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The purpose of this study was to determine the effect of color on food selection and consumption by nursery school children. The null hypotheses were:

1. There is no difference in the number of servings of food initially selected among the three colors of each food served.
2. There is no difference in the number of servings of food selected after the initial serving selected among the three colors of each food served.
3. There is no difference in the number of total servings of food selected among the three colors of each food served.
4. There is no difference in the grams of food consumed among the three colors of each food served.

The subjects for the study were all of the twenty-four three-and-four-year-old boys and girls enrolled at the University of North Carolina at Greensboro School of Home Economics Nursery School. For one pretest day and eight week days the noon meal at the nursery school was served in cafeteria style. Each child was permitted to choose the foods he desired and was allowed to return to the cafeteria line for as many additional servings of food as he wished. Each child sat at the table where he usually sat and a teacher sitting at the same table each day recorded the number of servings of food that each child selected. Plate

waste was weighed and recorded.

Ham, white bread, and milk were consistently offered each day. Either the choice of red, green, and white cabbage or the choice of red, yellow, and white rice was presented each day. Either yellow, pale green, and bright green peas or yellow, pale green, and bright green beans was served daily. The choice between red, green, and yellow applesauce, or red, green, and yellow pears was offered each day. The order of presentation of each food was determined by a table of random numbers.

Data analyzed by use of the analysis of variance indicated there were significant differences in food selection and consumption due to different colors of foods. There were significant differences among the total servings selected of yellow, pale green and bright green beans; among red, green, and yellow applesauce; among yellow, pale green, and bright green peas; and among red, green, and yellow pears. There were significant differences among the amounts consumed of yellow, pale green, and bright green peas; among yellow, pale green, and bright green beans; among red, yellow, and green pears; and among red, yellow, and green applesauce. The tabular *t* was used to determine the least significant difference among the three colors of foods. The mean amounts of green applesauce and green pears selected and consumed were significantly greater than mean amounts of yellow or red applesauce and pears. The mean amounts of pale green beans and peas selected and consumed were significantly greater than the mean amounts of yellow and bright green peas and beans.

THE EFFECT OF COLOR ON FOOD SELECTION  
AND CONSUMPTION BY NURSERY  
SCHOOL CHILDREN

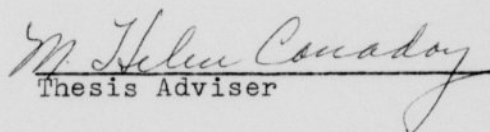
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APPROVAL SHEET

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## CHAPTER I

### THE PROBLEM

Good nutrition is one of the essential factors to a child's physical health. A child's food habits and preferences partially determine the nutritional adequacy of his food intake. Factors that influence the development of children's food preferences should be understood in order to help adults stimulate better eating habits so that children's nutritional intake will be improved.

Studies have been conducted suggesting that many factors influence selection and consumption of foods by children. Dudley, Sunderlin, and Moore (1960) found that methods of preparation did not significantly influence food preferences. McCarthy (1935) stated that parents' food aversions were related to their children's food aversions. Hodge (1963) found no relationship between parents' food preferences and food consumed by nursery school children. Dunshee (1931) found that age, length of time spent at the table, and the person in charge of serving were factors influencing the amount eaten by nursery school children.

Many studies (Davis, 1935; Litman, Cooney, & Stief, 1964; Dudley, Moore, & Sunderlin, 1960; Dunshee, 1931; Fesmire, 1965; King, 1967; Hodge, 1963; McCarthy, 1935;

Lamb & Ling, 1946; Van Duyne, 1963; Cook, 1931; Imlay, 1925) have revealed that children have food preferences. Other studies (Garth & Porter, 1934; Guilford, 1934; Katz & Breed, 1922; Micheals, 1924; Spears, 1966) have indicated that children have color preferences. However, these studies did not determine the effect of color on food selection and consumption.

There is little information about color as it relates to food selection and consumption. A knowledge of the relationship of color to food preference could aid mothers, dieticians, or other adults in planning menus for children. Information on the significance of color might provide clues as to how one might add colors or garnish food with colors that are attractive to children.

#### Purpose of the Study

The purpose of this study was to determine the effect of color of foods on selection and consumption of foods by nursery school children.

#### Hypotheses

The null hypotheses for this study were:

1. There is no difference in the number of servings of food initially selected among the three colors of each food served.

2. There is no difference in the number of servings of food selected after the initial serving among the three



colors of each food served.

3. There is no difference in the number of total servings of food selected among the three colors of each food served.

4. There is no difference in the grams of food consumed among the three colors of each food served.

#### Definitions of Terms

Color may be defined as an attribute of visual experience involving hue, intensity, and value as well as psychological awareness (Burnham, Hanes, & Bartleson, 1963).

Hue may be defined as the name of a color.

Intensity may be defined as the degree of saturation of a color.

Value may be defined as the degree of darkness or lightness of a color.

Colors of rice may be defined as:

1. Strawberry red--a light red hue, medium in intensity and high in value. Fifteen drops of red food coloring were added to one-half cup uncooked rice.

2. Yellow--a bright yellow hue high in value. Nine drops of yellow food coloring were added to one-half cup uncooked rice.

3. White--the color of regular long grained white rice.

Colors of green beans may be defined as:

1. Yellow--a pale yellow hue, low in intensity, which lacked color and visual appeal. Canned wax beans were used.

2. Pale green--a pale green hue, low in intensity and value. Canned green beans were used.

3. Bright green--a vivid green hue, high in intensity and medium in value. Two teaspoons of green food coloring were added to two number 303 cans of green beans.

Colors of peas may be defined as:

1. Yellow--a yellow-green hue, low in intensity and low in value. One teaspoon of yellow food coloring was added to two number 303 cans of green peas.

2. Pale green--a pale green hue, low in intensity and medium in value. Canned green peas were used.

3. Bright green--a vivid green hue, high in intensity and medium in value. Two teaspoons of green food coloring were added to two number 303 cans of peas.

Colors of cabbage may be defined as:

1. Red--a red-purple hue, medium in intensity and value. Red cabbage was used.

2. Green--a green hue, medium in intensity and value. Ten drops of green food coloring were added to one-half cup chopped, white cabbage.

3. White--a pale green hue, high in value and low in intensity. White cabbage was used.

Colors of applesauce and pears may be defined as:

1. Red--a red hue, medium in intensity and value. Eighteen drops of red food coloring were added to one number two and one-half can of applesauce and to the same amount of pears.

2. Green--a green hue, medium high in intensity and medium in value. Fifteen drops of green food coloring were added to one number two and one-half can of applesauce and to the same amount of pears.

3. Yellow--a pale yellow hue, low in intensity and high in value. Canned pears and applesauce were used in their natural colors.

#### Basic Assumptions of the Study

The investigator assumed that if nursery school children were given a choice of foods, they would select the foods they preferred. It was assumed that kinds and amounts of foods selected and consumed by each child would vary from day to day and from child to child. A difference in amounts selected and amounts consumed by each child was expected.

#### Data Secured

For a period of eight consecutive week days the noon meal at the nursery school was presented in cafeteria style to the children. Kinds of foods served were determined from menus of food previously served at the nursery school. The same kind of meat, bread, and milk were served each day. The children could choose ham and white bread if they

desired. A glass of milk was placed at each child's plate. Choices of yellow, pale green, and bright green beans or yellow, pale green, and bright green English peas were offered each day. White, red, and green cabbage or white, yellow, and red rice were presented each day. Red, green, and yellow applesauce or red, green, and yellow pears were served each day.

Degree of intensity and value of colors of foods was determined by three judges who matched the colors of foods each day by adding the same amounts of food coloring to the foods. Order of presentation of each food group and differently colored foods within groups was determined each day by a table of random numbers.

Each child was permitted to choose any food he desired. He was allowed to return as many times as he wished for additional servings. The amounts selected were recorded in servings and the amount calculated by multiplying the serving by the weight of the preweighed sample. Plate waste was weighed and recorded. The amounts consumed were calculated by subtracting the plate waste from the amounts selected.

#### Limitations of the Study

The sample was limited to the twenty-four three- and four-year-old children enrolled at the University of North Carolina at Greensboro Nursery School for the 1967-1968 school year. The subjects were from upper-middle and upper



socio-economic families living in Greensboro, North Carolina. Because randomization was not used, the subjects were considered as a group rather than a sample. The results of this investigation were not inferred beyond this group of subjects.

The length of time for conducting the study was limited to eight nursery school days. Choices of foods offered were limited to one kind of meat, one kind of bread, one kind of beverage, two kinds of desserts of three colors for each dessert, and four different kinds of vegetables of three colors, or three intensities of color for each vegetable.

## CHAPTER II

## REVIEW OF LITERATURE

Studies that have investigated food selection and consumption by children (Duyne, 1963; Breckenridge, 1959; Dierks & Morse, 1965; Dudley, Moore, & Sunderlin, 1960; Prentiss & Jones, 1930; Davis, 1935; McCarthy, 1934; Lamb & Ling, 1946; Potgieter & Morse, 1955; Metheny, Hunt, Patton, & Heye, 1962; Prevey, 1936; Dunshee, 1931; Vance, 1932; Mirone, Torrance, & Roughton, 1956; Hodge, 1963; Imlay, 1925; Cook, 1931) have revealed that children have definite food preferences.

Many factors influencing food preferences have been determined. Dudley, Moore, and Sunderlin (1960) investigated method of preparation as an influencing factor in food selection and consumption. McCarthy's (1935) study revealed family food aversions were related to children's food aversions. Bryan and Lowenberg (1958) found that fathers' dislike for foods was not significantly related to their children's food aversions. Hodge (1963) found no relationship between parents' food preferences and food consumed by nursery school children. According to Potgieter and Morse (1955) girls had better diets than boys and rural children had better food intakes than urban children. Dunshee (1931)

determined the relationship of food consumption to attitudes toward other children and other adults at the same table during meal time, sex, length of time spent at the table, length of nursery school attendance, seasons of the year, bodily activity during the meal, and the amount and kind of conversation at the table.

Color is also a factor which might influence food selection and consumption. Spock and Lowenberg (1955) emphasized the importance of including brightly colored foods in children's diets. Birren (1961) indicated that red and orange foods were preferred to yellow and yellow-green foods. He stated, "For the most part, peach, red, orange, brown, buff, warm yellow, clear green are the true appetite colors [p. 167]."

There seems to be a lack of systematic empirical investigation of the effect of color on food selection and consumption. Consideration of general color preferences in the young child, however, have been investigated without regard to food selection and consumption.

Studies (Garth & Porter, 1934; Spears, 1966; Garth, Ikeda, & Langdon, 1931; Michaels, 1924; Dorcus, 1926; Katz & Breed, 1922) have determined color preferences of young children. Spears' study (1966) revealed that infants demonstrated color preference by visual fixation on brightly colored objects. Staples (1949) and Corcoran (1954) investigated color preference in paintings by preschool children.

The results from the studies involving preferences of children indicated that preschool children had definite color preferences.

#### Food Consumption and Food Preference Studies

A review of literature revealed a number of studies on food intake of young children. Metheny, Hunt, Patton, and Heye (1962) investigated food consumption of 104 preschool children. Records were kept for three consecutive days on the children's diets at home and at nursery school. Mothers of the children were interviewed in order to obtain additional information on the children's eating habits. Results of the study revealed that diets of 21 per cent of the children met all the National Research Council recommendations for daily nutrient intake; 61 per cent of the diets fulfilled between 67 and 99 per cent of the recommended intake; and 18 per cent met less than 67 per cent of the recommendations. According to National Research Council standards, Vitamin A was the nutrient most adequately supplied. Protein, riboflavin, niacin, and ascorbic acid recommendations were adequately met for most of the children. Iron was the least adequately supplied nutrient. Recommendations for energy value, thiamine, and calcium were not met by 40 per cent of the children's diets.

Mirone, Torrance, and Roughton (1956) kept records of amounts of foods consumed by 21 children at the University of



Georgia Nursery School. Results revealed that the children consumed smaller amounts of vegetables than other foods with the exception of white potatoes and sweet potatoes. Liver was the least preferred meat. Larger amounts of desserts were eaten than other foods.

A study by Vance (1932) investigated food consumption patterns of 44 nursery school children. The children were served four foods on a plate and dessert was served only if the plate had been cleared. A recorder observed the order in which each food was tasted and finished by each child. Each child was observed 25 times. Results of the study revealed that meats were more acceptable if broiled. Sandwiches and toast were popular foods. Foods served alone were preferred to combination dishes. Vance concluded that

. . . the so-called taste preference is the largest single factor which is to be understood to include smell, taste, tactual and temperature qualities, visual appeal, and conditioning as the result of previous emotional reactions in connection with the food [p. 174].

