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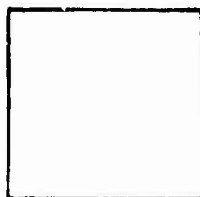
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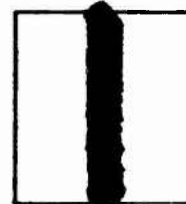
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FOOD PREJUDICES and SURVIVAL

Laboratory Note CRL 55-LN-210

May 1955

By E. Paul Torrance

SURVIVAL RESEARCH FIELD UNIT
Crew Research Laboratory (AFP&TRC)(ARDC)
attached to the
USAF SURVIVAL TRAINING SCHOOL
Stead Air Force Base, Reno, Nevada

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FOOD PREJUDICES AND SURVIVAL:

A Survey of the Psychological and Training Factors Affecting Food Acceptability*

E. Paul Terrance

INTRODUCTION

A series of studies concerned with the psychological and training factors affecting survival ration acceptability have been undertaken by the Survival Research Field Unit. These studies consist of three major parts. The first, of which this report represents a part, is a survey of the literature related to psychological and training factors affecting food acceptability in general. The second involves a series of field studies to determine what psychological and training factors affect the acceptability by aircrew personnel of "Ration, Special Survival, RS-1" with special emphasis on the meat food product bar, commonly called "pemmican." The third consists of an evaluation of training methods and attempts to manipulate social psychological factors in such a way as to increase the acceptability by aircrew personnel of pemmican.

Purpose of This Report

The purpose of this report is to bring together from many widely-scattered sources as much as possible of the existing information about the psychological and training factors affecting food acceptability in general. As a collection of information about food acceptability psychology and training, it should be immediately useful to training personnel in helping trainees understand their reactions to survival foods, particularly pemmican. It should also be useful to others interested in problems of feeding military personnel. In this report, an attempt will be made to give some indication of the direction and extent of the gradually accumulating theory and experimental evidence relative to the psychological problems of food acceptance. This report also constitutes much of the foundation upon which the other two phases of the series of studies is based.

Content of the Report

This report is based upon a wide variety of sources which include: psychological, psychiatric, dietetics, home economics, biological and medical journals; technical books in psychiatry and medicine; books of exploration and adventure; reports of such governmental agencies as the Quartermaster Food and Container Institute, National Research Council, and the Arctic, Desert, Tropic Information Center; and biographical and autobiographical accounts of survival experiences.

* This paper is an informal note and is subject to modification or withdrawal at any time. If referenced, it should be described as an "unpublished draft." Comments and suggestions are solicited and should be addressed to the author.

Consideration will first be given to evidence of the importance of food acceptability in survival and other military operations and to problems of measuring food acceptability. This will be followed by a discussion of the psychophysical, psychological, psychosocial, and psychocultural factors which have been found to affect food acceptance. Finally, techniques of modifying food prejudices will be examined.

IMPORTANCE OF FOOD ACCEPTANCE PROBLEMS

Perhaps the greatest impetus to food acceptance research came during World War II, when the problem of food acceptance became important both among military and civilian personnel. On the civilian scene, there were many shortages and the maintenance of proper nutrition necessitated the acceptance of many unpopular foods. It was recognized that "adequate adjustment to variations in food and in the regulations governing distribution depend upon the capacity of the individual to enjoy a wide range of foods and upon his ability to modify his preferences" (39, p. 34). The National Research Council established a Committee on Food Habits to study this problem of national security as it affected the civilian population (19, 37, 47, 50, 60, 61, 65, 69).

ACCEPTABILITY OF EMERGENCY RATIONS

A Committee on Food Research was also established within the Quartermaster Food and Container Institute for the Armed Forces. Much research and development was being done in connection with emergency rations. This Committee recognized that "no matter how adequate these foods and rations were nutritionally, only insofar as they were accepted were they dependable conveyors or nutriment" (27, P.8). It was generally conceded that food acceptability has both morale and economic effects in the Army (68).

Throughout history, survival foods for military personnel have constituted a major problem for which there is not as yet a completely satisfactory solution (71). Col. Paul P. Logan, the originator of the D Ration, states that he first followed a theory "that an emergency ration should not be palatable for fear the men would consume the ration rather than carry it until an emergency arose" (71, p. 61). He later revised his premises, however, when it was suggested that the food be used to supplement other rations. Field trials conducted by the Canadian and United States Armies also repeatedly demonstrated that North American soldiers would rather let themselves become sick and inefficient than to live on an unpalatable ration (46, p. 77). It has been conceded that although it may be true that men will eat anything if they are hungry enough, by the time they have reached this stage the stage of optimum nutrition has been passed.

Much of the controversy concerning survival rations has centered around pemmican. One group, basing much of its argument on the researches of Johnson, Kark, and Lewis (46, 48) in connection with ration trials conducted by the Canadian and United States Armies between 1941 and 46, has declared pemmican unsuitable as an emergency ration. Another group, led by Stefansson, Post, Peary, and other explorers (79) has enthusiastically championed its use.

