering the tenth grade with an excellent academic history. She was involved in many sports; horseback riding, skiing, and track. She played the piano and flute. Her parents described her as independent and always setting high standards for herself. The social worker claimed that her hospitalization and illness had detrimentally effected her sense of control over her environment and her independence. Shea experienced difficulty in communicating with her parents during her illness and periodic hospitalizations. Together with the social worker, a

program was arranged whereby Shea formally invited her parents to visit the hospital when she felt comfortable. This seemed to satisfy Shea but somewhat frustrated her parents.

At the beginning of her illness she continued her academic work with the help of a tutor. This, however, did not last long. She decided to take the year off and continue school the following year.

Behavioral Intervention

Referral for eating difficulties was made to the researcher. Prior to the beginning of the intervention and the day following (Day 5) the initial 4 day baseline recordings (Days 1-4), the nutritional staff persuaded Shea to try the nasogastric tube feedings. The tube was inserted and removed within the same afternoon at Shea's request. The threat, however, that the tube would be reinserted if Shea did not eat was made by the physicians and staff involved. The following day (Day 6) Shea had eaten predominantly empty caloric foods (i.e. junk foods). The subsequent day (Day 7) Shea had a drop in intake and the attending physician requested that the behavioral intervention begin on Day 8. After baseline records of total daily intake were taken, an intervention based on the behavioral approach of contingency contracting was designed with Shea. A contingency contract was chosen as the behavioral inter-

vention to help Shea develop self-control of the target behavior, eating. Baseline observations and information gathered indicated that Shea felt a lack of control. A contract serves many SD functions. It ensures that all involved agree to the goals and procedures. The goals are clearly specified, therefore the contract ensures that all parties agree on how close the patient is from reaching the goal. It also enables the patient to develop and learn self-modification.

The contract included:

1) a statement of the target behavior
2) the method of data collection
3) reinforcers to be used, their schedule of delivery and who will deliver them
4) any potential problems and their resolution
5) Bonus and/or penalties
6) progress review

The target behavior was to increase oral eating. Caloric requirement for weight maintenance was 2,000 calories. The goal of the program was to consume in nutritionally balanced meals across three consecutive days, 1500 calories, 75% of the required caloric oral intake needed for weight maintenance. Food and liquids were nutritionally balanced and chosen by Shea from the four basic food groups; milk/meat, fruits/vegetables, breads/cereals/legumes, and fats/sweets. No more than 150 calories per day (50 calories per meal) was to be

consumed orally from nutritional supplements. Counseling and teaching was provided by the diet counselors. A calorie guide was given to Shea to allow her to record calories consumed. The food record was checked and adjusted daily by the dietitian. The nursing staff closely monitored and recorded Shea's daily weights, emesis, and liquid input.

The program emphasized self-reinforcement, self-monitoring, and nutritional education. The self-reinforcement component included extrinsic and intrinsic reinforcers. Extrinsic reinforcers are reinforcers that come directly from the external environment and can be administered by the patient or another individual. The extrinsic reinforcers included discharge and ice cream to be consumed only if other nutritional requirements were met. Intrinsic reinforcers are internally controlled and can be obtained only by the patient through his/her means. The intrinsic reinforcer included regaining control over one's environment in relation to food and eating activities. Self-monitoring included calorie counting and nutritional analysis. This was taught and checked daily by the dietitian. This gave Shea more control of the program and a way to manipulate the consequences of her behavior.

Shea had previously avoided meals by sleeping late. Now, meals were to be eaten at regularly scheduled hospital meal times; 8:40 A.M., 1:05 P.M., and 6:15 P.M.

Based on her medical status, the attending physician, dietitian, and researcher determined daily criteria with the goal of gradually increasing oral intake across days. The criterion for days 8 and 9 was set to 750 calories. Shea was asked to set the criteria for Day 10 and Day 11, keeping in mind that a gradual increase was the most beneficial. She, chose, however, to attempt to achieve the total required for discharge, 1500 calories. Across all subsequent days the criterion remained at 1500 calories. The attending physician further specified that three consecutive days of a minimum of 1500 calories per day be required for discharge. The contingencies stated that the contract must be followed or the nasogastric tube would be reinserted and discharge would be prolonged or delayed. Reevaluation of progress (i.e. meeting caloric criterion in a nutritionally balanced diet from the basic four food groups) and any adjustments to the program were done on Day 10 and then daily thereafter until discharge. Shea set her goal of discharge to Day 16 in order to begin a driver's education course on Day 17.

At discharge, further nutritional counseling was provided and the program was to continue. Continued recording of intake was requested daily for approximately 3 1/2 weeks after discharge. Four day food records (i.e. a record of all food/liquid consumed and time consumed over a four day period, 2 weekdays and

2 weekend days) were requested monthly and then every 5 months thereafter. A diet scale was provided at discharge to accurately measure food at home.

Further counseling was available biweekly for two months for continuing the program. Occasional vomiting and nausea occurred the first couple of weeks at home. Self-monitoring and self-recording of these behaviors were requested. Specific details as to the time of day of nausea/vomiting, amount and type of food consumed prior to onset, activity or environmental circumstances prior to onset, and any unusual occurrences were requested. Follow-up continued periodically for nine months thereafter.

Data collection was in the form of daily calorie counts and itemized food lists.

Results

Subject Shea

Insert Figure 1

Figure 1 illustrates the effect of the treatment program. Prior to the behavioral treatment (baseline days 1-7), it was determined that Shea consumed an

average of 128.86 calories (range 0-600 calories). The food consumed was not nutritionally balanced from all four food groups; milk/meat, bread/starches/legumes, vegetables/fruits, and fats/sweets. Intervention began on Day 8 and continued until Day 15. The criterion amount was set at 750 calories for Days 8 and 9 and 1500 calories thereafter until discharge and to be balanced from the four food groups. Requirements for discharge included consumption of 1500 calories 3 days consecutively. On Day 10 and 11, total daily consumption fell slightly below the required amount. On Days 12-15, total daily intake exceeded 75% of the required oral intake, 1500 calories. On Day 16, Shea was discharged from the hospital. Shea consumed food from all four food groups throughout the intervention and all follow-up periods. It should be noted that Shea received an average of 1700 calories (range 1500-2500 calories) from total parenteral nutrition, during intervention days 8-12.

Insert Figure 2

Figure 2 represents mean intake across each phase. Mean intake consistently increased across baseline and intervention. Post treatment measures were taken during

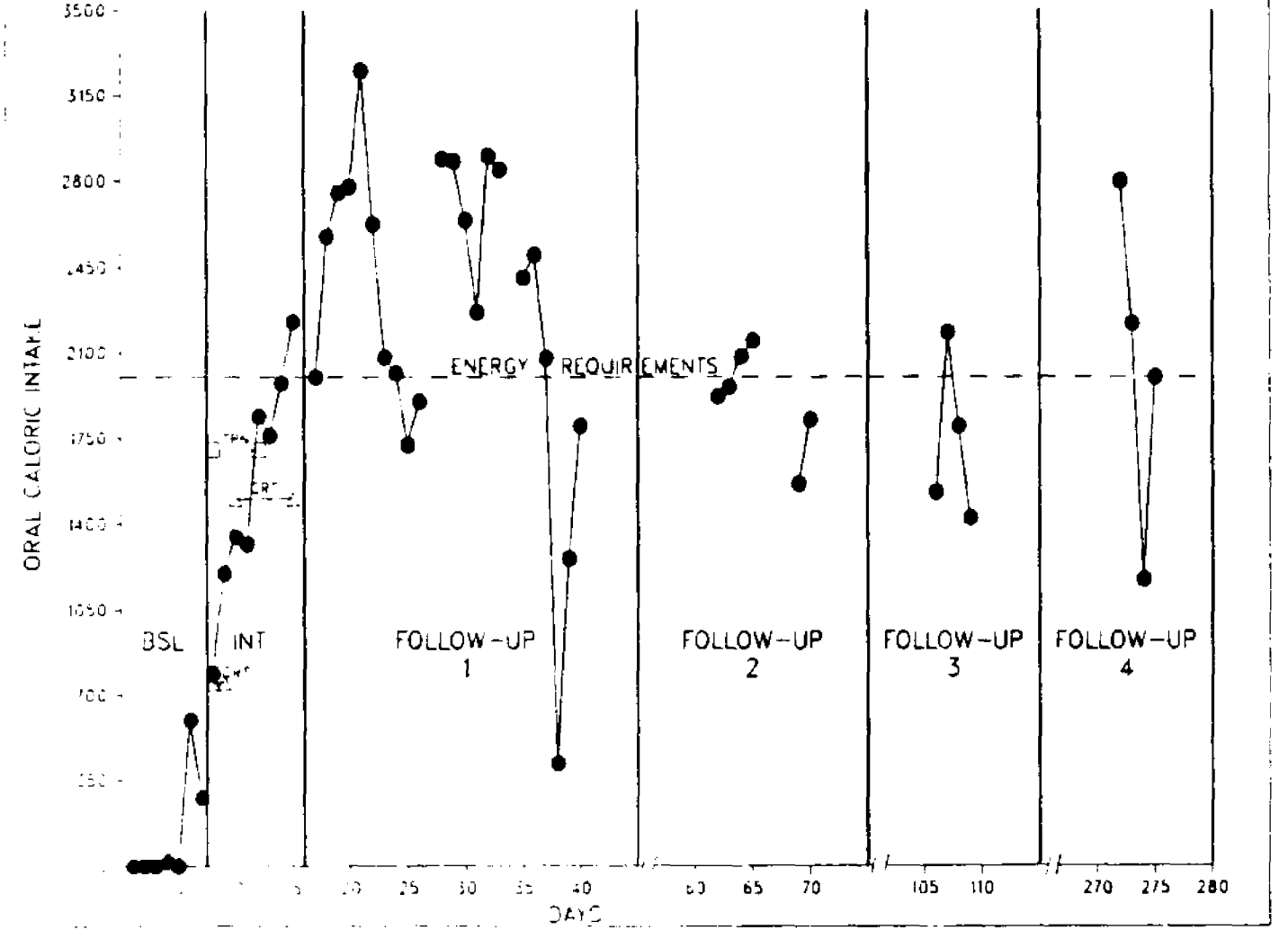
4 follow-ups periods, the last of which occurred 10 months after the program was started. The first follow-up extended from Day 16-40 excluding 3 days of non-recording (Days 16, 27, and 34). An average of 2198.9 calories were consumed across these days exceeding the 2000 calories per day needed for weight maintenance. During the 2nd follow-up, Days 62-65 and 69-70, Shea consumed an average of 2300.6 calories, still exceeding the necessary amount for weight maintenance. Records obtained at the 3rd follow-up (Days 106-109) reflected a slight drop in the average intake to 1735 calories. However, the 4th follow-up (Days 272-275) showed still adequate intake for weight maintenance as well as growth (2073.75 calories).

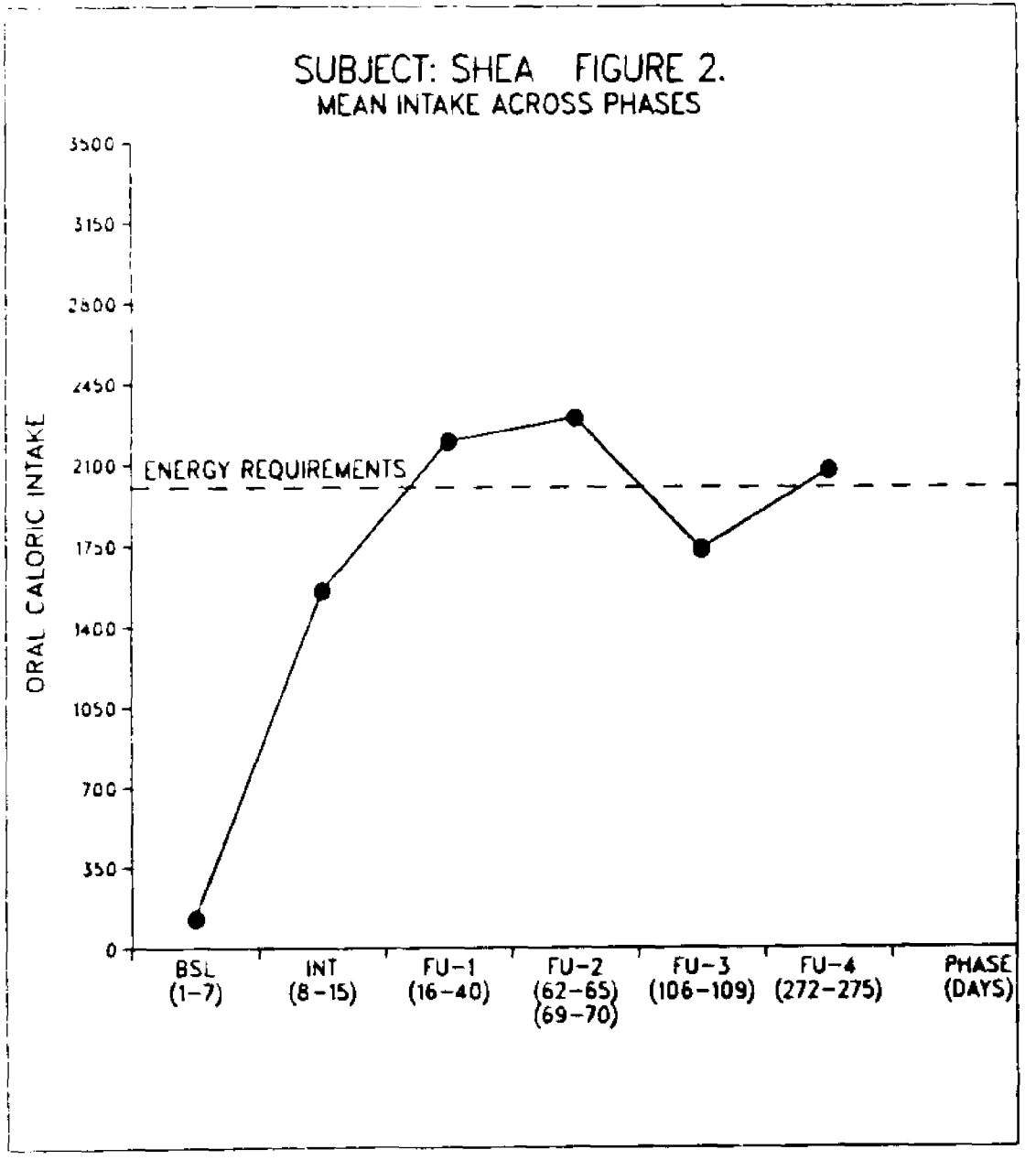
Data from follow-ups 1-4 show a sustained adequate average intake for weight maintenance. Shea's weight followed daily during treatment is not an accurate account of progress due to fluid changes from TPN and side effects of chemotherapy. Shea's starting weight, however, serves as a baseline weight level. Her weight after long term follow-up and removal of TPN and chemotherapy can be indicative of eating success in the form of weight gain. Her average starting weight before Intervention (Days 1-7) was 97.4 lbs. Her average weight on Days 272-275 was 111 lbs. Her weight 14 months post intervention was 120 lbs.

SUBJECT: SHEA

FIGURE 1.

CALORIC INTAKE OVER BASELINE, INTERVENTION, FOLLOW-UP




SUBJECT: SHEA FIGURE 2.
MEAN INTAKE ACROSS PHASES
ORAL CALORIC INTAKE
3500
3150
2800
2450
2100
1750
1400
1050
700
350
0
ENERGY REQUIREMENTS
BSL (1-7)
INT (8-15)
FU-1 (16-40)
FU-2 (62-65) (69-70)
FU-3 (106-109)
FU-4 (272-275)
PHASE (DAYS)

Method

Subject Jon

Medical History

Jon was diagnosed at two years of age with Fanconi's Anemia, an autosomal recessive, inherited type of aplastic anemia. He had a long history of poor eating patterns. At three months of age, he was diagnosed failure to thrive. His formula was changed but eating problems persisted. His mother reported that he would request several different types of food, but refused to eat upon being served.

Jon's medical condition had led to repeated hospitalizations with therapy consisting of the administration of large dosages of corticosteroids. One week after the present admission, at 4 years 3 months of age, immunosuppressive therapy began, followed by bone marrow transplantation 4 1/2 weeks later. Five days after transplantation he developed fever, mouth sores, anorexia, and graft-versus-host disease (a reaction between his body and the engrafted tissue). Treatment consisted of total parenteral nutrition and antibiotic coverage. Three weeks post-transplant, he was given milkshakes to increase oral intake. He failed, however, to consume sufficient calories for weight maintenance,

and TPN was restarted after four days. Records show that his failure to eat was the result of a decreased desire for milkshakes and probable graft-versus-host disease.

