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# The effect of oral need on cognitive responses of children.

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BOSTON UNIVERSITY  
GRADUATE SCHOOL

Dissertation

THE EFFECT OF ORAL NEED ON  
COGNITIVE RESPONSES OF CHILDREN

by

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## Chapter I

### Introduction

The purpose of this study is to investigate certain effects of oral need on perception and cognition.

H. A. Murray particularly stressed the concept of need in accounting for a variety of behavior. In his conceptual schema, he discussed need as a force which organizes perception, intellection, conation, and action in such a way as to change an existing, unsatisfying state of affairs. Specifically, Murray stated that "a need or an emotion may determine the direction of attention and markedly influence the perception and apperception (interpretation) of external occurrences."<sup>1</sup> Elsewhere he stated that "each need tends to attach itself, to be commonly evoked by certain classes of objects, other objects or classes being disregarded."<sup>2</sup> The implication here and elsewhere in his writing is that needs both select what is to be perceived or responded to, and distort the perception or response.

These propositions concerning the potency of need in influencing cognitive functioning provide a theoretical framework within which this experimental study is undertaken.

This particular research is an experimental extension of previous studies in which the need for food or drink has been related

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<sup>1</sup> H. A. Murray, Explorations in Personality, (New York: Oxford Univ. Press, 1938), pp. 65-66.

<sup>2</sup> Murray, p. 109.

to cognitive functioning. Primarily, these studies have dealt with the effects of experimental manipulation of oral need (food or water deprivation). The need induced in these experimental situations was temporary, while the present research is intended to test the effects of persistent and chronic oral need. For the purpose of the experiment, the assumption of the presence of this need was made from the fact of obesity, since most current theories account for obesity primarily in terms of continual overeating.

The term "oral need" has been frequently used in the literature. Oral need is used in this study to mean that hypothetical state of affairs within an individual inferred to be present dependent upon the kind, frequency, and amount of eating or drinking behavior i.e., the seeing, partaking, sucking, tasting, chewing, swallowing, or digesting of food or drink. One gross manifestation of this eating and drinking behavior, namely, body weight, lends itself to experimentation because of the ease of its objective measurement. It is recognized that the above definition may not include those aspects of oral need described in the psychoanalytic literature as related to fantasied mouth gratifications or other fantasies whose purpose is to reenact to some degree an oral dependent and/or oral aggressive relationship with the mother figure. However, it is assumed that individuals with high oral need according to the above conception are generally representative as far as the strength of the need is concerned.

The concept of need generally refers to a transient state of affairs aroused by periodic changes within the individual or his

environment. In the case of oral need, the physiology of the body demands food as a means of receiving an energy supply so that the body cells can perform their special functions. Normally, the intake is regulated by the amount of energy expended, so that the input of energy is equal to the output after due allowance is made for body repair and growth. In the special case of the obese person, the regulatory mechanism does not work properly. The homeostatic balance between food intake and energy output is altered, presumably because of persistent overeating. The result is a continuous gain in weight beyond the amount needed to meet growth and energy requirements.

In the previously mentioned experimental studies in which the magnitude of need strength was altered by manipulating hours of food deprivation, the subjects were treated as interchangeable, and individual differences with respect to oral need strength were not considered as part of the experimental design. In the several studies in which individual differences were considered, differentiation has usually been made in terms of responses to psychological tests. In this thesis individual differences in oral need were considered. However, these differences were inferred from an overt characteristic of the person other than responses to related psychological tests. The fact that there are individual differences with regard to the intensity of oral need suggests that a study of these differences based on an objective measure may offer experimental evidence for the relation between oral need and perception

and cognition which is more pertinent to the permanent need system of the individual than to a temporarily induced need state.

In this study variation in obesity was accomplished by the selection of two comparable age groups differing markedly in body weight. The groups investigated were obese and non-obese children in the latency age range (age six to twelve). This age range was chosen because children of this age are relatively free from sophistication and self-consciousness about their weight, and because it is a period in which acute developmental crises are generally considered to be absent. These two groups of children, one of normal weight and the other overweight, were studied with a perceptual and a learning task, for which three predictions were made.

The general hypothesis investigated was that oral need affects the perception and cognition of individuals in relation to stimuli with which they are confronted in such a way as to facilitate or accentuate any oral-related aspects.

Oral need was defined in terms of body weight. Perception was defined as a process of becoming aware of objects, qualities, or relations between objects and qualities by means of sense organs. Cognition was defined as a process of learning or remembering some quality or some object, or relations between qualities and objects. Oral-related aspects of the stimulus situation were defined as those objects or qualities, or relations between objects and qualities which were related to eating, drinking, or mouth activity in general. Operational definitions are presented in the methodology chapter with the discussion of experimental operations.

## Chapter II

### Review of the Literature

The majority of studies of oral need and its effect on psychological responses can be logically divided into two groups. The larger group consists of food or water deprivation experiments. The number of hours of this deprivation served as the independent variable. Consideration of the individual differences was not part of the experimental designs. The other group consists of experiments in which individual differences with regard to specific aspects of oral need were used as the independent variable.

#### A. Deprivation experiments

Some of the earlier experiments were conducted by Sanford. In his first experiment,<sup>1</sup> he studied a small sample of school children, testing them before and after lunch on equivalent forms of a word association and picture interpretation test. The results showed a tendency for a greater number of direct food responses to occur before the noon meal than after. His second experiment<sup>2</sup> was conducted on college students. He used an experimental group deprived of food for twenty-four hours, and a larger control group which was sub-divided on the basis of the time of the last meal.

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<sup>1</sup> R. N. Sanford, "The Effects of the Abstinence from Food upon the Imaginal Processes, A Preliminary Study," J. Psychol., 1936, 2, 129-136.

<sup>2</sup> Sanford, "A Further Study," J. Psychol., 1937, 3, 335-343.

The experimental group was the only group that had been told not to eat, but it had been told that the experiment was a speed of response test. The control group was asked after the experiment when they had eaten last. For his dependent measures, Sanford used single and chain word associations to stimulus words, interpretations of pictures, and completion of words and drawings. He scored the direct food responses, both names of foods and words pertaining to eating, for each measure, and took a composite score for all his measures after the separate means for each were treated statistically to give them equal weight. He found a statistical difference between his experimental group and the part of the control group who were without food for one-to-two hours. Further, the subjects in this division of the control group were discriminated from the four-to-five hour group on the basis of the number of food responses. However, there was not a significant difference in the number of food responses between the four-to-five hour and the twenty-four hour group.

On the basis of his experimental findings, Sanford posited a two-factor theory to account for the strength of oral need at four and twenty-four hours respectively. The rise in the number of food responses up to four hours he attributed to food habit. The rise in the number of food responses from one to twenty-four hours without food he attributed to changes in the physiological need for food. To account for the fact that only a small and insignificant difference was obtained between the four-to-five and the twenty-four hour group, Sanford postulated an inhibitory mechanism which in some

unexplained way prevented the increase in food responses that he had expected to find. Also, he postulated that food habit was the most important determinant of food-related responses, but this was a post hoc formulation.

Chein, Levine, and Murphy<sup>3</sup> studied two groups of college students, one serving as the control for the other. The same experimental subjects were tested after three, six, and nine hours of food deprivation, and compared with the control group, who had eaten one hour before testing. The groups of subjects were asked to give one association to each of two sets of twenty achromatic and twenty chromatic cards with ambiguous food reference. There was an increase in food responses on both achromatic and chromatic cards at three hours. At six hours, food responses increased with achromatic cards but decreased with the chromatic. At nine hours, subjects gave decreased food responses to both achromatic and chromatic cards. It should be mentioned that the experimenters fed the subjects in the experimental group after each testing session. The rationale given by the authors for this procedure was to keep a food set operating and to keep the subjects interested. The effect of this procedure cannot be discerned, but it makes the results more ambiguous, since the subjects' knowledge that they would be fed after testing introduced an uncontrolled variable.

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<sup>3</sup> I. Chein, R. Levine, and G. Murphy, "The Relation of the Intensity of a Need to the Amount of Perceptual Distortion," J. Psychol., 1942, 13, 282-293.

The authors of the above study have only offered post hoc explanations for the obtained results, i.e., explanations in terms of a food set and a reality set. In explaining this, they stated that the food set took precedence but that under the effect of increased need the subjects recognized that words did not gratify needs; thus, that first in the more ambiguous percepts (the chromatic cards) and then in the less ambiguous ones the subjects showed a decrease in food associated responses. This interpretation, however, leaves unclear why there should ever be an increase in food-related responses, and is contrary to the hypothesis that oral need affects perception. The same criticism is applicable to the Sanford studies. If these experiments and the discussion of the results are to be clear, some attempt must be made to specify the conditions under which, and the subjects to which the respective sets are most appropriate.

McClelland and Atkinson conducted an experiment using a series of tasks.<sup>4</sup> Subjects were tested under different conditions of food deprivation. The experimenters studied candidates for naval school who were competing for various positions. The candidates were led to believe that the tests they were taking were tests of the ability to perceive faint visual cues. The men studied were divided into one, four, and sixteen hour deprivation groups. In the first

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<sup>4</sup> D. McClelland and J. Atkinson, "The Projective Expression of Needs: I. The Effect of Different Intensities of the Hunger Drive on Perception," J. Psychol., 1948, 25, 205-222.

experiment subjects were shown blanks projected on a screen at high speeds. The experimenters divided the responses to the blanks into neutral and food response categories, and were the first to subdivide the food response category itself for investigation. The first response sub-category, "goal objects" referred both to the names of foods and to words denoting eating. The second sub-category referred to the places for and the instruments used in eating, and was labelled "instrumental activity objects." The results of the experiment revealed that with increased food deprivation there was a reliable increase in food-related responses, but that this increase was solely an increase in the response sub-category of instrumental activity objects and not in that of goal objects related to food. Also, the experimenters noted a reliable increase in responses in a sub-category labelled "neutral instrumental activity" which was unaccounted for.

The authors suggested post hoc that there was a "drive toward reality" which showed itself in the task situation in an increase of instrumental food responses and an active suppression of the non-accessible food object responses.

Their second experiment was conducted on the same subjects.<sup>5</sup> This time they used responses to ambiguous pictures adapted from Murray's Thematic Apperception Test for their dependent variable.

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<sup>5</sup> Atkinson and McClelland, "The Projective Expression of Needs: II. The Effect of Different Intensities of the Hunger Drive on Thematic Apperception," J. Exp. Psychol., 1948, 38, 643-658.

For the three hunger groups studied, they found no overall differences in food responses. However, when they sub-divided the food responses qualitatively, they found statistically significant increases in the percentages of subjects in each group who gave stories with food deprivation themes, stories with characters expressing a need for food, and stories aimed at removing sources of food deprivation. However, there was a significant decrease in the frequency of references to actual eating. They concluded that the amount of need deprivation and instrumental activity responses was a better index to the strength of a need than the amount of goal activity responses. Their conclusion, it would seem, ought to be limited to the specific task involved and to the experimentally manipulated need. The importance of their experiments lies in the fact that all food responses do not appear to come from the same universe of responses to oral need, and hence should be evaluated in terms of the particular type of response, i.e., object, activity, deprivation, and so on. Simply interpreting responses numerically conceals information which can be obtained by a qualitative examination of the responses.

Atkinson and McClelland interpreted the results of the experiments as indicative of a growing drive toward reality after long periods of food deprivation. Again, as in Sanford's experiments, the conditions under which this hypothesized drive toward reality emerges are unspecified. The question of why the drive toward reality does not operate during early stages of food deprivation

and why the cognitive and perceptual expression of oral need wanes are not made clear by the interpretations offered.

The most intensive study of the effects of semi-starvation on behavior was made at the University of Minnesota.<sup>6</sup> A group of thirty-two conscientious objectors who were used as representative of the adult population were studied continuously on a number of physiological and psychological variables over a period of twenty-four weeks of semi-starvation and at least twelve weeks of the rehabilitation period that followed. In general, the pre-occupation of these men with food--its taste, preparation, and the mechanics of eating it--as well as with food-related objects, was intense. The general observations seem to be in agreement with the reports of famine and the reports from persons who have been marooned. Uncontrolled observations of the amount of non-nutritive oral activity (such as gum chewing, smoking, coffee drinking, and nail biting) showed a large increase with increased starvation. The study illustrated the wide range of individual behavior under the same experimental conditions. For example, eight of the subjects could not maintain their diets, even though failure to do so excluded them from an experiment in which they wanted to participate. These eight subjects, presented in a brief psychological write-up, exhibited such behavior as excessive gum chewing, and eating of infinitesimal amounts of food as if to minimize guilt and discrepant

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<sup>6</sup> J. Brozek, A. Henschel, A. Keys, A. Mickelson, and H. Taylor, The Biology of Human Starvation, (Minneapolis: Univ. Minn. Press, 1950).

behavior. One subject ate garbage, another raw rutabagas. A third chopped off his fingers. Tendency for post-starvation obesity occurred. Unfortunately, initial body weight was not related to the observed effects, and the weight range of the subjects was limited.