Food consumption patterns of 121 children, ages two to six years, were determined by Dierks and Morse (1965). The subjects were children of students living in married housing facilities at the University of Minnesota. The investigators interviewed the mothers of the children and distributed family questionnaires on food preferences. Results revealed the mean total nutrient intake met the National Research Council recommendations for calories,

protein, iron, Vitamin A, thiamine, riboflavin, and ascorbic acid. Niacin was the only nutrient that was inadequately supplied. Data revealed the mothers felt that the children were especially fond of meats, fruits, sweets, cereals, cheese, and potatoes. Corn and beets were preferred vegetables while spinach, squash, asparagus, and lima beans were disliked. The mothers also indicated that the children did not like eggs.

A study by Potgieter and Morse (1955) investigated food habits of children in the fifth through eighth grades. One thousand two hundred forty-two children were asked to keep a complete record of all the food they ate for seven days.

Comparisons were made of rural and urban children. Findings may be summarized as follows:

The rural children had a more substantial nutrient intake than the urban children.

The girls had better diets than the boys.

As age increased, the adequacy of nutrient intake decreased.

All age groups failed to consume an adequate amount of green and yellow vegetables.

Ninety-seven per cent of the children ate between meals.

Eight children between two years and two months to three years and seven months of age were randomly selected from the Texas Technological Nursery School for an investigation conducted by Lamb and Ling (1946). The purposes of

the study were to determine food consumption and the adequacy of food intake by nursery school children, to determine food preferences, and to what extent these preferences influenced the adequacy of nutrient intake, and to determine the relationship between food consumption and results of dental and pediatric reports on the subjects. Mothers were asked to keep records of daily food intakes and to rank on a five-point scale the child's degree or acceptance of "affective concomitant" of certain foods. A record of the children's food consumption was also kept at the nursery school. Records were kept for one week at a time at three month intervals during one school year. Nutrient intakes of the food consumption records were calculated. Data from the "affective concomitant" records were analyzed on the basis of preference and learning by per cent of frequency and a rank score method. The results were as follows:

The average nutrient intake adequately met National Research Council recommendations.

No child consumed the recommended one quart of milk each day.

The greatest nutritive deficiency occurred in green and yellow vegetables.

Consumption of meat, cereals, and sugar was adequate.

Mothers indicated the children responded favorably more frequently than unfavorably to foods.

Fish, fowl, meat, dairy products, custards, and puddings were well-liked.

Cereals were less popular.

Vegetables were the least preferred of all foods.

A study by Davis (1935) determined food preferences of children between three to twelve years of age who were patients at the Orthopedic Ward in Memorial Hospital, Chicago. Food was served cafeteria style and the children were allowed to choose the kinds and amounts of foods they preferred. A variety of meats and meat substitutes, fruits, vegetables, breads, and desserts was offered. Davis stated that the children had "better appetites, larger food intakes, and happier meal times" as a result of the self-selection method of serving food. From the data Davis concluded:

Plain foods were preferred to casseroles or mixed dishes.

Oranges, apples, bananas, and pears were well-liked. The children preferred them whole rather than cut up.

Preferred vegetables were raw carrots, peas, beets, spinach, and lettuce.

Cauliflower, turnips, squash, and parsnips were disliked.

Ice cream and fruit pies were preferred as desserts over gelatin desserts, custards, and puddings.

Food consumption and food habits of 32 children at the University of Chicago Nursery School and 21 "home study" children were investigated by Imlay (1925). Questionnaires on food consumption and food habits were given to the mothers of the children. For 20 weeks adults sitting at the table



with the nursery school children during lunch recorded what the children ate, facts concerning appetite, likes, dislikes, order of eating, and mood. Results revealed vegetables were the most disliked food group. Spinach was disliked most and asparagus, cabbage, and lettuce were the second most disliked foods. Fourteen of the 21 children in home study group did not fulfill daily recommendations for calories, protein, and calcium.

Cook (1931) determined eating patterns of ten pre-school children between two years and one month to four years and ten months of age. Children were permitted to select their choices of milk, stew, sandwiches, vegetables, graham crackers, and dessert. Trained observers used profile sheets to record the children's activities during the meal. Results indicated no definite eating pattern was followed from day to day. Stew was chosen two and one-half times more than any other food except dessert.

A study was conducted at the University of North Carolina at Greensboro by King (1967) who determined the relationship of order of presentation of vegetables to amounts selected and consumed by 24 nursery school children. She also determined which vegetables were preferred of a group of raw and cooked vegetables. Four food groups were offered: meat and meat substitutes, raw vegetables, cooked vegetables, and desserts. The food was served cafeteria style and each child was permitted to choose the kinds and

amounts of food that he desired. Amounts of food selected were weighed in grams. Plate waste was weighed and recorded.

King found that raw carrots were selected more frequently than other vegetables. Green beans, green peas, and raw celery were also selected frequently. Raw vegetables were preferred to cooked vegetables. The order of presentation of vegetables was found to be not significantly related to the amounts of vegetables selected and consumed.

#### Factors Influencing Food Acceptance

Factors influencing food acceptance by young children have been investigated by Dunshee (1931). The subjects were 37 children at the Institute of Child Welfare, University of Minnesota. Records of food consumption during the noon meals were maintained for two quarters and a summer. The children were not given a choice of kinds of foods, but they could choose whether or not they preferred to eat the foods presented to them. The teachers sitting at the table recorded amounts and kinds of food eaten by each child. Amounts of food eaten were determined in calories. Each child's attitude toward each food was evaluated as to whether the child ate "with relish," "as a matter of course," "disliked but ate," or "refused [p. 178]." The teachers also recorded data as to whether the child had to be urged to eat, his attitude toward people in the room, and

his "general reaction to the environment [p. 179]."

The following conclusions were reached:

There was a great individual variability in amounts of food eaten.

Only slight differences were found in the mean number of calories consumed by children aged one and one-half to two years and five months and children between two and one-half and three years and five months of age. However, there was a statistically significant difference in the number of calories consumed by the one and one-half to two years and five months age group and the number of calories consumed by the three years and six months to four years and eight months group.

Sex was not significantly related to number of calories consumed.

Children who stayed at the table the longest amount of time ate less food.

The teachers sitting at the tables with the children had a definite influence on the amount of food eaten by the children.

Length of nursery school attendance was positively correlated with the amount of food eaten.

Most of the children "ate with relish."

Season of the year was not significantly related to amounts of food consumed.

There was little relationship between bodily activity during the meal and amount of food eaten.

Amount of conversation at the table and amount of food eaten were positively correlated.

Food most frequently refused were eggs and fish.

Meats and vegetables were accepted well.

Prevey (1936) conducted a study to determine the effect of self-service without adult interference on kinds and amounts of food eaten by nursery school children. Two

cooked vegetables, two raw vegetables, potatoes or substitutes, a meat or a meat substitute, whole-wheat sandwiches, milk and two desserts were placed on a table before the children entered the room. Children were permitted to choose the kinds and amounts of foods they desired. A daily record was kept of the amounts of foods selected, amount of plate waste, and time required for each meal. Results indicated that consumption was increased by the self-service method. Children selected larger servings of cooked and raw vegetables, meat, sandwiches, and desserts than they were normally given.

In a study (Duyne, 1963) conducted at the University of Illinois Nursery School, findings revealed that varying methods of preparation of commonly disliked foods increased acceptance of some foods but not others. Food histories were secured on each of the nursery school children. Observers ranked acceptability by the children of the different foods served at the noon meal. Bacon, beef, ham, poultry, and weiners were preferred meats. Fish was better accepted if broiled or oven-fried. Liver was not accepted regardless of how it was prepared. Broiled and buttered vegetables were accepted better than mixed vegetables or casseroles containing vegetables. Subjects preferred corn on the cob to whole kernel corn.

In a study conducted at Iowa State University Nursery School, (Dudley, Moore, & Sunderlin, 1960) 53 nursery school



children were given choices of vegetables prepared in different ways. The purpose of the study was to determine the relationship between method of preparation and food preferences. Results revealed great individual variations in food preferences. The results indicated that the children preferred raw carrots and rutabagas to cooked ones.

To determine the father's influence on their preschool children's food preferences, Bryan and Lowenberg (1958) conducted a study in which fathers of 61 preschool children were asked to indicate their food preferences. Mothers of these children were asked to indicate the children's preferences for foods. Results indicated that the father's dislike for foods was not necessarily related to the child's aversions for a food. Children liked vegetables least, while fathers liked breads and cereals least. The mothers accredited their children's aversions to certain foods as due to "taste, odor, texture, appearance, method of preparation, and ease of eating [p. 33]."

McCarthy (1935) found that children's food aversions were related to family food aversions. For this study, mothers of 48 children between two years and seven years six months were interviewed to determine the reactions of the children and other family members of 72 foods listed on a questionnaire. Family food aversions were associated with approximately 35 per cent of the children's food aversions. As age increased, indifference to food increased. There was

more similarity between children's and siblings' food aversions than between parent and child.

Hodge (1963) determined the relationship of parents' food preferences to actual food consumption by 24 nursery school children. Parents of the children were asked to complete a questionnaire by indicating their degrees of preference for 69 foods. The parents were later asked to indicate their children's food preferences. For three weeks records were kept of the children's actual food consumption at the noon meal at the nursery school. Results revealed no relationship between the parents' food preferences and food consumed by the children. In general parents were not aware of their children's food preferences.

#### Color Preference Studies

Various studies have revealed that young children demonstrated a decided preference for certain colors. Spears (1966) investigated color and shape preferences of 60 four-month-old infants. Preference was indicated by the infants' relative visual fixation time on certain shapes and/or colors presented from an apparatus constructed as a viewing box. Results indicated that the subjects demonstrated a definite preference for blue and red colors over a gray of equal or greater brightness. Spears concluded that the differences obtained were due to the infants' discrimination of hue.

Guilford (1934) investigated the affective value of color as related to hue, tint, and chroma. Observations of results of studies of color preferences led him to conclude,

In spite of the differences in experimenter, color material, method of measurement, age, race, and sex of Ss, the order of preference for the different hues is a rather uniform phenomenon . . . . Color preference is not merely a matter of convention . . . . The differences that do occur, might be attributed to differences in brightness or chroma, in the size, shape, and background of color stimuli, and to some extent the age and education of the Ss [p. 347].

In the Guilford study five men and five women were asked to rank 40 single colors on one day and 45 color combinations the next day. The colors were ranked on a nine-point rating scale which expressed affective value of colors from greatest possible pleasure to greatest possible displeasure. Guilford's findings were:

Hue determined affective value for 67 per cent of the women and 16 per cent of the men.

Tint determined affective value for 20 per cent of the women and five per cent of the men.

Chroma determined affective value for five per cent of the women and 13 per cent of the men.

Garth and Porter (1934) determined preferences of 1032 young children who were divided into three groups: Group I--439 preschool children from one to 4.9 years of age; Group II--381 kindergarten children from four to 6.9 years of age; and Group III--188 first grade children from six to 6.9 years of age.

Cardboard squares of saturated red, green, orange,



violet, blue, yellow, and white were presented to each child. Each child was asked to choose the color he liked best of the seven colors. He was then asked to designate which color he preferred of the six that were left. The elimination process was continued until only one color remained.

Garth and Porter's findings indicated:

Older children were better able to discriminate differences of colors than younger children.

Boys discriminated feeling values of colors better than girls.

White was the least preferred selection for all age groups.

Among the children between three and 3.9 years of age, red and blue were favored slightly above green and orange. Yellow and violet were least preferred. However, no one color was ranked decidedly above the others.

Yellow was the least preferred color, excepting white.

Red was highly preferred up through kindergarten age, but dropped in popularity in the first grade.

Blue was favored more and red was favored less with increasing age.

Another study in which children were asked to choose preferred colors was conducted by Katz and Breed (1922).

Subjects were 2500 children between five and 15 years of age. Results revealed a blue, green, red, violet, orange order of preference.

In a study Michaels (1924) investigated color preferences of 535 boys, aged six to 15. Circular charts of



violet, red, orange, green, blue, and yellow were presented to the subjects. Each child was asked to write down in decreasing order the colors he preferred. The findings revealed a blue, red, yellow, green order of preference. Ranking of violet and orange was unreliable. Michaels stated that environment and social status were related to development of color preference.

Color preferences of 1011 Japanese children in grades one through ten were investigated by Garth, Ikeda, and Langdon (1931). The purpose of the study was to determine if color preferences differed by race. Garth et. al. concluded that the Japanese children did not discriminate colors as clearly as Whites, Indians, Negroes, and Mexicans. Order of color preference for the Japanese children was red, blue, violet, green, yellow, and white. Girls demonstrated more discriminative feeling for color than the boys.

Hunt (1959) investigated color preferences of clothes by 128 children between three and eleven years of age. Subjects were presented drawings of T-shirts of different hues, brightness, and saturation levels. Hunt's findings revealed red, yellow, green, and blue were equally preferred, but orange and violet were less popular. There was a significant developmental difference in relation to color. Red was more popular with younger children. Green was favored with increasing age. Standard brightness levels of red, yellow, orange, and green were preferred. Duller or brighter colors

were less preferred.