Since Jon was an only child, both parents spent most of the day visiting and participating in his care. They immediately satisfied his requests to prevent temper tantrums which they believed could affect his health. They requested the staff to treat their child in the same manner.

Behavioral Intervention

Jon was referred for eating difficulties at 4 1/2 years of age, three months post bone marrow transplantation. He had remained on total parenteral nutrition, taking only small amounts of fluid orally. At the time of referral, his medical condition was stable but discharge depended upon increased oral intake and cessation of total parenteral nutrition.

After medical testing had ruled out a physiological basis for not eating, a four day baseline period permitted observation of the child during meals and measurement of his food consumption prior to intervention. Measurement and observation during base-line confirmed low levels of oral intake (i.e. 60 calories of liquid intake) and oppositional non-eating.

A behavioral treatment began which involved five components: eye contact, oral stimulation, modeling, social reinforcement, and a token economy. Feedings were arranged 4 times a day at varied times to prevent temporal conditioning. The initial oral intake would be liquids (e.g. apple juice, milk, etc.) which would be changed gradually to solids (e.g. strained bananas, pudding etc.) upon success. Since he had not eaten for many months this would allow a recapitulation of the developmental introduction of drinking and eating. With the exception of medicine administration there was a lack of past stimulation or contact around the facial area which warranted a reacclimation to stimulation in this area. The oral stimulation component was conducted as follows:

While sitting across from Jon, eye contact was first established by verbally requesting him to look at the person feeding him and then reinforcing approximations to this behavior. Initially, the person feeding Jon modeled the procedure first while vocalizing the description. Modeling was used to present a sample of the appropriate oral stimulation procedure to induce Jon to perform a similar procedure:

I am massaging my cheeks.

I am massaging my lips.

I am massaging my gums.

I am rubbing my teeth with my forefinger.

I am massaging the internal area of my cheeks.

I am moving my tongue around in my mouth.

This procedure was then performed with Jon while again verbally describing the procedure. Physical guidance was used to induce Jon to go through the motions of the oral stimulation procedure.

The next phase was modeling eating or drinking. Again modeling was used to present to Jon a sample of the appropriate behavior of eating/drinking and to induce him to engage in a similar behavior. Mutual eye contact was acquired followed by a gestural and verbal demonstration of how to drink and/or eat.

Table 1

The Sequence of steps involved in the demonstration of drinking (left column) and eating (right column):

Subject Jon

LIQUIDS	SOLIDS
1. Straw to mouth	1. Spoon to mouth
2. Open mouth	2. Open mouth
3. Put straw to mouth	3. Put spoon with food in mouth
4. Suck liquid	4. Chew food if necessary
5. Swallow (emphasize)	5. Swallow (emphasize)
6. Clap if successful	6. Clap if successful

In order to provide a social eating situation for a child who was in isolation to prevent germ contact from the environment, the researcher, a nurse, or parent always ate the same meal at the same time with Jon. Reinforcers were delivered consistently and immediately after every successful trial. A successful trial was defined as one in which liquid or food was swallowed.

Immediate rewards included verbal praise (e.g. "Good boy, nice job, I'm so proud of you."), physical contact (e.g. patting on head) and gestures (e.g. clapping). A "time-out" period followed every unsuccessful trial which occurred when Jon refused to eat or drink, spit out food, vomited, or complained of pain. These inappropriate behaviors were observed during baseline or reported by staff as having been demonstrated in the past by Jon. Time-out, a response contingent withdrawal of positive reinforcement was utilized following unsuccessful trials. Attention, identified as a positive reinforcer was withdrawn after the inappropriate behaviors to decrease the possibility of their occurrence. Every person feeding Jon was instructed to follow the same time-out procedure for the specified interval; 1) to move physically away from Jon 2) occupy oneself with another activity 3) Do not to speak to Jon 4) Do not establish eye contact with Jon.

The consequences involving a "time-out" procedure after an unsuccessful trial were as follows:

1) If Jon refused to eat or drink, coaxing was prohibited, and he was TIMED-OUT for 3 minutes. The eating/drinking demonstration was begun again. If he ate or drank, a reinforcer was given. If he still refused to eat or drink, the session was ended and followed by a TIME-OUT period for 10-15 minutes.
2) If Jon would drink or eat only part of the criterion

amount for that session and refused to consume any more, he was TIMED-OUT for 3 minutes. Then the eating/drinking demonstration was begun again. If he ate or drank, a reinforcer was given. If he still refused to eat or drink, the session was ended, and he was TIMED-OUT for 10-15 minutes.

3) If he spit out or vomited the drink or food, he was TIMED-OUT for 3 minutes. Then the eating/drinking demonstration was begun again. If he ate/drank without spitting out or vomiting, then he was rewarded. If he spit out or vomited again, the session was ended and he was TIMED-OUT for 10-15 minutes.

4) If Jon would not eat because of pain claimed to occur immediately before or during a session, the nurse was immediately called to care for the pain. If medication was given, then the medication was allowed to take effect and the session was resumed. A complaint of pain in the same area was followed by a TIME-OUT of 3 minutes. Then the session was resumed by beginning with the eating/drinking demonstration. If he ate or drank, he was rewarded. If he refused again, the session was ended and he was TIMED-OUT for 10-15 minutes.

A successful session occurred when the criterion amount of food and/or liquid was consumed. Criterion was to be increased daily in stepwise fashion as the previous days' criterion was met. A successful session

was followed by additional reinforcers (e.g. reading a book, mom/dad coming into the room and praising Jon, a sticker for each successful session.).

In addition, a token economy was designed to teach Jon the concept of delayed reinforcement. Baseline observations revealed that Jon's desires were immediately gratified by his parents. In addition, his parents insisted that the staff do the same so as to prevent Jon's temper tantrums which they feared could be harmful to his health. The token economy required that one penny be given for each successful session. After 4 pennies were accumulated they could be exchanged for a toy. The toys were wrapped so as to resemble a celebration.

An unsuccessful session was one in which criterion was not met or one that had to be terminated for any of the above described reasons. An unsuccessful session was not followed by reinforcers.

Seven different staff members and the patient's parents implemented the program with Jon at varied times over the nine day treatment period. The likelihood of generalization of eating across individuals was enhanced by the very nature of the design. The treatment was discontinued at the parent's request on the tenth day followed by two days of post-treatment measurement of food consumption. Jon was then discharged to go home.

Data collection was in the form of daily food

records to be completed by the staff person or parent feeding Jon. The form requested the amount of food/liquid consumed, type of food/liquid consumed, where the meal was eaten, who was present, the time of the meal and the number of time-outs implemented, if any. This information was then analyzed.

Results

Subject Jon

INSERT FIGURE 3 & 4

Demonstration of inappropriate oppositional behaviors (i.e. refusing to eat, turning head or whole body away from the person feeding or the food, complaint of pain, etc.) resulted in time-outs. If oppositional behaviors decreased then time-outs would in turn decrease. It should follow that as times fed increased, oppositional behaviors should proportionately decrease. Figure 3 shows a decrease of the proportion of time-outs to times fed across intervention days 5-12. Day 13 is not included because time-outs on that day were not recorded.

It should also follow if the program is successful,

caloric intake should increase as time-outs decrease. Figure 4 shows a proportionate decrease in time-outs to calories consumed across intervention days 5-12. Day 13 is not included since time-outs on that day were not recorded. If time-outs decreased as calories increased, the intervention was successful. The goal of the program was to increase caloric intake and decrease oppositional behaviors as reflected by the reduced time-outs.

Figure 5 shows the success of the treatment program. The curve depicts only what he was given to eat or drink, thereby reflecting an increase in the consumption criterion during treatment. Prior to the behavioral treatment the nurses determined that Jon orally consumed 60 calories per day (baseline days 1-4). Intervention began on Day 5 and continued until Day 13. Criterion amounts were determined daily based on the previous day's success. Criteria were set individually for liquids and solids. Figure 5, however, represents total caloric criterion for a given day. Total daily criteria were met every day except days 6,7, and 12. On day 6, Jon was not allowed to consume 2 meals due to medical tests. He did, however, meet mealtime criteria for the remaining two meals given on that day. On day 7, Jon was fed only 3 times instead of the required 4 times in a day. During those meals, he did consume the criterion amount for a meal. On Day 12, new types of food, lower

in caloric value, were introduced to extend the range of foods, resulting in decreased caloric intake for that day. Although Jon consumed the criterion quantity of food for that day, the amount of calories is slightly below required caloric criterion. The maximum caloric intake, on Day 13, was only slightly below required intake (1340.5 calories), based on weight and average energy expenditure for a hospitalized child (Gruskin,1976). It should be noted that during the entire intervention phase, Jon received an average of 818 calories (range 784-1029) from total parenteral nutrition, which is plotted in Figure 5.

Post treatment measurements were taken on Days 14 and 15, during which time oral intake remained high at 1000 calories. Intravenous nutrition was not given during this time. The patient was discharged on Day 16. Subsequent medical problems precluded a follow-up.

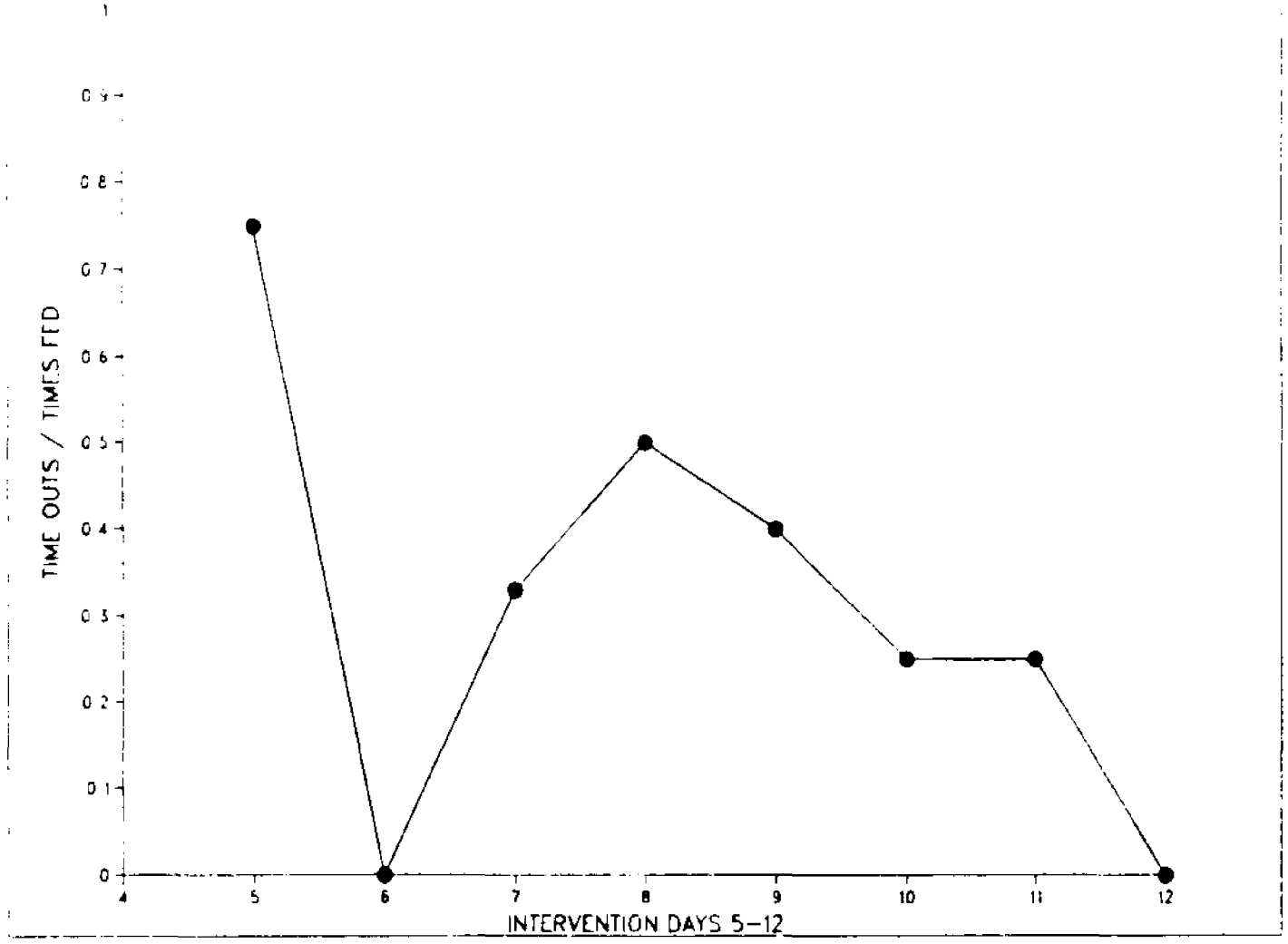
INSERT TABLE 2

A major concern in behavioral research is generalization of newly acquired target behaviors to new situations or new individuals. Generalizations of new behaviors to new individuals allows us to make a statement about the effect of the intervention technique

itself and exclude possible interpretations of the trainer acting as the SD . The intervention program for Jon was implemented by 9 individuals; the researcher, both parents, and 6 nurses. Table 2 shows generalization of eating with different people feeding Jon introduced across days. Jon consumed food/liquid from every person feeding him. The amount, however depended upon times fed and the particular day fed (as the days progressed mealtime criterion increased). Generalization across individuals increases the probability of behavior maintenance and demonstrates the success of the treatment techniques.

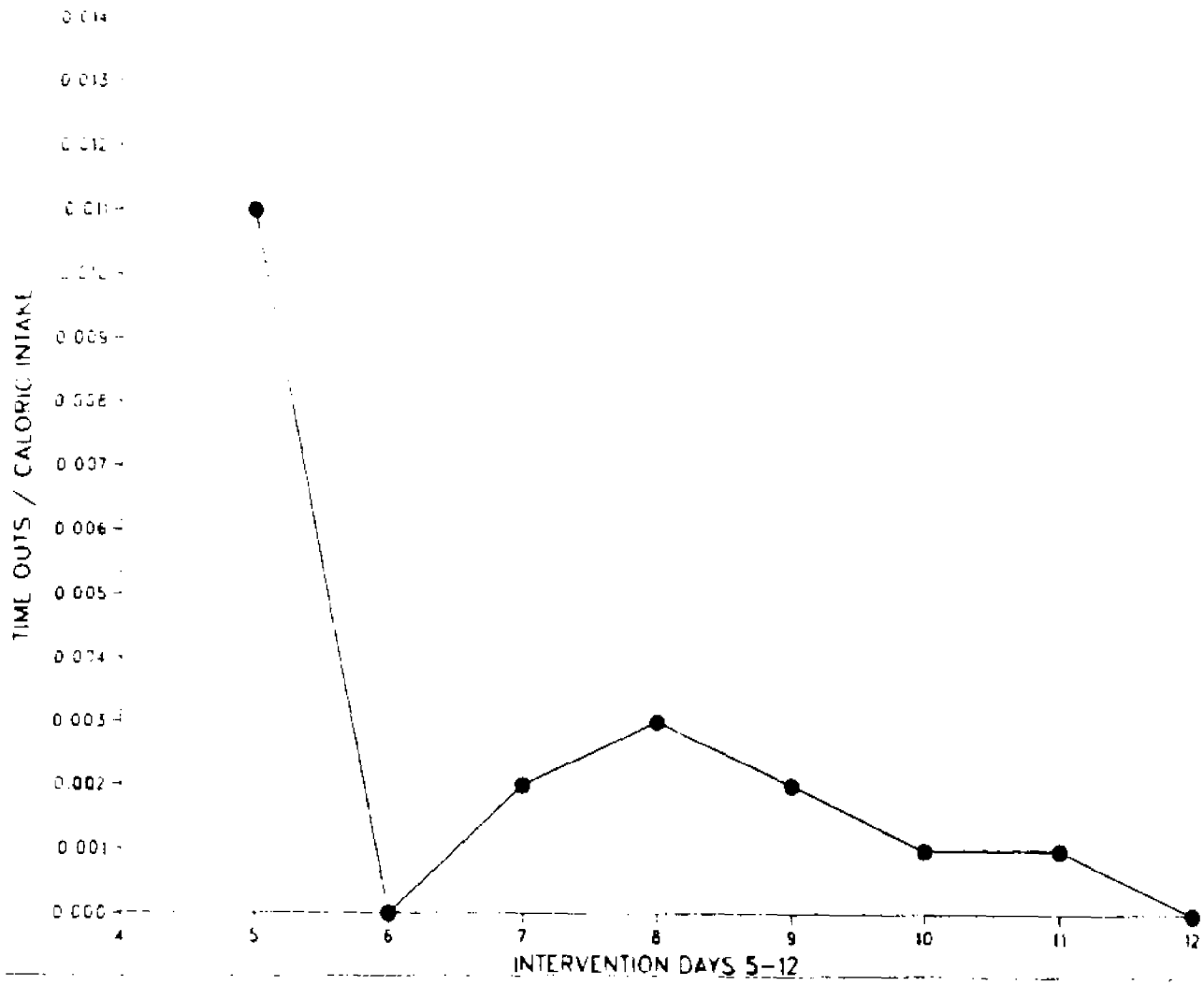
SUBJECT: JON FIGURE 3.