Johnson and Kark (46) report that during the Prince Albert trials of the Canadian Army that excellent troops consuming pemmican and tea as the sole components of their ration deteriorated so rapidly as to become operationally useless within three days. On the morning of the fourth day, physical examinations revealed a group of listless, dehydrated men with drawn faces and sunken eyeballs. Neurological changes were reported in several. Stefansson, Post, and Peary all declare, however, that of all the emergency foods that they are acquainted with, "pemmican is the one that, under appropriate conditions, a man can eat twice a day for 365 days a year and have the last mouthful taste as good as the first" (79, p. 258). Post describes innumerable marches in extremely low temperatures when men and dogs had been worked to the limit. Post says that he would reach camp feeling that he could eat his weight of anything and upon seeing his little half-pound lump of pemmican he would feel a sudden rage. He maintains, however, that by the time he had finished the last morsel, he would not have walked around the completed igloo for anything or everything that the St. Regis, the Blackstone, or the Palace Hotel could have put before him. Advantages claimed by its advocates include: compactness and ease of portage, its mentally stimulating qualities in restoring strength and ambition, its moderate palatability.

EFFECTS OF FOOD DEPRIVATION

It was also during World War II that interest was stimulated in research concerned with problems of semi-starvation and rehabilitation. This research was conducted at the University of Minnesota and has been reported by Brozek, Franklin, Guetzkow, Keys, and Schiele (18, 34, 38). These studies have given us rather detailed information concerning the effects of food deprivation and help to reinforce the importance of the problem of food acceptability in national security. Naturally, if men fail to eat a ration, the same reactions may be expected as occurred in the semi-starvation studies in the University of Minnesota laboratories. The encyclopedia of effects include the following:

Significant deterioration on tests of speed, hand and arm movement, complex reaction time and coordination, duration of errors;

Significant increases in body sway and a decrement in flicker fusion frequency;

Significant deterioration in perception of spatial relations and word fluency but not for perceptual speed, memory, number facility, and inductive reasoning;

Significant in such personality tendencies as hypochondriasis, hysteria, psychopathic deviancy, schizophrenia, and psychasthenia (as measured by the Minnesota Multiphasic Personality Inventory);

Marked deterioration in feelings of well-being;

Increase in complaints that the extremities "went to sleep";

Increasing discomfort and pain in sitting on hard surfaces;

Increase in tolerance of heat and decrease in tolerance of cold;

Increase in vertigo, giddiness, and momentary blackouts on rising from lying or sitting position;

No impairment of visual acuity but slight and consistent increase in auditory acuity;

Frequent complaints of fatigue, weakness, and hunger;

Increasing weakness, loss of ambition, narrowing of interests, depression, irritability and loss of libido described as a pattern of experience characteristic of "growing old";

Increased emotional instability: periods of depression, inability to sustain mental or physical effort, easy distraction from goals, irritability, lack of self-discipline and self control, indecisiveness, restlessness, acute sensitivity to noise, marked "nervousness";

Deterioration of personal care and appearance (brushing teeth, combing hair, shaving);

Decrease in social initiative and sociability;

Decline in sexual feelings and expression to point of virtual extinction;

Complaints of inability to concentrate and impaired judgment, although actual tests showed no such change;

Lack of humor and inability of humor to relieve tension;

Reaction of resignation, passivity, "don't care."

The information obtained from these studies provides a useful background for applied investigations on the reduction of deterioration of performance capacity and personality obtained by increasing acceptability of emergency (survival) rations.

Selye (73) has also discussed the effects of food deprivation in animal experiments. He also discusses the following effects found among POW's following the prolonged siege of Leningrad (1941-42): decreased resistance to infection, loss of fat and muscle tissue, hypothermia, bradycardia, dryness of hair and skin, psychologic disturbances and amenorrhea (73, pp. 47-48). This is pertinent to Air Force survival training, since it has been reported in the press and through other sources that many of our personnel chose to die rather than eat the food that was provided in North Korean POW camps.

Shock (75), on the other hand, in surveying the effect of nutritional factors on human behavior, states that changes in behavior and in mental performance with starvation are slight in human beings subjected to standardized tests and that mental efficiency is improved during short periods

of total fasting and recovery. Shock's survey, however, was before the Minnesota studies were published and the studies he refers to were not nearly as rigorous and well-controlled as the Minnesota studies.

Peculiar Nature of Food Acceptability Problem

In closing this section on the importance of food acceptability problems, some consideration should be given to the factors which make this problem different from other acceptance problems which affect morale and performance. Benedict (11) discussing the military importance of acceptance problems, relates an interesting World War II story involving a cotton field cap, a deluxe version of caps worn by painters and mechanics. At first, the cap was quite acceptable in both the European and Pacific theaters. Then appeared pictures of Admiral Mitschner wearing his now famous baseball cap with a long visor. Soon came complaints from the Pacific but not from Europe demanding a longer visor on the cap. At about this same time, airmen were wearing baseball caps with short visors turned up over the forehead. The publicity had set them up as something special. Again, complaints started rolling in, creating complete confusion as to what kind of cap would be satisfactory. Since morale was affected, field commanders were willing to go to considerable lengths to get the men what they wanted, even though there was little functional difference among the three items. This was a transitory problem, however, and the war ended before a solution to the cap problem was found.

Food acceptance problems did not end with the end of the war. Food acceptance problems also differ in other ways. As Lieb declares, "unless it is religion, there is no field of human thought in which sentiment and prejudice take the place of sound judgment and logical thinking so completely as in dietetics" (52, p. 25). Dill, writing in the Journal of Aviation Medicine, concludes: "Eating is so intimately bound up with emotions that research on human nutrition cannot afford to disregard flavor, aroma, and appearance of food, acquired tastes, and the effects of emotional states on appetite and digestion" (24, p. 593). Dill, further, takes the position that a few observations of men under combat operations may be more valuable than thousands of observations on test subjects and rats. The wartime conferences of the Committee on Food Habits also led to the conclusion that there is a need for giving due consideration to the psychological and sociological factors involved in any program of national nutrition.