A review of literature on color preferences of pre-school children revealed that color preferences are evident in infants four months of age (Spears, 1966). In general red seemed to be the most preferred color for preschool children as was indicated in studies by Garth and Porter (1934). As children advanced beyond preschool age, blue was preferred more frequently (Michaels, 1924; Katz & Breed, 1922). Garth, Ikeda, and Langdon (1931) found that color preferences varied among children of different races and nationalities.

The review of literature revealed that preschool children have food preferences and color preferences. Food selection and consumption by children has been determined by observation and recording food intake and acceptance by children of certain foods as well as by allowing the children to select their own foods. Various studies have revealed many influencing factors related to selection and consumption of foods by children. However, there was a lack of research on color as it related to food preferences.

## CHAPTER III

## PROCEDURES

For a period of one pretest day and eight consecutive week days, the noon meal at the nursery school was served cafeteria style to the twenty-four nursery school children. Each child was permitted to choose the foods he desired. Ham, white bread, and plain milk were consistently offered each day. Either the choice of red, green, and white cabbage or the choice of red, yellow, and white rice was presented each day. Either yellow, pale green, and bright green peas or yellow, pale green, and bright green beans were served each day. The choice between red, green, and yellow applesauce or red, green, and yellow pears was offered each day.

The number of servings selected by each child was recorded by the teacher sitting at his table. A premeasured sample of each food was weighed and recorded each day. The number of servings of food selected by each child was multiplied by the premeasured sample weight in grams to obtain the amount in grams of food selected.

Plate waste was weighed to the nearest .1 gram on an Ohaus trip balance scale and was recorded. Amounts of each food consumed by each child was calculated by subtracting

the plate waste from the total amount of food selected.

### Subjects

The subjects for the study were all of the 24 children enrolled at the laboratory nursery school of the School of Home Economics at the University of North Carolina at Greensboro for the 1967-1968 school year. There were six three-year-old boys, six three-year-old girls, six four-year-old boys, and six four-year-old girls who participated in the study. The children were from homes of upper and upper-middle socio-economic families living in Greensboro, North Carolina. The subjects were all normal physically with the exception of one three-year-old girl who had a cleft lip and a cleft palate. None of the children had physical malfunctions that might interfere with normal eating.

### The Noon Meal at the Nursery School Prior to the Study

The noon meal at the University of North Carolina at Greensboro School of Home Economics Nursery School seemed to be regarded as a "happy time" and a time for social participation by the nursery school children. Normally five children sat at one table with a teacher who ate lunch with them. Each child sat at the same table with the same teacher each day. The food was usually served either family style or blue-plate style. One small serving of each food was placed on each child's plate. Vegetables and fruits were served by



the tablespoonful. Meat was cut into bite-sized pieces and was served by the tablespoonful. At least one finger food was served at each meal. Desserts were served in individual dishes. A glass of milk was set at each child's place.

Children were encouraged to taste each food, but were not forced to clear their plate. Children were permitted to obtain as many additional servings of a food as they desired provided they had eaten all of a food before they received seconds of the same food. When family style service was used, the children asked the teacher sitting at their tables for additional servings of food. When blue-plate service was used, a child was permitted to carry his plate to the service counter for additional servings. Only one child at a time from each table was permitted to return for seconds. Children were not deprived of dessert if they did not clear their plate since dessert was considered a part of the meal, not a reward for eating.

#### Preliminary Food Testing

Two weeks before the study began, the cook with the director of the nursery school and the investigator of the study added different amounts of food coloring to given amounts of rice, applesauce, pears, peas, beans, and cabbage to determine the hue, intensity, and value of colors of foods to be used in the study. Criteria for determining hue, intensity, and value were (1) hues that were normally

regarded as "appetite colors" which were according to Birren (1961), "peach, red, orange, brown, buff, warm yellow, clear green [p. 267]."; (2) intensities ranging from bright to dull; (3) values ranging from light to dark; and (4) intensities and values of rice, cabbage, peas, beans, applesauce, and pears as they normally appeared as well as varying intensities and values.

In order to acquaint the children with artificially colored foods before the study actually began, red rice, yellow rice, and red cabbage were served as a part of the noon meal. The teachers, director, investigator, and cook did not discuss the colored foods with the children.

Types of foods served during the study were determined from menus of foods previously served at the nursery school. The same method of preparation of foods was used during the study as was used when the foods were previously served to the children. Specific instructions were given to the cook for preparing each food.

### Rice

Fifteen drops of red food coloring were added to one-half cup of regular long grained white uncooked rice. Nine drops of yellow food coloring were added to one-half cup of regular long grained white uncooked rice. One-half teaspoon of salt and one cup of water were added to one-half cup uncooked rice and it was cooked for 15 minutes. One and

one-eighth tablespoons of margarine were added to one-half cup cooked rice.

#### Green Beans and Peas

One teaspoon of yellow food coloring was added to two number 303 cans of green peas. Two teaspoons of green food coloring were added to two number 303 cans of green peas. The peas were soaked overnight in order to absorb the coloring. Two number 303 cans of peas were cooked with four tablespoons of margarine and one-half teaspoon of salt. Peas were cooked ten minutes. The same brand of peas was used throughout the study.

Two teaspoons of green food coloring were added to two number 303 cans of green beans. Beans were soaked overnight to absorb the food coloring. No food coloring was added to wax green beans which were used as yellow beans. Three judges determined that there was no difference in the taste of canned wax beans and canned green beans. Two number 303 cans of beans were cooked with four tablespoons of margarine and one-half teaspoon of salt for forty-five minutes. The same brand of beans was used throughout the study.

#### Cabbage

Nine drops of green food coloring were added to one and one-half cups of raw chopped cabbage. Red cabbage and white cabbage were used in their natural colors. One-half

cup of vinegar, one-half teaspoon of salt, three tablespoons of sugar, and two tablespoons of mayonnaise were added to two and one-half cups of raw chopped cabbage.

#### Applesauce and Pears

Eighteen drops of red food coloring were added to one number two and one-half can of applesauce. Fifteen drops of green food coloring were added to one number two and one-half can of applesauce. Applesauce was also served in its natural pale yellow hue. The same brand of applesauce was used throughout the study.

Twenty drops of red food coloring were added to one number two and one-half can of Bartlett pears. Eighteen drops of green food coloring were added to one number two and one-half can of pears. The pears were soaked overnight to absorb food coloring. Pears were also served in their natural pale yellow hue. Intensity and value of red and green pears were matched as closely as possible to intensity and value of the red and green applesauce. The same brand of pears was used throughout the study. Pears were cut into bite-sized pieces for serving. White loaf bread was cut into fourths and was served each day.

#### Ham

The same kind of cooked, boned, and rolled ham was used throughout the study. It was cooked in the oven at 325° Fahrenheit for two hours. Ham was cut into bite-sized



pieces and only lean meat was served.

### Pretest

A pretest was conducted on the day before the study began to determine possible flaws in the procedure of serving the noon meal and to aid the children and teachers participating in the study in adjusting to the procedure. The same procedure was followed on the day of the pretest that was followed during the study. After the pretest minor adjustments were made to provide for more efficient serving of the food and the investigator clarified instructions for the teacher-recorders and the persons serving the food.

Prior to the pretest parents of the children were told at a parents' meeting and later by a letter that a food selection and consumption study was going to be conducted at the nursery school. The investigator explained the nature of the study to the parents and requested the parents to refrain from discussing anything about the noon meal with their child or the children in their car pool until after the study was completed. (See Appendix C).

### Procedures of the Investigation

For one pretest day and eight consecutive week days the noon meal at the nursery school was served cafeteria style to the children. Children were permitted to choose any food they wanted and were neither encouraged nor discouraged by adults to select or eat any food. Ham and white

bread were served each day. Choices of red, yellow, and white rice or red, green, and white cabbage were offered. Pale green, yellow, and bright green peas or pale green, yellow, and bright green beans were served each day. Red, green, and yellow applesauce or red, green, and yellow pears were presented. A glass of plain whole milk was set at each child's place each day.

Rest period was conducted fifteen minutes prior to lunch time each day. The children rested in one room of the nursery school and ate lunch in another room.

At 11:50 A.M. on the day of the pretest the director of the nursery school told each child to take his rest mat to his locker and return to the room where he rested. She then told the children that lunch would be served cafeteria style for two weeks and that each child could choose and eat the things he wanted. The children were told that they would be given "tickets" which would tell the order in which they would enter the room to be served. The director informed the children they could return for as many additional servings as they wished. The children were told after they had received their food to sit at the same table where they usually sat.

Each day the director gave each child a ticket with a number between one and 24 written on it. The ticket was presented to the investigator when each child entered the room. The order in which each child entered the room was

determined by randomization. Each child's name was written on a card taken from a bridge deck of cards. The cards were shuffled five times and cut three times. The order in which each card was turned over determined the order in which each child entered the room. Children entered the room in a different random order each day. Both the investigator and the director had copies of the order in which each child entered the room. The director gave the children their tickets and sent them in order, one at a time, to the room where lunch was being served.

The first child entered the lunch room at 11:55 A.M. each day. The investigator sat at the front of the cafeteria line, took up each child's ticket, and checked to see that each child was in the correct order. The investigator instructed the children either to tell the servers the food they wanted or to point to the foods they preferred. Children were instructed to proceed from the first to the end of the cafeteria line.

The food was placed on two tables on the side of the room near the kitchen. The order in which each food was presented was determined by a table of random numbers. Order of presentation was randomized so that each food was placed in each of four positions an equal number of days. In order to avoid serving too many foods at one time, either rice or cabbage, beans or peas, and applesauce or pears were served each day. Therefore, rice, cabbage, beans, peas,

applesauce, and pears were each served on four days. The kinds of vegetables and desserts served on each day were determined by a table of random numbers. Ham, rice or cabbage, beans or peas, and applesauce or pears were placed in first, second, third, or fourth position on each of the eight days. Bread was placed at the end of the line each day. Additional servings of milk were provided.

The order of presentation of foods was randomized by color from the front of the table to the back of the table as well as by kind from the first to the end of the cafeteria line. A table of random numbers was used to determine which color of rice, cabbage, beans, peas, applesauce, or pears would occupy front, middle, or back positions on the table each day.

Ham was cut into small bite-sized pieces and only lean meat was served. Each food was served by the level standard tablespoonful. Pears were cut into bite-sized pieces for serving. One tablespoonful of ham, beans, peas, cabbage, or rice constituted a serving. White loaf bread was cut into fourths for serving. Ham, peas, beans, cabbage, and rice were placed in small white opaque bowls for serving. Milk was served in clear plastic glasses. White opaque plates were used. Applesauce and pears were served in individual paper dishes which were white on the inside, white on the upper half of the outside, and pale green on the lower half of the outside. Individual dishes were used



for desserts because individual dishes were usually used for desserts and in order to facilitate service. Applesauce or pears were placed in the dishes before the lunch hour began so that the dishes only had to be placed on the table for serving during lunch.

Beans, peas, and rice were served lukewarm. Cabbage, ham, pears, applesauce, and bread were served at room temperature.

The same two student teachers served the food each day. Servers were instructed to serve food by leveling off standard tablespoonfuls. The servers refrained from discussing the food with the children and neither encouraged nor discouraged the children to select any particular food. Their only comment was, "Which do you want?" They were asked to refrain from using the word "more" when the children returned for additional servings, but merely put the food the child chose on his plate. Both verbal and written instructions were given to the servers. Written instructions for the servers may be found in Appendix E.

The cook and the cook's assistant supplied the servers with additional bowls of food when needed. Both the cook and the cook's assistant were asked to refrain from discussing the food with the children.

After each child had selected his food, he sat at the table where he regularly sat during the lunch hour. Five children sat at each of four tables and four children sat at

one table.

The same five teachers sat at the same five tables with the same children each day. Three of the teachers sitting with the children were the same persons who sat at those tables regularly. Two student teachers sat at the two tables where the director and investigator usually sat. During the last three days of the study one of the teachers was absent, thus another teacher who had observed the investigation in action was trained to serve as a teacher-recorder.

The teacher-recorders sat at the tables with the children but did not eat with the children. Both verbal and written instructions for procedures were provided to the teacher-recorders. Written instructions may be found in Appendix E. The teachers recorded the number of servings of each color and kind of food each child selected. Teachers were instructed to record initial servings chosen by the children in a separate column from the additional servings selected. The teachers were asked to refrain from using the words "eat," "food," or the name of a particular color of food. Teachers made no comments about what or how much each child ate. The teachers were permitted to remind the children not to play at the table. They could also say that the child's ride had come for him.

Each child was permitted to return to the serving line for as many additional servings of food he wanted.

However, the children were requested to eat all of a particular colored food before they returned for seconds of that same colored food. They were permitted to return for a different food or a differently colored food even if they had not eaten all of the other food on their plates. Only one child from each table at a time was permitted to return for additional servings. No child was permitted to leave the table until ten minutes after the last child had received his first serving.

First servings were completed at approximately 12:05 P.M. each day. All of the children finished their lunch by approximately 12:25 to 12:30 P.M. each day.

After the children left the lunch room, teachers were instructed to put each food left by each child in separate paper cups. The cups were then placed on the child's plate and each child's plastic name tag was put on the plate.