The experimental findings obtained by the use of the Guilford-Martin and the Minnesota Multiphasic Personality Inventory showed an increase in the depression score with starvation. However, there were no differences in the number of food responses at the start of the experiment and at various points of semi-starvation during the experiment on a free association test, a restricted association test, dreams, the Rorschach, and the Rosenzweig Picture Frustration Test. A significant difference was obtained on the free word association test, but only on the sub-division of idiosyncratic food responses. To account for their negative findings with regard to personality changes and psychological responses on the tests used, they stated that at a complex level, frustration, satisfaction and general affect were a function of the ego structure as well as the biological determination of the need. By this they appear to mean that there were individual personality differences in the handling of the induced oral need. However, they did not study these differences systematically with regard to the effects of the semi-starvation diet.

The experiments discussed thus far appear to show that food deprivation increases sensitization to direct food stimuli and increases the likelihood that ambiguous stimuli are perceived or

judged in oral terms, at least to a certain point after which a decrease occurs. There appears to be a transition period somewhere in the vicinity of six to ten hours during which there is a decrease in food responses, the shift occurring in those food responses which involve food satisfiers or food acts. At any rate, the relationship between food responses and the amount of food deprivation is by no means linear, and the results in some instances are equivocal. Some of the experimenters were concerned about the subjects' growing "drive toward reality" as food deprivation continued. This drive seemed to be advanced as an hypothesis because need cannot be satisfied through words or percepts. However, the conditions of the "drive toward reality" were not specified. If such an orientation is not an artifact of the experimental method employed, and does operate in some way as the experimenters suggest, then an assessment of the variables that contributed to it is necessary. This assessment would certainly include an examination of the individual's oral need and his modes of coping with it.

Regardless of the post hoc explanation of the above data, it is important for the purposes of this study to note that subjects responded differently and that the results obtained did not follow strictly from predictions based on the induction of a temporary need by the experimenter. The strength of oral need of a subject independent of experimental manipulation, the acceptability of the oral need to the subject, and the subject's ability and willingness to give expression to the need in a psychological situation in which

it cannot be satisfied directly are all variables to be considered. The present study will take into account individual variation in strength of oral need and predict to cognitive and perceptual responses.

Klein and Schlesinger raised similar points in suggesting lines of research that would increase our understanding of need and cognitive functioning.<sup>7</sup> They stressed the importance of the intensity of the need or value to the individual, the relevance, difficulty, and complexity of the tasks used, and the type of controls employed. In their own experimental study, which is reported in their critique, these authors dealt with the variable of the intensity of a given value for a given group, as well as with that of the difficulty of the perceptual task independent of the values under study. However, they were not able to demonstrate that swastikas, which were assumed to have particular meaning to a group of refugee psychiatrists, were perceived differently by a group of American secretaries; nor that the dollar sign, which was assumed to be valued highly by secretaries, was perceived differently by secretaries and psychiatrists. The authors were cautious about generalizing too hastily from their experiment. They advocated experiments with conditions well specified in advance.

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<sup>7</sup> G. Klein, H. Schlesinger, and D. Meister, "The Effect of Personal Value on Perception: An Experimental Critique," J. Personal., 1949, 18, 32-47.

Pastore<sup>8</sup> criticized earlier experiments on the effects of need, value, and reward on perception, some of which have been cited above. His main objections were to the vagueness of the perceptual theory which guided the research, the inappropriateness of the tasks used to test perception, and to the generally inadequate methodology used. He mentioned two propositions which ought to be differentiated; first, that individuals select from their environment that which is relevant to their needs, and secondly, that the phenomenal perception of an object is changed or distorted by virtue of some need. In this he agrees with Murray.

These criticisms showed the need for more carefully controlled experiments, especially those in which greater attention is given to the role of individual differences in need intensity and its effect on either perceptual selection or distortion. The need for more carefully controlled experiments has partially been met by those now to be discussed.

In the experiment by Wispé and Drambarean,<sup>9</sup> sixty college students volunteered to go without food or water for twenty-four hours as part of a supposed visual acuity experiment. However, each was assigned randomly to one of three deprivation groups: zero, ten, and twenty-four hours without food or drink. They were

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<sup>8</sup> N. Pastore, "Need as a Determinant of Perception," J. Psychol., 1949, 18, 457-475.

<sup>9</sup> L. Wispé and N. Drambarean, "Physiological Need, Verbal Frequency, and Visual Duration Thresholds," J. Exp. Psychol., 1953, 46, 25-31.

then presented with two lists of twenty-four words, each containing four sub-classes of need words: a) food-act words b) food-objects c) water-act words d) water-object words. These need words were matched with neutral words for word commonness. The words were presented rapidly by an epistotister, using a method of ascending limits. Pre-solution guesses were encouraged and recorded. The results of the experiment showed that word commonness was the single most important factor in determining recognition thresholds. Also, and relevant here, they showed that need-related words were recognized at a lower threshold as deprivation continued. With regard to the pre-solution responses when categorized into goal objects (hunger and thirst satisfiers), goal acts (verbs pertaining to eating or drinking), and instrumental responses (places for eating, objects for cooking, and inedible forms of food), the experimenters found that there was a sharp increase in act and object responses at ten hours, but a drop at twenty-four. With regard to instrumental responses, they showed a decrease at ten hours and a sharp gain at twenty-four. These results were corroborated in a similar study by Wispé using word associations,<sup>10</sup> and are similar to the findings of McClelland and Atkinson already discussed.

Gilchrist and Nesberg<sup>11</sup> conducted a series of four experiments

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<sup>10</sup> L. Wispé, "Physiological Need, Verbal Frequency, and Word Association," J. Abnorm. Soc. Psychol., 1954, 49, 229-234.

<sup>11</sup> J. Gilchrist and L. Nesberg, "Need and Perceptual Change Related to Need-Related Objects," J. Exp. Psychol., 1952, 44, 369-377.

on volunteering college students. They used an experimental and control group in each experiment, and tested the effects of food and/or water deprivation. In one experiment, subjects who were deprived of food for six and twenty hours were compared with a satiated group; in the others, subjects deprived of food and drink for four and eight hours were compared to a satiated group which ate regularly. The dependent variable was level of illuminance, and subjects were asked to set illuminance level matches for presented slides. The slides consisted of need-related pictures, and in the later experiments, of need-unrelated slides in which form quality was eventually controlled. Their results indicated that increasing need gave rise to an increasing positive time error in the illuminance matches of the need-related slides. That is, the subjects accentuated the brightness of these slides. the experimenters noted a considerable drop in the illuminance error following eating or drinking in the last experimental session.

These last experiments discussed are well-controlled studies and demonstrate conclusively an effect of oral need on certain aspects of perceptual and cognitive responses. However, the results are limited to the specific instances in which the oral need is experimentally induced, and overlook individual differences in oral need. Also, they overlook the specific meaning of the deprivation to subjects who are aware of the fact that they are being deprived of food and/or drink for a given period of time.

The experiments cited in this section are those which cover,

in general, the studies relating food or water deprivation to perception and cognition. They are valuable in that they demonstrate that oral need affects perception and cognition, although there is a lack of experimental agreement as to the specific conditions of food or water deprivation when this effect is greatest. Other conditions specifically relevant to the strength of need independent of the experimental situation were not included in these designs. At this point, relevant studies which involve individual differences in oral need will be discussed.

B. Experiments Investigating Individual Differences

There seem to be three chief ways of experimentally determining individual differences in magnitude of oral need. One way is to use related psychological tests to assess its magnitude indirectly. A second way is to make observations of behavior such as non-nutritive mouth activity assumed to be a measure of oral need strength. The third way is to observe actual eating. This last kind of observation has never been made in connection with perceptual and cognitive activity. The procedure in the present research approximates this last method, while avoiding the practical difficulties of making continuous and reliable observations in a free choice eating situation. The studies utilizing the first two methods above will be reviewed before the discussion of the present research.

Blum and Miller<sup>12</sup> have studied individual differences of oral need as determined by the number of non-purposeful mouth movements, i.e., thumb sucking, licking the lips, tongue rolling, etc., in children who were observed over a period of time in school. They predicted a positive correlation with eight variables on the basis of the psychoanalytic theory concerning the "oral character." Significant correlations of .52 and .51 were obtained between purposeful mouth movements and the amount of ice cream consumed in a free choice eating situation in the classroom, and also with teachers' reports as to eagerness at lunchtime. With regard to personality variables, non-purposeful mouth movements correlated highest with social isolation. Other variables did not significantly correlate with the independent variable. When a comparison was made with previously obtained Rorschach and T.A.T. protocols scored objectively, and the Blacky Test scored both objectively and interpretively, the purely oral measures of mouth movements, ice cream consumption, and eagerness for lunch correlated negatively as frequently as they correlated positively with the projective test scores. It appears that overt and covert expressions of oral need differ, possibly because the oral need is unacceptable for some persons and they have difficulty in giving overt expression to it.

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<sup>12</sup> G. Blum and D. Miller, "Exploring the Psychoanalytic Theory of the Oral Character," J. Pers., 1952, 20, 287-304.

R. Schafer<sup>13</sup> attempted to demonstrate that persons of both normal and hospital populations show a consistent performance on tests involving oral stimuli which he devised. The oral items were divided into the categories of oral passivity and oral aggression. He did not predict in advance which subjects would be high or low on his test measures, but rather that they would be consistently high or low from test to test on scores for oral passivity and oral aggression. Most of the correlations were low and many of them not significant. The oral stimuli themselves varied from test to test and the rationale for expecting high correlations is questionable. The measures were crude and not adequately tested for reliability and validity.

M. Cohen<sup>14</sup> divided his subjects into groups showing different defenses for oral material (repressors and intellectualizers) on the basis of their responses to ambiguous pictures patterned after T.A.T. cards. The division was based on the way subjects dealt with oral material suggested by the percepts. He then predicted group differences in the memory of two stories, one containing oral elements and the other not. Statistically significant differences were obtained between the repressors and the intellectualizers for memories in the oral stories. This differentiation was

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<sup>13</sup> R. Schafer, "Selective Responses to Oral Content: A Study of Interfunction Reliability," unpublished doctoral dissertation, Clark University, 1950.

<sup>14</sup> M. Cohen, "Cognition and Perceptual Defense: The Relation between Defense and the Recall of Oral Material," unpublished doctoral dissertation, Boston University, 1955.

obtained on the oral elements of the oral story. No difference between groups was obtained on the neutral story.

These three studies substantially represent the literature on oral need which takes individual differences into account. Blum and Miller conducted the only experiment in which oral need was operationally defined by overt behavior, and in which predictions of personality characteristics were made on the basis of the strength of oral need. This study was limited however, because it did not deal with perception and cognition. Schafer predicted consistency on several psychological tasks, but did not concern himself with determining high or low oral need groups, nor with manifestations of oral need that were not defined by his tasks. Cohen operationally defines defenses around oral need, but they are defined by performance on psychological tasks. He also assumed for the purposes of his study that strength of oral need and conflict was the same for all subjects. This present research attempts to eliminate the shortcomings of these experiments by defining oral need without assessing it on the basis of responses to psychological tasks, nor inducing the need experimentally.

Eriksen<sup>15</sup> has made several valuable comments in connection with perceptual defense studies which also appear to be quite relevant to the study of oral need. He expressed concern with the fact that many of the earlier perceptual defense experiments overlooked

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<sup>15</sup> C. W. Eriksen, "Needs in Perception and Projective Techniques," J. Proj. Tech., 1954, 18, 435-440, and "The Case for Perceptual Defense," Psychol. Rev., 1954, 61, 175-182.

individual differences in dealing with the perceptual stimuli. Failure to demonstrate that anxiety raises perceptual thresholds for certain stimuli, according to Eriksen, is not an adequate test of the perceptual defense hypothesis. He questioned whether the assumption is justified that the stimuli used are actually anxiety-provoking, and if so, whether the second assumption, that the individuals have learned to deal with the anxiety by some avoidance mechanism, is valid. He further questioned the applicability and adequacy of tests used, not only with regard to sensitivity and reliability in general, but with regard to the needs that the test sampled. He mentioned that the Rorschach test ordinarily does not sample food responses because it lacks the proper kind of ambiguity, ambiguity being defined as reasonable alternatives of response. The Rorschach had been administered according to standard procedure, and food responses do not occur with a great enough frequency to permit a differentiation between groups. The Rorschach test used in the present research was modified to meet these objections.

To handle some of the questions which he himself raised, Eriksen conducted several experiments. In one of these,<sup>16</sup> he used a word association test which included areas such as homosexuality and aggression, which clinical findings have demonstrated to be important to people and frequently to cause conflict in them. The word

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<sup>16</sup> C. W. Eriksen, "Perceptual Defense as a Function of Unacceptable Needs," J. Abnorm. Soc. Psychol., 1951, 46, 557-564.

association test served the purpose of discriminating subjects according to the amount of anxiety provoked by each experimental area. On the basis of the criteria of increased association time, failure to respond, failure to hear the stimulus word, and odd or unusual responses, Eriksen determined the anxiety-provoking words that appeared to be met with this avoidance-like reaction. He then presented pictures tachistoscopically which involved the same areas as the word association test. He found significant correlations between avoidance reactions to the word association and the elevation of perceptual thresholds for pictures dealing with the same experimental areas as the words.