FOOD ACCEPTANCE TESTING METHODOLOGY

The Quartermaster Food and Container Institute has been specially concerned with problems of food acceptance methodology (66). The basic food acceptance "test" has been the nine-point hedonic scale. Thurstone (66) has introduced "psychophysical" scaling which still relies on subjective judgment. He has also suggested that "perhaps we could agree on using the term 'acceptance' to represent that degree of preference for a range of values whereby the subject is willing to eat the food without objection" (66, p. 63).

The recent symposium of the Quartermaster Food and Container Institute also revealed that there is a growing tendency to observer-orientation; i.e.; when evaluating a food product, it is human behavior and not beer, bologna, or dehydrated milk that is being evaluated.

Dove (26, 28) has devised a technique for use in food habit studies whereby psychological measures of value are combined with nutritional measures of value under the end-result termed "appetite levels" of consumption. According to Dove's technique, foods classified as poor sources according to nutrients per unit measure or weight may come to be classified as excellent sources and vice versa. Dove's approach makes it possible to detect problem foods (foods unpalatable or of low general nutrient value), problem individuals (individuals who are allergic to or who dislike or who never try certain foods), and problem phases of food economics.

Dove (26) has also suggested a variety of ways of stating preferences. In one study, he used the following scale:

- Never tried the food.
- Allergic to the food.
- Disliked the food.
- Tolerated the food only when very hungry.
- Desired the food moderately well.
- Considered the food good.
- Considered the food very good.

He has also experimented with classification according to the rate at which the food was desired in terms of servings per week, regardless of nutritional value and assuming the supply to be unlimited and available the year round, with the provision that the subject could afford to purchase the food at any time.

In animal experiments, Beebe-Center, Black, Hoffman, and Wade (10) used per diem consumption as the unit of measure. World War II studies conducted by the RA F used percentage of complaints and amount of food eaten. Amount of food consumed has also been employed in studies in the United States Army (15). Various measures of nutritional status have also been used (2).

PERSONALITY FACTORS AND FOOD PREJUDICES

Several studies have demonstrated a relationship between personality maladjustment and food aversions (4,21,32,36,72,86,87). It has even been suggested that a food-aversion check-list might be used in screening military personnel (4, 86). High mean aversion scores were found for Marine recruits discharged on psychiatric grounds, epileptics, various types of neurotics, schisoid personalities, and others with poor emotional control (85). Wallen (87) attempts to explain these findings by explaining that neurotics have a tendency to produce unpleasant ideational content which is in part responsible for the ease with which they form aversions. Fenichel (32) gives support to this contention when he maintains that specifically disliked foods unconsciously

symbolize milk, breast, penis, or feces.

Both Fenichel and Wallen emphasize the role of early experiences in the home in producing food aversions. Children may refuse to eat as an expression of negative feelings towards their parents. Fenichel (32) states that the repression of oral impulses frequently results in an inhibition in eating, or eating certain kinds of foods which are unconsciously reminiscent of the objects desired by the repressed oral-erotic strivings. Selling concluded that "when security and affection are present in the home, there is little likelihood that the child will be either under- or over-nourished, or that food habits are likely to be bizarre" (72, p. 168). He also warns that the crusading zeal of the nutritionist may become a tool of the maladjusted parent in making the child's problem worse. He concludes that every factor which can cause any type of behavior disorder can also be responsible for eating problems and that food is the point of focus because of its importance in the maintenance of life.

Bruch and Janis (19) studied the influence of personality adjustment upon adaptation to a prescribed diet. They concluded that people who are reasonably secure and constructive in outlook will be able to accept a wide range of changes and limitations in their eating habits. They explain that some degree of panic and confusion might be expected in the beginning. They also warn against neurotic, obsessive acceptance, with fear and panic and expectation of magical help. According to Bruch and Janis, this type might become anxious about the point rationing system with its fluctuating values from one month to another. It might also be hypothesized that this is a factor involved in the acceptance of pemmican as an emergency ration. Johnson and Kark in their studies of pemmican acceptability admit that "hypochondria and other psychological states may have played a part in their findings" (46, p. 70).

Smith, Powell, and Ross (77) demonstrated the relationship between manifest anxiety as measured by the Taylor Scale of Manifest Anxiety and food aversion. They also found that individuals with siblings had more food aversions than those with no siblings and that the "don't-go-to-church" group had more food aversions than their peers who go to church. Swarts (85) explains the relationship of fear, anxiety, anger, and other emotional states to food aversion. Lurie (57) demonstrated the relationship between eating problems and feelings of security. Lippman, in commenting upon Lurie's study, states that an insecure child, whether neurotic or not is likely to have difficulty enjoying meals. The problem is only worse if he is neurotic. Bindra's (12) animal experiments also demonstrate the importance of security in food habits. These findings may possibly offer clues concerning the problem of the acceptability of survival rations -- individuals feel insecure in the field trials and in the emergency and extreme situations for which the rations are designed.

Flexibility and maturity are emphasized by Hellersberg (39). On the basis of her wartime studies for the Food Habits Committee, she concluded that good food habits depend upon the individual's flexibility and that such flexibility is a mark of maturity in our culture. According to her, the acquisition of good food habits may be studied as one part of the process of growing up and

that the adult's way of dealing with food reflects the manner in which he has been reared.