The investigator weighed a sample of each food each day to determine the approximate number of grams in one serving of each food. One tablespoonful of rice, cabbage, beans, peas, and ham were weighed to the nearest .1 gram on a trip balance Ohaus scale. Two tablespoonfuls of apple-sauce and pears, one fourth slice of white bread, and five ounces of milk were weighed to the nearest .1 gram on a trip balance Ohaus scale. Amounts of plate waste were weighed and recorded for each child. The total amounts of each food selected by each child was calculated by multiplying the

number of servings by the number of grams of the sample weight. Total amounts of food consumed by each child were calculated by subtracting the plate waste from the total amounts selected.

The analysis of the data secured is described in Chapter IV. The summary, conclusions, and recommendations are discussed in Chapter V.



## CHAPTER IV

### PRESENTATION AND DISCUSSIONS OF RESULTS

The purpose of the study was to determine the effect of color on food selection and consumption by twenty-four nursery school children. The investigator hypothesized that there would be no difference in the number of servings of food initially selected from among three colors of each food served. A second hypothesis was that after the initial serving there would be no difference in the number of servings of food selected among the three colors of each food served. The investigator also hypothesized that there would be no difference in the total number of servings of food selected among the three colors of each food served.

#### Data Collection

The number of initial servings and the number of additional servings of each food selected by each child were recorded in separate columns by the five teachers each of whom sat at one of the five tables with the children. A sample of each food was weighed to the nearest .1 gram on an Ohaus trip balance scale in order to provide a sample weight for calculating grams selected and consumed. The procedure followed was described in Chapter III, page 25.

### Data Analysis

Analysis of variance was used to determine if there were significant differences among colors of each food of the initial number of servings, the additional number of servings, and the total number of servings of food selected on each day by all of the children. When significant F values were found at the .05 level, the least significant difference needed between means of colors of foods was determined by the tabular t. If the difference between any two means was greater than the least significant difference, then the difference was significant. The formula for calculating analysis of variance is given in Lordahl's (1967) Modern Statistics for Behavioral Sciences. The formulas for calculating the least significant differences are found in the Principles and Procedures of Statistics by Steele and Torrie (1960). Significant differences among and within colors of foods and amounts in grams of foods consumed were determined by analysis of variance. Significant differences in the amounts of bread selected and consumed on the days on which rice was served and the days on which cabbage was served were also determined by analysis of variance. The statistical formula indicated there was no significant difference between the number of servings of bread chosen on rice or cabbage days.

All of the 24 children were not present on every one of the eight days of the study. The number of children

present on any given day ranged from 19 to 23. Analysis of variance was used to determine if there was a day effect on amounts of food selected and consumed. The analysis indicated the amounts of foods selected and consumed were not significant for any one single day.

The range and the means of initial, additional, and total servings selected each day of ham, bread, and milk were determined. The range and the means of grams of ham, bread, and milk consumed each day was determined and is presented in Appendix B. The weights of each serving of each food for each of the eight days is also presented in Appendix B.

#### Ham

The number of servings of ham selected on each of the eight days fluctuated between 25 and 55 total servings. The mean number of total servings of ham selected on each day was 40.0 servings. The number of servings varied from day to day but did not increase or decrease as the study continued. The amounts in grams of ham consumed varied from 226.8 grams to 552.6 grams. The mean number of grams of ham consumed on each day was 388.3 grams. The amount of ham consumed in grams did not increase or decrease progressively from one day to the next. However, more ham was consumed on the first day than any other day of the study.

### Milk

The number of total servings of milk selected varied from 20 to 27 servings. The mean number of servings of milk selected each day was 23.7 servings. Since an initial serving of milk was set at each child's place, the children did not actually select the milk voluntarily. The grams of milk consumed varied from 788.9 grams to 2452.3 grams. The mean amount of milk consumed was 1688.9 grams on each day. There was a large variation of amounts of milk consumed on different days, but grams consumed did not follow a progressive increase or decrease from beginning to conclusion of the study.

### Bread

The total selections of bread varied from 32 to 49 servings, but the number of servings did not increase or decrease as the study progressed. The mean amount of bread selected on each day was 41.0 servings. The amounts of bread consumed varied from 165.4 grams to 257.2 grams. The mean amount of bread consumed on each day was 199.5 grams. No pattern was evident from the first to the last day of the study.

### Rice

Red, yellow, and white rice were served on four days. The ranges of the servings of red rice selected extended from three to five initial servings, from two to seven additional



servings, and from eight to 13 total servings. The mean number of servings of red rice selected by all 24 children were 5.3 initial servings, 5.0 additional servings, and 10.3 total servings. The mean number of grams of red rice consumed was 114.1 grams and the range of consumption was from 85.9 to 146.7 grams.

The ranges of yellow rice selected extended from six to seven initial servings, six to 14 additional servings, and 11 to 21 total servings. The mean number of servings of yellow rice selected were 6.5 initial servings, 8.5 additional servings, and 14.8 total servings. The range of consumption of yellow rice was from 116.7 to 234.4 grams and the mean number of grams consumed was 174.68.

The amounts of white rice selected ranged from three to seven initial servings, two to 10 additional servings, and seven to 17 total servings. The mean amounts of white rice consumed were 5.3 initial servings, 8.0 additional servings, and 12.8 total servings. There were from 96.1 grams to 178.4 grams of white rice consumed and the mean number of grams consumed was 148.93. Table 1 indicates the ranges, the totals, and the mean number of servings of rice selected. The ranges, the totals, and the mean amounts of rice consumed are found in Table 2.

#### Analysis of Data on Rice

Analysis of variance indicated there were no

significant differences in the number of the initial servings selected, the additional servings selected, and the total servings selected, or amounts consumed of red, yellow, and white rice. The results of the statistical treatment of rice and the other five foods are presented in Appendix F.

Table 1

The Ranges, Total Amounts, and Means of Initial Servings, Additional Servings, Total Servings of Rice Selected in Four Days by Twenty-Four Children

	Red rice number of servings	Yellow rice number of servings	White rice number of servings	Least Significant Difference
Range of initial servings				
Low	3	6	3	
High	6	7	7	
Total initial servings	21	26	21	
Mean initial servings	5.3	6.5	5.3	N.S.
Range of additional servings				
Low	2	5	2	
High	7	14	10	
Total additional servings	20	34	32	
Mean additional servings	5.0	8.5	8.0	N.S.
Range of Total servings				
Low	8	11	7	
High	13	21	17	
Total Servings	41	59	51	
Mean total servings	10.3	14.8	12.8	N.S.

Table 2

The Ranges, Total Amounts, and Means  
of Grams of Rice Consumed on Four  
Days by Twenty-Four Children

	Red rice grams	Yellow rice grams	White rice grams	Least Significant Difference
Range of grams consumed				
Low	85.9	116.7	96.1	
High	146.7	234.4	178.4	
Total grams consumed	456.4	698.7	595.7	
Mean grams consumed	114.1	174.7	148.9	N.S.

### Cabbage

Red, green, and white cabbage were served on four days. The ranges of servings of red cabbage selected extended from two to four initial servings, from zero to four additional servings, and from two to 10 total servings. The mean amounts of red cabbage selected were 3.5 initial servings, 2.0 additional servings, and 6.0 total servings. The amounts of red cabbage consumed ranged from 3.4 to 61.1 grams while the mean consumption was 42.4 grams.

The ranges of green cabbage selected extended from one to three initial servings, from zero to two additional servings, and from one to 11 total servings. The mean amounts of green cabbage selected were 1.5 initial servings, 1.0 additional servings, and 5.0 total servings. Consumption of green cabbage ranged from 0.0 grams to 42.9 grams

and the mean consumption was 22.7 grams. The ranges of servings of white cabbage selected extended from one to four initial servings, from zero to two additional servings, and from three to 14 total servings. The mean amounts of white cabbage selected were 2.3 initial servings, .8 additional servings, and 6.3 total servings. Consumption of white cabbage ranged from 11.3 grams to 45.6 grams and the mean consumption was 28.1 grams. Table 3 indicates the ranges, the totals, and the mean number of servings of cabbage selected. The ranges, the totals, and the mean amounts of cabbage consumed are found in Table 4.

#### Analysis of Data on Cabbage

The examination of results indicated there were no significant differences in the initial servings selected, in the additional servings selected, in the total servings selected, or amount in grams consumed of red, green, and white cabbage.

#### Beans

Yellow, pale green, and bright green beans were served on four days. The range of serving of yellow beans selected extended from one to five initial servings, from one to two additional servings, and from three to six total servings. The mean amounts of yellow beans selected were 3.0 initial servings, 1.5 additional servings, and 4.5 total servings. Consumption of yellow beans ranged from 22.5



Table 3

The Ranges, Total Amounts, and Means of Initial Servings, Additional Servings, and Total Servings of Cabbage Selected on Four Days by Twenty-Four Children

	Red cab- bage Number of Servings	Green cab- bage Number of Servings	White cab- bage Number of Servings	Least Significant Difference
Range of initial servings				
Low	2	1	1	
High	4	3	4	
Total initial servings	4	6	9	
Mean initial servings	3.5	1.5	2.3	N.S.
Ranges of additional servings				
Low	0	0	0	
High	4	2	2	
Total additional servings	8	4	3	
Mean additional servings	2.0	1.0	.8	N.S.
Range of total servings				
Low	2	1	3	
High	10	11	14	
Total servings	24	20	25	
Mean total servings	6.0	5.0	6.3	N.S.

Table 4

The Ranges, Total Amounts, and Means of Grams  
of Cabbage Consumed on Four Days  
by Twenty-Four Children

	Red cab- bage Grams	Green cab- bage Grams	White cab- bage Grams	Least Significant Difference
Range of grams consumed				
Low	3.4	0.0	11.3	
High	61.1	42.9	45.6	
Total grams consumed	169.4	90.9	112.2	
Mean grams consumed	42.4	22.7	28.1	N.S.

grams to 56.0 grams while the mean consumption was 42.1 grams. The ranges of servings of pale green beans selected extended from four to seven initial servings, from one to two additional servings, and from six to eight total servings. The mean amounts of pale green beans selected were 5.0 initial servings, 1.8 additional servings, and 6.8 total servings. Consumption of pale green beans ranged from 54.7 grams to 73.1 grams and the mean consumption was 65.7 grams.

The number of servings of bright green beans selected ranged from zero to four initial servings, from zero to one additional servings, and from one to five total servings. The mean amounts of bright green beans selected were 1.8 initial servings, .5 additional servings, and 2.3 total servings. Consumption of bright green beans ranged from .8 grams to 21.7 grams and the mean consumption was 9.7 grams.

Table 5 indicates the ranges, the totals, and the mean number of servings of beans selected. The ranges, the totals, and the mean amounts of beans consumed are found in Table 6.

Table 5

The Ranges, Total Amounts, and Means of Initial Servings, Additional Servings, and Total Servings of Beans Selected on Four Days by Twenty-Four Children

	Yellow Beans Number of Servings	Pale green Beans Number of Servings	Bright green Beans Number of Servings	Least Significant Difference
Range of Initial servings				
Low	1	4	0	
High	5	7	4	
Total initial servings	12	20	7	
Mean initial servings	3.0	5.0	1.8	N.S.
Range of additional servings				
Low	1	1	0	
High	2	2	1	
Total additional servings	6	7	2	
Mean additional servings	1.5	1.8	.5	N.S.
Range of total servings				
Low	3	6	1	
High	6	8	5	
Total servings	18	27	9	
Mean total servings	4.5	6.8	2.3	.05 = 2.43

Table 6

The Ranges, Total Amounts, and Means of Grams  
of Beans Consumed on Four Days  
by Twenty-Four Children

	Yellow Beans Grams	Pale green Beans Grams	Bright green Beans Grams	Least Significant Difference
Range of grams consumed				
Low	22.5	54.7	.8	
High	56.0	73.1	21.7	
Total grams consumed	168.5	262.6	38.6	
Mean grams consumed	42.1	65.7	9.7	.05 = 20.87

#### Analysis of Data on Beans

Analysis of variance indicated there was no significant difference in the initial or the additional servings selected of yellow, pale green, and bright green beans. The examination of results revealed a significant difference at the .05 level between total servings of yellow, pale green, and bright green beans selected. There was a significant difference at the .05 level between the number of total servings chosen of pale green beans and the number of total servings of bright green beans, the mean amount of total servings of pale green beans selected being significantly greater than the mean number of total servings of bright green beans selected. Analysis of variance revealed a significant difference at the .05 level among the number of grams consumed of yellow, pale green, and bright green beans.



There was a significant difference at the .05 level between the grams of pale green beans consumed and the grams of bright green beans consumed, the mean number of grams of pale green beans consumed being significantly greater than the mean number of bright green beans consumed. At the .05 level there was a significant difference between the grams of pale green beans consumed and the grams of yellow beans consumed, the mean number of grams of pale green beans consumed being significantly greater than the mean number of grams of yellow beans consumed.