Other studies of perceptual defense have also demonstrated individual differences of response to tachistoscopic presentation of material to be consistent with responses on tasks involving similar stimuli. In one of these, Postman<sup>17</sup> found no overall differences in the recall of completed and incompleting anagrams or in the pre-recognition thresholds when the same solutions were presented tachistoscopically. However, individual subjects showing differences in favor of either the completed or the incompleting anagrams also had a lowered threshold for the same type of anagrams when they were presented tachistoscopically.

Eriksen's discussions of perceptual defense have relevance to the experiments on oral need which have been reviewed. The

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<sup>17</sup> L. Postman, "On the Problem of Perceptual Defense," Psychol. Rev., 1953, 60, 298-306.

assumptions in the perceptual defense studies which he discussed appear to be analogous to those made in the oral need experiments. More specifically, the first assumption made in the oral need experiments was that the perceptual and cognitive tasks used are indeed relevant to the particular subject's need and have need satisfying properties. The second assumption that must be considered is that the individual or groups of individuals studied have learned to deal with the oral need by some approach mechanism.

On the basis of the literature considered to this point, the following general hypothesis can now be stated:

Oral need affects the perception and cognition of individuals in relation to stimuli with which they are confronted in such a way as to accentuate any oral-related aspects of the stimulus situation.

### C. Literature on Obesity

Attention is directed toward the obese in an attempt to find individuals who meet the assumption of dealing with a strong oral need by a positive action (approach mechanism).

The actual physiological basis for obesity is unknown except in exceedingly rare cases of diseases such as Cushing's disease or in cases of hypothalamic lesions. Rymearson and Gastineau, after an extensive review of the literature on obesity declared that "fat comes only from food and obesity comes only from eating more than is required to meet energy demands of the body."<sup>18</sup> Excessive eating

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<sup>18</sup> C. Gastineau and E. Rymearson, Obesity, (Springfield, Ill.: C. C. Thomas, 1949), P. 12.

has been demonstrated in the obese despite their claims that they eat like normal people or "don't eat a thing." Hunger pangs caused by gastric secretions are not the only mechanism in food intake as was thought earlier. Because the problem of what determines satiation in food intake has not been explained satisfactorily by physiological findings, it would be useful to examine psychological theories.

Psychiatrists and psychologists interested in obesity have based their theories on clinical observations. They, too, attribute obesity to excessive food intake. Bruch,<sup>19</sup> who has worked extensively with obese persons, has noted the failure of dieting in many cases and, in fact, has observed in many of those persons who managed a diet for a period of time that they eventually gained weight to a point which exceeded their original weight. Brosin<sup>20</sup> summarized the emotional factors in obesity. He distinguished four psychological reasons for obesity: 1) response to non-specific emotional tensions 2) substitute gratifications in intolerable life situations 3) underlying emotional illness 4) addiction to food. In all four categories, overeating was assumed to be a consequence of the emotional situation.

Regardless of the nature of the emotional conflicts, the obese

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<sup>19</sup> H. Bruch, "Psychological Aspects of Reducing," Psychosom. Med., 1952, 14, 337-346.

<sup>20</sup> W. Hamburger, summarized in H. Brosin, "The Psychology of Overeating," Overeating, Overweight, and Obesity, Nutrition Symposium, New York: National Vitamin Foundation, 1953, pp. 52-69.

attempt to resolve their conflicts, either partially or completely, by eating more than the body needs for its growth and energy requirements. Reduced motoric activity may be an aspect of this problem. In any case of obesity, this reduced motoric activity, if it is a factor, does not curtail eating to the extent that body weight becomes normal.

In a most recent book on nutrition,<sup>21</sup> Wohl reiterated that emotional factors appear to be of prime importance in obesity. On the basis of the literature, the assumption is tenable that the obese, in almost all instances, overeats chronically and persistently. Hence, it appears psychologically justifiable to use an obese group to represent a high oral need group. So too, a normal-weighted group may be assumed to be a group which is heterogeneous with regard to oral need. The fact that there are lean and normal-weighted people who have a high food intake is not overlooked. However, in a normal-weighted group, it appears to be a justifiable assumption that there is a more random distribution of the magnitude of oral need than in an obese group, and that the mean of this distribution approaches the general population norm.

In summary, the literature discussed in this chapter reflects a primary concern on the part of the experimenters with the effect of induced oral need on perception and cognition, without regard

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<sup>21</sup> M. Wohl, "Obesity," in R. Goodhart and M. Wohl, Modern Nutrition in Health and Disease, (Philadelphia: Lea and Febiger, 1955), pp. 773-787.

for individual differences. When individuals have been considered, the variable of oral need strength has usually been defined by psychological responses. In the former case, the need reflects only a temporary state; in the latter the method of determining the independent variable does not sufficiently insure its objective status, i.e., the procedure uses one psychological task to determine the independent variable and a closely allied one for the dependent variable. In addition, most of these studies have not sufficiently controlled related variables. The present research attempts to eliminate these three shortcomings of previous studies by considering a persistent manifestation of oral need which also represents individual differences, by determining the independent variable by an objective measurement (body weight), and by controlling the related variables.

This study investigated the general hypothesis that oral need affects the perception and cognition of individuals in relation to stimuli with which they are confronted in such a way as to accentuate any oral-related aspects of the stimulus situation. Since obese children represent a group with high oral need, the following specific hypothesis appropriate to obese children can be stated:

Obese children will accentuate perceptually and cognitively the oral aspects of a stimulus situation.

## Chapter III

### Methods and Procedure

#### A. Definition of the Independent Variable

The independent variable in this study was oral need. Since body weight variations were assumed to be reflections of food intake, variations in oral need were defined by variations in body weight. Body weight was varied by selecting two groups, one obese and one of normal weight.

Obesity was defined in terms of body weight. Height was also considered in the definition to correct for the fact that taller people would generally weigh more.

The operational definition of the obese group in this experiment was a body weight at or above the ninetieth percentile for weight for a given age. The height correction limited this group to subjects at or below the seventieth percentile for height for a given age. Since these criteria excluded very heavy subjects because of the high correlation between height and weight, additional criteria were also used. Subjects were considered as belonging to the obese group who were at least twenty pounds in excess of the ninety-seventh percentile for weight providing they were no taller than the ninetieth percentile for height. This definition was somewhat arbitrary, but was intended to include in the group a sample of heavy persons who were not excessively tall. It was partially determined on the basis of availability of subjects. (See Appendix A for the height and weight charts used for this determination.)

The normal-weighted group was defined in terms of body weight, with a provision for height. Height was considered in the definition in order to eliminate from the group both extremely tall and extremely short people. (Hereafter this group will be called the normal group.)

The operational definition of the normal group was a body weight between the thirtieth and seventieth percentiles, providing that the height was also between these percentiles. (See Appendix B for the raw data on height and weight for the obese and normal groups.)

Thirty obese and thirty normal children were used in the experiment. The normal subjects were individual matches for the obese ones.

The experiment was conducted in a local school system. The children used were boys and girls from the third to the sixth grades. Their ages ranged from seven and a half to eleven and a half years. The girls were slightly younger than the boys because girls enter puberty at an earlier age than boys, and it was hoped to eliminate the variable of pubescent or pre-pubescent growth. The school nurses from the three schools used in the study aided in the selection of subjects.

Initially, only the height and weight information was used. After this preliminary step, the class analysis charts used in the school system were consulted to obtain information as to age, sex, intelligence, and grade progress. For each of the obese subjects selected, a normal child who was comparable with regard to these other variables was located. Height and weight charts were again

consulted so that the best possible match could be obtained. In a few cases it was not possible to find a suitable match; these obese subjects were not used. Failure to match was due to the exceptionally high or low intelligence of a candidate. In all, thirty pairs of subjects were used. Eight pairs came from the first school, thirteen from the second, and nine from the third.

In every case the subjects were tested between the hours of 8:45 and 11:30 a.m., presumably after breakfast and in all cases before lunch. In almost all instances the children were tested in pairs on successive days at about the same time of the day. In the three pairs where this was not possible because of complication in the school schedule, the obese and normal subjects were alternated with regard to who was tested earlier in the day.

#### B. Controlled Variables

The subjects in the obese and normal groups obtained in local schools were matched on the following variables: 1) age 2) classroom experience 3) grade progress 4) intelligence and 5) sex. Each member of the pair was tested at the same time of the day, so that this variable was also controlled. The reason for the matching of age, grade progress, intelligence, and sex was to control these variables which are known to correlate positively with performance on many psychological tasks. Classroom experience was matched to prevent differences due to such things as type of teacher and text books used. The time of the day was controlled because of the knowledge that number of hours without food affects oral responses.

Age was matched on the basis of school information regarding the date of the last birthday. Classroom experience was controlled by choosing each pair member from the same school classroom. Grade progress was determined by the last administration of the Metropolitan Achievement Test. Intelligence was controlled by matching subject pairs one either Kuhlman-Anderson or Pintner-Durost intelligence quotients. The intelligence scores for the pairs of subjects who had taken the Kuhlman-Anderson and those who had taken the Pintner-Durost were treated in separate distributions. Sex was controlled by choosing pairs of the same sex. (Appendix C includes the raw data on the matched variables of age, grade progress, intelligence, and sex.)

#### C. Definition of the Dependent Variables.

The effect of oral need was studied on four dependent variables, but predictions were made only to the first three. The first two involved cognitive responses, the third perceptual ones, and the fourth associative responses. Three tests were used for the investigation, a serial learning test, a modified Rorschach test, and a word association test.

##### Dependent Variable 1.

The first dependent variable was the kind of errors, oral or neutral, made in learning.

To study this variable, a serial learning task was used. It consisted of a twelve word list which included four oral words and eight neutral words. All the words were four-letter words and were among the most frequently used words by children as determined by

the Thorndyke and Lorge word listing.<sup>1</sup> The oral words were all names of food and could be classified as food satisfiers in the scheme adopted by McClelland and Atkinson. The words were pre-tested by the author at a local hospital in the summer of 1956 on a group of children in the outpatient department, some of whom had feeding difficulties. On the basis of the pre-testing, the following words were considered appropriate. The words are 1) door 2) rain 3) cake 4) name 5) food 6) play 7) meat 8) gold 9) milk 10) show 11) hand 12) bird. The oral words were so spaced that a neutral word was interposed between each oral word. The specific directions given to the subjects were:

"I'm going to show you a bunch of words, one word at a time. I want you to learn these words. The first time I'm going to show you these words so that you'll know what words there are. That's the first time. The second time and every time after that what I'll want you to do is to guess the word that is going to come next before you see it. Every time you guess right try to remember that guess. Whenever you guess wrong, try to remember the right one so you can guess it the next time. There's no penalty for guessing so I want you to guess. You'll keep guessing till you learn all the words."  
(Part of the instructions were repeated if necessary. If the subject showed hesitancy in guessing, he was again encouraged to guess at the end of each trial. He was told that he had nothing to lose and a chance of being right. Also, all reasonable questions were answered, and the rest were deferred till the end of the test.)

A maximum of twenty-five trials was allowed for the subjects to learn the list according to the criterion of one complete and correct recitation. Each response for every trial was recorded, as well as the fact of no response, if none was forthcoming in the time limit of approximately six seconds per word.

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<sup>1</sup> E. Thorndyke and I. Lorge, The Teacher's Word Book of 30,000 Words, (New York: Columbia Univ. Press, 1944).

The specific hypothesis stated that obese children will accentuate perceptually and cognitively the oral aspects of a stimulus situation. On this cognitive task, the words were given on a memory drum. The subjects were shown the list of oral and neutral words once, and thereafter were encouraged to guess the word that was to come next. The learning continued until they could give one perfect recitation. The oral words were the need-related aspects of the stimulus situation. The ratio of incorrect oral guesses to total incorrect guesses was used as one operational definition of this variable. This ratio will hereafter be referred to as the Index of Oral Errors. Incorrect oral guesses were defined as guesses of oral words at neutral word positions which either came from the list or were introduced by the subjects and judged to be oral. Total incorrect guesses referred to an incorrect guess of a neutral word at neutral word positions which either came from the list or were introduced by the subject, as well as to the incorrect oral guesses. (See Appendix D for the scoring of words introduced by the subjects into the serial learning situation.) The following prediction can now be stated:

Prediction 1.

The obese group will have a larger Index of Oral Errors than the normal group when presented with the same list of oral and neutral words to learn.

Dependent Variable 2.

The second dependent variable was the comparative speed of learning of oral and neutral words. The data from the serial learning

task was also used in the study of this variable. This variable was the number of trials needed to learn the oral words in comparison to the number needed to learn the neutral words in adjacent positions to the oral words. The fewer the number of trials in learning oral words, compared to neutral words, the greater is the accentuation or facilitation of the oral aspects of the stimulus situation. The second prediction can now be stated:

Prediction 2.