Psychophysical Factors

The relationship between the psychic and physiological factors in relation to eating problems has received the attention of scientists from the "rat-psychologists" to psychiatrists. For example, Bindra (12) established the fact that eating among rats can become relatively independent of the alimentary state of the organism. Psychoanalytic research has also been focused, in some instances, on problems of eating. Alexander (1) explains that this is because the alimentary tract is a system which the psychic system uses with great frequency to relieve different emotional tensions.

Physical Characteristics of Foods

The physical qualities of foods have received considerable study. Dove (26), in a Quartermaster Corps manual, reports that scientific taste panels are required to judge foods for odor, appearance, flavor, texture, and temperature. Lowenberg (54, 55, 56) found that children's food preferences are greatly affected by physical qualities with preference for foods which are plain and unmixed, soft and fluffy, lukewarm in temperature, and mild in flavor. She explains that senses of taste and smell of a child are much more acute than those of adults. For example, she says that the young child's rejection of sulfurous vegetables such as cabbage and onions may be based on the strength of the odor of these as he eats them. Some reports (42) also indicate that downed aircrew personnel experience feelings of nausea toward foods with strong odors, sometimes in the first few days of survival and again after rationing has been in effect for some time.

Survival reports also indicate that hot foods are important in survival in cold temperatures and when there is a very limited amount of food available (42). These reports indicate that hot food is definitely a morale builder and that men are reluctant to eat cold food and eat it with no enthusiasm. Survivors maintain that hot foods gave a physical as well as morale lift. This phenomenon was also observed in the Minnesota semi-starvation experiments (34, 38).

Tenderness has also been of great consideration in the marketing and advertising of foods. Among Americans and Europeans, tenderness appears to be a valued quality and affects the acceptability of the food. Stefansson sees this as a psychological problem and maintains that in the Arctic tastes are "nearly uniform whether they be Indians, Eskimos, or white men" (80, p. 231). There, meat is eaten by taste, "As our ancestors must have done when they originated the saying, 'The nearer the bone the sweeter the meat.'" Essentially, Stefansson's point is that we judge meat not by its flavor but by its tenderness.

In conducting taste-tests (22), it has been found necessary to eliminate certain psychophysical factors. For example, proper results cannot be obtained if beer is tasted from a cup or tea from a glass.

Fatigue and Other Stresses

Psychophysical states of the organism also affect reactions to food. Fatigue, being partially physiological and partially psychological in nature, offers perhaps the best example. A number of survivors have called attention to the fallacy in the familiar expression, "tired and hungry." They maintain that the person who says he is tired and hungry is probably neither "very tired" nor "very hungry." An accumulation of many survival records seems to indicate that there is a tendency for only one of man's "basic, primitive drives" to be at the forefront at the time. Furnas and Furnas recommend that "the tired man should never eat until he has rested" (35, p. 243). They explain that in the healthy man there will be little if any flow of gastric juice after strenuous exercise. Studies of Alpine climbers, they report, have shown that a morning's work on steep slopes delays any digestive action for considerable time. Lowenberg (55), in her studies of food problems among children, found that fatigue is an important factor. A hungry child rapidly becomes fatigued and irritable and then loses his appetite and refuses to eat. It is also a common experience among adults that working beyond one's regular lunch time results in a loss of appetite. It is generally conceded that there is no deterrent to appetite more powerful than real physical fatigue. Other stresses, such as serious danger, also appear to impair appetite. Aircrew survivors (42) report that many individuals have to be coaxed to eat for the first three days. In some cases, failure to experience sensations of hunger may be fortunate since it means that the survivor or evadee has one less problem to deal with at the time. In other words, he can give his attention to more serious dangers. There is a danger, however, that he will permit himself to become weakened physically and consequently will be unable to cope with the dangers which confront him.

Hunger

Real hunger, however, is apparently a very potent force in overcoming many food prejudices. Furnas and Furnas advise: "If you would enjoy a meal, no matter what its content, simply refrain from eating until your sense of hunger dominates all else. Poor materials, atrocious preparation, and unattractive service then become minutiae, and tough meat, stale bread, and slightly rotten potatoes make a banquet" (35, p. 241). The Minnesota experimenters (34) report that their subjects shed all of their food prejudices near the end of their semi-starvation studies. Many evadees and former POW's report unusual experiences of overcoming food prejudices, but they also describe individuals who chose to die rather than eat what was available. Both in the Minnesota studies and in survival records, there occur many references to stretching eating to cover as much of the day as possible, even with the smallest amount of food. One survivor reported the pleasure of just rolling one of his few peanuts around in his mouth before chewing it. A piece of

caramel would be stretched out for hours by sucking it for a few moments, then putting it aside and sucking it again. Sorokin (78) reports many dramatic examples of the effects of hunger upon what is regarded as acceptable food during a famine in Russia. People eagerly ate half-rotten horse flesh, dogs, cats, mice, rats, and the like. He also noted profound effects upon behavior toward those upon whom they depend for food. For example, a man may hate his boss to an extreme degree but openly he may flatter him in the most complimentary and eulogistic terms. Similar statements were made about the so-called "progressives" in communist POW camps.