#### Peas

Yellow, pale green, and bright green peas were served on four days. The range of servings of yellow peas selected extended from one to four initial servings, zero to one additional servings, and from two to five total servings. The mean amounts of yellow peas selected were 3.0 initial servings, .8 additional servings, and 3.8 total servings. The amount in grams of yellow peas consumed ranged from 13.1 grams to 49.6 grams and the mean consumption was 31.2 grams. The number of servings of pale green peas selected ranged from four to eight initial servings, from one to 10 additional servings, and from five to 16 total servings. The mean amounts of pale green peas selected were 5.8 initial servings, 6.8 additional servings, and 12.5 total servings. The amounts of pale green peas consumed ranged from 40.7

grams to 180.4 grams and the mean consumption was 134.5 grams. The number of servings of bright green peas selected ranged from three to six initial servings, from one to six additional servings, and from four to 12 total servings. The mean amounts of bright green peas selected were 4.3 initial servings, 4.3 additional servings, and 8.5 total servings. Consumption of bright green peas ranged from 22.6 grams to 111.1 grams while the mean consumption was 75.3 grams. Table 7 indicates the ranges, the totals, and the mean number of servings of peas selected. The ranges, the totals, and the mean amounts of peas consumed are found in Table 8.

#### Analysis of Data on Peas

Analysis of the data revealed there was no significant difference in the number of initial servings or additional servings of yellow, pale green, and bright green peas selected. However, there was a significant difference at the .05 level among the total number of servings of yellow, pale green, and bright green peas. There was a significant difference at the .05 level between the number of total servings of pale green peas and yellow peas, the mean number of servings of pale green peas chosen being significantly greater than the mean number of servings of yellow peas selected. The statistical formula revealed a significant difference at the .05 level among the number of grams of

Table 7

The Ranges, Total Amounts and Means of Initial Servings, Additional Servings, and Total Servings of Peas Selected on Four Days by Twenty-Four Children

	Yellow peas Number of servings	Pale green peas Number of servings	Bright green peas Number of servings	Least Significant Difference
<hr/>				
Range of initial servings				
Low	1	4	3	
High	4	8	6	
Total initial servings	12	23	17	
Mean initial servings	3.0	5.8	4.3	N.S.
<hr/>				
Range of additional servings				
Low	0	1	1	
High	1	10	6	
Total additional servings	3	27	17	
Mean additional servings	.8	6.8	4.3	N.S.
<hr/>				
Range of total servings				
Low	2	5	4	
High	5	16	12	
Total servings	15	50	34	
Mean total servings	3.8	12.5	8.5	.05 = 6.33
<hr/>				

Table 8

The Ranges, Total Amounts, and Means of Grams  
of Peas Consumed on Four Days  
by Twenty-Four Children

	Yellow peas Grams	Pale green peas Grams	Bright green peas Grams	Least Significant Difference
Range of grams consumed				
Low	13.1	40.7	22.6	
High	49.6	180.4	111.1	
Total grams consumed				
	124.9	537.9	301.1	
Mean grams consumed				
	31.2	134.5	75.3	.05 = 25.96

yellow, pale green, and bright green peas consumed. There was a significant difference at the .05 level between the number of grams of pale green peas consumed and the number of grams of yellow peas consumed, the mean number of grams of pale green peas consumed being significantly greater than the mean number of grams of yellow peas consumed. There was a significant difference at the .05 level in the grams of pale green peas consumed and the grams of bright green peas consumed, the mean number of grams of pale green peas consumed being significantly greater than the mean number of grams of bright green peas consumed. There was a significant difference at the .05 level between the grams of bright green peas consumed and the yellow peas consumed, the mean number of grams of bright green peas consumed being significantly greater than the mean number of grams of yellow peas



consumed.

### Applesauce

Red, yellow, and green applesauce were served on four days. The servings of red applesauce selected ranged from three to seven initial servings, from six to 18 additional servings, and from 13 to 23 total servings. The mean amounts of red applesauce selected were 5.5 initial servings, 11.0 additional servings, and 16.5 total servings. The amounts of red applesauce consumed ranged from 444.3 grams to 761.9 grams and the mean consumption was 534.1 grams.

The servings of green applesauce selected ranged from seven to 11 initial servings, from eight to 25 additional servings, and from 19 to 30 total servings. The amounts of green applesauce selected were 9.0 initial servings, 18.8 additional servings, and 27.8 total servings. The amounts of green applesauce consumed ranged from 587.1 grams to 1120.2 grams, the mean consumed being 895.4 grams.

The ranges of servings of yellow applesauce extended from four to eight initial servings, six to 10 additional servings, and 11 to 16 total servings. The mean amounts of yellow applesauce selected were 5.3 initial servings, 8.5 additional servings, and 13.8 total servings. The amounts of yellow applesauce consumed ranged from 348.2 grams to 515.5 grams and the mean consumption was 440.8 grams.

Table 9 indicates the ranges, the totals, and the mean number of servings of applesauce selected. The ranges, the totals, and the mean amounts of applesauce consumed are found in Table 10.

Table 9

The Ranges, Total Amounts, and Means of Initial Servings, Additional Servings, and Total Servings of Applesauce Selected on Four Days by Twenty-Four Children

	Red applesauce Number of servings	Green applesauce Number of servings	Yellow applesauce Number of servings	Least Significant Difference
Range of initial servings				
Low	3	7	4	
High	7	11	8	
Total initial servings	22	36	21	
Mean initial servings	5.5	9.0	5.3	.05 = 3.01
Range of additional servings				
Low	6	8	6	
High	18	25	10	
Total additional servings	44	75	34	
Mean additional servings	11.0	18.8	8.5	N.S.
Range of total servings				
Low	13	19	11	
High	23	33	16	
Total servings	66	111	55	
Mean total servings	16.5	27.8	13.8	.05 = 2.54

Table 10

The Ranges, Total Amounts, and Means of Grams  
of Applesauce Consumed on Four  
Days by Twenty-Four Children

	Red applesauce Grams	Green applesauce Grams	Yellow applesauce Grams	Least Significant Difference
Range of grams consumed				
Low	443.3	587.1	348.2	
High	761.9	1120.2	515.5	
Total grams consumed	2136.2	3581.7	1763.0	
Mean grams consumed	534.1	895.4	440.8	.05 = 289.20

#### Analysis of Data on Applesauce

The examination of results revealed that there was a significant difference at the .05 level among the number of initial servings selected of red, green, and yellow applesauce. There was a significant difference at the .05 level between initial servings selected of green applesauce and initial servings selected of yellow applesauce, the mean number of initial servings of green applesauce selected being significantly greater than the mean number of initial servings of yellow applesauce selected. There was a significant difference at the .05 level between the mean number of initial servings of green applesauce selected and the mean number of initial servings of red applesauce selected, the mean number of initial servings of green applesauce

selected being significantly greater than the mean number of additional servings of red applesauce selected. Analysis of variance revealed there was no significant difference in the number of additional servings of red, green, and yellow applesauce selected. Analysis of variance revealed there was a significant difference at the .05 level among the number of total servings of red, green, and yellow applesauce selected. There was a significant difference at the .05 level between the number of total servings of green applesauce selected and the number of total servings of yellow applesauce selected, and between the number of total servings of green applesauce selected and the number of total servings of red applesauce selected. The mean number of total servings of green applesauce selected was significantly greater than the mean number of total servings selected of yellow applesauce and mean number of total servings of green applesauce was significantly greater than the mean number of total servings of red applesauce. There was a significant difference at the .05 level between the number of total servings of red applesauce and yellow applesauce, the mean number of total servings of red applesauce being significantly greater than the mean number of total servings of yellow applesauce.

Analysis of variance indicated there was a significant difference at the .05 level among the amounts of red, green, and yellow applesauce consumed. There was a



significant difference at the .05 level between the number of grams of green applesauce consumed and the number of grams of yellow applesauce consumed, the mean number of grams of green applesauce being significantly greater than the grams of yellow applesauce. There was a significant difference at the .05 level between the grams of green applesauce consumed and the grams of red applesauce consumed, the mean grams of green applesauce consumed being significantly greater than the grams of red applesauce consumed.

#### Pears

Red, yellow, and green pears were served on four days. The ranges of servings of red pears extended from four to seven initial servings, 10 to 17 additional servings, and 17 to 24 total servings. The mean number of servings of red pears selected were 6.0 initial servings, 13.8 additional servings, and 19.8 total servings. The amounts of red pears consumed ranged from 600.6 grams to 906.3 grams and the mean consumption was 720.0 grams.

The ranges of servings of green pears extended from five to 10 initial servings, 20 to 26 additional servings, and 29 to 31 total servings. The mean amounts of green pears selected were 7.8 initial servings, 23.5 additional servings, and 30.8 total servings. The amount of green pears consumed ranged from 967.9 grams to 1163.2 grams and

the mean consumption was 1098.9 grams.

The number of servings selected of yellow pears ranged from three to eight initial servings, 12 to 15 additional servings, and 16 to 20 total servings. The mean amounts of servings of yellow pears selected were 4.8 initial servings, 13.5 additional servings, and 18.0 total servings. The amount of yellow pears consumed ranged from 580.8 grams to 725.5 grams and the mean consumption was 649.9 grams. Table 11 indicates the ranges, the totals, and the mean number of servings of pears selected. The ranges, the totals, and the mean amounts of pears consumed are found in Table 12.

#### Analysis of Data on Pears

The analysis of data revealed there was no significant difference among the number of initial servings selected of red, green, and yellow pears. The statistical formula indicated there was a significant difference at the .05 level among the number of additional servings selected of red, green, and yellow pears. At the .05 level there was a significant difference between the number of additional servings of green pears selected and red pears selected and between green pears selected and yellow pears selected. The mean number of additional servings of green pears selected was significantly greater than the mean number of red pears or yellow pears selected. The data revealed a significant

Table 11

The Ranges, Total Amounts, and Means of Initial  
Servings, Additional Servings, and Total  
Servings of Pears Selected on Four  
Days by Twenty-Four Children

	Red pears Number of servings	Green pears Number of servings	Yellow pears Number of servings	Least Significant Difference
Range of initial servings				
Low	4	5	3	
High	7	10	8	
Total initial servings	24	31	19	
Mean initial servings	6.0	7.8	4.8	N.S.
Range of additional servings				
Low	10	20	12	
High	17	26	15	
Total additional servings	55	93	54	
Mean additional servings	13.8	23.5	13.5	.05 = 1.54
Range of total servings				
Low	17	29	16	
High	24	33	20	
Total servings	79	123	72	
Mean total servings	19.8	30.8	18.0	.05 = 1.36

Table 12

The Ranges, Total Amounts, and Means of  
Grams of Pears Consumed on Four  
Days by Twenty-Four Children

	Red pears Grams	Green pears Grams	Yellow pears Grams	Least Significant Difference
Range of grams consumed				
Low	600.6	976.9	580.8	
High	906.3	1163.2	725.5	
Total grams consumed				
	2879.9	4395.4	2599.4	
Mean grams consumed				
	720.0	1098.9	649.9	.05 = 183.05

difference at the .05 level between the number of total servings selected of red, green, and yellow pears. At the .05 level there was a significant difference between the total number of servings of green pears and red pears selected and between green pears and yellow pears selected. The mean number of total servings of green pears was significantly greater than the mean number of total servings of red pears or yellow pears. There was a significant difference at the .05 level between the total number of servings selected of red pears and yellow pears, the mean number of total servings of red pears being significantly greater than the mean number of total servings of yellow pears. The analysis of data revealed a significant difference among the amounts consumed of red, green, and yellow pears at the .05 level. There was a significant difference at the .05 level



between the amounts consumed of green pears and red pears and between the amounts consumed of green pears and yellow pears. The mean number of grams of green pears consumed was significantly greater than the mean grams of yellow pears or red pears consumed.

In summary, analysis of data by analysis of variance indicated there was significant differences in food selection and consumption due to different colors of foods. There were significant differences among initial servings selected of red, green, and yellow applesauce. Significant differences were found among additional servings selected of red, yellow, and green pears. There were significant differences among the total servings selected of yellow, pale green and bright green beans; among red, green, and yellow applesauce; among yellow, pale green and bright green peas; and among red, green, and yellow pears. There were significant differences among the amounts consumed of yellow, pale green and bright green peas; among yellow, pale green, and bright green beans; among red, yellow, and green applesauce; and among red, yellow, and green pears. The mean amounts of green applesauce and green pears selected and consumed were significantly greater than mean amounts of red or yellow applesauce and pears. The mean amounts of pale green beans and peas selected and consumed were significantly greater than the mean amounts of yellow or bright green peas and beans.

## CHAPTER V

## SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

The purpose of this study was to determine the effect of color on food selection and consumption by 24 nursery school children. The investigator hypothesized that there would be no significant difference in the number of servings of food initially selected among the three colors of each food served. A second hypothesis was that there would be no difference in the number of servings of food selected after the initial serving among the three colors of each food served. The investigator further hypothesized that there would be no difference in the total number of servings of food selected among the three colors of each food served. The final hypothesis was that there would be no difference in the number of grams of food consumed among the three colors of each food served.