The obese group will take a fewer number of trials in learning the oral words than the neutral words in a list of oral and neutral words compared to the normal group.

Dependent Variable 3.

The third dependent variable was a choice between two percepts or interpretations, one oral and one non-oral, to ambiguous visual stimuli.

A special objective form of the Rorschach test based upon a modification by McReynolds,<sup>2</sup> was employed. Forty pairs of items were used, utilizing different specified areas of the Rorschach cards. Each pair of items consisted of an oral and a non-oral percept. For the most part, these percepts were taken from the Hertz manual.<sup>3</sup> Some of the percepts came from the experiences of a clinical psychologist and from those of the writer. The percepts that were

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<sup>2</sup> P. McReynolds, "Perception of Rorschach Concepts as Related to Personality Deviations," J. Abnorm. Soc. Psychol., 1951, 46, 131-141.

<sup>3</sup> M. Hertz, Frequency Tables for Scoring Responses to the Rorschach Ink Blot Test, 3rd ed., (Cleveland: Western Reserve Univ. Press, 1951).

chosen to be used were paired as to the frequency with which they are seen and the form adequacy of the percepts. The neutral percept in each pair, that is, the non-oral percept, was partially chosen on its seeming independence of other needs. The purpose of this was to increase the likelihood that the subject's choice of the oral percept was a positive action, that is, not an avoidance of the matching percept. The final form of forty pairs was arrived at after three revisions. (See Appendix E for the final form used.)

These revisions were based on pre-testing on children at a local hospital. These children were outpatients, some of whom presented a feeding problem. Non-discriminating items were eliminated and new ones substituted. A reliability test on the final test form using two clinical psychologists as judges yielded 97 and 100% agreement with the writer as to the more oral percept in each pair. Further, the judges found only one and four pairs of items respectively, which they judged to be made up of two percepts with some oral connotations. (See Appendix F. for the directions to the judges.) Hence, the oral percepts were judged to be oral, and the neutral percepts were judged to be non-oral. Since the subjects were asked to give the percept in each pair which they saw as the most appropriate percept for a given area of the two percepts given, and since the objective form of each pair of percepts was equated as far as possible, it was inferred that the selection of percepts for the ink blots was based on an internal process. Further, as the non-oral percept in each pair was intentionally made neutral, that is, as free from need or threat aspects as possible, it was

also inferred that an oral percept choice was indicative of the operation of oral need. The specific directions given were:

"That last test was hard (reference to the serial learning test). Now we're going to do something which is easier. There are no right or wrong answers on this. I'm going to show you something and I'm going to name two things that it might look like to you. I want you to tell me which one it looks more like to you. Let me show you what I mean." (The subject was then presented with Rorschach card I, on which the several relevant areas had been encircled in ink. The subject was directed to the first percept.) "Do you see this? Does it look more like a mouth that is open or a hand with a mitten on?" (The area was traced with the back of a pen. This procedure was repeated for the forty percepts on the ten Rorschach cards. The oral percept was alternated with the non-oral one in order of presentation to the subject. If the subject asked how to hold the card he was told that he could hold it anyway he wanted, although he was given the percept right side up. The occasional doubtful subject was asked to take the one which the blot looked a little bit more like.)

The operational definition, then, of the amount of accentuation or facilitation in perception of the oral aspects of the stimulus situation was the number of oral percepts seen in the forty Rorschach percept choices. The following prediction can now be stated:

Prediction 3.

The obese group will choose the oral percept of an oral and non-oral percept choice in an ambiguous stimulus situation more frequently than the normal group.

Dependent Variable 4.

The fourth dependent variable was the kind of associations given in three associations to stimulus words. The subjects were asked to give three associations to stimulus words with the

intention of getting variations in the number of oral associations, which would differ from the obese to the normal group.

The subjects were asked to give the first three words that came to their minds when presented with the following fifteen stimulus words: 1) store 2) table 3) sweet 4) tree 5) money 6) bowl 7) knife 8) buy 9) roll 10) stomach 11) pop 12) birthday 13) meat 14) room 15) circus. The specific directions were:

"Now we've got something like the first thing we did. This time I'm going to name a word and when I say it, I want you to tell me the first three words you think of just as fast as you can. The words don't have to rhyme." (If the subject persisted in giving words that rhymed, the instructions were repeated.)

The number of oral associations given was the operational definition of the amount of facilitation of oral-related associations.

Because these words were chosen strictly on the basis of the writer's opinion that they might elicit other oral words in associations and were not chosen with the knowledge that the stimulus words vary in the number of oral associations they elicited for different subjects, no formal prediction was stated in advance of the actual experiment. Although no formal prediction was made, the prediction that obese children would give more oral associations than normal children appeared to be a logical deduction from the specific hypothesis.

#### D. The Experimental Situation

Testing was performed by the writer, who saw each child for thirty to forty-five minutes, depending upon the individual subject's

ability and speed. Most of the subjects from any given school were tested in the same room, but in one school the experimenter alternated between two rooms. The subjects were called into the testing room by the secretary. After introductions, the subjects were told that the examiner was testing children in different schools to see the way words were being learned in the different classes of the school.

A word naming test served the purpose of establishing rapport. It was adapted from the Stanford-Binet scale of intelligence, and served as an easy, non-anxiety provoking task to begin the testing. The subjects were told:

"I want you to give me as many words as you can think of just as fast as you can. I'll time you on my watch and you'll have one minute. Any old words will do. Are you ready? Okay. Go."

Timing was not rigid in order to allow poorer performers to adjust to the testing situation without undue anxiety.

## Chapter IV

### Results of the Experiment

#### A. Results of the Matching of Variables

The obese and normal groups were matched on the variables of age, classroom experience, grade progress, intelligence, and sex. Since all pairs of subjects were chosen of the same sex, and each member of every pair came from the same classroom, these variables needed no statistical comparisons. The results of the success in matching the variables of age, grade progress, and intelligence are presented below. In each case, the statistical hypothesis that there is no difference between means for the given variable was tested against the class of alternatives that there is a difference in means. In each case, also, a Student's  $t$  test for correlated samples was employed for the statistical test of significance for differences in means. A level of alpha of .05 was adopted to test the difference in means.

The mean age (to the nearest birthday) of the obese group was 9.40 years with a standard deviation of .85, and for the normal group 9.33 years with a standard deviation of .89. Student's  $t$  was .67, which has a chance probability of greater than .05. Hence, the null hypothesis that there was no difference in mean ages was accepted.

The mean grade progress for the obese group was 4.10 grades with a standard deviation of 1.67, and for the normal group 4.27 with a standard deviation of 1.23. Student's  $t$  was 1.60, which has

a chance probability of greater than .05. Hence, the null hypothesis that there was no difference in mean grade progress was accepted.

The mean intelligence quotient of the 12 obese subjects who took the Kuhlman-Anderson test was 117.8 with a standard deviation of 12.3, and for the 12 normal subjects 116.1 with a standard deviation of 8.4. The mean intelligence quotient of the 18 obese subjects who took the Pintner-Durost test was 108.6 with a standard deviation of 12.7, and for the 18 normal subjects 111.7 with a standard deviation of 9.5. Student's  $t$  was .94 and 1.27 respectively for the two tests. The chance probability of these differences were both greater than .05. Hence the null hypothesis that there was no difference in mean intelligence was accepted.

The statistical analysis above shows that these variables, as well as those of classroom experience and sex were sufficiently matched that differential effects on the dependent variables were not likely to be due to them. (See Appendix G for the raw data on these variables.)

## B. Results of the Predictions

### Prediction 1.

Prediction 1 stated that the obese group will have a larger Index of Oral Errors than the normal group when presented with the same list of oral and neutral words to learn.

Because the raw data expressed in proportions (Index of Oral Errors) did not meet the assumption of normality, an arc sine transformation of the data was carried out. This transformed Index has

an approximately normal distribution.

The statistical hypothesis that there is no difference in the transformed Index between obese and normal children was tested against the class of alternatives which states that the transformed Index is greater for obese children than for normal children. A level of alpha of .05 was allowed. The mean transformed Index for the obese group was 1.470 with a theoretical standard deviation of .033, and for the normal group was 1.377 with the same theoretical standard deviation of .033. The  $\underline{z}$  statistic is appropriate to this data. A  $\underline{z}$  of 2.04 was obtained. This  $\underline{z}$  value has a probability of chance occurrence of .02 which is less than .05 for a one-tail test. Hence, the null hypothesis can be rejected and the alternate hypothesis accepted. The inference is made that there is a greater number of incorrect oral words substituted for neutral words by obese than by normal children.

#### Prediction 2.

The obese group will take a fewer number of trials in learning the oral words than the neutral words in a list of oral and neutral words compared to the normal group.

The two groups were compared according to three criteria. These criteria were the number of trials in the learning of either two, three, or four of the oral words at positions 3, 5, 7, and 9 in the list, and the learning of either two, three, or four of the adjacent neutral words at positions 4, 6, 8, and 10. The criteria, then, referred to both oral and neutral words. For each subject, the

difference scores in the number of trials required to learn the oral or neutral words to the given criterion were compared. The criterion of one oral or one neutral word was not used because the variance of the distribution of differences was much smaller than for the criteria used. It appeared that almost all subjects were able to learn one of the four oral or neutral words by the first trial, so the differences were frequently zero. The analysis of variance design appropriate to this data assumes homogeneity of variance. Hence, the elimination of this criterion.

Two psychological hypotheses were being tested. The first was whether there was a difference between obese and normal children in the speed with which they learned oral words as compared to neutral words. The second was whether there was a difference between obese and normal children when the combined influences of the kinds of words learned at various levels of learning were considered together.

The statistical hypothesis that there is no difference between obese and normal children in the differences in the number of trials in learning of neutral and oral words was tested against the class of alternatives which states that the difference in the mean differences (number of trials for learning neutral words minus number of trials for oral words) is greater in obese than normal children. An analysis of variance design was employed, and a level of alpha of .05 was allowed. The difference in the number of trials for learning the two kinds of words was compared at each of three

criterion levels (already described) for the obese and normal groups. No available experimental design could take the matching into account as well as the correlated data for both the words and criteria. Therefore, the groups were treated as independent. The operational definition of the speed of learning oral words was the difference between the number of trials needed in learning adjacent neutral words to a given criterion and the number of trials needed in learning the oral words.

The first statistical sub-hypothesis, that the mean square based upon variations in the differences in learning trials for neutral and oral words between obese and normal children is no different from the mean square based upon variations of subjects within the same groups, was tested against the class of alternatives which states that the mean square between these groups is greater than the mean square within the groups. The F ratio obtained was .33, which has a chance probability much greater than .05. The second statistical sub-hypothesis, that the mean square based upon variations due to the interaction of groups and criteria is no different from the mean square due to the interaction between pooled subjects and criteria, was tested against the class of alternatives which states that the mean square between groups and criteria is greater than the mean square between pooled subjects and criteria. The F ratio obtained was .77, which has a chance probability much greater than .05. Neither of the F ratios were significant. Hence, the null hypothesis that there is no difference

Table 1

ANALYSIS OF VARIANCE OF DIFFERENCE IN NUMBER OF TRIALS IN LEARNING  
FOUR NEUTRAL AND FOUR ORAL WORDS, FOR THE CRITERIA OF TWO, THREE  
AND FOUR WORDS LEARNED IN THE OBESE AND NORMAL GROUPS (N = 60)

SOURCE OF VARIATION	SUM OF SQUARES	DEGREES OF FREEDOM	MEAN SQUARES	F	F <sub>.95</sub>	DECISION
Groups	8.45	1	8.45	.33	4.01	Accept
Criteria	12.04	2	6.04			
Subjects	1081.87	58	19.08			
Interaction: (Groups X Criteria)	9.07	2	4.03	.77	3.08	Accept
Interaction: (Pooled Subjects X Criteria)	929.60	116	7.96			

in the number of trials for learning neutral and oral words was accepted. No inference is made about the comparative speed in learning oral words for obese children. (See Table 1 for the statistical analysis of the data.)

### Prediction 3.

The obese group will choose the oral percept of an oral and non-oral percept choice in an ambiguous stimulus situation more frequently than the normal group.

The statistical hypothesis that there is no difference in the number of oral percepts seen by obese and normal children was tested against the class of alternatives which states that obese children will see more oral percepts than normal children. A level of alpha of .05 was allowed. The mean number of oral percepts for the obese group was 20.8 with a standard deviation of 2.7, and for the normal group 19.0 with a standard deviation of 2.8. Student's  $t$  for the difference between means for two correlated samples was appropriate to the data. Student's  $t$  was 2.57. The chance probability for this occurrence is .02, which is less than .05. The null hypothesis was rejected and the class of alternatives that states that the obese group will more frequently see ambiguous visual stimuli as oral stimuli was accepted. The inference is made that obese children see a greater number of ambiguous stimuli as oral stimuli than children of normal weight. (See Appendix G for the raw data on the learning and perceptual tasks.)

Although no formal prediction was made to the fourth dependent

variable (kind of associations given in three associations to stimulus words), the results will be reported in this chapter.