Water Deficit

Howard (43) reports that desert survivors refused food if they were short on water. Survivors studied by him reported that they felt no desire for food and thoughts of food seldom entered their minds when their water supply was low. It may have been that the thirst drive had become prepotent over all drives. Or, the lack of water may have made the food difficult to ingest. Howard also reports that men smoked very little, if any, during desert survival experiences and survivors report that cigarettes simply did not even seem desirable.

Age

Physiological factors concomitant with advanced age are also believed to affect the acceptability of certain foods. In taste tests, Dawson (21) found that discrimination decreases with age. Preference for sweets declined in the oldest group and preference for tart fruit tastes rose. One author (22, p. 13) thinks that persons under 30 years of age have significantly lower taste sensitivity. Another considers the optimum age range to be 30 to 40.

Climate

Climatic conditions have also been thought to affect appetite and food acceptability. Early investigators of Arctic calorie requirements (5) suggested 5500 to 6000 calories per day. More recent studies, however, show that the average daily consumption of men on Arctic duty is about 3000 calories in the Air Force and 3200 in the infantry. Air Force groups, however, have shown increased consumption of fat in winter. Doubtless, climatic conditions may affect the acceptability for certain foods but this effect may not be as great as has been supposed by some.

LEARNING, MOTIVATION, RELIEFS

Just as groups of scientists have viewed problems of food acceptability from the standpoint of personality variables and others have examined them in terms of psychophysical variables, still others have investigated them in

terms of learning, motivation, and beliefs. Young (90) has carried out extensive studies in this area through animal experiments. Considering palatability as an affective reaction, he found it to be a determining factor in acquiring specific food-seeking drives. In other words, rats learn to go places where specific foods are obtained. High palatability was found to be associated with high motivating tension; low palatability, with low motivating tension. He found, however, that if learning is defined as the acquisition of patterns of behavior through practice, the law of effect is not valid. If the definition of learning is broadened to include the acquisition of motives (drives and specific food expectancies) as well as motivated behavior patterns, then it can be said that there are two determinants: practice and effect.

Habit Strength

Stefansson (79, 80, 81), in the course of his Arctic explorations, recorded many excellent relevant illustrations concerning the eating problems of dogs and men. He found that dogs brought up around ships and used to foraging in slop pails would eat any kind of food that was offered them. Dogs brought up on a diet restricted to two or three different foods would almost always refuse when an entirely new food was offered them. He found that the older the dog the stronger the prejudice and that this caused great difficulty in certain operations in the Arctic. For example, if a dog brought up on seal meat had to be shifted to caribou meat, he would starve rather than eat the caribou meat. The only device to get such dogs to eat was to feed them spoiled caribou meat and then they did not seem to be able to detect the difference. Stefansson, as a result, concluded that new litters of pups should be fed many varieties of meat so that they will not acquire food prejudices. He hypothesized a similar set of factors as affecting food prejudices among men and believed that the men who adapted most easily were the "college-type fellow" who was accustomed to a varied diet rather than the sailor or whaler who came from a lower socio-economic class and was accustomed to a relatively restricted diet.

Stefansson (81) describes quite interestingly his handling of his own food prejudices. As far back as he could remember he was supposed to be unable to eat either fish or drink chocolate. He doesn't know how he was supposed to have developed his dislike for chocolate. He was supposed to have developed a dislike for fish because the family cow died and in the absence of milk his mother was forced to feed him on boiled fish made into a kind of mush. Finally he tasted chocolate and found that he liked it. He would occasionally taste fish, usually in connection with stories he was telling of how disagreeable it was. In the Arctic, he found himself face to face with a winter of nothing but fish - fish without salt or tea or anything else. He would write in his diary about his troubles with the fish diet. He would take long walks to "work up an appetite" and the Eskimos would bake his fish to make it more palatable for him. One day, he returned from his walk very hungry and in the absence of a baked fish, he joined the Eskimos in eating their boiled fish. After this, he preferred boiled fish. Later, he was to face many problems in breaking in new men to an all meat diet.

He always maintained that the difficulty was wholly psychological and was dependent upon the individual's "conservatism and the strength of his prejudices."

Stefansson discusses adaptation to a diet without salt in terms of habit strength (80, p. 366). He reports that some men experience greater difficulty in breaking the salt habit than in breaking the tobacco habit. He found that generally the greatest hankering for salt came about two or three weeks after the individual had ceased using salt. He found that individuals who continued longing for salt for six or eight weeks would discover on trial that this longing was artificial (or psychological) and that salt was no longer pleasant. He maintains that when a white man has been without salt for a year it becomes almost as unpalatable to him as it is to the Eskimos or Indians who have never used it. The difference, he explains, is that the white man knows that he will come to like it again, but the native believes that he never will.

Variety

Variety has received considerable attention in food acceptability research. Johnson and Kark (46) give considerable attention to this factor in their studies of ration acceptability in military situations. It is believed by many that variety in diet is essential. Stefansson maintains, however, that his health was at the maximum during the seven years he lived on an exclusive meat diet. To demonstrate that an all meat diet is just as satisfactory in hot as in cold weather and in sedentary as in active work, he and a colleague submitted to an all-meat diet in New York City under controlled conditions under the observation of qualified scientists (52,53). In the Arctic, Stefansson (80) observed many incidents which indicate that when a person has adapted to a single component diet, he loses his "taste" for other foods.