The subjects for the study were all of the 24 three- and-four-year-old children enrolled at the University of North Carolina at Greensboro School of Home Economics Nursery School for the 1967-1968 school year. There were six three-year-old boys, six three-year-old girls, six four-year-old boys, and six four-year-old girls involved in the study. The results of this investigation were not inferred

beyond this group of subjects.

For one pretest day and eight consecutive week days the noon meal at the nursery school was served in cafeteria style. Each child was permitted to choose the foods he desired and was allowed to return to the cafeteria line for as many additional servings of foods as he wished. Each child entered the cafeteria line in a random order each day.

Ham, white bread, and plain milk were consistently offered each day. Either the choice of red, green, and white cabbage or the choice of red, yellow, and white rice was presented each day. Either yellow, pale green, and bright green peas or yellow, pale green, and bright green beans were served daily. The choice between red, green, and yellow applesauce or red, green, and yellow pears was offered each day.

Degree of saturation and value of colors of foods was determined by three judges who matched the colors of foods each day by adding the same amounts of food coloring to the same amounts of foods. Order of presentation of each food group and order of differently colored foods within groups was determined each day by a table of random numbers.

After each child selected his choices of foods at the cafeteria line, he sat at the table where he usually sat during the lunch hour. Five children sat at each of four tables and four children sat at one table. A teacher sat at each table with the children but did not eat with them.

The number of servings selected by each child was recorded by the teacher sitting at his table. A premeasured sample of each food was weighed and recorded each day. The number of servings of each food selected by each child was multiplied by the premeasured sample weight in grams to obtain the amount in grams of food selected.

Plate waste was weighed to the nearest .1 gram on an Ohaus trip balance scale and was recorded. Amounts of each food consumed by each child was calculated by subtracting the plate waste from the total amount of food selected.

Analysis of variance was used to determine if there were significant differences among colors of foods and number of initial servings of foods selected, among colors of foods and additional servings of food selected, among colors of foods and total servings of foods selected, and among colors of foods and number of grams of food consumed. Ranges and means were determined for the initial servings selected, additional servings selected, total servings selected, and number of grams consumed of each food.

Results of analysis of data indicated there were no significant differences among the three colors of rice and the number of servings selected and the number of grams consumed. There were no significant differences among the three colors of cabbage and the number of servings selected and the number of grams consumed. Although there were no significant differences among the three colors of peas and



the initial servings and additional servings selected, significant differences were found at the .05 level among the colors of peas and total servings selected. The mean number of total servings selected of pale green peas was significantly greater than the mean number of total servings of yellow peas. At the .05 level of significance, the mean grams of pale green peas consumed was greater than mean grams consumed of bright green or yellow peas, and the mean grams of bright green peas consumed was greater than mean grams consumed of yellow peas. No significant differences were found among the colors of beans and initial and additional servings, but there was a significant difference at the .05 level between total servings selected of pale green beans and total servings selected of bright green beans. At the .05 level of significance, the mean grams consumed of pale green beans was greater than the mean grams consumed of bright green beans or yellow beans. At the .05 level of significance, the mean number of grams of yellow beans consumed was greater than the mean number of grams of bright green peas consumed. Analysis of variance indicated there were significant differences at the .05 level among colors of applesauce and initial servings selected, although no significance was found among additional servings selected and colors of applesauce. The analysis of data revealed there were no significant differences among colors of pears and initial servings of pears selected, but there was a

significant difference at the .05 level among colors of pears and additional servings selected. At the .05 level of significance, the mean number of total servings selected of green applesauce and green pears was greater than mean number of total servings selected of red or yellow applesauce and red or yellow pears. At the .05 level of significance, the mean number of grams consumed of green applesauce and green pears was greater than the mean number of grams consumed of red or yellow applesauce and red or yellow pears.

### Conclusions

On the basis of findings of the study, the investigator concluded that color had a definite effect on the number of servings of food selected and the number of grams consumed, thus the null hypotheses were rejected, with exceptions of rice and cabbage. Results supported Spock and Lowenberg's (1955) theory that color influences children's food preferences.

The data analysis indicated the amounts of green applesauce and pears selected and consumed was significantly greater than amounts of red or yellow applesauce and pears. The investigator concluded that clear green was the preferred color of applesauce and pears over red and yellow applesauce and pears. Yellow was the least preferred color. These conclusions paralleled results of a study by Garth and Porter (1934) which determined color preferences in general

of preschool age children. Garth and Porter concluded green was preferred over yellow and that yellow was the least esteemed color. Results of this study contradicted the results of a study on general color preferences by Michaels (1924) in which he concluded that a group of children from five to 15 years of age preferred red over yellow and yellow over green.

The data analysis indicated that the amounts of pale green peas and pale green beans selected and consumed was significantly greater than amounts of bright green peas and bright green beans. Amounts of bright green peas consumed was significantly greater than yellow peas consumed, but amounts of yellow beans consumed was significantly greater than bright green beans consumed. Thus the investigator concluded that peas and beans were preferred in their natural green colors or intensities above the bright green or yellow colors or intensities. The bright green colors of beans and peas may have been too intensely colored and the yellow colors of beans and peas may have been too low in intensity to appear appetizing to the children. The children also may have preferred colors of peas and beans with which they were familiar. That different intensities affect color preferences was supported by Guilford (1934) who stated that differences in color preferences might be attributed to "... differences in brightness or chroma, in the size, shape, and background of color stimuli [p. 347] . . . ."



The data analysis indicated that the three colors of cabbage had no significant effect on selection and consumption of cabbage. There was little variation between groups of colors of cabbage and the number of servings selected. However, the number of grams of red cabbage consumed exceeded the number of grams of green cabbage consumed by 158.5 grams and number in grams of white cabbage consumed by 57.2 grams. The number of grams of white cabbage consumed was 21.3 grams greater than the number of grams of green cabbage consumed. There was much variation within groups of colors of cabbage consumed which may have attributed to results of no significant difference in amounts of cabbage consumed of the three colors.

The data analysis indicated that the three colors of rice had no effect on the selection and consumption of rice. There was little variation between groups of colors of rice of the number of servings selected. However, 242.3 and 103.0 grams more of yellow rice were consumed than red or white rice respectively. The number in grams of white rice consumed exceeded the number in grams of red rice consumed by 139.3 grams. The children may have felt that the yellow rice looked as though it had butter on it, and this may be a possible explanation for the greater amounts of consumption of yellow rice than red or white rice. There was much variation within groups of colors of rice which may have attributed to the results of no significant difference



between the colors of rice and amounts consumed.

In summary color did have a significant effect on selection and consumption of some, but not all of the foods served. Thus the degree of influence of color on food selection and consumption appeared to depend partially on the type of food which was colored differently. Differences in significance might also be attributed to the fact that different colors, intensities, and values of different foods were offered.

#### Recommendations for Further Study

The investigator recommended that further study be conducted in determining the relationship of color to food preferences. Children could be given choices of differently colored foods. Later they could be asked to select the colors they preferred from cardboard squares painted the same colors of the colored foods previously served. Correlations between color preference for foods and color preference alone could be determined.

It would be interesting to determine if different colors of foods other than those used in this study had a significant effect on food selection and consumption. Selection and consumption of colored milk might be determined. Another recommended study might be to determine whether children of different socioeconomic levels, different ages, different sexes, or different races preferred the same or different colors of foods.

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## APPENDIX A

Data Recording Sheets for Food  
 Selection and Consumption by  
 Each Child and by the  
 Twenty-Four Children

## Daily Food Selection and Consumption of Each Child

Name of Child \_\_\_\_\_

Order of entering room \_\_\_\_\_

Date May, 1968

Food	First Serving Amt.Gms.	Additional Servings Amt. Gms.	Total Servings Amt. Gms.	Plate Waste Gms.	Quantity Consumed Amt.Gms.
Ham					
Milk					
Bread					
Red rice					
Yellow rice					
White rice					
Red cabbage					
Green cabbage					
White cabbage					
Yellow beans					
Pale green beans					
Bright green beans					
Yellow peas					
Pale green peas					
Bright green peas					
Red apple- sauce					



Food	First Serving	Additional Servings	Total Servings	Plate Waste	Quantity Consumed
	Amt.Gms.	Amt. Gms.	Amt. Gms.	Gms.	Amt.Gms.
Green apple- sauce					
Yellow applesauce					
Red pears					
Green pears					
Yellow pears					

Daily Food Selection and Consumption  
by the Twenty-Four Children

Date \_\_\_\_\_

Food	First Serving Amt.Gms.	Additional Servings Amt. Gms.	Total Servings Amt. Gms.	Sample Weight Gms.	Quantity Consumed Amt.Gms.
Ham					
Milk					
Bread					
Red rice					
Yellow rice					
White rice					
Red cabbage					
Green cabbage					
White cabbage					
Yellow beans					
Pale green beans					
Bright green beans					
Yellow peas					
Pale green peas					
Bright green peas					
Red apple- sauce					

Food	First Serving	Additional Servings	Total Servings	Sample Weight	Quantity Consumed
	Amt.Gms.	Amt. Gms.	Amt. Gms.	Gms.	Amt.Gms.
Green applesauce					
Yellow applesauce					
Red pears					
Green pears					
Yellow pears					

# Total Daily Food Selection and Consumption by the Twenty-Four Children

June 1962, May 7, 1962

Food	Portion	Additional	Total	Sample	Quantity
Portion	Portion	Portion	Portion	Portion	Portion
15	18.0	27	27.5	25	27.5
16	22.0	2	22.0	21	22.0
17	25.0	2	25.0	21	25.0

## APPENDIX B

### Total Daily Food Selection and Consumption by the Twenty-Four Children

18	28.0	2	28.0	21	28.0
19	30.0	2	30.0	21	30.0
20	32.0	2	32.0	21	32.0
21	34.0	2	34.0	21	34.0
22	36.0	2	36.0	21	36.0
23	38.0	2	38.0	21	38.0
24	40.0	2	40.0	21	40.0
25	42.0	2	42.0	21	42.0
26	44.0	2	44.0	21	44.0
27	46.0	2	46.0	21	46.0
28	48.0	2	48.0	21	48.0
29	50.0	2	50.0	21	50.0
30	52.0	2	52.0	21	52.0
31	54.0	2	54.0	21	54.0
32	56.0	2	56.0	21	56.0
33	58.0	2	58.0	21	58.0
34	60.0	2	60.0	21	60.0
35	62.0	2	62.0	21	62.0
36	64.0	2	64.0	21	64.0
37	66.0	2	66.0	21	66.0
38	68.0	2	68.0	21	68.0
39	70.0	2	70.0	21	70.0
40	72.0	2	72.0	21	72.0
41	74.0	2	74.0	21	74.0
42	76.0	2	76.0	21	76.0
43	78.0	2	78.0	21	78.0
44	80.0	2	80.0	21	80.0
45	82.0	2	82.0	21	82.0
46	84.0	2	84.0	21	84.0
47	86.0	2	86.0	21	86.0
48	88.0	2	88.0	21	88.0
49	90.0	2	90.0	21	90.0
50	92.0	2	92.0	21	92.0
51	94.0	2	94.0	21	94.0
52	96.0	2	96.0	21	96.0
53	98.0	2	98.0	21	98.0
54	100.0	2	100.0	21	100.0



Total Daily Food Selection and Consumption  
by the Twenty-Four Children

Date Tuesday, May 7, 1968

Food	First Serving	Additional Servings	Total Servings	Sample Weight	Quantity Consumed
	Amt. Gms.	Amt. Gms.	Amt. Gms.	Gms.	Amt. Gms.
Ham	18 189.0	37 388.5	55 577.5	10.5	52.6 552.6
Milk	19 2281.9	2 240.2	21 2522.1	120.1	12.2 1458.6
Bread	18 95.4	21 111.1	39 206.5	5.3	36.6 194.3
Red rice	NS				
Yellow rice	NS				
White rice	NS				
Red cabbage	4 48.0	3 36.0	7 84.0	12.0	4.7 56.7
Green cabbage	3 36.0	2 24.0	5 60.0	12.0	3.6 42.9
White cabbage	2 24.0	2 24.0	4 48.0	12.0	3.8 45.6
Yellow beans	NS				
Pale green beans	NS				
Bright green beans	NS				
Yellow peas	4 53.2	1 13.3	5 66.5	13.3	3.5 49.6
Pale green peas	5 66.5	9 119.7	14 186.2	13.3	12.5 167.5
Bright green peas	5 66.5	6 79.8	11 146.3	13.3	7.5 101.0
Red applesauce	NS				

Food	First		Additional		Total		Sample	Quantity	
	Serving		Servings		Servings			Weight	Consumed
	Amt.	Gms.	Amt.	Gms.	Amt.	Gms.	Gms.	Amt.	Gms.
Green applesauce NS									
Yellow applesauce NS									
Red pears	7	275.8	17	669.8	24	945.6	39.4	23.5	906.3
Green pears	7	275.8	23	906.2	30	1182.0	39.4	29.1	1145.5
Yellow pears	3	118.2	14	551.6	17	669.8	39.4	16.1	635.2