Because the distribution of the number of oral associations was not normal, the statistical test used was Wilcoxon's T for paired replicates, a test of the sum of rankings. The statistical hypothesis that there is no difference between obese and normal children in the sum of difference rankings was tested against the class of alternatives which states that the sum of the rankings of differences is different between these groups. A level of alpha of .05 was allowed. (The directional prediction indicated by the specific hypothesis could not be made unless stated in advance of the experiment.) In the statistical comparisons, the sum of the smallest rankings was compared with the expected sum of rankings based upon the normal approximation of Wilcoxon's T distribution. The rankings were compared on both the first association and all three associations. Ties in the ranking of the differences were broken by giving the smallest ranking (when the tied rankings were of a different sign) to that difference which was also smallest when the other criterion was employed. That is, the ranking of three associations was employed for ties in the ranking of differences in the first association and visa versa.

The sum of the smaller ranking of differences obtained was 134 for the first association and 146.5 for the three associations. The expected sum of rankings of 136 is greater than only one of the obtained rank sums. The chance probability of occurrence is

greater than .05 for three associations and less than .05 for the first association. Hence, it is suggested that the null hypothesis can be rejected. No inference is made to a greater number of oral associations for obese children, although the data would suggest it. (See Appendix H for the raw data on word association).

## Chapter V

### Discussion of the Results

#### A. Experimental results as related to experimental design.

The specific effect predicted and supported was facilitation. Since obesity is presumably due to overeating, it may be considered the effect of facilitative responses to direct oral stimuli; that is, to food and drink. Since the obesity was assumed ego-acceptable it was predicted that the perception and cognition of symbolic oral stimuli would also evoke facilitative responses. The specific results of the experiment indicated that high oral need inferred from excess body weight manifested itself in the perception of ambiguous visual stimuli as oral stimuli and again in the choice of a greater number of oral errors as compared with the total number of guessed errors in learning a list of oral and non-oral words. The relative speed of learning of the oral words, however, was not demonstrably faster for obese than for normal children. These results suggested that the expression of high oral need is generally consistent.

The implication of these results is that high oral need manifests itself not only directly (in obesity) but that it also affects psychological functions. A high oral need generally led subjects to select aspects of the stimulus field in which they were placed. The learning task enabled the study of the selection of responses from several stimuli, since subjects were able to select from the presented list of words those which they wanted to respond. The data

indicated that the selection did not show significant differences between high and normal oral need groups with regard to the speed of learning the correct oral words. However, when incorrect words were selected the high oral need group selected oral words more frequently than the normal group. The Rorschach test presented subjects with ambiguous stimuli which in themselves were simply ink blots, and thus enabled the study of another kind of selection of responses. Though subjects were asked to select between an oral and non-oral percept, there was only one stimulus. The cumulative effect of such an oral selection assumes the general features and import of a distortion. The high oral need subjects distorted to the extent that they reported seeing the blots as oral stimuli more frequently than the normal children.

Two central problems grow out of the experimental study and the results obtained. These are the problem of assessing the intensity of the oral need that subjects bring to a situation, and of demonstrating the effect of the variable under study (oral need) in the clearest way. Previous research dealing with oral need and cognitive and perceptual functioning concentrated on experimentally manipulating a state of high oral need. In this study, however, excess weight was assumed to indicate the presence of a strong and persistent high oral need.

The determination of oral need strength by experimental manipulation has the chief disadvantage of overlooking inter-subject differences. The use of psychological instruments to determine

magnitude of oral need is limited to the reliability and validity of the instruments used and to the extent to which these methods can actually assess active needs.

In this study, the problem has been dealt with by using children from one end of the body weight continuum as a group and comparing them with children from the middle of the continuum. The study of each group raises further questions.

In considering the obese group, the presently undiscovered physiological factors must be kept in mind. For example, one study reported that when both parents are obese, 80% of the children are obese, when one parent is obese, 50% of the children are obese, and when neither parent is obese, only 10% of the children are obese.<sup>1</sup> These figures were used to demonstrate an inherited predisposition to obesity. However, the data permits an equally tenable hypothesis based on the amount of exposure to parents and to the psychological factors that may be responsible for their obesity. Even the experiments on mice are not conclusive.<sup>2</sup> It has been possible to breed obese mice, but the second generation of mice also over-eats. The role of many factors, ranging from disease to endocrines to carbohydrate metabolism (the so-called glucostatic theory), has been alluded to in the literature as possible causes of obesity. No definitive statements about any of these are possible at this time.

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<sup>1</sup> Reported in J. Mayer, "Physiological Basis of Obesity and Leanness, Part II," Nutrition Abst., 1955, 25, 871-883.

<sup>2</sup> Mayer, Pp. 876-877.

New methods for defining obesity by body build and fat distribution are presently being explored.<sup>3</sup> It is necessary to recognize that the equation of over-weight with overeating is an assumption.

A closer look at the scores of some of the subjects in the obese group revealed a percentage that showed no facilitative mechanism on any of the dependent variables, and a larger percentage that showed no facilitation on some of the measures under study. There is clinical evidence of a purely oral type, the so-called "oral character," and also of types with high conflict, who use overeating as either a substitute (regressive) mechanism or as a means of dealing compulsively with other problems. The clinical evidence indicates that overeating may not be an acceptable need in the satisfaction of which people overindulge, but rather an incomplete solution to problems of sexuality and aggression which create considerable conflict. We would expect that the ego processes, particularly the defense mechanisms used, would bear more important study. The work of M. Cohen already referred to (Pp. 20-21.) demonstrates the operation of defenses like repression and denial in dealing with oral needs. Uncontrolled observations in the course of the present study suggested that several subjects attempted to avoid the oral-related material. However, the study did not use a measure which would have made it possible to predict subjects who would respond in this way, since the predictions were based on a need deemed to be socially and individually acceptable to all members of the obese group.

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<sup>3</sup> Mayer, P. 880.

The problem of assessing the magnitude of oral need is more difficult for the normal group. All that is known about any member of this group is the fact that his body weight is not extreme.

The results of the present study also suggest certain ways of investigating the problem of determining oral need strength and the individual's defenses around it. Such research would simultaneously investigate either two direct methods of assessing oral need, or a direct method and a defense around it. A study in which obese and non-obese subjects were studied under various conditions of food deprivation, or a study which combined observation of school eating habits with observation of non-nutritional mouth movements would be feasible in a school situation. Defense processes could be ascertained either by direct observation of behavior, or indirectly by means of psychological tests. This would permit more accurate predictions to the dependent variables under study. Groups exhibiting anorexia nervosa, or some more minor oral difficulty such as vomiting, could be studied in comparison with an obese or other high oral need group, as well as with a normal group.

In summary, there is a need for research which would combine several of the past approaches to the problem of need assessment, and/or would try to account for possible defenses against the need. The analysis of variance technique would be appropriate to such designs.

The other major problem is that of determining what cognitive and perceptual tasks should be used to investigate the influence

of oral need on perception and cognition, and of designing such tasks in the most efficient way. Eventually, we would like to know not only the circumstances and conditions under which we would expect the need to be strongly operating, but also those under which its operation and effect would be minimal or non-existent. The discussion which follows is limited to the tasks which have been used in this experiment to provide data for the dependent variables.

The serial learning task was advantageous in a number of ways. It had intrinsic meaning to most subjects, they enjoyed participating in it, and they appeared well-motivated. Unfortunately, the matching did not well enough equate the pairs of subjects with reference to the speed of learning the total list. The obese children tended as a whole to learn more slowly than the normal, though the difference was not statistically significant. Whether this was due to actual differences in ability to do such a task, or whether it reflected a psychological difference such as a different anxiety level or frustration tolerance is not known. Nor is the interaction of these variables with the variables under study known. The studies of Spence and Taylor have indicated that the difficulty of a given task has differential effects for anxious and non-anxious subjects as measured by the Taylor Manifest Anxiety scale. These studies have shown the degree of anxiety varies directly with achievement on a conditioned response task, but

indirectly with that on a serial maze task.<sup>4</sup> The task used in the present study involved simple four-letter words, but until other kinds of words and longer lists are studied, the relative difficulty of the task cannot be accurately determined. The effect of the semantic content of words has been discussed in the review of the literature. McClelland and Atkinson, and Schafer divided oral words and percepts into such groupings as food deprivation, food objects, food acts, oral passive and oral aggressive. Their work suggests that oral words, while coming from one population in that they are oral symbols, come in other respects from populations which might be more or less important in the determination of responses. The learning list used in this study involved only food object words. Other lists deserve exploration.

The fact of stimulus generalization would suggest that tests requiring the learning of a list comprised solely of neutral words should also be studied. Learning of paired associates would permit a study of the influence of the need factor independent of those created by serial position.

The results of the speed of learning part of the test showed a slight, though not statistically significant, tendency for oral need to operate with greater discrimination at the earlier stages of learning. The number of obese subjects who learned oral words

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<sup>4</sup> K. Spence and J. Taylor, "Anxiety and Strength of the UCS in Determining the Amount of Eyelid Conditioning," J. Exp. Psychol., 1951, 42, 183-188; and "The Relationship of Anxiety Level to Performance in Serial Learning," J. Exp. Psychol., 1953, 44, 61-64.

before neutral words increased from 14 to 19 when the criterion was lowered from 4 to 2 words, while the number of normal subjects decreased from 16 to 15. Unfortunately, the task was so easy at the criterion of one oral or neutral word to be learned that many of the subjects learned to criterion in one trial. This might have obscured a possible difference between groups at the earliest stages of learning. Longer and more difficult word lists should be studied so that finer discriminations could be made at the earlier stages of learning. The effect of oral need on learning had hardly been studied.

Use of the Rorschach test in previous experiments trying to demonstrate the effect of oral need has been fruitless. However, the technique of pairing an oral and non-oral percept with relatively the same form adequacy has demonstrated that this test can be arranged to discriminate between high and normal oral need subjects. An item analysis of the forty pairs revealed that discrimination was best on the colored cards. The obese group chose 59 more oral percepts than the normal group, and 51 of these were chosen from colored cards. Only .6 of the test items came from these cards. This finding supports the Rorschach hypothesis that color cards pertain to the way in which persons relate to their environment. Not only were there significant differences between groups, but an examination of the normal group showed a tendency for the subjects in the normal group with the highest oral need scores to choose those items which best differentiated between groups. For example,

the best differentiation was obtained on item 13; the oral percept was chosen 9 times more often by the obese group. When the normal group was divided into the ten highest in oral need as measured by the Rorschach, nine of these ten chose the oral percept for this item, while only five of the remaining twenty chose the oral percept. Similar but less significant results were obtained for the other more discriminating items. This modified Rorschach technique, which is relatively new, deserves further exploration. The investigation adds some validity to the concept of the Rorschach as an instrument which can determine an individual's needs.

It is also suggested that different kinds of pairings be studied. Oral responses have themselves been divided, and such divisions as oral passive--oral aggressive may be useful in differentiating various kinds of oral problems. Other categories might include direct and symbolic expressions or gratification--successful and gratification--unsuccessful percepts. The range for the matched percept is very wide; pairings could be based on theories of psychosexual levels of development or defenses against specific threatening areas. Form adequacy could be manipulated so that good neutral percepts could be matched against inferior need-related ones, or good conflict-laden percepts matched against inferior neutral ones. The technique seems to be a good one with many possible variations.

The particular test used in this study could have been made more effective if neutral pairings had been added at various points in order to eliminate a set, anxiety, or doubt that might have arisen

in a subject who tended to see practically all oral percepts.

It appeared that the word association test could be useful in discriminating high and normal need groups. Some pre-testing would be required to permit choice of the best stimulus words. However, even in the crude form used in this study, the test appeared to get a differential response.

#### B. Experimental Results as Related to Theory.

The experimental results were largely consistent with the general hypothesis. Previous support of the hypothesis has come from studies in which oral need was induced in the experimental situation. In the present research, oral need was inferred from an overt characteristic of the individuals under study (body weight). The assumption was made that excess body weight, in the absence of any known physiological factor responsible for the obesity, was the result of overeating. Several questions bearing on the hypothesis of oral need in particular and need theory in general are raised at this point.

Murray's propositions suggest that need affects selection and distortion; but they do not specify the direction. The facilitation hypothesis, as opposed to an inhibition of response (defense) hypothesis, makes several assumptions about the nature of the need under study which appear reasonable in terms of the present study. These assumptions involve the general acceptability of the need also, and its acceptability to the particular subject involved. An acceptable need generally means a need which can be given expression in

a free choice situation, or which at least does not meet with severe disapproval. The assumption was made in this study that the need was acceptable to the subjects. The second assumption--that the subject can give expression to the need with a positive or approach method as contrasted with an avoidance mechanism--is also central for predicting the direction of response. The third assumption is basic to any approach which makes predictions to a perceptual or cognitive task; that is, that the need can find expression in this indirect symbolic way.

In terms of the obese group used in this experiment, the first two assumptions appeared to be justified. Since constitutional factors were ruled out by the process of exclusion, and since the group was an adequately functioning school group of obese youngsters with no psychiatric or obesity clinic referral, the group appeared to be homogeneous with regard to a strong and acceptable oral need to which the subjects in the group gave direct expression. At least, the group was not a group of clearly psychiatric problems.