Familiarity

Also associated with the learning problem is the familiarity factor. Lowenberg (54) found that the two-year-old child is a conservative creature who likes best the foods with which he is familiar. Stefansson (79) found that when he first lived with Eskimos he was inclined to favor the cuts he had preferred in "civilization." He soon adapted his preferences to those of the Eskimos, however. Howard (41) reports that Air Force survivors in the Southwest Pacific were also bothered by this problem. Foods eaten by survivors were primarily those with which the men were familiar. They also tried to maintain regular hours of eating just as they had at their home bases. Some men went as long as possible before trying local foods with which they were not familiar. One man stated that the pangs of hunger disappeared completely on the sixth day but on the fourteenth day returned overpoweringly. He then found some fruits to eat and continued to eat during the remainder of his 20-day period of survival. Several of these

men who abstained from eating were medical cases by the time they were rescued or reached a base. Two men who survived in the same territory gave contrasting reports on the food situation. One found a complete absence of anything familiar and ate nothing. The other reported edible foods in surplus and had no problem of finding food.

Beliefs

Belief that the food being consumed is good for one or is harmful greatly affects the response to it. Of special interest are American beliefs about meat. In a national survey of meat consuming habits, Roper (69) found that the American public does not know about vitamins in meat; think meat difficult to digest, fattening, expensive, harmful if eaten in quantity, and the cause of a variety of ills such as rheumatism, hardening of the arteries, high blood pressure, and kidney trouble. Stefansson (79) believes that recent rejection by some military personnel of pemmican is related to changed attitudes toward meat, particularly fat. He also thinks that the chief difficulty experienced in the Arctic in shifting to a meat diet is a digestive revulsion based upon the idea that meat is dangerous (82, p.248). He also believes that the common belief that you cannot be healthy unless you have a varied diet is related to this problem. He also explains the longing for salt in the same way -- we have been taught that salt is necessary for health.

Aury (8), a scientist conducting studies for the French Naval Air Force on the use of sea water in water-survival has recognized the importance of beliefs. After his second set of experiment in 1954, he concluded:

"The influence of psychological factors is preponderant. While Anglo-Saxon subjects 'believed' that sea water was harmful, they found its ingestion very pleasant or even impossible; the experimenters of the Naval Air Force, who 'knew' that on the contrary it is beneficial, drank it easy and even tolerated it" (8, p. 21)."

Semantic Reactions

It has also been found that some people react to words which represent foods rather than to the foods themselves. Stefansson (79) suggests that if you want to demonstrate this, ask some impressionable friends to dine. Serve them veal, a good quality and well cooked. When you inquire about the veal, they will answer with the usual compliments. Then you say that your case has been proved. Rover died and they have eaten him. If the stage setting and the acting have been adequate, some at least of the company will make a dash for the bath room. What has sickened them is not the meat of a dog but the idea that they have eaten dog. Steffansson

* The author does not necessarily endorse the French position on the "can-you-drink-sea-water" controversy. He has outlined his position in an unpublished manuscript proposing a method of arbitration. It is understood that additional experiments have been conducted by the French Navy during 1955 and that studies are contemplated by other military groups.

also believes that there has developed an extremely strong taboo about the word "fat" (78, p. 126). He points out that we eat a lot of fat under such agreeable names as cream, butter, bacon, gravy, salad dressing, and the like, while we refuse to eat things which we call "fat."

Similarly, the value ascribed to foods affects reactions to them. RAF studies reported by Macrae (58) indicate the whether a person pays for his meal, or receives it free, has an important psychological effect on his appreciation of the food. In the RAF it was found that inferior food was eaten in the various canteens, whereas the meals served in the messes, which were usually superior in quality, were not appreciated. At one base in the Sudan, serious grumbles were heard about the sausage served in the mess compared with the "excellent sausage" found in a neighboring canteen. It was found that the sausage served in the mess and in the canteen were from the same source and were identical.

Traumatic Experiences

One other learning-related factor is the traumatic experience behind a number of food aversions. Many such examples are found in case studies. Stefansson cites an interesting example concerning a whaler who had an aversion to fat in any form (79, pp. 590-591). This whaler explains that when he was a small boy in the Cape Verde Islands, fat was expensive and he was forbidden to eat more than his share. One day when nobody was looking, he ate the allowance intended for the entire family. To punish him, his mother melted up some lard and compelled him to drink it. This overdose caused nausea and from that time on he had an unconquerable aversion against fat in any form. This he kept during his career as a whaler in the Arctic and as a trapper married to an Eskimo woman. One day his wife caught him surreptitiously eating a piece of fat. He was angry and forbade her to tell but the joke was too good to keep. She told everybody, whereupon he began eating fat openly and recovered his health which had seriously deteriorated. Later, he prided himself on being able to eat more fat than any Eskimo in the party.

PSYCHOSOCIAL AND PSYCHOCULTURAL FACTORS

Many problems of food acceptability are anchored in a person's human relations and in his culture. This is stressed by Swartz (85) in his discussion of allergies and by Sorokin (77) in his discussion of psychosocial starvation. Swartz explains that, in its broadest sense, "allergy is a heightened physiologic response of the organism to threat" (85, p. 100). As man emerged from a primitive to a social being, most of the old threats remained (climate and inimical animals and plants). In addition, he has to contend with the threats which arise from his society, his human relations. In most survival situations, there is a heightening of the primitive types of threats but there is not an easy escape from the culturally acquired ones.