TIME OUTS / TIMES FED OVER INTERVENTION



SUBJECT: JON FIGURE 4.

TIME OUTS / CALORIC INTAKE OVER INTERVENTION



SUBJECT: JON

FIGURE 5.

CALORIC INTAKE OVER BASELINE, INTERVENTION, FOLLOW-UP

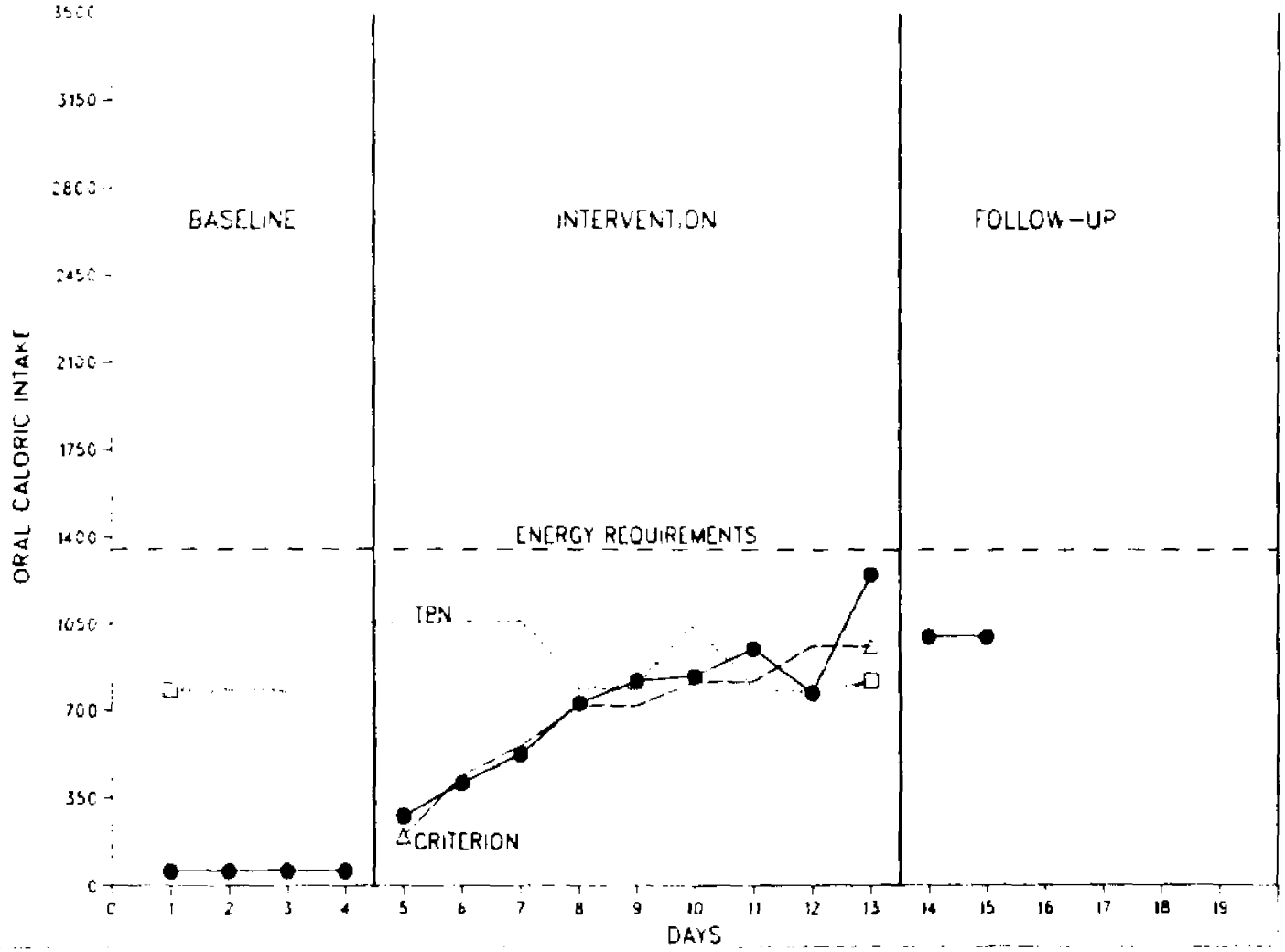


Table 2
Generalization of Eating with Different People Feeding Introduced Across Days: Subject Jon

Person Feeding

			Nurse							
	Resear	Father	A	B	C	D	E	F	G	Mother
Days										
5	61	11	28	-	-	-	-	-	-	-
6	41.5	-	-	58.5	-	-	-	-	-	-
7	-	-	-	46	27	27	-	-	-	-
8	75	25	-	-	-	-	-	-	-	-
9	-	-	36	-	-	-	42	-	-	22
10	-	-	29	-	71	-	-	-	-	-
11	69	2.5	-	-	-	-	28	-	-	-
12	-	-	-	-	-	-	-	31	32	37
Total Cal. Fed	1449	50	800	480	740	140	573	240	252	468
Percent Total Cal.	28	1	15.4	9	14	2.7	11	4.6	4.9	9

Method

Subject George

Medical History

George, a male infant, was diagnosed at four weeks of age with failure to thrive and pneumonia. At six weeks of age, he was diagnosed with severe combined immune deficiency (SCID), a genetically transmitted illness that results in the absence of a functioning immune defense system. His illness required continuous hospitalization with special isolation restrictions to prevent exposure to any germs. Initially, he was hospitalized on a pediatric floor in a traditional hospital room. He was placed, however, on reverse isolation restrictions and cared for in a laminar air flow crib. The laminar unit in the crib filtered the air to eliminate or reduce germ contact. All who entered the room were required to be scrubbed, gowned, gloved, and masked. This prevents skin-skin touching and eliminates microbial transfer.

At four months of age, he received a bone marrow transplant from his mother. The bone marrow engraftment was not successful. George was then transferred to a more sterile room in the bone marrow transplant unit. Here, he was placed in a laminar air flow room in which

stricter sterile conditions are followed. In this environment, at ten months of age, he received a second bone marrow transplant from his mother. Two months later, he was transferred back to the pediatric floor and placed under reduced isolation restrictions. His engraftment of donor bone marrow was still questionable. He remained hospitalized under observation for engraftment until 14 months of age. Evidence of a graft coming in permitted discharge. He was readmitted, however, two weeks later with sepsis, a severe infection of the blood. Antibiotic coverage continued for two weeks and then he was discharged again. He remained at home for three months until severe diarrhea and weight loss prompted readmittance. Malabsorption and absence of engraftment were confirmed. In addition, a diagnosis of hepatic carcinoma was uncovered.

Social History

George was the second child of young unmarried parents. Their first child expired in infancy from severe combined immune deficiency diagnosed post mortem. George's mother visited every day. George's father seldom visited. He rarely provided emotional support, but consistently provided some financial support.

Behavioral Intervention

George was first referred for eating problems at nine months of age, five months after the first bone marrow transplantation. George was mainly supported nutritionally through TPN. He did supplement his diet orally with formula. His intake, however, was inconsistent from day to day and was unable to supply adequate nutrition or energy for survival. His medical condition was stable but preparation for an additional bone marrow transplant was being made. He was transferred from the pediatrics floor under reduced sterile precautions to more severe isolation conditions on the transplant floor. Since his medical status, a diagnosis of SCID and lack of a successful engraftment, could not rule out a physiological basis for not eating, only monitoring of eating/drinking was done until after the second bone marrow transplant. Approximately one month after the second bone marrow transplant, a four day baseline observation was carried out for measurement of food/liquid consumption and identification of eating difficulties. The baseline data revealed low oral intake of liquids and virtual absence of semi-solid or solid food intake. Eating difficulties included oppositional non-eating (e.g. refusal of liquids/foods, aggression towards the person feeding, and holding food/liquid in his mouth) and rumination.

The goals of a treatment plan included an attempt

to make eating pleasurable, increase semi-solid and solid food consumption, increase the variety of food consumption and eliminate rumination and oppositional non-eating (i.e. head and body turning, pushing food away). The realization that the developmental sequence of eating had never taken place suggested that the treatment plan must incorporate gradual progression of eating in small steps. The long term goal was to eventually bring eating skills and consumption up to an appropriate age level. A treatment plan was developed which involved oral stimulation, modeling, and reinforcement, and time-out. Feedings were arranged six times across a 24 hour period (9:00 a.m., 12:00 p.m., 3:00 p.m., 6:00 p.m., 9:00 p.m., and 4:00 a.m.). Sessions were limited to 20-30 minutes to prevent reported one hour feeding times. Medicine was to be given at least 1/2 hour before feedings or 1/2 after feedings. Baseline observations revealed that staff was always visiting George and that the television was constantly playing. For each feeding all distractions were removed; the television was turned off, the door was closed, and a sign was posted, "FEEDING TIME, PLEASE DO NOT DISTURB." A clear face mask was constructed so as to allow George to view the mouth area of the person feeding him. The plan was to begin to introduce Isomil formula and gradually fade in by successfully offering increasing amounts.

The oral stimulation component consisted of first establishing eye contact with George, then massaging his cheeks, lips, gums, and internal area of mouth. Initially the person feeding George modeled the procedure first while vocalizing the description. Modeling was used to present a sample of the appropriate oral stimulation procedure to induce George to perform a similar procedure. This component served to acclimate George to stimulation and use of these areas.

The next phase included a demonstration of how to drink and/or eat (see Table 2). Again modeling was used to present a sample of the appropriate behavior and induce George to engage in a similar behavior. Eye contact was first established to insure George's attention. Then the demonstration followed as close as possible within the constraints of a face mask. The person feeding George continued to feign eating with him throughout the session.

Table 2

The sequence of steps involved in the demonstration of drinking (left column) and eating (right column): Subject George

Liquids	Solids
a) Put the bottle to your mouth	a) Put the spoon to your mouth
b) Open your mouth	b) Open your mouth
c) Put the bottle in your mouth	c) Put the spoon in your mouth
d) Suck the liquid	d) Smack with the baby food
e) Swallow-emphasize and point to throat	e) Swallow-emphasize and point to throat
f) Clap for self	f) Clap for self

After every successful trial, defined as one in which a mouthful of food or liquid was ingested, reinforcement followed. Reinforcement included physical contact (e.g. stroking, patting, hugging, holding), verbal and gestural praise (e.g. "Good boy," clapping). A "time-out" period followed every unsuccessful trial. An

unsuccessful trial was one in which he refused to eat or drink, did not drink or eat the appropriate amount for that session, spit out or vomited, or held food in his mouth for more than 30 seconds. These inappropriate behaviors were observed during baseline or reported by staff as having occurred in the past. Every person feeding George was instructed to follow the same time-out procedure for the specified interval:

1) Move physically out of George's line of vision for the specified time interval.

2) Do not speak to George.

3) Do not establish eye contact with George.

The behaviors resulting in the consequence of a time-out included:

1) If George refused to eat or drink, coaxing was prohibited and he was TIMED-OUT for 1-2 minutes. Then the eating/drinking demonstration began again. If he ate or drank, a reinforcer was given.

If he still refused to eat or drink, coaxing was prohibited and he was TIMED-OUT for 1-2 minutes. Then the eating/drinking demonstration began again. If he ate or drank, a reinforcer was given.

If he still refused to eat or drink, the session was ended and George was put back in the crib and TIMED-OUT for 10-15 minutes. If he ate/drank the

session was continued.

2) If George would eat or drink only part of the criterion amount for that session and refused to eat/drink anymore, he was TIMED-OUT for 1-2 minutes. Then the eating/drinking demonstration was repeated. If he ate/drank a reinforcer was given.

If he refused to eat/drink he was TIMED-OUT for 1-2 minutes. Then the eating/drinking demonstration was repeated. If he still refused to eat or drink, then the session was ended, he was put in the crib, and TIMED-OUT for 10-15 minutes. If he ate/drank, he was reinforced and the session continued.

3) If George spit out or vomited he was TIMED-OUT for 1-2 minutes. Then the eating/drinking demonstration was begun again. If he ate/drank without spitting out or vomiting, then he was rewarded. If he spit out or vomited he was TIMED-OUT for 1-2 minutes. Then the eating/drinking demonstration was repeated. If he spit out or vomited again, the session was ended, he was put in the crib, and TIMED-OUT for 10-15 minutes. If he did not spit out or vomit, the session continued.

4) If George held food in his mouth for more than 30 seconds instead of swallowing, he was TIMED-OUT

for 1-2 minutes. Then the eating demonstration began again. If he swallowed and did not hold food in his mouth, then he was rewarded and the session continued. If he held food/liquid in his mouth again, he was TIMED-OUT for 1-2 minutes. Then the eating/drinking demonstration began again. If he did not hold food/liquid, then he was rewarded and the session continued. If he held food/liquid, the session was ended, he was put in the crib, and TIMED-OUT for 10-15 minutes. A successful session occurred when the criterion amount of food and/or liquid was consumed. A successful session was followed by additional reinforcers (e.g. new toys, playtime, holding George).

The nurses, mother, and the researcher alternated in feeding George. Each nurse and the mother were trained in the program by the researcher. Periodic observations were made to increase consistency of techniques. George developed progressively worse mouth sores on the third day of the implementation of the behavioral program. Since one of the purposes of the program was to teach George that eating could be pleasurable and rewarding, the program was temporarily discontinued until his condition improved. Consultation, however, continued to help find ways to make drinking less painful (e.g. use of a softer premee nipple, cold liquids, etc.).

Data collection was in the form of daily food

records completed by the mother or staff person feeding George. The form requested amount of food/liquid consumed, type of food/ liquid consumed, where the meal was eaten, who was present, and the time of the meal. This information was then analyzed.

The program was formally restarted approximately two months later followed shortly by discharge. Ten days prior to the reinitiation of the intervention, TPN was discontinued. This decision was solicited by the social worker and mother. The mother, however, was told that adequate consumption must be maintained or TPN would be restarted. The mother was left with George without support or guidance over the weekend. Reports indicated that the mother used forceful techniques to induce eating (e.g. nose squeezing, yelling, forcing his mouth open, etc.). Baseline observations were again made over a four day period. An additional goal of the intervention was now that of teaching the mother appropriate techniques to feed George and the use of time-out to reduce the mother's tension in the eating situation. Baseline observations noted the following inappropriate behaviors performed by the person feeding George (mother and nurse) and by the child: mother/nurse - coaxing, force feeding, offering many different foods in a session, lengthy sessions (up to one hour), yelling, reinforcer of inappropriate behaviors (by hugging, rocking) and television watching

while feeding.

child - gagging, ruminating, oppositional non-eating, crying, food holding.

The program designed initially was revised and reinitiated to eliminate these problems.

Before discharge, additional caretakers were trained in the behavioral program to assure continued consistency of techniques as well as enhancement of generalization of eating/ drinking to the new home environment.

Biweekly or weekly follow-ups via telephone continued for several months. Clinic visits for medical check-ups were combined with follow-up eating sessions to insure maintenance of established skills. Daily food records were filled out by the caretaker or person feeding George. This included amount consumed, description of food/liquid consumed, person feeding, and time of feeding. Periodically, the dietitian analyzed the nutritional content and caloric value of these daily records. Feedback and nutritional counseling were then provided to the mother.

Readmittance three months later for a medical investigation regarding persistent diarrhea and weight loss enabled continued monitoring of the behavioral eating program. Tests confirmed malabsorption and further medical complications. The program was therefore discontinued. The patient died several months later.

RESULTS

Subject George

To reiterate, the goals of the behavioral intervention for George involved an attempt to make eating pleasurable, to increase semi-solid food consumption, and to eliminate rumination and oppositional non-eating. In addition it was necessary to progress gradually through the developmental sequence of eating (i.e., to begin with formula, move to small amounts of baby food beginning with cereal,etc.). The ultimate goal was to reach a 12 month level of eating and drinking in quantity, consistency, and variety.