NS = Not served



Food	First Serving		Additional Servings		Total Servings		Sample Weight Gms.	Quantity Consumed	
	Amt.	Gms.	Amt.	Gms.	Amt.	Gms.		Amt.	Gms.
Green applesauce	NS								
Yellow applesauce	NS								
Red pears	4	145.2	17	617.1	21	762.3	36.3	21.0	760.8
Green pears	10	399.3	23	871.2	33	1197.9	36.3	32.0	1163.2
Yellow pears	4	145.2	12	471.9	16	580.8	36.3	16.0	580.8

NS = Not Served



Total Daily Food Selection and Consumption  
by the Twenty-Four Children

Date Thursday, May 9, 1968

Food	First Serving		Additional Servings		Total Servings		Sample Weight Gms.	Quantity Consumed	
	Amt.	Gms.	Amt.	Gms.	Amt.	Gms.		Amt.	Gms.
Ham	21	210.0	36	360.0	57	570.0	10.0	54.1	541.0
Milk	23	2746.2	4	477.6	27	3223.8	119.4	15.2	1836.8
Bread	23	121.9	21	111.3	44	233.2	5.3	37.0	196.2
Red rice	NS								
Yellow rice	NS								
White rice	NS								
Red cabbage	4	52.0	1	13.0	5	65.0	13.0	3.7	48.2
Green cabbage	1	13.0	2	26.0	3	39.0	13.0	2.8	35.7
White cabbage	2	26.0	1	13.0	3	39.0	13.0	2.6	33.6
Yellow beans	NS								
Pale green beans	NS								
Bright green beans	NS								
Yellow peas	1	13.1	1	13.1	2	26.2	13.1	1.0	13.1
Pale green peas	6	78.6	10	131.0	16	209.6	13.1	14.5	180.4
Bright green peas	6	78.6	6	78.6	12	157.2	13.1	8.5	111.1
Red applesauce	5	169.0	18	608.4	23	777.4	33.8	22.5	761.9

Food	First Serving		Additional Servings		Total Servings		Sample Weight	Quantity Consumed	
	Amt.	Gms.	Amt.	Gms.	Amt.	Gms.	Gms.	Amt.	Gms.
Green applesauce	10	338.0	20	676.0	30	1014.0	33.8	28.4	957.3
Yellow applesauce	8	270.4	8	270.4	16	540.8	33.8	15.1	515.5
Red pears	NS								
Green pears	NS								
Yellow pears	NS								

NS = Not Served

Total Daily Food Selection and Consumption  
by the Twenty-Four Children

Date Friday, May 10, 1968

Food	First Serving		Additional Servings		Total Servings		Sample Weight		Quantity Consumed	
	Amt.	Gms.	Amt.	Gms.	Amt.	Gms.	Gms.	Amt.	Gms.	
Ham	20	214.0	20	214.0	40	428.0	10.7	34.8	372.4	
Milk	21	2409.5	7	836.5	28	3246.0	119.5	21.4	2452.3	
Bread	18	97.2	26	140.4	44	237.6	5.4	39.8	215.1	
Red rice	NS									
Yellow rice	NS									
White rice	NS									
Red cabbage	2	24.4	0	0.0	2	24.4	12.2	.3	3.4	
Green cabbage	1	12.2	0	0.0	1	12.2	12.2	.0	0.0	
White cabbage	4	48.8	0	0.0	4	48.8	12.2	1.8	21.7	
Yellow beans	3	33.6	2	22.4	5	56.0	11.2	5.0	56.0	
Pale green beans	4	44.8	2	22.4	6	67.2	11.2	4.9	54.7	
Bright green beans	4	44.8	1	11.2	5	56.0	11.2	1.9	21.7	
Yellow peas	NS									
Pale green peas	NS									
Bright green peas	NS									
Red applesauce	NS									

Food	First Serving		Additional Servings		Total Servings		Sample Weight	Quantity Consumed	
	Amt.	Gms.	Amt.	Gms.	Amt.	Gms.	Gms.	Amt.	Gms.
Green applesauce	NS								
Yellow applesauce	NS								
Red pears	7	256.2	10	366.0	17	622.2	36.6	16.7	612.2
Green pears	9	329.4	20	732.0	29	1061.4	36.6	26.7	976.9
Yellow pears	4	146.4	15	549.0	19	695.4	36.6	18.0	657.9

NS = Not Served



Total Daily Food Selection and Consumption  
by the Twenty-Four Children

Date Monday, May 13, 1968

Food	First Serving		Additional Servings		Total Servings		Sample Weight Gms.	Quantity Consumed	
	Amt.	Gms.	Amt.	Gms.	Amt.	Gms.		Amt.	Gms.
Ham	16	179.2	9	100.8	25	280.0	11.2	20.3	226.8
Milk	20	2396.0	6	718.8	26	3115.8	119.8	20.9	2401.9
Bread	17	93.5	15	82.5	32	176.0	5.5	30.1	165.4
Red rice	5	69.5	5	69.5	10	139.0	13.9	10.0	113.5
Yellow rice	6	83.4	5	69.5	11	152.9	13.9	8.4	116.7
White rice	5	69.5	9	125.1	14	194.6	13.9	11.9	166.6
Red cabbage	NS								
Green cabbage	NS								
White cabbage	NS								
Yellow beans	NS								
Pale green beans	NS								
Bright green beans	NS								
Yellow peas	4	54.0	1	13.5	5	67.5	13.5	3.7	49.4
Pale green peas	5	67.5	0	0.0	5	67.5	13.5	3.0	40.7
Bright green peas	3	40.5	1	13.5	4	54.0	13.5	1.7	22.6
Red applesauce	7	238.7	8	272.8	15	511.5	34.1	13.3	452.8

Food	First Serving		Additional Servings		Total Servings		Sample Weight Gms.	Quantity Consumed	
	Amt.	Gms.	Amt.	Gms.	Amt.	Gms.		Amt.	Gms.
Green applesauce	7	238.7	22	750.2	29	988.9	34.1	26.9	917.1
Yellow applesauce	4	136.4	10	341.0	14	477.4	34.1	14.0	475.6
Red pears	NS								
Green pears	NS								
Yellow pears	NS								

NS = Not Served

Total Daily Food Selection and Consumption  
by the Twenty-Four Children

Date Tuesday, May 14, 1968

Food	First Serving		Additional Servings		Total Servings		Sample Weight Gms.	Quantity Consumed	
	Amt.	Gms.	Amt.	Gms.	Amt.	Gms.		Amt.	Gms.
Ham	18	192.6	18	192.6	36	385.2	10.7	31.1	332.8
Milk	20	2394.0	0	0.0	20	2394.0	119.7	9.8	1164.5
Bread	18	95.4	26	137.8	44	233.2	5.3	40.7	215.9
Red rice	6	75.0	2	25.0	8	100.0	12.5	7.7	85.9
Yellow rice	7	87.5	14	175.0	21	262.5	12.5	18.8	234.4
White rice	3	37.5	10	125.0	13	167.5	12.5	12.4	154.6
Red cabbage	NS								
Green cabbage	NS								
White cabbage	NS								
Yellow beans	1	11.4	2	22.8	3	34.2	11.4	2.0	22.5
Pale green beans	7	79.8	1	11.4	8	91.2	11.4	5.9	67.3
Bright green beans	2	22.8	0	0.0	2	22.8	11.4	.3	3.9
Yellow peas	NS								
Pale green peas	NS								
Bright green peas	NS								
Red applesauce	3	102.9	12	411.6	15	514.5	34.3	13.9	478.2

Food	First		Additional		Total		Sample		Quantity	
	Serving		Servings		Servings		Weight		Consumed	
	Amt.	Gms	Amt.	Gms.	Amt.	Gms.	Gms.	Amt.	Gms.	
Green										
applesauce	11	377.3	8	274.4	19	651.7	34.3	17.1	587.1	
Yellow										
applesauce	4	137.2	10	343.0	14	480.2	34.3	12.6	423.7	
Red pears	NS									
Green pears	NS									
Yellow pears	NS									

NS = Not Served



Total Daily Food Selection and Consumption  
by the Twenty-Four Children

Date Wednesday, May 15, 1968

Food	First Serving Amt. Gms.	Additional Servings Amt. Gms.	Total Servings Amt. Gms.	Sample Weight Gms.	Quantity Consumed Amt. Gms.
Ham	17 178.5	23 241.5	40 420.0	10.5	35.9 376.9
Milk	21 2517.9	1 119.9	22 2637.8	119.9	13.1 1568.6
Bread	19 100.7	23 121.9	42 222.6	5.3	34.6 183.3
Red rice	NS				
Yellow rice	NS				
White rice	NS				
Red cabbage	4 51.2	4 51.2	8 102.4	12.8	4.8 61.1
Green cabbage	1 12.8	0 0.0	1 12.8	12.8	.9 12.3
White cabbage	1 12.8	0 0.0	1 12.8	12.8	.8 11.3
Yellow beans	3 36.6	1 12.2	4 48.8	12.2	2.9 35.4
Pale green beans	4 48.8	2 24.4	6 73.2	12.2	5.5 67.5
Bright green beans	1 12.2	0 0.0	1 12.2	12.2	.1 .8
Yellow peas	NS				
Pale green peas	NS				
Bright green peas	NS				
Red applesauce	NS				

Food	First Serving		Additional Servings		Total Servings		Sample Weight	Quantity Consumed	
	Amt.	Gms.	Amt.	Gms.	Amt.	Gms.	Gms.	Amt.	Gms.
Green applesauce	NS								
Yellow applesauce	NS								
Red pears	6	220.2	11	403.7	17	623.9	36.7	16.3	600.6
Green pears	5	183.5	26	954.2	31	1137.7	36.7	30.2	1109.8
Yellow pears	8	293.6	12	440.4	20	734.0	36.7	19.7	725.5

NS = Not Served

Total Daily Food Selection and Consumption  
by the Twenty-Four Children

Date Thursday, May 16, 1968

Food	First Serving		Additional Servings		Total Servings		Sample Weight Gms.	Quantity Consumed	
	Amt.	Gms.	Amt.	Gms.	Amt.	Gms.		Amt.	Gms.
Ham	17	185.3	17	185.3	34	370.6	10.9	32.2	351.1
Milk	23	2753.1	2	239.4	25	2992.5	119.7	15.4	1839.5
Bread	20	116.0	29	168.2	49	284.2	5.8	44.3	257.2
Red rice	6	78.6	7	91.7	13	170.3	13.1	11.2	146.7
Yellow rice	6	78.6	6	78.6	12	157.2	13.1	11.5	151.3
White rice	7	91.7	10	131.0	17	222.7	13.1	13.6	178.4
Red cabbage	NS								
Green cabbage	NS								
White cabbage	NS								
Yellow beans	5	61.0	1	12.2	6	73.2	12.2	4.5	54.6
Pale green beans	5	61.0	2	24.4	7	85.4	12.2	6.0	73.1
Bright green beans	0	0.0	1	12.2	1	12.2	12.2	1.0	12.2
Yellow peas	NS								
Pale green peas	NS								
Bright green peas	NS								
Red applesauce	7	238.7	6	204.6	13	443.3	34.1	13.0	443.3

Food	First Serving		Additional Servings		Total Servings		Sample Weight	Quantity Consumed	
	Amt.	Gms.	Amt.	Gms.	Amt.	Gms.	Gms.	Amt.	Gms.
Green applesauce	8	272.0	25	852.5	33	1125.3	34.1	32.9	1120.2
Yellow applesauce	5	170.5	6	204.6	11	375.1	34.1	10.2	348.2
Red pears	NS								
Green pears	NS								
Yellow pears	NS								

NS = Not Served



Dear Parents,

From Monday, May 6 to Friday, May 10, I plan to conduct research during lunch time at the nursery school. The goal will be to record children's play and each child will be asked to choose the foods in the kitchen he desires.

The Director and I would like to enlist your help.

Will you please refrain from discussing with your child the goal of the study at the nursery school? Also please do not discuss with your child or any other child the goal of the study.

#### APPENDIX C

### Letters to Parents of the Twenty-Four Nursery School Children

The research project is being conducted for my master's thesis. Results of the study will be available at the nursery school in July.

We appreciate your cooperation. For without you and your children, we would have been unable to complete this study. My sincere thanks to each of you.

Sincerely,

Ellen Savoy,  
Graduate Student

Approved by:  
Ellen Savoy,  
Research Director and  
Director of the Nursery  
School

Dear Parents,

From Monday, May 6 to Friday, May 10, I plan to conduct research during lunch time at the nursery school. The meal will be served cafeteria style and each child will be asked to choose the foods in the amounts he desires.

The director and I would like to enlist your help. Will you please refrain from discussing with your child the noon meal at the nursery school? Also please do not discuss with your child or car pool what was eaten for lunch during the entire week.

The research is being conducted in partial fulfillment for my master's thesis. Results of the study will be available at the nursery school in July.