Sorokin points out that appetite as generated by psychosocial starvation disappears after a few minutes or an hour, even if we do not take any nourishment (77, p. 16). He also points out that it can be killed momentarily by the sight of a worm or other unappetizing stimuli. Psychosocial starvation is also related to certain times and places of eating, certain kinds and amounts of food, and preferences for finer and more appetizing foods and contrasts between the luxurious and inferior diets of the upper and lower classes.

Group Influences

Lowenberg (56) reports that children in groups usually eat better. Lewin (50) as a result of his research with the Committee on Food Habits concluded that the feeling of group belongingness created by eating in the company of others is an important factor and that the "eating group" influences greatly the eating conduct of the individual and that every eating group has a specific eating culture. Stefansson (78) in living with the Eskimos found himself following the rule of "doing in Rome what the Romans do." He soon realized that many of his former beliefs about the wholesomeness of food and about likes and dislikes were due to the locale of his birth and upbringing rather than his biological inheritance. After three months he agreed with the Eskimos that fish is better boiled, and that heads are the best part of the fish. He no longer desired variety in the cooking, became fond of raw fish, and liked fermented whale oil. Later, he even came to like "high" fish and lost his longing for salt.

The experiences of survivors indicate that the group may be either a deterrent or a stimulus to eating. On the basis of 1,000 survival experiences in the Southwest Pacific, Howard (41) concluded that men alone were apt to be more adventurous in trying unfamiliar foods than men in a group. Apparently, adverse group opinion on eating strange foods was a powerful force to overcome. A solitary individual, when hungry, had only his own prejudices to overcome and would often try strange foods. In groups, usually one man would break through the group prejudice and declare that he would rather eat the item available than to starve and the others would follow suit. Makarounis (59) describes one such incident in his experience on one of the Korean Death Marches. The prisoners were given dried fish containing all of the colors of the rainbow and bugs of all those colors inside the fish. Makarounis and some of his companions flung the fish to the floor. Some of the men, however, ate theirs. After it did not seem to do them any harm, Makarounis ate his and found that the bugs didn't taste bad at all. One group in East Africa in desperation decided to try eating some berries and made it a suicide pact. Each man was to eat the berries at the same time so that if they were poisonous the entire party would die. They all lived.

The leadership of the group and the group atmosphere may have a profound effect on the acceptability of the food and the amount eaten. Escalona (31), studying the eating behavior of 50 babies in a women's reformatory, found that disturbances in feeding behavior was much greater on parole days and holidays when the emotional atmosphere was more unsettled, although the routine of feeding on these days was exactly the

same as on any other day. Col. P. E. Howe (44) reports that in Army messes where the troops were consuming certain foods satisfactorily, at most of the tables there would be considerable waste. At an occasional table, there was no waste and the serving dishes were completely empty. One possible explanation given by Col. Howe is that someone showed interest, no one complained, and everybody ate heartily.

In the 1950 Arctic Winter Ration Trials, the test team reports that "one of the most interesting and significant findings...was the effect of leadership on the nutritional status of the troops (2, p. 25). During the first trial phase, a marked difference was noted between two groups. This difference was evident in biochemical assays, medical observations, caloric intakes, and psychological observations. Since both groups were on the same ration, it was decided to shift the group leaders to the opposite teams at the outset of the second trial phase. The trends were reversed for all of the measurements used in the trials and were attributed to the shifts in leadership. The "good" leader was a much more conservative and emotionally mature individual than the "poor leader" (as shown by the Minnesota Personality Inventory). The "good" leader was described as the "follow me" type of leader who worked with his team by taking part in trail breaking, pulling the Ahkio, and setting up and breaking camp. The "poor" leader was described as the "driver" type of leader and did not share in the physical tasks of his team.

Family Factors

Emotional atmospheres created in the home are also known to affect food acceptability and eating disturbances. Selling concluded that "if the disturbance is due to lack of affection or attention or social contacts, undereating is a frequent reaction" (72, pp. 168-169). Overeating is a common symptom where there is a lack of security. Selling also found that conflicts between mother and father and rivalry among the children of a family are important. A child may reject the foods liked by a favored child or may begin rejecting food as a means of attracting attention. It is possible that these same factors may operate in the rejection of survival rations such as pemmican. For example, a trainee may reject pemmican because it is liked by an instructor who is disliked or he may absolutely refuse to eat it in order to attract attention.

Lurie (56) also found that children may refuse to eat as a means of controlling their parents. Hellersberg (39) concluded that families with no more than two children may be deliberately indulgent toward whims but that this does not occur in families with five or six children. She also concluded that realistic bases for strict control in regard to food planning are provided by expediency in managing a family group to everyone's satisfaction and the need to struggle for survival or advancement if the means are scanty and the opportunities are limited. She found that among adolescents, good food habits are not produced by a single type of family pattern -- strict, lenient, or intermediary -- but upon adaptability to changing needs and conditions.

Regional and National Factors

Since food habits are usually established within the family, it is not surprising to find that regional food habits are related to food acceptance. The effect of regional food habits is demonstrated by an example cited by Col. Howe (44) concerning two companies which messed together at Ft. Meade. One company was largely from New England and had a New England mess sergeant. The other was largely from the south and the mess sergeant was from the same region. The mess sergeants supervised the cooking on alternate days. In a survey of the mess it was noted and verified that the consumption of food was greater by the men from the region from which the mess sergeant came on the days he was in charge of the cooking.