In this particular case, the quantity of intake was used as a guideline instead of calorie intake. This was suggested by the consulting dietitian to insure an adequate balanced nutritional intake. Caloric consumption does not always guarantee a balanced diet. Caloric intake, however, was reviewed to determine if weight maintenance and weight gain were possible. Caloric requirements were based on a formula devised for hospitalized children determined by weight and activity level (Gruskin, 1976).

Table 4 shows 4 day baseline mean values of

consumption in calories and ounces before the first intervention, before initiation of the second intervention, and prior to cessation of the program. Average daily requirements for initial weight maintenance derived from norms for a hospitalized child are presented at the bottom of the table. After the first intervention was halted abruptly due to the development of severe mouth sores which led to his inability to eat and drink, the program began on Day 5 after 4 days of baseline. The mouth blisters became apparent and uncomfortable on Day 8 and the program was discontinued on Day 12.

After the second intervention George did meet and exceed requirements for total calories, volume and caloric values for both liquids and solids.

Insert Table 4

It should be noted that George received an additional average of 400 calories via TPN during the initial intervention which is not indicated in Table 4. TPN was discontinued on Day 58, 10 days prior to the second intervention. Oral supplements, however, were begun on Day 55 and were continued throughout until Day 152.

George received an average of 178.62 calories per day from oral supplements (range 0-1178.75) which is not shown in Table 4.

T-tests were performed to determine if a significant difference between means existed at different phases (see Table 5). In examining Table 5-values are presented comparing mean values of total caloric consumption and liquid and solid consumption in ounces. The phases compared include BSL prior to the first intervention versus prior to the second intervention, BSL prior to the second intervention versus prior to the cessation of the program, and follow-up versus Baseline prior to the cessation of the program.

Insert Table 5

T-values comparing mean values before and after the first and second intervention phases are significant either at the 5% or 1% level. Therefore, it can be suggested that the first treatment program and initiation of the second treatment program very probably produced an increase in intake of total calories, liquid and solid caloric intake, and the quantity of ounces of

liquids and solids. When mean values of total intake were compared prior to the first intervention versus follow-up, follow-up values were significantly higher at the .01 level. When mean values of total intake were compared prior to the cessation of the program versus follow-up, follow-up values were significantly lower (.01 and .05 level). It should be noted that follow-up values were gathered when hospitalization for a medical work-up took place to determine the reason for failure to gain weight. Lower values of consumption are questioned here. Were these lower values a result of the effects of hospitalization, illness, or other reasons.

An adequate balanced diet was a further consideration. Specific amounts of food requirements in several categories are the usual nutritional guidelines followed. Table 6 shows the amount suggested from each food group for an infant at the 50th percentile for height and weight at 12 months of age. At 12 months of age, George weighed 6.8 kilograms and was 25 inches in length (64 cm.). His weight for his height was below the 50th percentile. However, when his weight and height are compared to the norms for his age, he falls very far below the 5th percentile. This should be considered when evaluating his intake and comparing it to the average daily consumption of a 12 month old at the 50th percentile for weight and height (see Table 6). The

comparison of weight and height to normative data for age is possibly unjust in George's case as in any chronically ill child. He did, however improve his intake across time (i.e. before the first intervention, before the second intervention, and after the second intervention). In several categories (milk, fruit, vegetables, toast, and crackers), he either consumed the specific amount or exceeded it. In other categories (juice, cereal, meat, and eggs) he fell slightly below the suggested average intake. It was essentially impossible to determine the exact amount of potato and starch intake from the records provided by George's mother.

Insert Table 6

New types of food were encouraged to extend the range of foods in George's diet. Table 7 shows the increment in food variety across time (before the first intervention, before the second intervention, and after the second intervention). Before the first intervention George only consumed Isomil. Before the second intervention, there was a total of 30 new foods and liquids in George's diet. After the second intervention, there was a total of an additional 35 new

foods and liquids in George's diet. New foods at different phases are indicated by highlighted print.

Insert Table 7

Generalization of eating across individuals is important in demonstrating the success of an intervention technique as well as substantiating the claim of behavior maintenance. Generalization of eating was seen with George across a total of 38 people feeding him during Intervention periods 1 and 2 and Follow-up periods 1 and 2. The people feeding George included his mother, father, the researcher, doctor, mother and researcher, aunt and researcher, social worker, grandmother, babysitter, volunteers A and B, and 27 nurses.

Insert Table 8

Table 8 shows the percent of total intake from 23 individuals feeding George during each phase. Data in Intervention period 1 is shown daily. There were a total of 6 people feeding George during this phase

contributing from 3-100% to George's total daily intake. During Follow-up period 1, data is sampled and shown for every 5th day. Three individuals feeding George from the previous Intervention period 1, George's mother and 2 nurses were the only constant figures. Twenty-two new individuals (9 of which are shown) participated in George's feedings. There was a total of 25 individuals feeding George in this phase. During Intervention period 2, data is also shown for every 5th day. Eleven familiar individuals continued feeding during this phase; George's mother, the researcher, and 8 nurses. Eight new individuals were also introduced to feed George during this phase. There was a total of 19 individuals feeding George in this phase. During Follow-up period 2, there were 6 familiar individuals feeding George, George's mother, the researcher, and 4 nurses. In addition, 2 new individuals were introduced to feed George, 2 nurses, totaling 8 individuals feeding him for this phase. Generalization was instituted across a range of 38 individuals to enhance maintenance of these new eating behaviors.

Figures 6 and 7 further show the success of the treatment program. Figure 6 depicts solid food consumption (in ounces) and Figure 7 depicts liquid consumption (in ounces). Both Figure 6 and Figure 7 reflect an increase in consumption during treatment.

Insert Figures 6 and 7

In first examining Figure 6, prior to the behavioral treatment, George consumed 0 ounces of semi-solid or solid food. The long term goal amount of semi-solid and solid food intake was set at 15.6 ounces, the desired amount for an average child 12 months of age. Smaller goals were set intermittently based on the mother's report of George's performance. The first intervention began on Day 5. Initially, strained baby food would be offered, but not required. Later criteria would be set based on success from liquids. Food was first offered on Day 7 at one meal. George consumed one ounce. Food was also offered on Day 8 and Day 9. Mouth sores appeared on Day 8 and became progressively more painful. The first program was discontinued on Day 12. During that time, George's mother was encouraged to continue feeding George. At her request, a second program would be initiated. Food intake continued to vary. On Day 69, the second intervention was initiated at the mother's request. Criterion consumption indicated by the plotted triangles was set at 1 ounce per meal 5 times a day. The criterion was increased on Day 73 to 1.25 ounce per meal, 6.25 in total each day. George was discharged home on Day 73. Total daily criterion was

not met because George was not being fed 5 times daily. However, George was consuming the criterion amount for each meal given. Therefore, mealtime criterion increased to 1.25 ounces 4 times a day and 1.5 ounces one time a day on Day 76. In general, again the mealtime criterion was being met but total daily criterion was not. On Day 87 the criterion was set at a total of 6 ounces a day to be equally distributed now only across 4 meals. On day 91, George was readmitted to the hospital. Criterion was reduced to 1 ounce each meal at least 3 times daily. When the criterion was met on Day 94, a new criterion of 1.25, 4 times daily was initiated. On day 97 the criterion was increased to include one meal of 1.5 ounces of food and 1.25 ounces for the other meals. Over the next 3 days, one meal each day would be increased to 1.5 ounces. The total daily criterion was not being met, but the mealtime criterion was met. Again, cooperation from the nurse and mother was not consistent. On Day 103 criterion was increased to 1.75 ounces per meal 4 times a day. Meal time criterion was met but total feedings for each day was 3 not 4.

On Day 104, George was to be discharged home. The criterion was readjusted to 1.75 ounces of rice cereal and now an introduction of .25 ounce vegetables 4 times a day. On Day 109 the criterion was increased to a total of 2.25 ounces per meal 4 times a day. On day 117

the criterion was increased to 2.5 ounces 4 times a day. Again the meal time criterion was being met but total daily criterion was not due to reduced feedings.

On Day 126 the criterion per meal was increased to 2.75 ounces two times a day and 2.5 ounces two times a day. The mother and grandmother finally began to cooperate in feeding George 4 times a day. Meal time and total daily criterion were met. On Day 128 and Day 130 criterion was increased ultimately to 2.75 ounces 4 times a day. The mother was then instructed to increase mealtime quantities .25 ounces systematically. By day 167-171 she had him consuming an average of 19.59 ounces per day. The goal was initially set at 15.6 ounces. During the second follow-up, semisolid and solid quantity of food intake varied and dropped somewhat. The average amount of food intake across follow-up days was 8.44 ounces. Whether this drop in intake was due to the effects of rehospitalization, his illness, or other reasons is not known.

Figure 7 which depicts George's oral fluid intake in ounces shows that prior to behavioral treatment (Days 1-4), George consumed an average of 5.75 ounces of formula. The criterion was set at being fed 6 times a day at least one ounce each meal. The ultimate criterion was to achieve the average consumption for a 12 month old, 20.3 ounces per day. The intervention began on Day 5. Criterion was not met on Day 5 but was

met on Day 6, 7, 8, and 9. On Day 10 intake dropped probably due to increased discomfort and severity of mouth sores. On Days 11 and 12, intake continued to drop. Intervention was stopped on Day 12. The mother and nurses were instructed to only try to give him a bottle if he appeared to feel better.

The intervention was restarted on Day 69. Criterion was set at 2.5 ounces 5 times a day, a total of 12.5 ounces per day. Criterion was met all days except on Day 80 and 87 when he became ill and Day 91 when he was readmitted. The criterion was readjusted on Day 94 to 2.5 ounces four times a day equaling a total of 10 ounces a day. Criterion was met on all but Day 104 (7 ounces) until Day 117. On Day 117, criterion was increased to 3 ounces 6 times a day, a total of 18 ounces a day. Criterion was met or exceeded on all but Days 121 and 125 until Day 130. On Day 130, the criterion was set at its final value of 20.9 ounces. The criterion was met or exceeded on almost all days to the cessation of the intervention, Day 171. On Days 142,143,144,146, oral liquid intake dropped slightly to 17.5 ounces, 18.5 ounces, 17.5 ounces, 18.5 ounces respectively.

The second follow-up recorded when George was hospitalized again on Days 204-218, showed a decline in intake to an average oral intake of 16.4 ounces.

Demonstration of oppositional behaviors (i.e.

turning head or whole body away from food or the person feeding him, pushing food away,etc.) or rumination resulted in time-outs. If oppositional behaviors decreased, time-outs should also decrease. Figure 8 shows the proportion of time-outs to times fed over Intervention periods 1 and 2. Time-outs were not recorded on all days. However, all days recorded are plotted in Figure 8. This proportion of time-outs to times fed is used as a comparison value because the number of feedings per day varied which would effect the number of time-outs. The proportion averages time-outs over times fed on a given day.

Insert Figure 8

During Intervention period 1, the proportion first rises then drops slightly below the initial value. During Intervention period 2, the proportion of time-outs to times fed remains below the values during Intervention period 1 on all days recorded except two, day 69 and day 155. Therefore, there appears to be a decrease in oppositional behaviors from Intervention period 1 to Intervention period 2. There are, however, periodic increases and decreases of time-outs to times fed over Intervention period 2. The proportion value

remains low but does not steadily decrease. This implies that oppositional behaviors decreased from Intervention period 1 to 2, but were still occurring during Intervention period 2.

Oppositional behaviors observed from Baseline 1 (before Intervention period 1) to Baseline 2 (before Intervention period 2) appear to have increased. During Baseline 1, over 5 baseline recordings, 19 oppositional non-eating occurrences were tabulated, $\bar{X}$ = 3.8 per session. The mean time of the sessions were 19 minutes (range 10-25 minutes) in which 1 session lasted 10 minutes, 3 sessions lasted 20 minutes, and 1 session lasted 25 minutes. In addition, there were 3 instances of vomiting. George pushed food away and turned his head or body away in all observations done while his mother was feeding him. He did not demonstrate these behaviors during the session in which the nurse fed him. Consequences for oppositional non-eating occurrences included attention, physical contact, scolding, and pushing the bottle in his mouth.

During Baseline 2, 31 oppositional non-eating occurrences were tabulated across 3 baseline recordings, $\bar{X}$ = 10.33 per session. This value is higher than in Baseline 1. The mean time of the sessions was 23.3 minutes. One session lasted 10 minutes in duration and the other two lasted for 30 minutes. George pushed food away and turned his head or body away in all sessions.

In addition, there was 1 occurrence of vomiting, gagging, spitting, and food holding. He cried, however, throughout the sessions with his mother but not during the session with the nurse. The consequences for not eating or ruminating included attention, force feeding, pinching his mouth, scolding, coaxing, and physical contact.

The fact that oppositional non-eating occurrences were higher during Baseline 2 but the time-outs to times fed proportion is lower during Intervention 2 as compared to Intervention 1 suggests that the impact of the intervention on oppositional non-eating behaviors was more effective during Intervention period 2.

Table 4

Mean Values of Oral Intake: Subject George

Baseline prior to 1st Intervention (Days 1-4)

	Total Cal.	Liquids(oz/cal)	Solids (oz/cal)
Mean Values	115 cal	5.8oz / 115cal	0oz /0cal

Baseline prior to 2nd Intervention (Days 65-68)

	Total Cal.	Liquids(oz/cal)	Solids(oz/cal)
Mean Values	324 cal	15.1oz / 324cal	1.1oz/20.9cal

Prior to Cessation of 2nd Intervention (Days 168-171)

	Total Cal.	Liquids(oz/cal)	Solids(oz/cal)
Mean Values	1125.7 cal	25.8oz / 538cal	19.6oz/587.8cal

Average Daily Requirements for Weight Maintenance (based on weight of 6.7 kilograms)

	Total Cal.	Liquids(oz/cal)	Solids(oz/cal)
Mean Values	670 cal	20oz / 400cal	15.6oz/270cal

Table 5
Significance of Differences Between Means
T-Tests
Subject George

Phase	Measurement	T-value Level of Significance
BSL prior to 1st INT vs BSL prior to 2nd INT	Total Calories	4.10 .01 level
BSL prior to 1st INT vs BSL piror to 2nd INT	Liquids (calories)	4.10 .01 level
BSL prior to 1st INT vs BSL prior to 2nd INT	Liquids (ounces)	4.04 .01 level
BSL prior to 1st INT vs BSL prior to 2nd INT	Solids (calories)	2.53 .05 level
BSL prior to 1st INT vs BSL prior to 2nd INT	Solids (ounces)	2.68 .05 level
BSL prior to 2nd INT vs Prior to cessation	Total calories	20.4 .01 level
BSL prior to 2nd INT vs Prior to cessation	Liquids (calories)	3.74 .01 level
BSL prior to 2nd INT vs Prior to cessation	Liquids (ounces)	6.03 .01 level
BSL prior to 2nd INT vs Prior to cessation	Solids (calories)	14.16 .01 level
BSL prior to 2nd INT vs Prior to cessation	Solids (ounces)	27.57 .01 level

(Table Continues)

Table 5
Significance of differences between means
T-Tests
Subject George

Phase	Measurement	T-value Level of Significance
Prior to Cessation vs Follow-up 2	Total calories	14.14 .01 level
Prior to Cessation vs Follow-up 2	Solids (ounces)	11.99 .01 level
Prior to Cessation vs Follow-up 2	Solids (calories)	9.10 .01 level
Prior to Cessation vs Follow-up 2	Liquids (ounces)	2.76 .05 level
Prior to Cessation vs Follow-up 2	Liquids (calories)	5.44 .01 level

Table 6
Average Intake Across Phases Versus Age Related Norms: Subject George

	Before 1st INT (average) BSL Days 1-5	Before 2ND INT (average) INT Days 6-11	After 2ND INT (average) Days 63-68	165-171	Average Daily Intake *12 mos.
INTAKE Food Type					
Formula/ Milk	Isomil 6.4 oz	5.4 oz	16.7oz	22.5oz	16-24 oz
Juice	.6 oz	.6 oz	.6oz	1oz	2-4 oz
Infant Cereal	0 oz	0 oz	.1oz	3.5oz	8T(4oz)
Fruits	0 oz	.86 oz	.90 oz	8.6 oz	3-4 oz
Vegetables	0 oz	0 oz	.71 oz	4.5oz	3-4 oz
Meat	0 oz	0 oz	0oz	1.3oz	2-3 oz
Egg	0 oz	0 oz	0oz	.14oz	1 whole (1 oz)
Potato, Spaghetti, Macaroni	0 oz	0 oz	0 oz	mixed with baby food	2 oz
Toast, Crackers, Cookies	0 oz	0 oz	0 oz	1.64 day	1-2 day

* amounts suggested are based on caloric and nutrient needs for an infant at 50th %ile for height and weight at a given age.