The third assumption mentioned above deserves further attention. Previous experiments have pointed to a "drive toward reality" which appears to be counter to the general hypothesis of this and other studies. By "drive toward reality" was meant an inferred state of affairs which evoked a response pattern that no longer accentuated or facilitated oral stimuli. The fact that some of the obese subjects did not show facilitation in response suggests that on a perceptual and cognitive level the expression of the need was in some

way controlled or was not possible, as if the general nature of the task did not permit expression of the need. In several cases, in which there appeared to be a partial or complete inhibition of oral responses, the operation of a mechanism similar to avoidance can be inferred. If this inference is correct, a situation would exist in which an approach mechanism would be in operation on the overt level and an avoidance mechanism in operation on the perceptual and cognitive level. If these inferences are correct, then it is possible that strong oral need may in some cases have no manifest effect on perception and cognition, or may inhibit the perception and cognition of oral-related stimuli. The posited inhibitory mechanism did not exhibit itself in the majority of the subjects, but if the measures which worked well for most subjects are to be trusted, then those responses which did not follow from the predictions must be taken into account. These points are raised because they appear to have relevance to previous experimental findings and to the conjectures made by these experimenters.

On the basis of previous studies involving food and water deprivation, the relationship between oral need and cognition and perception appeared to be roughly curvilinear. That is, as oral need was increased, there was an initial facilitation followed by an inhibition or drop in the perception of the oral-related aspects of the stimulus situation. The timing for this change was not definite, but indications were that at a point between six to twelve hours of food deprivation a shift occurred. The new process

was described as a "drive toward reality" and the speculation of the experimenters was that the subjects at this point gave up the directed perceptual and cognitive activity as if they had become aware that the words, pictures, or thoughts could not in themselves gratify the need realistically.

The writer has two main objections to this speculation. In the first place, drive is discussed in a way that leads the reader to believe that the need is no longer operative. It is as if another process took the place of the need process. On the basis of the present experiment, it appears that the "drive toward reality" is in actuality a secondary process which seems to govern the need or keeps it from manifesting itself. It may thus be similar to a defense process. Certainly, the semi-controlled observations in the Minnesota study already reported (on Pp. 11-12) and the reports of famine indicate that oral need practically determines all behavior as it intensifies. One might speculate that the operation of the need appears first to direct perception and cognition toward oral stimuli. Then, in some persons more than others, a reality check or a defense of the need prevails. In extreme need states, however, the operation of the need again becomes apparent in practically all persons.

The second objection to the postulated drive is the inclusion in its support of the findings involving the category of oral responses (consisting of the names of places where food is served, or utensils for eating, or the non-edible forms of food). This category was

labelled instrumental food responses.<sup>5</sup> The continued increase of these responses at periods up to twenty-four hours of food deprivation was explained as part of a growing reality orientation. Reality is not easy to define, but the fact is that no food words, thoughts, perceptions, or cognitions can directly satisfy an oral need. Hence, it would be more appropriate to consider these responses as indicators of the continued operation of the need on a covert level.

In this research, the oral need was assumed to be a manifestation of a chronic and persistent craving for food. The obese person seems not to get enough food to meet his needs. The experiment showed a facilitation of oral-related stimuli on the part of most of the subjects. Those that did not show this facilitation might be assumed to be operating under the "drive toward reality," or more accurately, in the opinion of the writer, in terms of a defense on the fantasy level against oral-related stimuli. But regardless of the willingness to use the post hoc idea of "reality drive," it will be necessary in future research to specify the conditions under which and the subjects in whom the oral need will show itself in 1) the facilitation of perceptual or cognitive functioning with regard to the oral aspects of stimuli; 2) a more realistic appraisal of stimulus material; and 3) an inhibition or defense around oral aspects of stimuli.

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<sup>5</sup> L. Wispe and N. Dramborean, "Physiological Need, Verbal Frequency, and Visual Duration Thresholds," J. Exp. Psychol., 1953, 46, 25-31.

In the present study, the general prediction of facilitation of oral stimuli was made for the obese group. A difference in the etiology of the high oral need can be distinguished between this group and a group of subjects in which the need has been induced by some deprivation procedure. When left to their own devices, obese persons, in contrast to normal subjects, and probably to those who have volunteered for the induced need experiments, enjoy consuming food beyond what is needed for physical requirements. This overeating is generally a free choice activity. In the laboratory setting, it is a forced situation, but one in which subjects who volunteer identify themselves as persons who can give up food for twenty-four hours. This factor of persistent free choice activity as compared with temporary situational behavior is important for the understanding of persons as they actually behave, both on overt and covert levels. The role of the individual's thoughts, feelings, and attitudes toward eating and food deserve special attention. For this reason, study of other feeding disturbances such as anorexia nervosa is again recommended. In this way more information will be provided about persistent free-choice eating behavior, i.e., behavior determined primarily from within the person.

The negative results obtained on the speed of learning variable might be accounted for by a more complex theory of oral need. The free-choice behavior of overeating can readily be observed, but the ease of the choice and the motivation behind it are not so easily determined. The degree of conflict in the choice is not easily

measured. The defense structure involved may manifest itself only in psychological tests, and this implies the necessity of some psychological assessment of each individual before very accurate predictions can be made. The conflict and attending anxiety may have manifested themselves in the learning of any one of the not strictly equivalent oral words, or in the difficulty of ordering words some of which provoke anxiety and defense. Uncontrolled observations revealed that several children blocked on one of the oral words, so that the word was never guessed until the very end. These considerations are speculative and do not intend to overlook the factors of intelligence, memory, work skill, stimulus generalization, attention, and achievement motivation which may have blurred differences between groups on this variable.

In review of the discussion, it might be said that there are many questions which positive results in a single experiment cannot answer. The important point that must be made is that a critical evaluation of past research and a keen awareness of the many problems involved are requisite for meaningful future work in the area.

## Chapter VI

### Summary and Conclusions

#### A. Summary

The purpose of this study was to investigate certain effects of oral need on perception and cognition. Oral need was inferred to be of high or normal intensity from the overt characteristic of body weight. The general hypothesis was that oral need affects the perception and cognition of individuals in relation to stimuli with which they are confronted in such a way as to accentuate any oral-related aspects of the stimulus situation.

Previous studies in the area of oral need dealt with this need by experimentally inducing its presence through food deprivation procedures. The present research intentionally took into account differences in need intensity, as this was reflected in a group of obese children.

Theories of obesity have generally agreed that the chief cause for it is associated with the fact that the obese person persistently eats more than his body needs for its normal growth and repair functions. Presently, there is no adequate physiological mechanism or disturbance that can account for either the obesity or the overeating. Obesity and overeating thus appear to be governed in some way by psychological factors. When the general hypothesis was applied to obese children, the specific hypothesis that followed was that obese children will accentuate or facilitate perceptually and cognitively the oral aspects of the stimulus situation.

The experimental subjects consisted of thirty obese children for each of whom a comparable match with regard to age, classroom experience, grade progress, intelligence, and sex had been found. All pairs of subjects were tested during the hours before lunch, and at the same time.

To test the general and specific hypotheses, four dependent variables were studied. Three tests were used to investigate these variables. One, involving serial learning of relatively simple words appropriate in length to the age group of six to twelve, provided the data for the proportion of oral errors to neutral errors in learning (Index of Oral Errors), and the comparative speed in the learning of oral words. A modified Rorschach test, in which the subjects were asked to discriminate on forty pairs of items, served as a perceptual choice task. Each pair of items consisted of an oral and a non-oral percept, and the subjects had to choose the one which in their estimation most resembled a given blot area. Each pair of items previously had been judged by psychologists to contain an oral percept. A word association test was used to study the fourth dependent variable, but no prediction for it was ventured at the beginning of the experiment. This test consisted of fifteen ambiguous oral words for which the subjects had to give three associations.

The following predictions were made:

- 1) The obese group will have a larger Index of Oral Errors (oral errors/oral and neutral errors) than the normal group when

presented with the same list of oral and neutral words to learn.

2) The obese group will take a fewer number of trials in learning the oral words than the neutral words in a list of oral and neutral words compared with the normal group.

3) The obese group will choose the oral percept of an oral and non-oral percept choice in an ambiguous stimulus situation more frequently than the normal group.

The results of the experiment supported the first and third predictions. This was considered as evidence for the hypothesis of accentuation or facilitation of the oral-related aspects of the stimulus situation when high oral need is presented. The variables of the kind of word associations also showed a tendency for obese children to give more oral associations than normal children.

The results of the test of the speed of learning were not consistent with the other experimental findings. The question which remained to be answered was whether oral need had no effect on ordered learning speed, whether the methodology was inadequate, or whether a more complex need theory was necessary. A slight, although statistically insignificant, trend indicated that it might be easier to demonstrate that oral need affects learning speed of oral words at earlier stages of learning. With this in mind, it was suggested that more involved and difficult learning tasks be used in future research so that partial learning can be studied more thoroughly.

#### B. Conclusions

The experimental findings lend further support to the general hypothesis that oral need affects perception and cognition in such

a way as to facilitate the oral-related aspects of the stimulus situation. Further, the method of determining high oral need by studying the characteristic of body weight was fruitful in the demonstration of facilitation of oral response. It is suggested that the most meaningful future studies will be those that consider simultaneously the experimental induction of oral need, and an assessment of individual differences in both oral need and the preferred mode of dealing with it, before experimental manipulation is undertaken.

Appendix A:  
Height and Weight Charts

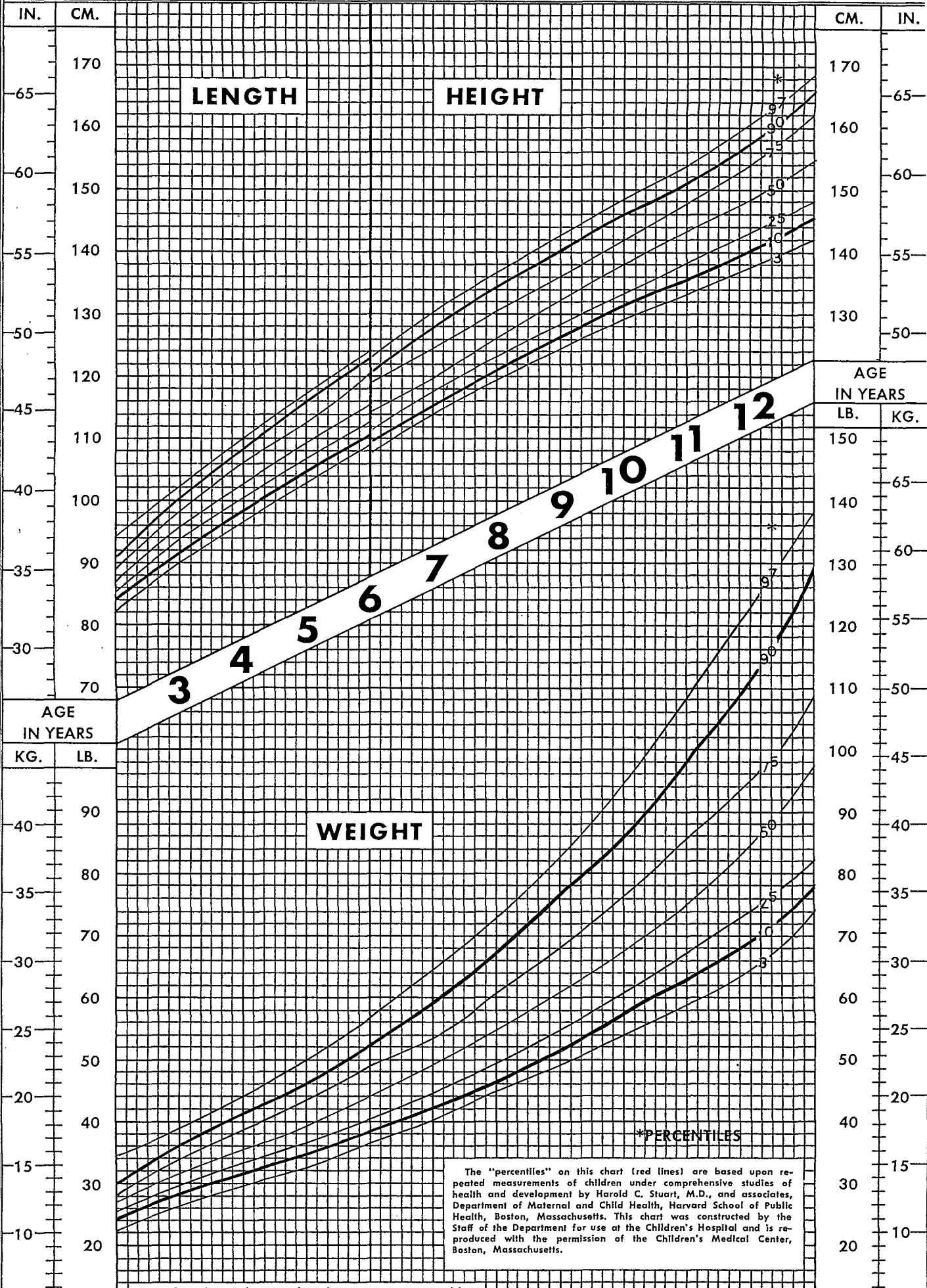
# BOYS

NAME

BIRTH DATE

NO.