We appreciate your cooperation, for without you and your children, we would have been unable to complete this study. My sincere thanks to each of you.

Sincerely,

Ellen Bacon,  
Graduate Student

Approved by:  
Helen Canaday,  
Thesis Director and  
Director of the Nursery  
School

Dear Parents,

I would like to thank each of you for allowing your child to participate in the foods research we conducted May 6 through May 16. Without your children the study would not have been possible.

The purpose of the investigation was to determine the relationship between color and food selection and consumption by nursery school children. Results will be available at the Nursery School at the end of the second week in July.

Again, many thanks to you for your fine cooperation.

Sincerely,

Ellen Bacon,  
Graduate Assistant

# Menus of Foods Served Each Day During the Study

## Protocol, Monday, May 6

beans:  
bright green  
yellow  
pale green

peas:  
bright green  
yellow  
pale green

carrots:  
white  
green

## APPENDIX D

### Menus of Foods Served Each Day During the Study

green  
red  
yellow

peas:  
green  
red  
yellow

beans:  
bright green  
yellow  
pale green

carrots:  
white  
green

\*Foods are listed in the order of presentation  
each day.



Menus of Foods Served Each Day During the Study<sup>a</sup>Pretest, Monday, May 6

## beans:

bright green  
yellow  
pale green

## peas:

bright green  
yellow  
pale green

## cabbage:

white  
green  
red

## rice:

white  
yellow  
red

## applesauce:

green  
red  
yellow

## pears:

green  
red  
yellow

## ham

## white bread

## milk

---

<sup>a</sup>Foods are listed in the order of presentation each day.

Menus of Foods Served Each Day During the Study<sup>a</sup>Day 1, Tuesday, May 7

pears:  
red  
green  
yellow

ham

peas:  
pale green  
yellow  
bright green

cabbage:  
white  
green  
red

white bread

milk

Day 2, Wednesday, May 8

peas:  
yellow  
bright green  
pale green

pears:  
red  
yellow  
green  
ham

rice:  
white  
yellow  
red

white bread

milk

---

<sup>a</sup>Foods are listed in the order of presentation.

Menus of Foods Served Each Day During the Study<sup>a</sup>Day 3, Thursday, May 9

ham

peas:

bright green

yellow

pale green

cabbage:

red

green

white

applesauce:

yellow

green

red

white bread

milk

Day 4, Friday, May 10

ham

beans:

bright green

pale green

yellow

cabbage:

red

green

white

pears:

green

yellow

red

white bread

milk

---

<sup>a</sup>Foods are listed in the order of presentation.

Menus of Foods Served Each Day During the Study<sup>a</sup>Day 5, Monday, May 13

peas:  
yellow  
bright green  
pale green

rice:  
white  
red  
yellow

applesauce:  
green  
yellow  
red

ham

white bread

milk

Day 6, Tuesday, May 14

rice:  
yellow  
white  
red

applesauce:  
yellow  
red  
green

beans:  
yellow  
pale green  
bright green

ham

white bread

milk

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<sup>a</sup>Foods are listed in the order of presentation.



Menus of Foods Served Each Day During the Study<sup>a</sup>Day 7, Wednesday, May 15

cabbage:

red  
green  
white

ham

pears:

yellow  
green  
red

beans:

bright green  
yellow  
pale green

white bread

milk

Day 8, Thursday, May 16

applesauce:

green  
yellow  
red

rice:

yellow  
red  
white

ham

beans:

pale green  
bright green  
yellow

white bread

milk

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<sup>a</sup>Foods are listed in the order of presentation.

### Instructions for children

Children will be asked to take their seats to their lockers and return to the room where they rested at 11:50.

On the day of the protest, children will be told lunch will be served in the cafeteria for eight days. They will be given a card with a number which will be the order in which they enter the dining room.

Children will be told they may choose the kind of food they will be allowed to eat. If they choose a particular food, they must eat it. If they choose a particular color and kind of food.

Children will be asked to stand in front of the line for food. They will be asked to stand in line for food.

Children will be told to stand in line for food. They will be asked to stand in line for food.

### APPENDIX E

#### Instructions for the Persons

#### Assisting with the Study

### Instructions for children:

Children will be asked to take their mats to their lockers and return to the room where they rested at 11:50.

On the day of the pretest, children will be told lunch will be served cafeteria style for eight days. They will be given cards with a number which will be the order in which they enter the dining room.

Children will be told they may choose one kind of each food. They will be allowed to return for additional servings if they finish the first serving of a particular color and kind of food.

Children will proceed from the front to rear of the line for both first and additional servings.

Children will be told to sit at the table where they normally sit after they have received their food.

Instructions for cook (Mrs. Cowan):

For eight consecutive days the noon meals at the nursery school will be served cafeteria style to the children.

Ham, white bread, and milk will be served each of the eight days.

Three colors of beans or peas, cabbage or rice, and applesauce or pears will be served each of the eight days. A menu for foods to be served each day will be provided.

All foods with the exception of applesauce, pears, and milk will be placed on the serving table in white opaque dishes.

Applesauce and pears will be served in white individual paper dishes.

Milk will be served in clear plastic glasses.

Food will be served in random order from two additional tables set up in the dining room.

Tables and order of presentation of foods will be arranged by the investigator.

Before children enter the room, one-half cup milk will be placed on the table beside the place where each child is to sit.

Each food will be prepared the same way each day. The same number of drops of food coloring will be added to the same amounts of food each day. The same name brands of foods will be used each day.

Seconds of milk and bread will be offered at an extra side table.

One-fourth slice of bread will be served at a time.

Ham and pears will be cut into bite-sized pieces and served by the tablespoonful. All other foods will be served by the tablespoonful.

All other foods with the exception of milk will be served at room temperature.

The words "eat," "food," "color" may not be used by the cook and assistants.

Food should be ready to be served at 11:55 each day.



Following are specifications for amounts of food coloring to be added to foods:

$\frac{1}{2}$  cup uncooked rice and 15 drops red color  
 $\frac{1}{2}$  cup uncooked rice and 9 drops yellow color  
 2 no. 303 cans peas and 1 teaspoon yellow color  
 2 no. 303 cans peas and 2 teaspoon green color  
 2 no. 303 cans beans and 2 teaspoons green color  
 1 no. 2 $\frac{1}{2}$  can applesauce and 18 drops red color  
 1 no. 2 $\frac{1}{2}$  can applesauce and 15 drops green color  
 1 no. 2 $\frac{1}{2}$  can pears and 20 drops red color  
 1 no. 2 $\frac{1}{2}$  can pears and 18 drops green color

Following are specifications for methods of preparing the foods:

**Ham:** Use boned, cooked, and rolled ham. Cook in the oven 2 hours at 325°F.

**Cabbage:** Cabbage will be cut up and served raw.  $\frac{1}{2}$  cup vinegar,  $\frac{1}{2}$  teaspoon salt, 3 tablespoons of sugar, and 2 $\frac{1}{2}$  tablespoons of mayonnaise will be added to 2 $\frac{1}{2}$  cups cabbage.

**Rice:** Rice will be cooked 15 minutes. 1  $\frac{1}{8}$  tablespoons margarine and  $\frac{1}{2}$  teaspoon salt will be added to  $\frac{1}{2}$  cup rice.

**Peas:** 2 no. 303 cans of peas will be cooked with 4 tablespoons seasoning and  $\frac{1}{2}$  teaspoon salt. Peas will be cooked 10 minutes.

**Beans:** 2 no. 303 cans of beans will be cooked with 4 tablespoons seasoning and  $\frac{1}{2}$  teaspoon salt. Beans will be cooked for 45 minutes at low heat.

Instructions for teacher-recorders:

For eight consecutive days lunch will be served cafeteria style to the children. Each child will enter the room in a random order. Each child will be allowed to choose one color of each kind of food. Ham, bread, and milk will be served every day. No choice will be given. Three colors of cabbage or rice, beans or peas, applesauce or pears will be offered each day.

Children will put their mats in their lockers and return to the room where they rested at 11:52 A.M.

At 11:55 children will begin to enter the dining room.

Each teacher will sit at the table where he usually sits during the lunch hour with the exception of two student teachers who will sit at the table where the investigator and director sit during the lunch hour.

Each teacher will record the kinds and amounts of foods selected by each child. The investigator will explain the form for recording kinds and amounts of food prior to the lunch hour.

Teachers will not eat lunch with the children.

Teachers are asked to refrain from encouraging or discouraging the children to eat particular foods.

Teachers will not make comments on the children's food selection and consumption.

Teachers may not use the words "food," "eat," "color," or the name of a particular color during the meal.

Teachers may remind the children that "Lunch time is not play time," or "Your ride is here" or "Your ride will be here and you won't be ready."

Children must remain in the dining room for at least ten minutes after the last child has been served.

A child will be permitted to return for seconds of a particular food ONLY IF he has eaten all of his first serving of that particular color of food. He may return and get another color of the food.

Teachers are asked to refrain from discussing anything at any time about the lunch hour with the children during the investigation.

Children returning for second servings must proceed from the front to the end of the line. Children take their plates with them when returning for seconds. Desserts will be served in individual bowls.

After the children have left the room, you may leave the recording sheets on your chair at the table where you sit each day.

After the children leave, the teachers will put each kind of food left over in a separate paper cup. The paper cups containing the left over food will be put at each child's place. His name tag will be placed beside the paper cups and glass.

Instructions for servers:

For eight consecutive days the noon meal will be served cafeteria style. The same persons will serve each day.

Children will be permitted to choose one kind of each food. He may choose only one color of each food in the first serving.

Servings of one tablespoonful will be placed on the children's plates. Consistency in serving will be stressed.

Children must proceed from front to rear of the line for first and additional servings.

Servers may not use the words "food," "eat," or "color."

Servers may ask the children "Do you want red, green, or white cabbage?" or "Which ones do you want?"; but they should not encourage or discourage the child to choose a particular food.

Servers should avoid using the word "more" when children return for seconds.

A child may receive a second serving of a particular color of a certain food only if he has finished his first serving of that food. However, when he returns for seconds he may choose a second color of a particular food even if he has not finished a different color of that same food.

Additional servings of milk and bread will be available at a side table.



Instructions to be given to weigher:

All foods will be served by the tablespoonful with the exception of pears, applesauce, milk, and bread. Two tablespoons of pears or applesauce will be a serving. One-half cup of milk will be a serving. Bread will be served by one-fourth slice. Each day a premeasured sample serving will be made and recorded of each food.

After the children finish eating, the weigher will weigh plate waste of each food left by each child. Milk will be weighed in plastic glasses. All foods except pears and applesauce will be weighed in small paper cups. Applesauce and pears will be weighed in paper dessert dishes.

All weighings will be made to the nearest one tenth of a gram on an Ohaus scale.

The number of the initial and additional servings selected by the children for each food on each day will be added to determine the total number of servings selected.

Amount consumed will be calculated by subtracting the amount of plate waste from the amounts selected.

Results of Analysis of Variance of Data

Food	Level of Significance	Least Significant Difference
BASIC SERVICES:		
rice	not significant	
chicken	not significant	
beef	not significant	
eggs	not significant	
peas	not significant	
applesauce	.04	green over red green over yellow

ADDITIONAL SERVICES:

rice	not significant	
chicken	not significant	
beef	not significant	
eggs	not significant	
peas	not significant	
applesauce	.04	green over red green over yellow

APPENDIX F

Results of Analysis of Variance of Data

TOTAL SERVICES:		
rice	not significant	
chicken	not significant	
beef	.05	pale green over yellow pale green over white green
eggs	.01	pale green over white green
peas	.01	green over red green over yellow red over yellow
applesauce	.02	green over red green over yellow red over yellow
	.01	green over red green over yellow

## Results of Analysis of Variance of Data

Food	Level of Significance	Least Significant Difference
INITIAL SERVINGS:		
rice	not significant	
cabbage	not significant	
peas	not significant	
beans	not significant	
pears	not significant	
applesauce	.05	green over red green over yellow
ADDITIONAL SERVINGS:		
rice	not significant	
cabbage	not significant	
peas	not significant	
beans	not significant	
pears	.05	green over red green over yellow
applesauce	not significant	
TOTAL SERVINGS:		
rice	not significant	
cabbage	not significant	
peas	.05	pale green over yellow
beans	.05	pale green over bright green
	.01	pale green over bright green
pears	.05	green over red green over yellow red over yellow
	.01	green over red green over yellow
applesauce	.05	green over red green over yellow red over yellow
	.01	green over red green over yellow

Food	Level of Significance	Least Significant Difference
AMOUNTS CONSUMED:		
rice	not significant	
cabbage	not significant	
peas	.05	pale green over bright green bright green over yellow
beans	.05	pale green over yellow pale green over bright green pale green over yellow yellow over bright green
	.01	pale green over bright green
pears	.05	pale green over yellow green over red green over yellow red over yellow
	.01	green over red
applesauce	.05	green over yellow green over red green over yellow
	.01	red over yellow green over red green over yellow