Table 7
Breakdown of Oral Intake: Subject George

	Before 1st INT	Before 2nd INT	After 2nd INT
Formula	**Isomil**	Isomil	
		Enfamil w/Iron	
Liquids		**Prosobee**	
		Enfamil-Premee	
Juice	------	**Cranberry**	Apple
		Apple Cherry	Mixed Fruit
		Apple	Orange
		Mixed Fruit	Apple Grape
		Orange	Pineapple
		Apple Grape	**Grape**
		Pineapple	
		Apple Cranberry	
Water	------	----------	**Water**
Milk	------	**Milk**	Milk
			-chocolate
			-strawberry
Cereal	------	**Rice Cereal**	Rice Cereal
		Barley Cereal	Farina
		Farina	**Mixed Cereal**
			Cream of Wheat
			Oatmeal
Fruits	------	**Applesauce**	Applesauce
		Apricot	Bananas
			Peaches
		Bananas	**Pears**
		Peaches	**Whole Banana**
Vegetables	------	**Carrots**	Carrots
		Squash	Squash
		Peas	Peas
		Sweet Pot.	SweetPot.
		Mixed Veg.	Mixed Veg.
			Green Beans
			Creamed Corn
			Beets
			Pumpkin
Soups	-------	**Cream of Chicken**	**Chicken**
		Cream of Corn	**Cream veg.**
		Chicken w/Rice	**Cream of rice**

(Table continues)

	Before 1st INT	Before 2nd INT	After 2nd INT
Desserts	-------	Apple,Banana,Pear Apple Custard	Apple Betty Vanilla Custard Apple Custard Banana Custard Rice Pudding Vanilla Ice Cream
Dairy Products	-------	Banana Yogurt	Apple Yogurt Plain Yogurt Lemon Yogurt Egg
Breads, Cookies	-------	----------	Ritz Crackers Saltines Corn Meal Arrowroot Cookie
Meat	-------	----------	Chicken Macaroni,Beef,and Tomato Split Peas & Ham Vegetable Lamb
Condiments	-------	----------	Honey Jelly

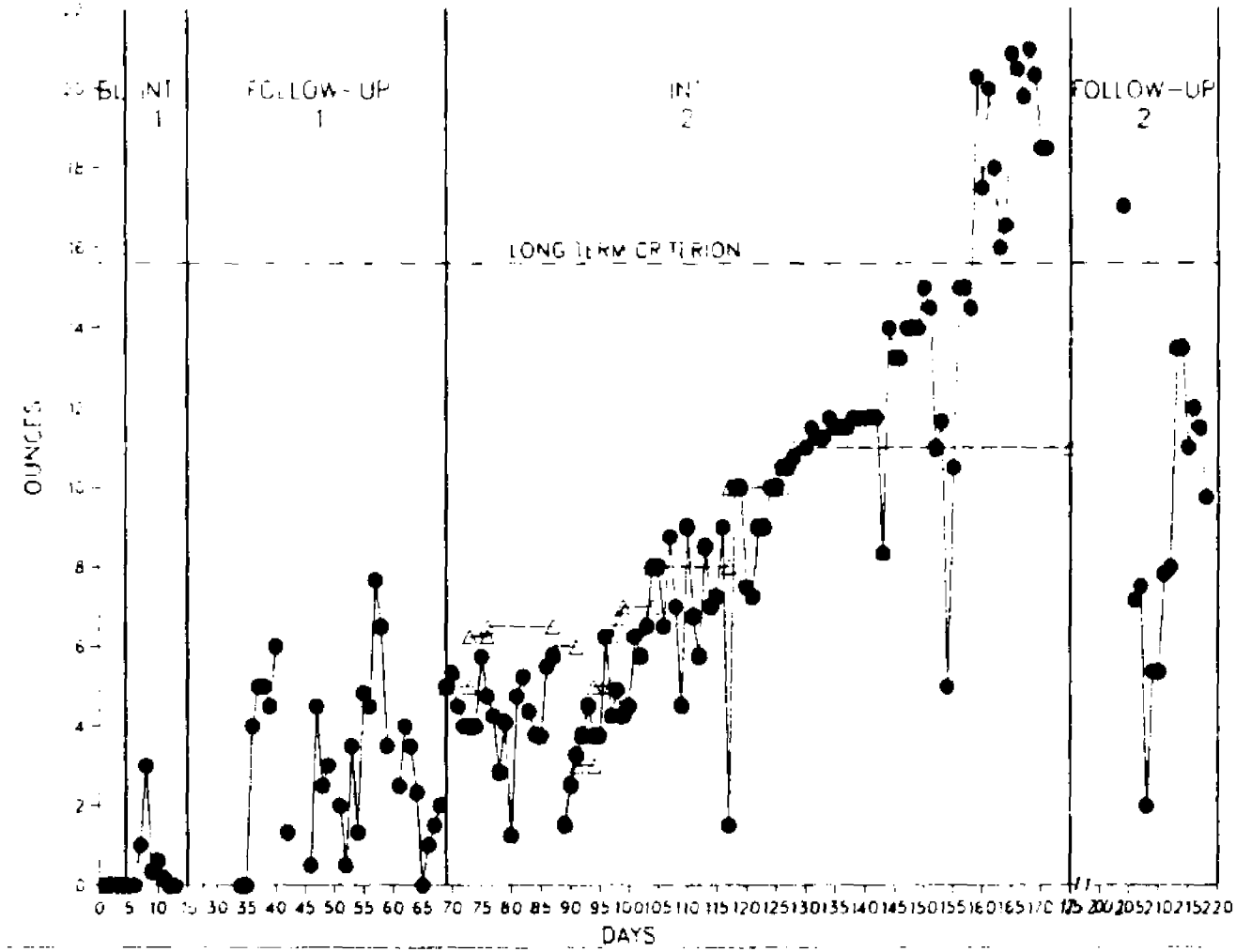
Table 8
Percent of Total Daily Intake By Person Feeding Across Interventions 1 and 2 and Follow-up Periods 1 and 2: Subject George

Person Feeding

	Days	RR	MR	A	MR RR	B	C	D	E	DR	F	G	H	I	J	V A	RR AT	GR	K	L	M	N	V B	B
	5	63	13	24	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
I	6	27	53	20	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
N	7	-	85	-	15	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
T	8	-	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1	9	-	100	-	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	10	51	37	-	-	12	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	11	19	78	-	-	-	3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	12	0	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	33	-	41	-	-	-	-	20	12	27	-	-	-	-	-	-	-	-	-	-	-	-	-	-
F	38	-	66	-	-	-	-	-	-	-	12	22	-	-	-	-	-	-	-	-	-	-	-	-
U	43	-	-	-	-	-	-	79	-	-	-	-	21	-	-	-	-	-	-	-	-	-	-	-
1	48	-	74	-	-	-	-	-	-	-	17	-	-	9	-	-	-	-	-	-	-	-	-	-
	53	-	56	-	-	-	-	-	-	-	44	-	-	-	-	-	-	-	-	-	-	-	-	-
	58	-	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	63	-	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	68	-	28	-	-	-	-	-	-	-	56	-	-	-	10	6	-	-	-	-	-	-	-	-
	73	21	62	-	-	-	-	-	-	-	-	-	-	-	-	-	17	-	-	-	-	-	-	-
	78	-	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
I	83	-	52	-	-	-	-	-	-	-	-	-	-	-	-	-	-	48	-	-	-	-	-	-
N	88	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
T	93	-	84	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	16	-	-	-	-	-
2	98	36	26	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	20	18	-	-	-
	103	40	19	-	-	-	-	22	-	-	-	-	-	-	-	-	-	-	-	-	-	9	9	-
	108	-	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	113	-	78	-	-	-	-	-	-	-	-	-	-	-	-	-	-	22	-	-	-	-	-	-
	118	-	53	-	-	-	-	-	-	-	-	-	-	-	-	-	-	47	-	-	-	-	-	-
	123	-	67	-	-	-	-	-	-	-	-	-	-	-	-	-	-	33	-	-	-	-	-	-
	133	-	47	-	-	-	-	-	-	-	-	-	-	-	-	-	-	53	-	-	-	-	-	-
	138	-	54	-	-	-	-	-	-	-	-	-	-	-	-	-	-	46	-	-	-	-	-	-
	143	-	51	-	-	-	-	-	-	-	-	-	-	-	-	-	-	49	-	-	-	-	-	-
	148	-	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	153	-	37	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	64	-	-
	158	-	55	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	45	-	-
	163	-	50	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50	-	-	-	-	-	-
	168	-	40	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	60	-	-
F	205	-	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
U	210	-	100	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
2	215	38	62	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

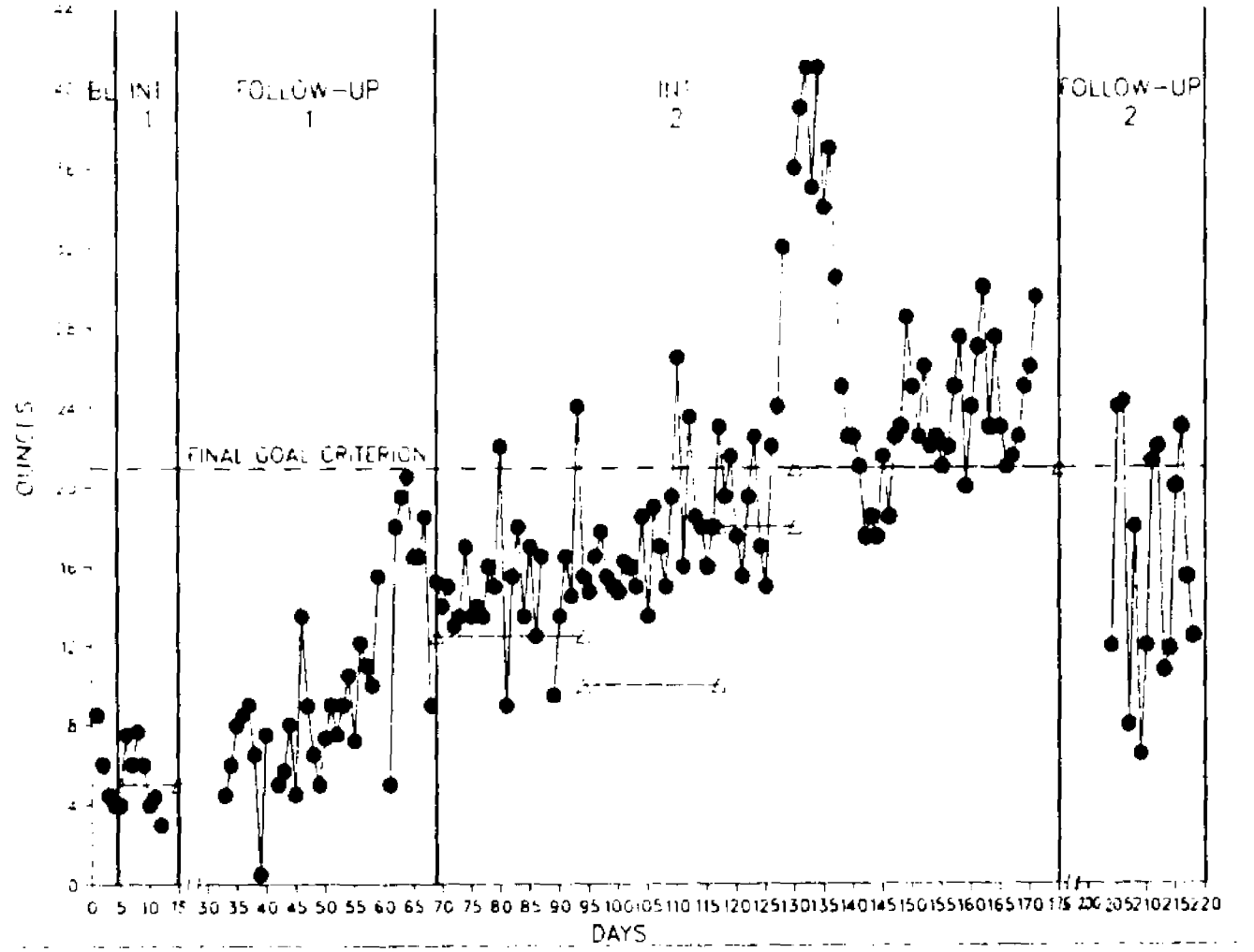
SUBJECT: GEORGE FIGURE 6.

SOLID FOOD CONSUMPTION IN OUNCES ACROSS DAYS



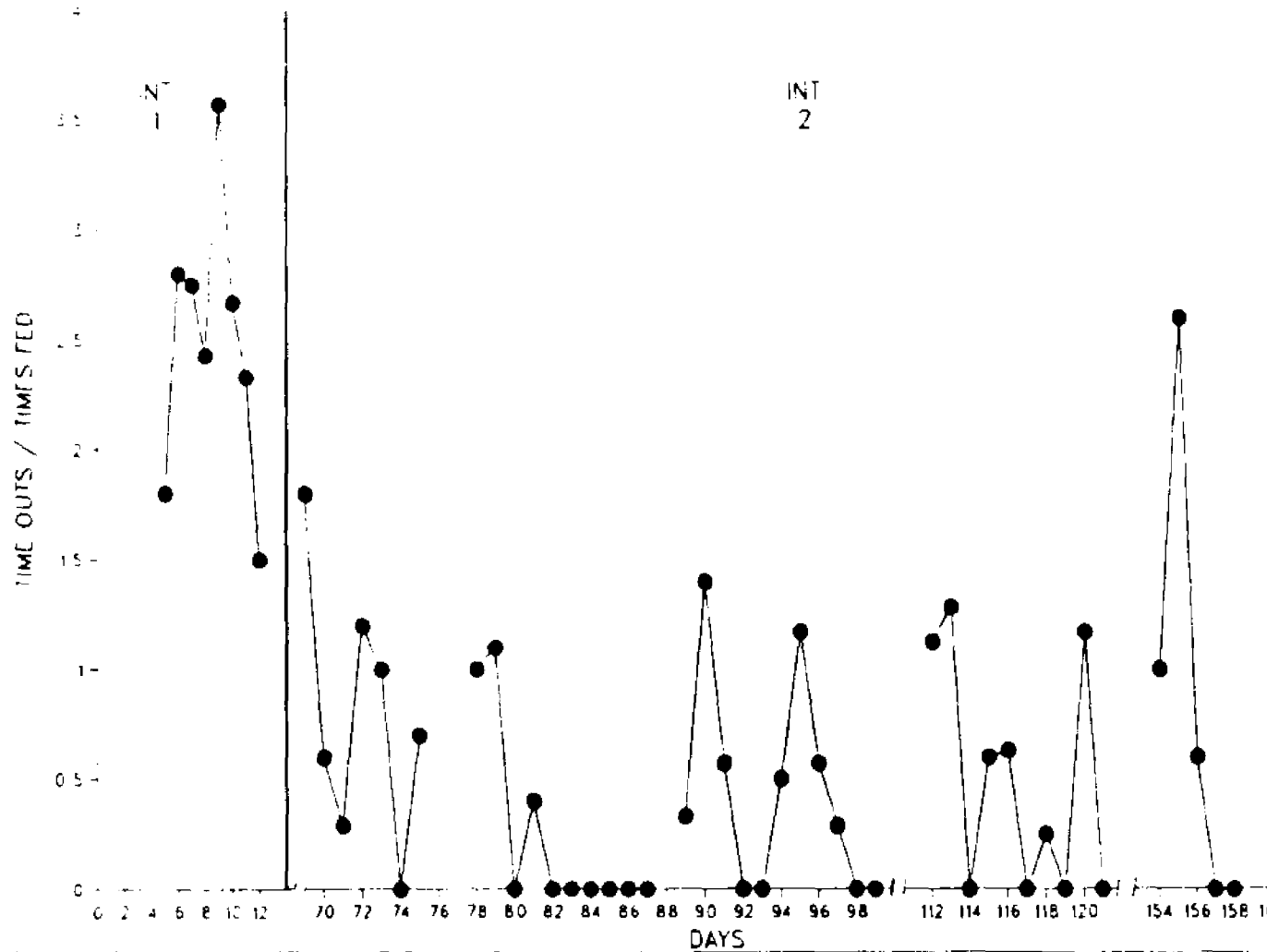
SUBJECT: GEORGE FIGURE 7.