THE CHILDREN'S MEDICAL CENTER, BOSTON - ANTHROPOMETRIC CHART



The "percentiles" on this chart (red lines) are based upon repeated measurements of children under comprehensive studies of health and development by Harold C. Stuart, M.D., and associates, Department of Maternal and Child Health, Harvard School of Public Health, Boston, Massachusetts. This chart was constructed by the Staff of the Department for use at the Children's Hospital and is reproduced with the permission of the Children's Medical Center, Boston, Massachusetts.

# PERCENTILE CHART FOR MEASUREMENTS OF BOYS

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**T**HIS CHART provides for boys standards of reference for body weight and recumbent length at ages between 2 and 6 years and for weight and standing height from 6 to 13 years. It is based upon repeated measurements at selected ages of a group of more than 100 white boys of North European ancestry living under normal conditions of health and home life in Boston, Mass. The distribution of the measurements obtained from these children at each age is expressed in percentiles, each percentile giving a value which represents a particular position in the normal range of occurrences. The number of the percentile refers to the position which a measurement of the given value would hold in any typical series of 100 children. Thus, the 10th percentile gives the value for the tenth in any hundred; that is, 9 children of the same sex and age would be expected to be smaller in the measurement under consideration while 90 would be expected to be larger than the figure given. Similarly the 90th percentile would indicate that 89 children might be expected to be smaller than the figure given while 10 would be larger. The 50th percentile represents the median or midposition in the customary range. Here, the 10th and 90th percentiles are represented in heavy lines to show the limits within which most children remain. The lighter lines in the graphs divide the distribution into segments for ready recognition and description of individual differences as well as of the "regularity" of progress. The 3rd and 97th percentiles represent unusual though not necessarily abnormal findings.

In line with common usage in the United States, the charts are ruled on a scale in pounds to represent weight. They are ruled, however, in centimeters to represent length under 6 years and height thereafter, because this scale facilitates accuracy in measuring and recording and centimeter rules and tapes are readily available. For the convenience of those preferring them, scales for kilograms and inches are placed outside of the principal scales and paralleling them. Therefore, if weights are taken in kilograms and lengths and heights in inches, they may be plotted directly without conversion by placing a ruler at the appropriate points on the outer scales of the chart.

To determine the percentile position of any

measurement at a given age, the vertical age line is located and a dot is placed where this intersects the horizontal line representing the value obtained from the measurement. Vertical lines give age by 2-month intervals and horizontal lines by 2-pound and 2-cm. intervals. This permits by interpolation accurate placement for age to  $\frac{1}{2}$  month and for measurements to  $\frac{1}{2}$  pound or 0.5 cm. Recognition of the position held by a child within or outside of the range in respect to each measurement recorded calls attention to the relative size and build of the individual at the time. More importantly, comparisons of percentile positions held by these measurements at repeated periodic examinations indicate adherence to or possibly significant deviation from previous percentile positions. Under normal circumstances, one expects a child to maintain a similar position from age to age — that is, on or near one percentile line or between the same two lines. Occasionally encountered sharp deviations or more gradual but continuing shifts from one percentile position to another call for further investigation as to their causes. In all cases, readings of measurements should be checked and care should be taken to secure the same position of the child accurately at all examinations. The following procedures were used in obtaining these norms and therefore are recommended:

**Body Weight** — The child is weighed without clothing except light undergarments.

**Recumbent Length** — The child lies relaxed on a firm surface parallel to a centimeter rule. The soles of the feet are held firmly against a fixed upright at the zero mark on the rule, and a movable square is brought firmly against the vertex. The head is held so that the eyes face the ceiling.

**Height** — The child's heels should be near together, and heels, buttocks and occiput should be against a firm vertical upright mounting the measuring stick. The eyes should be horizontal and approximately in the same plane as the external auditory canals. A right angle triangle or other movable device should be placed firmly on the head at right angles to the measuring stick and the measurement read after a satisfactory position has been adopted.

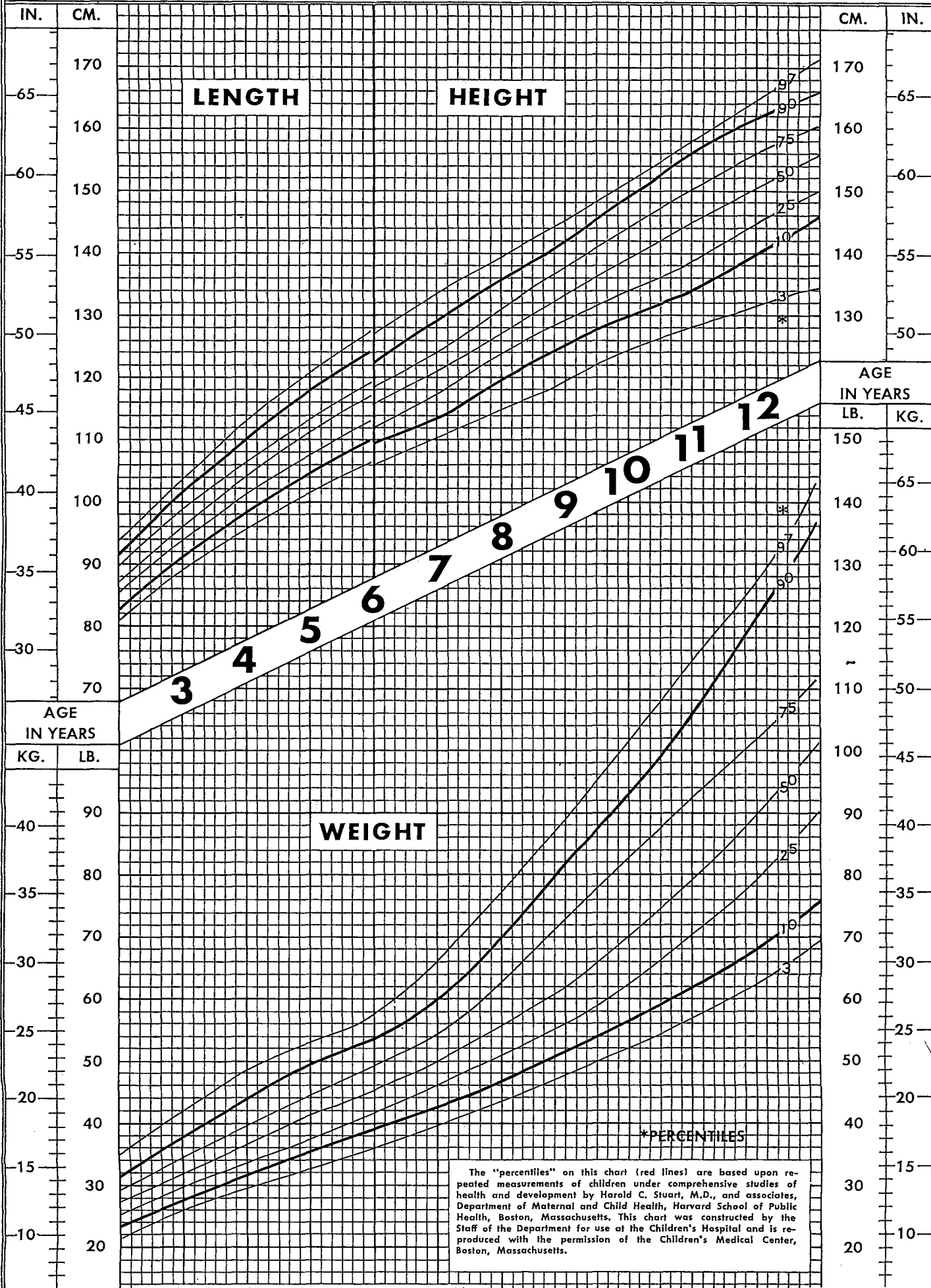
# GIRLS

NAME

BIRTH DATE

NO.

THE CHILDREN'S MEDICAL CENTER, BOSTON - ANTHROPOMETRIC CHART



The "percentiles" on this chart (red lines) are based upon repeated measurements of children under comprehensive studies of health and development by Harold C. Stuart, M.D., and associates, Department of Maternal and Child Health, Harvard School of Public Health, Boston, Massachusetts. This chart was constructed by the Staff of the Department for use at the Children's Hospital and is reproduced with the permission of the Children's Medical Center, Boston, Massachusetts.

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Appendix B:

Height and Weight Data for All Subjects

## HEIGHT AND WEIGHT DATA FOR ALL SUBJECTS ( N = 30 PAIRS )

OBESE GROUP			NORMAL GROUP		
SUBJECT	WEIGHT	HEIGHT	SUBJECT	WEIGHT	HEIGHT
1	95	51.8	1	70	53.0
2	93	55.5	2	63	53.0
3	87	54.3	3	59	50.5
4	128	58.0	4	74	56.5
5	106	56.8	5	78	57.0
6	88	51.5	6	63	51.5
7	123	57.0	7	71	56.0
8	140	51.3	8	70	57.3
9	83	52.3	9	53	48.0
10	75	50.8	10	58	50.3
11	90	53.5	11	70	53.5
12	98	55.3	12	76	54.5
13	104	54.3	13	71	53.3
14	81	52.0	14	59	50.5
15	111	54.5	15	65	53.0
16	102	56.0	16	68	54.3
17	120	60.3	17	64	52.0
18	83	52.3	18	69	54.0
19	99	56.5	19	67	53.5
20	75	50.8	20	58	50.3
21	138	58.5	21	73	57.0
22	101	54.0	22	65	56.3
23	97	53.8	23	66	51.0
24	96	54.3	24	59	52.3
25	129	57.0	25	72	53.0
26	121	53.8	26	72	53.0
27	104	56.3	27	68	55.3
28	103	55.5	28	72	55.0
29	117	55.5	29	62	51.3
30	117	57.8	30	87	56.8

Appendix C:

Age, Grade Progress, Intelligence, and Sex Data

## AGE, GRADE PROGRESS, INTELLIGENCE AND SEX DATA

OBESE GROUP				NORMAL GROUP			
SUBJ.	AGE	GRADE PROG.	IQ	SUBJ.	AGE	GRADE PROG.	IQ
* 1	9	3.1	106	1	9	2.9	97
* 2	10	4.6	121	2	10	5.2	123
* 3	8	2.7	85	3	8	2.5	95
* 4	11	5.4	100	4	10	5.3	109
5	10	5.0	112	5	10	4.8	116
6	9	2.8	104	6	9	3.3	104
7	9	3.2	109	7	9	3.7	115
8	10	6.4	128	8	10	6.3	120
* 9	9	3.4	133	9	8	3.4	134
* 10	8	2.8	113	10	8	2.8	115
* 11	9	3.7	108	11	9	4.3	112
* 12	10	6.3	127	12	10	6.2	125
13	9	2.6	98	13	10	2.9	109
14	8	2.5	91	14	8	2.4	105
15	10	6.0	123	15	10	5.2	123
16	10	4.7	119	16	9	4.6	111
17	10	7.4	134	17	10	6.2	116
18	9	3.5	107	18	9	3.6	117
19	10	2.9	98	19	9	4.6	109
20	8	2.8	124	20	8	2.8	115
21	10	6.0	106	21	11	7.0	111
* 22	10	4.5	112	22	10	4.8	113
* 23	10	2.9	100	23	9	3.9	105
* 24	8	3.0	130	24	8	3.3	124
25	10	4.3	116	25	9	4.7	124
26	10	5.1	121	26	10	5.0	115
27	10	2.6	102	27	10	3.6	111
28	10	4.6	125	28	10	4.4	127
29	9	3.6	111	29	9	3.3	108
30	10	4.6	107	30	11	5.0	97

\* The star refers to pairs of girls.

Appendix D:

Scoring for Words Introduced by the Subjects into  
the Serial Learning List

SCORING FOR WORDS INTRODUCED BY THE SUBJECT INTO  
THE SERIAL LEARNING LIST

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---

WORDS SCORED AS ORAL

WORDS SCORED AS NON-ORAL

---

cook  
bread  
drink  
bake  
seed

make  
dog  
easy  
ball  
floor  
home  
again  
snow  
friend  
book  
shop  
shower  
piece  
mother  
band  
more  
seat  
come  
see  
game  
place  
good  
chair  
feet  
coat

---

Appendix E:  
Rorschach Form





Appendix F:

**Directions to the Judges on the Rorschach Test**

## INSTRUCTIONS TO THE JUDGES ON THE RORSCHACH TEST

"For each of the forty pairs of items below, choose the oral percept. By oral percept is meant any percept that deals directly with food or drink or the eating process i.e., in the seeing, partaking, sucking, tasting, chewing, swallowing, or digesting of food; or percepts that readily suggest such activity to a child of six to twelve years of age. If both of the items of a pair appear to be oral percepts, choose the one which most strongly suggests an oral process and mark the letter B before the pair of items. If neither appears to be an oral percept, choose the one with some oral connotations and mark the letter N before the pair of items."