FLUID CONSUMPTION IN OUNCES ACROSS DAYS



SUBJECT: GEORGE FIGURE 8.

TIME OUTS / TIMES FED OVER INTERVENTION 1 AND 2



Method

Subject Mia

Medical History

Mia, a white female, was diagnosed at two years of age with an inherited phagocytic cell disorder. This is a rare disorder characterized by an inadequate host defense system against infection during inflammatory responses (Bowen et al., 1982; Fischer et al., 1983; Hayward et al., 1979). Therefore, recurrent infections occur. Due to an inability to fight the infections, the disorder is usually lethal in two years. Mia's medical condition led to repeated hospitalizations since three weeks of age. Medical problems included hypertension, multiple abscesses, fever, elevated white blood counts, pseudomonas sepsis, and failure to thrive. Treatment consisted of antibiotic coverage and periodic total parenteral nutrition (TPN). Her weight gain was never steady and oral intake was variable.

Mia was an only child of parents in their early twenties. The mother was the primary caretaker who spent a majority of her time with Mia while hospitalized. Her caretaking was adequate though inconsistent at times. Her inability to keep appointments with staff (e.g. dental service,

occupational therapy) and her occasional trips home without notifying anyone were of concern. The overall impression, however, was one of a caring mother overwhelmed by the responsibilities and stress of a chronically ill child.

Behavioral Intervention

At 17 months of age, after a three month hospitalization, approxmately one week before anticipated discharge, Mia was referred for eating difficulties. She was being fed via TPN and plans to continue TPN feedings at home were confirmed. Oral intake included 6-8 ounces of water each day. Medically, she was not diagnosed with a specific disorder. However, she was being treated continuously for symptoms (e.g. fever, recurrent infections, failure to thrive). Whether there was a link that existed between her medical condition and failure to thrive was not known. A four day baseline period permitted observation of the child during meals to determine if a behavioral eating disturbance existed. The baseline data revealed little oral intake, oppositional non-eating (e.g. food holding, head turning), and rumination.

A behavioral treatment plan was designed which involved five phases; oral stimulation, modeling, social reinforcement, time-out, and a special chewing

procedure. Since Mia had not eaten for many months, an oral stimulation component was used to reacclimate Mia to stimulation or contact around the facial area. During the oral stimulation procedure, eye contact was first established with Mia by the person feeding seated across from her. She was placed in a high chair during the mealtime. Initially, the person feeding Mia modeled the procedure and then verbally described it. Modeling was used to present a sample of the appropriate oral stimulation procedure to induce Mia to perform a similar procedure. This procedure was then peformed at the same time as Mia while again verbally describing the procedure. Physical guidance (i.e. actually physically guiding her through the procedure) was used to induce Mia to go through the motions of the oral stimulation procedure. The procedure included the following steps and was always accompanied by a vocal and gestural description of each act:

Massage cheeks

Massage lips

Massage gums

Rub teeth with forefinger

Massage internal area of cheeks

Move tongue around

The next phase was modeling eating and drinking. Eye contact was established to insure Mia's attention.

Again modeling was used to present a sample of the appropriate behavior and induce Mia to engage in a similar behavior. Eating and drinking were described vocally and demonstrated gesturally (see Table 7). The following step-by-step procedures were used for liquids and strained foods or solids respectively.

Table 9

The sequence of steps involved in the demonstration of drinking (left column) and eating (right column):

Subject Mia

Liquids	Strained Foods and Solids
a) Bottle (nipple) to mouth	a) spoon to mouth
b) open mouth	b) open mouth
c) put nipple in mouth	c) Put spoon with food in mouth
d) suck liquid	d) chew food (if necessary)
e) swallow	e) swallow
f) open mouth, say "all gone"	f) open mouth, say "all gone"
g) clap and shout "yeah"	g) clap and shout "yeah"

It should be noted that the step to open one's mouth and say "all gone" (step f) was incorporated to prevent food holding and make all reinforcement contingent upon swallowing.

In order to provide a social eating environment, the researcher, nurse, or parent always ate the same meal at the same time with Mia. Social reinforcement in the form of verbal praise (e.g. "Good girl," "Nice job"), physical contact (e.g. patting on the head, stroking the cheek, hugging) or gestures (e.g. clapping) was given after every successful trial. This reinforcement was chosen as a means of now giving reinforcement for appropriate versus inappropriate eating behaviors. A successful trial was one in which the food or liquid was appropriately ingested. A "time-out" period followed every unsuccessful trial. An unsuccessful trial was one in which she refused to eat or drink, spit out or vomited, held food in her mouth for more than 30 seconds after chewing, played with food, or did not eat or drink the criterion amount for that session. These inappropriate behaviors were observed during baseline or reported by staff as having been demonstrated in the past by Mia. Time-out, a response contingent withdrawal of positive reinforcement was utilized following every unsuccessful trial. Attention was withdrawn as soon as any inappropriate behavior occurred to decrease the possibility of future

occurrence. Every person feeding Mia was instructed to follow the same time-out procedure for the specified interval.

1) Occupy yourself with another activity.

2) Do not speak to Mia.

3) Do not establish eye contact with Mia.

The behaviors resulting in the consequence of a "time-out" procedure included:

1) If Mia refused to eat or drink, coaxing was prohibited, and she was TIMED-OUT for 3 minutes. Then the eating/drinking demonstration began again. If she ate or drank, a reinforcer was given and the session continued. If she still refused tc eat or drink, the session was ended and followed by a time-out period for 10-15 minutes.

2) If Mia would eat or drink only part of the criterion amount for that session and refused to consume any more, she was TIMED-OUT for 3 minutes. Then the eating/drinking demonstration was repeated. If she ate or drank, a reinforcer was given and the session was continued. If she still refused to eat or drink, the session was ended and she was TIMED-OUT for 10-15 minutes.

3) If Mia spit out or vomited, she was TIMED-OUT for 3 minutes. Then the eating/drinking demonstration was begun again. If she ate/drank without spitting out or vomiting, then she was rewarded

and the session was continued. If she spit out or vomited again, the session was ended and she was TIMED-OUT for 10-15 minutes.

4) If Mia held food in her mouth for 30 seconds after chewing instead of swallowing, the food was removed from her mouth and she was TIMED-OUT for 3 minutes. Then the eating/drinking demonstration was begun again. If she ate/drank and swallowed, then she was rewarded and the session continued. If she held food in her mouth for 30 seconds after chewing, the session was ended, and she was TIMED-OUT for 10-15 minutes.

5) If Mia played with food (e.g. throwing it, smearing it on the high chair) she was TIMED-OUT for 3 minutes. Then the eating/drinking demonstration was begun again. If she still played with food, the session was ended and she was TIMED-OUT for 10-15 minutes. If she did not play with the food she was rewarded and the session continued.

A successful session occurred when the criterion amount of food and/or liquid was consumed. Criterion was to be increased daily in stepwise fashion as the previous days' criterion was met. A successful session was followed by additional reinforcers (e.g. playing with toys for 10-15 minutes, new toys, etc.).

A special chewing procedure was incorporated to

enhance and teach Mia to chew. Mia clearly demonstrated a preference for solids during baseline observations but failed to chew solids when given to her. Modeling by the person feeding Mia, reinforcement of model, and then copying modeled behavior were followed by reinforcement. The steps were as follows:

(1) Bite down on cracker

(2) Reinforce as soon as crunch heard or sounded

(3) Repeat 1 and 2

(4) Do it with Mia - if she crunches within 15 seconds, immediately reinforce
- if 15 seconds passes with no crunch, model again.
(repeat modeling five consecutive times; discontinue session if fails, continue if succeeds.)
(Butterfield & Parson, 1973).

Four feeding sessions were arranged and varied daily to prevent temporal conditioning. Meals initially consisted of liquids (e.g. Hawaiian Punch, juice) and strained baby foods, etc.). She was not permitted any food or beverages between meals except water upon request. Initially, Mia's mother and the researcher were the only ones to implement the program. The mother requested that the staff not become involved.

Shortly after the program began the patient was discharged on home TPN. The patient's mother was

encouraged, however, to continue the oral feeding program at home. The patient was readmitted approximately six weeks later for an infected Broviac site (the area which the TPN is inserted) resulting in pseudomonas sepsis (a serious, sometimes fatal blood infection). This required several days of isolation to prevent spread of infection to other children on the ward. Mia was still on TPN and eating/drinking only small amounts. Mia's mother was retrained in the program. Mia's father and paternal grandmother were also trained in the intervention to enhance generalization of eating skills to new individuals and the home environment when discharged.

Follow-up of Mia continued over 7 months. During that time periodic feeding sessions were arranged to insure continued maintenance of eating. The sessions included the researcher, Mia's mother, and sometimes Mia's father.

About 2.5 months after the beginning of the intervention (Day 51-83), Mia was sent to another hospital to continue further work-up of her medical condition and identification of a definitive disease process. During that hospital stay, her mother accidentally severed the TPN line in changing the bandage. TPN was discontinued and oral intake was her only means of nutritional support. Approximately, 1.5 months (=Day 90) later she was readmitted to the local hospital with recurrent

infection. At this time, Mia's mother revealed that Mia had been choking on various foods, especially meats. It was advised that she give several small portions of food at a meal, model and practice chewing at the beginning of each meal, model and practice swallowing, time-out choking unless aspiration was a concern. Subsequent feeding sessions were arranged to reinforce the newly established eating behavior patterns.

Choking periodically reoccurred. At this time, it was revealed that both parents had been inserting their fingers into Mia's mouth and at times turned Mia upside down to dislodge the piece of food that Mia was believed to be choking on. During the follow-up it was suggested that Mia return to strained baby food (around Day 105-118) to reestablish good eating skills, to restore pleasurable eating times, and eliminate choking. Then gradually semi-solids and solids would be reintroduced.

Choking ceased for a short period of time but then reappeared (around Day 136). Another intervention technique was suggested to be combined with time-out and modeling. Foods deemed difficult to swallow and all meats were to be ground in a food grinder. Mia and her mother would receive stickers for successful eating sessions. When her mother successfully carried out sessions implementing time-outs consistently, modeling and reinforcing correct eating, drinking, and swallowing, she received a sticker to be placed on a

chart for her husband and mother-in-law to see and reinforce. Mia would receive a sticker if she ate and drank the entire meal with a maximum of two time-outs of ten minutes or less. Positive verbal and gestural approval (e.g. clapping) was encouraged for swallowing or actively dislodging food on her own. Inserting fingers into her throat or turning her upside down to prevent choking was discouraged.

Periodically throughout the continued follow-up, feeding sessions were arranged with the researcher to reinforce and maintain appropriate feeding. The mother gradually faded out the sticker program when successful results occurred.

Data were collected on daily intake forms to be completed by Mia's mother. The form requested amount of food/liquid consumed, type of food/liquid consumed, where the meal was eaten, who was present, and the time of the meal. This information then was given to the staff dietitian to be analyzed for daily caloric consumption. Daily intake of ounces of food/liquids and intake across phases were computed by the researcher.

Results

Subject Mia

Insert Table 10

Generalization of newly acquired eating patterns to new environments and new individuals is important for behavior maintenance as well as to demonstrate the efficacy of the behavioral intervention. Generalization of eating to six different environments (i.e. 3 hospital rooms, home, friend's home, and researcher's office) was seen during Baseline, Intervention periods 1 and 2, and Follow-up periods 1 and 2. Generalization of eating was seen with Mia across 11 individual people feeding (see Table 10) during the same time periods.

During Baseline, Mia's mother or father were the sole people feeding Mia. Mia, however, had a very low oral intake (X = 21.3 calories). During Intervention period 1, Mia's mother and the researcher together were the predominant people feeding Mia. During Follow-up period 1 Mia's mother took over the majority of the feedings. A nurse was successfully taught the program on Day 12. Mia's grandmother often observed while Mia's mother fed her. Grandmother, however, did not know how

to carry out the intervention herself. During Intervention period 2 Mia's mother was the primary person feeding Mia. Mia's grandmother, however, was trained in the program on Day 33 and proceeded to successfully feed Mia on Day 33 and Day 34 and after discharge on Days 40 and 43. It is interesting to note that her attempts to feed Mia on Days 24, 25, and 31, prior to training in the intervention resulted in 0 caloric intake. After train-ing her grandmother in the intervention, all sessions were successful and resulted in 65%, 66%, 41%, and 41% of total daily intake (Days 33, 34, 40, and 43 respectively). During Follow-up period 2, the nurse, Mia's mother alone, Mia's grandmother, or Mia's mother and father were the people feeding. During Intervention periods 1 and 2 and Follow-up periods 1 and 2, new eating behaviors were generalized to 6 different environments and 11 different people feeding Mia.

Insert Figure 9

Figure 9 depicts intake of ounces of food during baseline, 1st intervention, 1st follow-up, 2nd intervention, and 2nd follow-up. Baseline values were

low, an average of .66 ounces of food over five days. Criterion, indicated by the plotted triangle, was set during the 1st intervention to 2 ounces of food 4 times daily, a total of 8 ounces each day. On day 6 and 7 criterion was not met. On days 8 and 9 the criterion was met. On day 10 intake dropped slightly below criterion. Intake averaged 6.77 ounces across the 1st intervention, days 6-10. During the 1st follow-up, days 12-15, Mia was hospitalized on day 12 without her mother being present. Records were not kept on this day. On day 13 she was discharged to go home. Intake dropped slightly to a mean intake of 7.1 ounces per day. On day 20, 4 days after readmission to the hospital, the second intervention began. Criterion was initially set at 8 ounces, 2 ounces of food 4 times daily and gradually increased ultimately to 13 ounces per day as previous days' criteria were successfully met. Total daily intake was maintained at or above this level until day 37 for all days except 3 (days, 26, 29, 37). During the 2nd follow-up, days 39-44, intake remained above the 13 ounce criterion level for 4 out of 6 days, with a mean of 12.83 ounces. This figure therefore shows the success of the behavioral program to increase food consumption in ounces across the first 37 days. Further breakdown of consumption in ounces was not possible due to the types of food and the the types of records kept.

Insert Figure 10

Figure 10 represents total daily caloric intake across all phases of the procedure. Calories required for weight maintenance was determined by Gruskin's formula for the hospitalized child which is based on weight and reduced activity level (Gruskin, 1976). The determining weight was the average of the range of weight throughout treatment and follow-up. The range of weight was 9.62-11.3 kilograms (or 21.164-24.86 lbs.). Calories required for weight maintenance would range from 962 calories to 1065 calories. The weight that falls exactly midway is 10.46 kg. The calories required for maintenance of this weight is 1023 calories. This is the amount that is plotted on Figure 10 (the solid, straight line) reflecting the amount required for weight maintenance. It should be noted that the lowest and highest weight appeared at different times of the program; not at the beginning or end as would be expected if weight was indicative of success. The lowest weight occurred on day 95 and the highest weight occurred on day 44. Weight was not indicative of success in this case due to the fluctuations in fluid from TPN. In addition, Mia was receiving an average of 785.64 calories via TPN (intravenously delivered

nutrients) documented from day 1 to day 39 as represented in Figure 10 by the dotted line. TPN was still delivered up to and partially through the 3rd follow-up. During the 3rd follow-up, while receiving treatment out of state, the TPN line was severed and therefore discontinued by the mother between day 50-55. The exact day is not known. In examining Figure 10, one sees a rise in caloric intake around this time period. Whether the discontinued TPN was a contributing factor to this increase is not known. TPN was not delivered again after this point. Oral intake was the sole means of nutritional sustenance.

Insert Figure 11

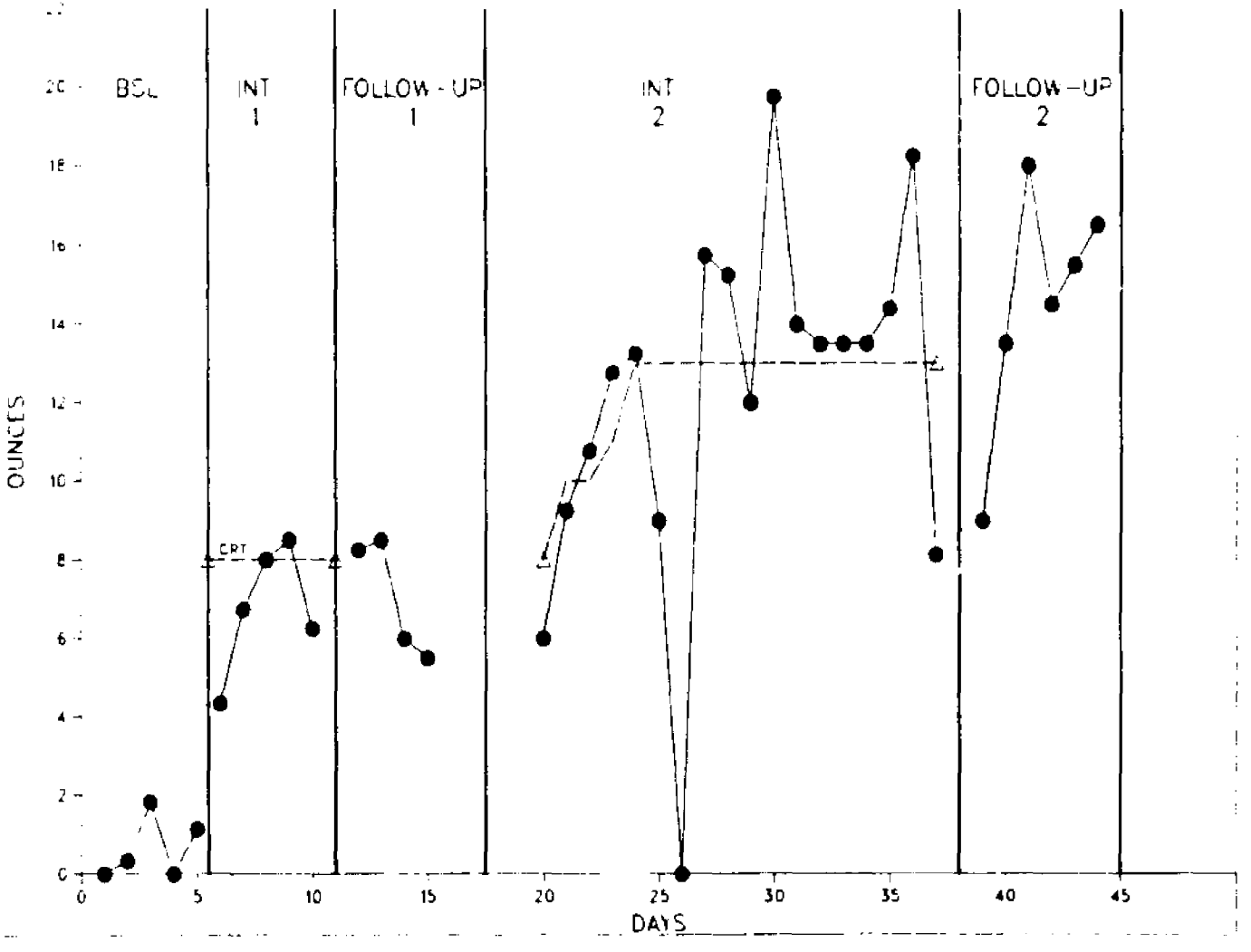
Figure 11 represents mean intake across each phase. Mean intake consistently increased across each phase as reflected by the plotted curve. The dotted line represents the amount of caloric intake necessary for weight maintenance (1023 calories). Oral intake exceeded this amount by the 3rd follow-up.

Table 10
Percent of Total Daily Intake By Person Feeding Across Baseline, Intervention 1 and 2, and Follow-up Periods 1 and 2 : Subject Mia

Person Feeding		Mor	Mor Res	Mor Far	Mor Far Grm	Mor Grm	Grm	Grm Res	Nurs	Mor Friend	Mor Room
Days											
	1	0	-	-	-	-	-	-	-	-	-
	2	100	-	-	-	-	-	-	-	-	-
B	3	100	-	-	-	-	-	-	-	-	-
S	4	100	-	-	-	-	-	-	-	-	-
L	5	-	-	100	-	-	-	-	-	-	-
	6	-	100	-	-	-	-	-	-	-	-
I	7	20	80	-	-	-	-	-	-	-	-
N	8	-	75	-	25	-	-	-	-	-	-
T	9	24	76	-	-	-	-	-	-	-	-
1	10	-	100	-	-	-	-	-	-	-	-
	12	-	-	-	-	-	34	-	-	22	44	-
F	13	64	-	-	-	-	36	-	-	-	-	-
U	14	76	-	-	-	3	21	-	-	-	-	-
1	15	45	-	-	-	-	55	-	-	-	-	-
	20	33	67	-	-	-	-	-	-	-	-	-
I	21	33	67	-	-	-	-	-	-	-	-	-
N	22	29	71	-	-	-	-	-	-	-	-	-
T	23	27	73	-	-	-	-	-	-	-	-	-
2	24	35	65	-	-	-	-	-	-	-	-	-
	25	61	-	0	-	-	-	-	-	-	-	39
	26	-	-	0	-	-	-	-	-	-	-	-
	27	62	38	-	-	-	-	-	-	-	-	-
	28	44	56	-	-	-	-	-	-	-	-	-
	29	25	75	-	-	-	-	-	-	-	-	-
	30	33	67	-	-	-	-	-	-	-	-	-
	31	37	31	-	-	-	-	-	-	-	-	-
	32	100	-	-	-	-	-	0	-	-	-	-
	33	-	-	-	-	-	-	65	35	-	-	-
	34	-	-	-	-	-	-	66	34	-	-	-
	35	74	26	-	-	-	-	-	-	-	-	-
	36	21	79	-	-	-	-	-	-	-	-	-
	37	100	-	-	-	-	-	-	-	-	-	-
	39	-	-	-	-	-	-	-	-	100	-	-
F	40	-	-	-	-	-	-	41	-	59	-	-
U	41	51	49	-	-	-	-	-	-	-	-	-
2	42	100	-	-	-	-	-	-	-	-	-	-
	43	59	-	-	-	-	-	41	-	-	-	-
	44	55	45	-	-	-	-	-	-	-	-	-

SUBJECT: MIA FIGURE 9.

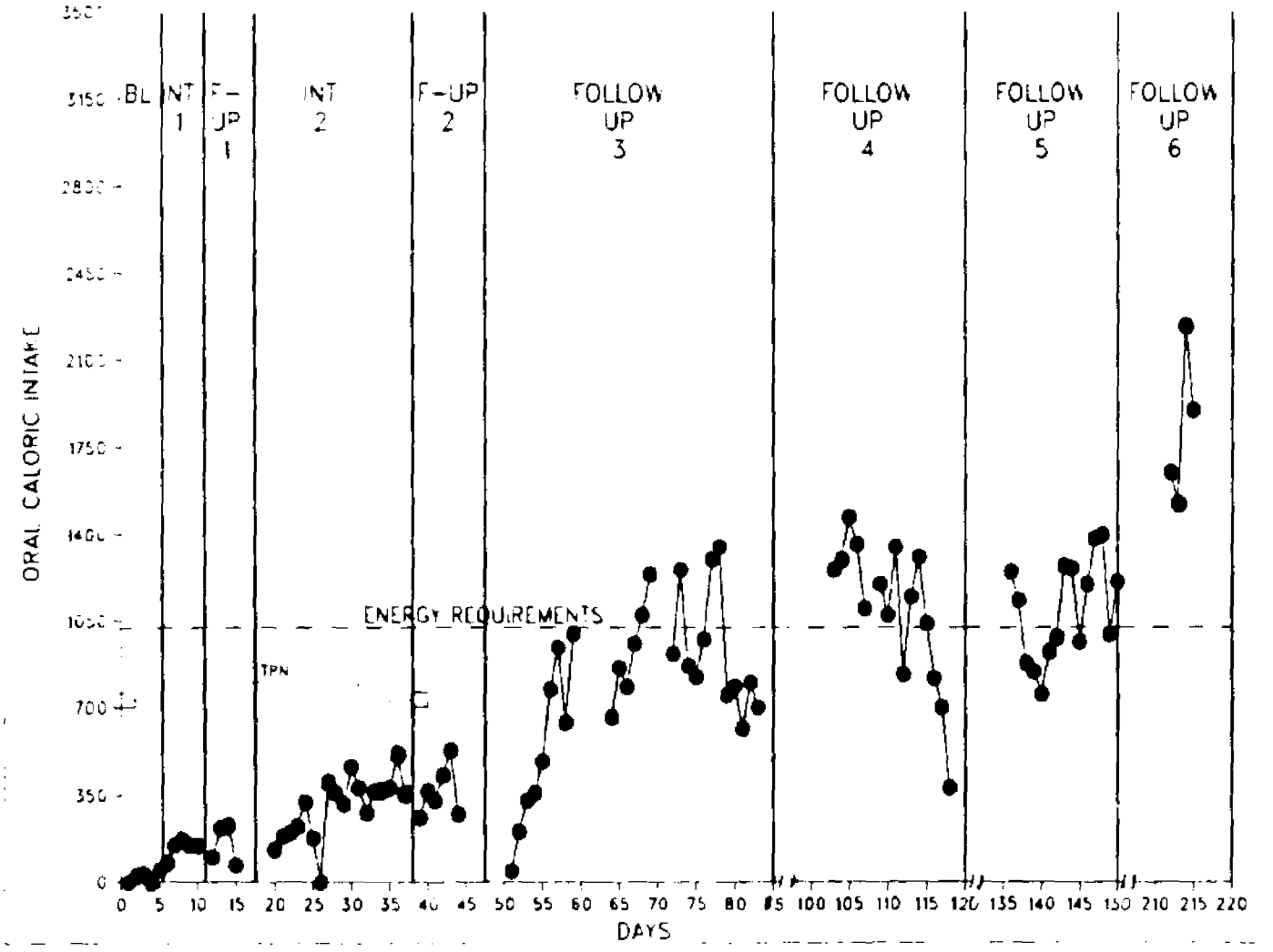
SOLID FOOD CONSUMPTION IN OUNCES ACROSS DAYS



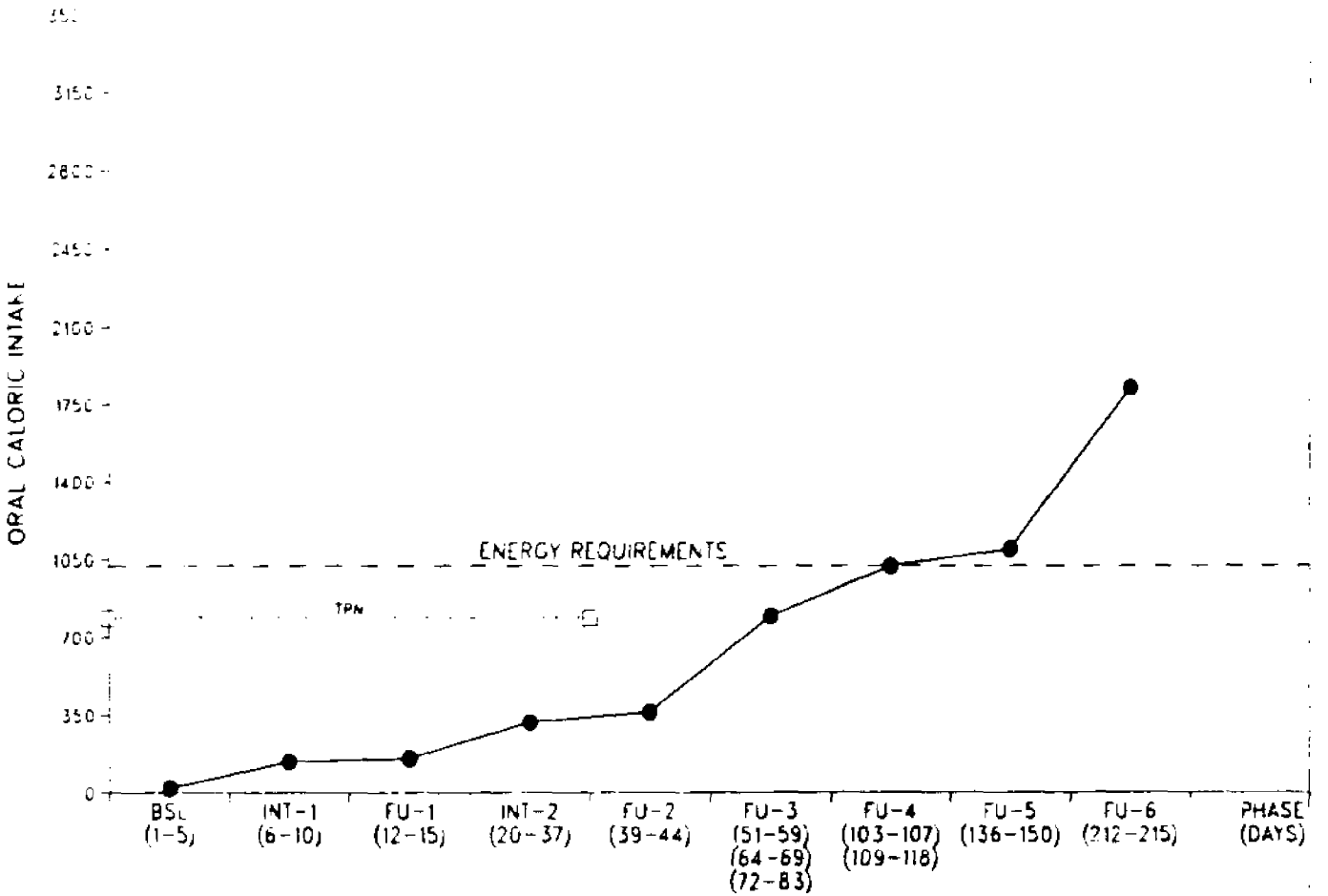
SUBJECT: MIA

FIGURE 10.

CALORIC INTAKE OVER BASELINE, INTERVENTION, FOLLOW-UP



SUBJECT: MIA FIGURE 11.
MEAN INTAKE ACROSS PHASES



Discussion

The results suggest that a variety of behavioral interventions are effective in promoting normal eating patterns and replacing artificial means of nourishment (e.g. TPN or nasogastric tube feedings) in patients with cancer and immune deficiencies. At the end of the treatment period, all 4 subjects were consuming adequate amounts of food/liquid so that weight was maintained or growth was observed. As stated in the literature, artificial feeding has potentially serious, even life-threatening complications including catheter contamination and metabolic complications (Dudrick et al., 1977; Heird & Winters, 1983). In addition, various psychological complications have been cited as a result of TPN treatment (Dudrick & Englert, 1980; Hall, Stickney, Gardner & Popkin, 1981; MacRitchie, 1978; Malcolm, Robson, Vanderveen, & O'Neil, 1980). The present data support the notion that a viable alternative intervention exists to artificial feeding for rumination and oppositional non-eating in a cancer and related immune diseased population. The present study uses a program that emphasizes positive consequences to successfully control rumination and oppositional non-eating in a pediatric oncological population.

Numerous studies have used programs emphasizing

positive consequences for rumination with normal infants (Sheinbein, 1975; Wright, Brown, & Andrews,1978), normal adolescents (Ingersoll & Curry, 1977) and retarded children (Barmann, 1980; Bennett, 1983; Mulick et al., 1980; Smith & Lyon, 1976). Programs emphasizing positive consequences have been used in treating eating disorders in patients with severe medical problems (Hatcher, 1979; Palmer, Thompson, & Linscheid, 1975) and eating disorders in retarded children and adolescents (Butterfield & Parson, 1973; Thompson & Palmer, 1974; White, 1982). The research has been minimal, however, in using behavioral techniques to treat eating disturbances in a pediatric oncological population. The present research extends the use of positive reinforcement procedures in a broader pediatric oncological population. The results show that not only can an adolescent oncological patient be successful with a behavioral treatment regimen but the results extend these findings to children and infant populations. The range of diagnoses treated was also expanded to include malignant fibrous histocytoma, severe combined immune deficiency, hepatic carcinoma, glycoprotein deficiency, and Fanconi's Anemia.

Even though successful results to the treatment regimen were indicated in all subjects, each patient presented a unique profile. Age, background, caretaker(s), and disease created a different picture of

the problem for each subject. Certain similar patterns, however, were common to all subjects. Clinical observations by staff and researcher indicated that all subjects attempted to gain control over their environment and those individuals in it through food. As reported in the literature, attention for not eating or for rumination perpetuated the eating disturbance (Lavigne et al, 1981). In addition, all subjects required a reversal of contingencies; positive consequences were given only after appropriate eating and removed after inappropriate eating. All subjects or subject's parents were lacking in nutritional information. Nutrition education in varying degrees were necessary.