Appendix G:

Raw Data on the Rorschach and Learning Tasks

SCORES ON THE RORSCHACH FOR THE  
OBESE AND NORMAL GROUPS

Subject Number	OBESE GROUP Oral Percepts	NORMAL GROUP Oral Percepts
1	21	22
2	19	15
3	24	21
4	20	23
5	20	22
6	26	16
7	22	19
8	24	13
9	22	20
10	23	20
11	16	21
12	20	13
13	20	17
14	25	19
15	21	16
16	18	17
17	21	20
18	21	17
19	20	19
20	22	23
21	20	15
22	21	18
23	24	23
24	23	22
25	25	19
26	18	19
27	21	20
28	16	21
29	15	21
30	20	20

SCORES OF THE ERRORS MADE IN SERIAL LEARNING FOR  
THE OBESE AND NORMAL GROUPS

Subject Number	OBESE GROUP			NORMAL GROUP		
	Oral	Neutral	No guess	Oral	Neutral	No guess
1	23	17	10	7	9	7
2	6	8	21	7	15	7
3	11	31	36	7	17	16
4	15	21	2	3	7	4
5	13	15	11	3	15	7
6	9	11	6	12	17	8
7	34	36	14	16	33	25
8	14	14	30	13	21	7
9	3	11	21	12	8	4
10	6	4	5	11	17	13
11	14	9	2	4	12	7
12	12	3	6	2	1	6
13	8	14	9	12	18	9
14	3	21	20	14	20	14
15	11	4	6	7	17	2
16	6	3	7	7	6	7
17	2	8	1	6	13	1
18	23	39	27	15	11	6
19	8	19	17	1	3	5
20	5	6	18	8	14	6
21	11	23	26	11	8	9
22	2	10	16	15	18	16
23	11	16	11	2	3	4
24	8	20	8	1	4	5
25	10	13	9	7	6	3
26	27	23	15	10	11	11
27	3	2	6	31	40	8
28	4	1	17	22	24	8
29	11	11	16	20	34	10
30	14	13	11	15	13	9

## NUMBER OF TRIALS TO LEARN TWO KINDS OF WORDS TO THREE

## CRITERIA FOR THE OBESE AND NORMAL GROUPS

Subject Number	OBESE GROUP						NORMAL GROUP					
	2 Words		3 Words		4 Words		2 Words		3 Words		4 Words	
	O	N	O	N	O	N	O	N	O	N	O	N
1	5	7	9	7	12	14	5	2	6	5	8	5
2	1	8	2	9	10	9	3	1	3	8	11	8
3	12	11	13	18	19	20	6	8	6	9	6	10
4	3	7	8	9	10	9	1	1	4	6	4	7
5	6	5	8	5	8	12	2	3	7	5	8	7
6	4	5	9	8	10	9	2	8	2	10	5	10
7	6	8	16	14	20	14	8	8	8	13	20	13
8	10	7	11	12	16	16	6	1	7	12	15	12
9	3	7	3	7	9	9	1	4	1	4	6	8
10	2	2	2	5	5	6	3	4	5	4	7	9
11	1	4	2	5	2	10	1	2	5	7	8	7
12	1	4	4	5	10	5	1	1	1	3	2	3
13	4	3	7	5	9	7	6	5	6	8	11	10
14	4	8	13	10	14	10	4	7	7	11	15	14
15	1	3	1	3	1	7	2	3	8	5	8	5
16	1	1	3	2	5	7	2	3	6	5	6	7
17	1	1	5	4	6	4	4	2	6	2	6	7
18	14	7	21	7	25	18	3	2	5	4	5	14
19	1	4	6	9	8	11	3	1	4	1	4	4
20	1	2	5	6	8	7	3	2	7	7	9	7
21	1	7	1	9	19	14	3	3	4	3	6	3
22	3	4	3	4	7	12	3	5	10	6	12	13
23	2	5	6	10	12	12	1	1	2	1	3	2
24	4	6	6	10	9	11	1	2	3	2	4	5
25	4	4	6	9	6	11	2	3	2	6	2	6
26	3	10	3	13	12	13	1	4	3	8	8	10
27	1	2	5	4	6	5	1	4	10	13	24	25
28	5	1	9	6	9	6	7	4	9	4	14	16
29	3	6	6	7	6	7	8	8	12	9	18	22
30	4	3	4	7	4	10	3	5	9	7	13	10

O stands for the oral words.

N stands for the neutral words.

Appendix H:

Raw Data on the Word Association

NUMBER OF ORAL ASSOCIATIONS ON THE WORD ASSOCIATION  
TEST FOR THE OBESE AND NORMAL GROUPS

Subject Number	OBESE GROUP		NORMAL GROUP	
	First Association	Three Associations	First Association	Three Associations
1	4	18	8	16
2	7	18	2	9
3	3	6	5	15
4	8	23	6	18
5	8	22	4	8
6	3	9	2	4
7	5	10	1	4
8	9	25	3	7
9	6	21	4	13
10	4	9	4	10
11	7	16	6	12
12	7	22	6	11
13	3	9	5	13
14	6	19	2	4
15	4	10	6	18
16	6	16	2	3
17	7	16	4	16
18	5	15	6	16
19	3	8	6	17
20	7	19	3	13
21	5	16	4	10
22	6	12	8	23
23	8	19	7	18
24	2	11	5	13
25	3	7	3	12
26	11	30	5	16
27	5	12	7	14
28	4	15	6	19
29	9	20	7	22
30	8	21	3	13

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THE EFFECT OF ORAL NEED ON  
COGNITIVE RESPONSES OF CHILDREN

Abstract of a Dissertation

Submitted in partial fulfillment of the requirements  
for the degree of Doctor of Philosophy

BOSTON UNIVERSITY GRADUATE SCHOOL

by

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The purpose of this study was to investigate certain effects of oral need on perception and cognition. The general hypothesis investigated was based upon Murray's propositions that need both selects and distorts what is to be perceived or responded to. This hypothesis was that oral need affects the perception and cognition of individuals in relation to stimuli with which they are confronted in such a way as to accentuate any oral-related aspects of the stimulus situation.

The term "oral need" was used in this study to mean that hypothetical state of affairs within an individual inferred to be present dependent upon the kind, frequency, and amount of eating or drinking behavior i.e., the seeing, partaking, sucking, tasting, chewing, swallowing, or digesting of food or drink. A gross manifestation of this eating and drinking behavior, namely, body weight, was used for the independent variable because of the ease of its objective measurement. Oral need was inferred to be of high or normal intensity from body weight. It was assumed that individuals with high oral need according to the above conception are generally representative of the population as far as the strength of the need is concerned,

The literature discussed in this study reflects a primary concern on the part of experimenters with the effect of induced oral need on perception and cognition, without regard for individual differences. When individual differences in oral need have been considered a part of the experimental design, the variations in

oral need have usually been defined by psychological responses. In the former case the need reflects only a temporary state; in the latter the method of determining the independent variable does not sufficiently insure its objective status, i.e., the procedure uses one psychological task to determine the independent variable and a closely allied one for the dependent variable. In addition, most of these studies have not sufficiently controlled related variables. The present research intended to eliminate these limitations by considering a persistent manifestation of oral need which also represented individual differences, by determining the independent variable by an objective measure (body weight), and by controlling the related variables. Individual differences as reflected in obese and normal-weighted groups were intentionally taken into account.

Theories of obesity have generally agreed that the chief cause for it is persistence in eating considerably more than the body needs for normal growth and repair functions, and for energy needs. Presently, there is no known adequate physiological mechanism or disturbance that can account for either the obesity or the overeating. When the general hypothesis was applied to obese children, the specific hypothesis that followed was that the obese children will accentuate or facilitate perceptually and cognitively the oral aspects of the stimulus situation.

In this study, the independent variable was oral need. Since body weight variations were assumed to be reflections of food intake,

variations in oral need were defined by variations in body weight. Obesity was defined in terms of body weight at or above the ninetieth percentile and some provision was made for height to correct for the fact that taller people generally weigh more. Normal weight was defined in terms of body weight between the thirtieth and seventieth percentiles with a similar provision for height. These definitions were somewhat arbitrary and were partially determined by the availability of subjects.

As the result of the selection procedures, an experimental group consisting of thirty obese children was obtained. Also, thirty normal-weighted children who were comparable matches for each obese subject on the variables of age, classroom experience, grade progress, intelligence, and sex, were used for the control group. All pairs of subjects were tested during the hours before lunch, and at the same time.

To test the general and specific hypotheses, four dependent variables were studied. The first two involved cognitive responses, the third perceptual ones, and the fourth verbal associations. The first dependent variable was the kind of errors, oral or neutral, made in learning. The second one was the comparative speed of learning of oral and neutral words. A serial learning test was used to study the first two dependent variables. It consisted of a twelve word list presented on a memory drum. The list included four oral words and eight neutral ones. All the words were so spaced that a neutral word was interposed between each oral word. The third dependent

variable was a choice between two percepts or interpretations, one oral and one non-oral, to ambiguous stimuli. A modified and objective form of the Rorschach test was used. The subjects were asked to discriminate on forty pairs of items, each consisting of an oral and a non-oral percept, by choosing the one which in their estimation most resembled a given Rorschach blot area. Each pair of items previously had been judged by psychologists to contain an oral percept.

The fourth dependent variable was the kind of verbal associations given in three associations to stimulus words. This test consisted of fifteen ambiguous oral words for which the subjects had to give three associations. No prediction was ventured at the start of the experiment because the stimulus words had not been pre-tested and therefore, no knowledge existed as to the ability of subjects to give different responses to them.

The following predictions were made:

Prediction 1. The obese group will have a larger Index of Oral Errors (oral errors/oral  $\neq$  neutral errors) than the normal group when presented with the same list of oral and neutral words to learn.

Prediction 2. The obese group will require fewer trials in learning the oral words than the neutral words in a list of oral and neutral words compared to the normal group.

Prediction 3. The obese group will choose the oral percept of an oral and non-oral percept choice in an ambiguous stimulus choice situation more frequently than the normal group.

The first prediction was tested with a z statistic. The data, expressed in proportions, were transformed by an arc sine transformation to insure a normal distribution. The z value obtained had a chance probability of less than .05, which was the alpha error allowed. The inference that obese children would substitute a greater number of incorrect oral words for neutral words than normal-weighted children was justified.

The second prediction was tested with an F test, using an analysis of variance design. The F ratios obtained in the test of the difference between groups in the number of trials to learn oral words as compared to neutral words had a chance probability of greater than .05, which was the alpha error allowed. Similarly, negative results were obtained on the test of the difference between groups when the combined influences of the kinds of words learned at various levels of learning were considered together. Hence, no inference was made about the comparative speed of learning oral words and neutral words for obese and normal-weighted children.

The third prediction was tested with a Student's t test for the difference in means for two correlated samples. The t value obtained had a chance probability of less than .05, which was the alpha error allowed. The inference that obese children would see a greater number of ambiguous visual stimuli as oral stimuli than would children of normal weight was justified.

Although no formal prediction was made, an analysis of the fourth dependent variable, the kind of verbal associations, was

undertaken. A T for paired replicates was used to test the difference in sum of rankings for both the first and for all three associations. The T values obtained had chance probabilities of slightly less and slightly more than .05 (for a two-tailed test), which was the alpha error allowed. No inference was made that obese children give more oral associations than normal-weighted children, although the data suggest this.

The results of the experiment supported the first and third predictions. This was considered as evidence for the hypothesis of facilitation or accentuation of oral-related aspects of the stimulus situation when a high oral need is present. The word association test also showed a tendency for obese children to give more oral associations than normal-weighted children.

The results of the speed of learning variable were not consistent with the other experimental findings. The question which remained to be answered was whether oral need had no effect on ordered learning speed, whether the methodology was inadequate, or whether a more complex need theory was necessary. A slight but insignificant trend indicated that it might be easier to demonstrate that oral need affects the learning speed of oral words at the earlier stages of learning. With this in mind it was suggested that more involved and difficult learning tasks be used in future research so partial learning can be studied more thoroughly.

In conclusion, the experimental findings lend further support to the general hypothesis that oral need affects perception and

cognition in such a way as to facilitate the oral-related aspects of the stimulus situation. Further, the method of determining high oral need by studying a more persistent manifestation of it, namely, excess body weight, was fruitful in demonstrating facilitation of oral responses. It is suggested that the most meaningful future studies will be those that consider simultaneously the experimental induction of oral need, and an assessment of individual differences in both oral need and the preferred mode of dealing with it, before experimental manipulation is undertaken.



The writer was born on January 27, 1934, in New York City, the son of Max S. and Gussie Cohen. He attended public school in New York, graduating from the Bronx High School of Science in 1949. He then enrolled at the University of Michigan and majored in psychology. After receiving his degree in June of 1953, he entered Boston University Graduate School where he was accepted as a student in the Clinical Psychology Training Program. He received his A.M. in Psychology in June, 1954.

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