All children benefited from an oral stimulation component in the treatment regimen to reduce mouth and facial tension when approached with food/liquid. It has been claimed that institutional feeding methods contain one or more characteristics that eliminate necessary stimulation in the eating situation (Ball, Hendrickson, & Clayton, 1974). The oral stimulation procedure was one aspect of the eating procedure that restored stimulation to the eating situation.

Another common thread among patients was that total parenteral nutrition (TPN) was given to all subjects during baseline and at least during the initial phases of treatment. The effect of TPN on appetite is

inconclusive. Some human studies have determined that intravenous feedings do have a decreasing effect on appetite (Borgen,1978; Jordan, Hamilton, & MacFayden 1974; Melinkoff, 1956; Stunkard & Wolf, 1954). In contrast, Bernstein and Grossman (1956) found little if any effect on appetite and consumption. Animal studies show conflicting results. Two studies show depression of appetite and decrease in food intake (Adair, Miller, & Booth, 1968; DeSomery & Hansen, 1978). An additional study found no effect on food intake and refusal as a result of TPN feedings (Baile, Zinn, & Mayer, 1971).

Clinical reports by staff (i.e. nurses and nutritional team) at the hospital in which the present research was conducted were generally in agreement that appetite is suppressed during TPN therapy. The present research seems to indicate the opposite in 3 out of 4 subjects. Subject Shea received an average of 1700 calories (range 1275-2500 calories) from total parenteral nutrition during baseline and the first five intervention days. She still consumed an average of 1300 calories orally across the first 5 intervention days (range 790-1840 calories). Subject Jon received an average of 818 calories (range 784-1029 kilo-calories) from total parenteral nutrition during the entire intervention phase. In addition, he consumed orally an average of 730.1 calories during the entire intervention (range 280-1250 calories).

Subject George received an average of 415 calories via TPN during the initial intervention. He still consumed an average of 117.4 calories by mouth. TPN was discontinued before the second intervention. Oral supplements, however were started before the 2nd intervention and continued all the way through except for the last 19 days. George received an average of 178.6 calories daily from oral supplements (range 0-1178.8 calories). In spite of those, he still consumed an average of 523.2 calories (range 220.5-861.5 calories) orally.

Subject Mia received an average of 800 calories from TPN during the first intervention but still continued to consume an average of 141.2 calories orally (range 77.2-175.6 calories). During the 1st follow-up, she consumed an average of 155.75 calories orally (range 71-229 calories) in spite of the fact that she received 800 calories daily from TPN. The residual effects of the intervention could have played a role. During the 2nd intervention, she consumed an average of 319.1 calories orally (range 133.2-511 calories) and was receiving an average of 787 calories daily via TPN. She continued to receive TPN up through the 3rd follow-up but the exact amount was not documented. Mia's mother severed the TPN line at the beginning of the third follow-up (the exact day unknown, approximately day 50-55). She then claimed that oral intake increased

thereafter. However, this cannot be confirmed. The effect of other variables on oral intake (e.g. effect of intervention, change of food) need to be determined. Of the 4 subjects, this is the only subject whose treatment course may suggest that TPN could have influenced appetite or amount consumed to some extent. All other subjects ate in spite of TPN delivered nutrients while the intervention was in progress. The advantage of using TPN while behavioral management techniques are implemented to induce food/liquid consumption is the gained latitude to gradually increase intake without endangering the medical or nutritional status of the subject. As behavioral techniques are more and more effective in increasing intake, TPN can be gradually decreased. However, the quicker the effectiveness of the behavioral intervention, the more advantageous it is for the patient. As pointed out earlier, long-term TPN is not beneficial medically or psychologically.

In addition to the presently demonstrated effects of a positive behavioral intervention to suppress eating disturbances and rectify a life-threatening situation, several considerations recommend its continued inclusion in treatment programs for oppositional non-eating and rumination in a pediatric oncological population. When used instead of punishment, it eliminates the potential for abuse inherent in electric shock and other aversive

procedures, and reluctance of family and staff to implement the intervention (Lavigne et al., 1981; Sajwaj et al., 1974). With children, the feeding technique allows the parents to assume a major role in the treatment and to develop a feeling of competence in their ability to handle a difficult situation (Lavigne et al.,1981). The child also becomes an active participant in feeding. In a low stimulation environment, inappropriate stimulation (e.g. rumination) often develops (Ball et al., 1974). The key is to interrupt the learned behavior chain of inappropriate feeding behaviors while reinforcing new appropriate ones (Jackson et al., 1975).

Generalization was also enhanced to other settings and to other individuals via training. Training other family members in the children's programs took place in the established feeding environment. Reprogramming the social environment must be undertaken to enhance generalization. The parents or family members become the behavior modifiers and are taught to alter the contingencies for reinforcement and therefore generalization is enhanced in the home environment. To achieve maintenance of new eating behaviors generalization must be built into the program (Patterson, McNeal, Hawkins, & Phelps, 1967).

The fact that this is a technique that both staff and parents can be trained to carry out is advantageous.

Programs that have shaped parents to function as behavior modifiers to alter the social environment of deviant children and of children with eating problems have been successful (Palmer et al., 1975; Patterson et al., 1967, Thompson & Palmer, 1974; Thompson et al., 1977; Wahler, Winkel, Peterson, & Morrison, 1965). The method of training parents in the present project, however, could benefit from further refinement. Teaching parents behavioral management of eating with videotapes of appropriate techniques has been found beneficial in the developmentally delayed (Thompson & Palmer, 1974; Thompson et al., 1977) and the medically ill population (Palmer et al., 1975). However, it has not been used in an oncological population to teach parents and staff feeding techniques. Providing visible imme-diate feedback of teaching-modeling trials might prove to be a quicker, more efficient method of training.

An additional advantage of this research comes from its interdisciplinary approach to the treatment of eating disturbances. The need to treat all aspects of the disturbance simultaneously; nutritional, behavioral, and developmental has not been explored. Successful results of an attempt to incorporate these variables in an intervention has been demonstrated in the present project.

The results suggest the treatment regimens were adequate to overcome a life-threatening situation caused

by the eating disturbances, but the question remains as to when the best time is to intervene. At the start of treatment, Shea just completed her last cycle of chemotherapy and was encouraged to return to a normal mode of living within the constraints of her disease and treatment consequences (i.e. lack of hair due to chemotherapy and prosthesis due to knee surgery). Her eating therapy was relatively short with the intervention lasting only 8 days before she reached her total caloric requirements for weight maintenance. Nutritional status was the only reason for her prolonged hospitalization and endangered state.

Jon was still ill at the beginning of the eating treatment due to the lack of bone marrow engraftment. His illness, Fanconi's anemia, did not have a good prognosis. He was, however, stable medically and was not receiving any active medical treatment. Intervention only lasted 9 days and oral consumption was at 93% of required level for weight maintenance (1250 kilocalories consumed; 1340.5 kilocalories needed for weight maintenance). Nutritional status was his only reason for prolonged hospitalization. Monitoring of bone marrow engraftment could have been done on an outpatient basis.

Mia was essentially undiagnosed and chronically ill when treatment for eating was begun. The first intervention lasted 5 days and the 2nd intervention

lasted 22 days. Calories required for weight maintenance (1023 kilocalories) were achieved during the 3rd follow-up after being diagnosed in an out of town hospital.

George was ill throughout the entire intervention and all follow-ups. Maternal bone marrow never engrafted and later an additional diagnosis of hepatic carcinoma was uncovered. His intervention time frames were lengthy. The first intervention lasted 8 days until terminated for medical reasons. The second intervention lasted 102 days and had to be continued on an outpatient basis. However, he reached calories required for weight maintenance (670 kilocalories), without supplements by the 62nd day of the 2nd intervention.

The questions remain, is the optimal time for intervention <u>after</u> medical treatment and <u>not</u> during the time of active medical treatment and possible medical complications? Will the treatment time for the eating disturbance be shortened and criterion reached sooner? All subjects were ultimately successful in spite of the treatment time and medical complications. It would, however, be ideal to identify the factors (e.g. point of intervening, status of illness, ongoing medical treatment) that would shorten all interventions and facilitate criterion achievement to 8 or 9 days as seen with subjects Shea and Jon.

Research and clinical practice has repeatedly

pointed to the detrimental effects of nutritional deficiency and the susceptibility to infection (Scrimshaw, Taylor, Gordon, 1968). In addition, adverse effects of undernutrition on the immune response have been demonstrated (Chandra & Newberne, 1977; Suskind, 1977). In general, the deleterious effects of malnutrition on immunocompetence are reversible depending on when it occurs. If malnutrition exerts its effect during the critical early stages of immunological development, these effects may be prolonged or permanent (Chandra, 1981). Some immunological changes that occur in malnutrition include marked histomorphological derangements in the thymus (Chandra & Newberne, 1977), T-cell mediated immune responses (Chandra, 1981) and changes in the complement system (Chandra, 1972, 1981). The implications of this research emphasize the impairment or restoration of the immune system through adequate nutrition and medical treatment. It has even been suggested that nutritional modulation of the immune response may play a role in susceptibility to infection in cancer, old age, post operative period, low-birth weight infants, chronic liver disease, malabsorption syndromes, and other diseases (Chandra, 1981). An interesting question is how much effect did improved nutrition have on the disease processes in these research subjects? As a result of the present research, it is possible that the improved nutritional status

brought about by the behavioral intervention could have improved any detrimental effects on immunological functioning caused by poor nutrition and increased susceptibility to further disease. Did enhanced nutrition improve the state of the disease? To isolate the effects of medical treatment from enhanced nutritional status requires additional research. It is interesting, however, to take note of subject Mia who never received medical treatment for her disease, only for treatable symptoms. For example, when pseudomonas sepsis occurred, she was given antibiotic coverage. There is not, however, a treatment or cure that exists for her diagnosed illness, glycoprotein deficiency. This disease has only been reported in a handful of cases. Average life span is 2 years. Mia is presently almost 4 years of age and has not been hospitalized for almost 2 years. Prior to improved nutritional status, she was not able to fight colds, viruses, and common illnesses. Is it coincidental that her medical status greatly improved at the time of her nutritional status or are they somehow intertwined? Continued follow-up may be able to isolate further effects of improved nutrition.

Appropriate nutrition can restore or improve immunological functioning and susceptibility to disease. The advantage that this behavioral intervention can aid to achieve this end adds to the benefits of its further

use in an oncological population. Functional eating disturbances can have serious medical consequences which include failure to thrive, electrolyte imbalance, dehydration, and death. Eating disturbances are particularly hazardous in seriously ill hospitalized children and adolescents and warrant immediate attention and intervention when they occur (Lavigne et al., 1981). This intervention, even though it includes many parameters, offers an alternative solution to life threatening situations. The alternative solution, an intervention for natural oral consumption, does not carry medical or psychological side-effects as other treatments do. The intervention presents a gradual procedure which can be taught to staff and family to implement and should be built in to the overall rehabilitation of the cancer and immune deficient patient population. A cure for the disease is not enough to restore a substantive life without resumption of eating, necessary for life itself.

Appendix 1

FEEDING OBSERVATION

Name_____ Date_____ Observer_____

Time_____ Nurse/Feeder_____

ANTECEDENTS

Place of Feeding

Child	Nurse/Feeder
High Chair_____	Chair_____
Crib_____	By Crib_____
Playpen _____	By Bed_____
Nurse/feeder's lap_____	Other_____
Bed_____	

Reaction to Set-up

Facial Expressions_____

Body Movements_____

Vocalizations_____

Utensils Used	Meal
Spoon_____	Type of Food_____
Syringe_____	Amount of Food_____
Bottle_____	Liquid_____
Other_____	Amount of Liquid_____

Interaction Between Nurse/Feeder and Child Prior to Eating

Vocalizations

Nurse:_____

Child:_____ Play Activity: Type_____

Physical Contact_____ Duration_____

Procedure

Child's Behavior: Feeds Self_____

Nurse/Feeder: Feeds Child_____

Description-Vocalization_____

_____

Other_____

If fed: Turns Head_____

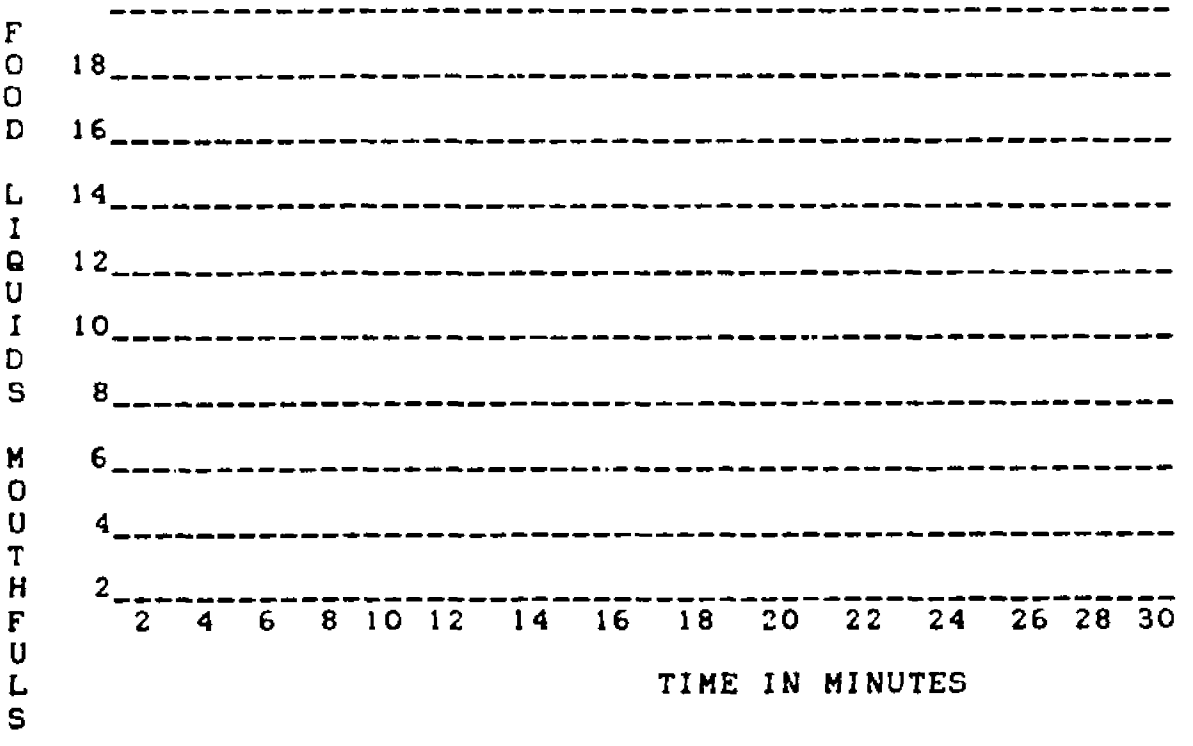
Pushes Food Away_____

Turns_____

Plays With Food_____

PACE OF EATING

* Note kind of food for each recorded frequency in appropriate box - Food (X) Liquid (O)



Activities During Eating	Others Present During Eating	
Television_____	Name	Involvement
Toys_____	_____	_____
Other_____	Name	Involvement
	_____	_____

Interest in Food/Liquid

Kind of Food/Liquid	1	2	3	4	5	6	7	8	9
_____	No Int.		Little Int.		Moderate Int.		More Int.		Most Int.
Kind of Food/Liquid	1	2	3	4	5	6	7	8	9
_____	No Int.		Little Int.		Moderate Int.		More Int.		Most Int.
Kind of Food/Liquid	1	2	3	4	5	6	7	8	9
_____	No Int.		Little Int.		Moderate Int.		More Int.		Most Int.

CONSEQUENCES
Nurse/Feeder Reaction to:

Eating/Drinking	Not Eating/ Drinking	Gagging	Vomiting
		Child's Behavior	
Attention_____	Attention_____		
Physical Contact_____	Physical Contact_____	_____	_____
		Vocalizations	
Smiling_____	Smiling_____		
		_____	_____
Scolding_____	Scolding_____	Nurse/Feeder's Reaction:	
Other_____		Attention	Attention
		_____	_____
		Removal of Attention	Removal of Attention
		_____	_____
		Physical Contact	Physical Contact
		_____	_____
		Smiling___	Smiling___
		Scolding___	Scolding__
		Other_____	Other_____
Frequency_____	Frequency____	Frequency___	Frequency___

How Session Ends

Nurse/Feeder Behavior	Child's Behavior
Reward:	
Verbal_____	Vocalizations_____
Material_____	Smiling:_____
Physical Contact_____	Activity After Eating: (observe 5 minutes)
Smiling_____	
	Description:_____
Scolding_____	
	_____
Removal of Attention_____	

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