Stefansson, Hanson, and other explorers (78) have maintained that a healthy white man can stay in perfect health (as far as food alone is concerned) on any diet that keeps native populations in health. This concept has been misunderstood by some who have tried to test the hypothesis. For an example, a lady ethnologist once reproached Hanson, saying that he was all wrong (78, p. 136). She stated that she had tried it for a number of weeks in Mexico with almost disastrous results. Hanson asked if she hadn't had trouble adjusting her taste to the "greasy" food of the Mexicans. She answered that "of course" she and her companions, while eating "exactly what the Mexicans ate," had been careful to prepare the food in an appetizing way, by leaving out the grease. She then continued to describe her troubles in typical terms of fat-shortage (constant hunger, a vague discomfort, lack of energy, distended stomach, etc.).

In adapting to extreme conditions and strange cultures, the British have been noted for their stiff-necked, unbending attitude (45). There is perhaps a bit of truth in jokes about the Englishman who dresses in a formal, starched shirt for his dinner in a filthy hovel. Such an Englishman was Sir John Franklin whose entire party perished in the Arctic because they refused to adopt the food habits of the native Eskimos. On his expedition in 1845 to search for the Northwest passage, he took along a three-year supply of lime juice, vinegar, fresh carrots, onions, cranberries, potatoes and the like to prevent scurvy, even though none of these foods retain their anti-scurbutic properties for more than a year. They further burdened themselves with good British tea, silver service, sterling plate ware, and other similar conveniences of British life. They did not, however, take along the ability to respect the ways of "uncivilized" Eskimos and to learn from them. All 105 of Franklin's explorers died of undernourishment in a territory where hundreds of Eskimos had been living contentedly, breeding children, and caring for their aged for many generations. Even the Hudson Bay Company was quite conservative for many years and operated on the principle that European foods are best (84, p. 91). Finally, competition forced the Hudson Bay Company to change its attitude in regard to food.

Cultural Traditions

Each culture has placed a taboo on certain foods. One culture places a taboo on locusts or white grubs. Another places great value on them. One culture places a taboo on pork, another places one on whale meat, and so on down the line. Specific eating taboos become rationalized or idealized. To some, it is cruel to eat animals, or dirty or unhygienic to eat this or that. There are some things which from tradition we consider proper and anything slightly different is improper. For example, Roquefort cheese is prized for its vegetative greenness but the same mold accidentally taken on a piece of bread starts reverse peristalsis.

Lewin (50) and Mead (60) in their wartime work with the Committee on Food Habits described the complicated nature of American food traditions. According to Lewin, it was necessary to understand what a people considers "food," "food for us," "food for other members of the family"; meal patterns; and the significance of the eating situation. (50, pp. 40-41) He found that there were many edible materials which people never even consider for food because they do not think of them as food for themselves. There are foods for animals and foods for people. There are foods for one's own family and there are foods for other people, foods for the poor and foods for the rich, foods for husbands and foods for children, foods for breakfast and foods for lunch or dinner.

Margaret Mead traced the major influences on the American food pattern (60, p.23). These included: European peasant conceptions of status which gave importance to white bread, sugar, meat every day, etc.; the Puritan tradition of a connection between food which is healthful and food which is disliked, and the tendency of communities with the Puritan tradition to use food for purposes of reward and punishment; the equally definite Southeastern food pattern in which emphasis is not upon health and duty but upon personal taste and a personal relationship between the eater and his food. Other tendencies identified included: emphasis upon appearance of food rather than taste; a preference for refined, purified, highly processed foods and a parallel emphasis on purity and packaging; objections to complex food dishes in which the constituents cannot be identified.

Herskovits (40) calls our attention to an interesting aspect of food consumption in non-literate societies. This is the lack of a direct relationship between consumption and immediate needs. For example, the Tallensi of the Gold Coast eat less food during the season of heavy agricultural labor than during the leisure months of the dry season.

Social Structure and Status

Many food acceptance problems have been found rooted in the social structure of the individual's society and his status concepts. Passin and Bennett's World War II study of the historic and contemporary diets of the area of Stringtown, Illinois, demonstrated that "differences in food habits, as well

as differences in resistivity to change in food habits were seen to be closely related to the contemporary social structure" (65).

Although the author has been unable to discover any large-scale, quantitative studies relating status and food acceptance, evidences have been cited in a number of studies (9, 49, 80). Babcock (9) lists the emotional uses of foods as: to relieve anxiety, to gain acceptance and security, and to influence others. She sees these as related to status strivings and status concepts associated with certain foods. For example, she described the case of one young man with terrific status strivings who refused to eat hamburger. To him, hamburger had become a symbol which offended his prestige and his attitudes of self-evaluation. To him, the nutritive value of the food was no consideration. Koos (49), in studies for the Committee on Food Habits, gave emphasis to consideration of the status giving qualities of certain foods. He concluded that the desire for freedom of choice and especially freedom to choose foods which are symbols of status is so universal among low income individuals as to require consideration by nutritionists when planning low income courses. He found that individuals in the low income groups greatly resented being told to eat the cheaper cuts of meat. He maintained that resentment on this point was also stimulated by advertising.

Stefansson (80) observed the affect of status concepts on his own food prejudices as well as those of others in the Arctic. He reports that he was able to achieve a liking for "high" fish only when he recognized that eating "high" game in England was a mark of status and that eating certain strong cheeses was also a mark of the gentry. He found that the "laborer" types in the Arctic failed to adapt to Eskimo diet because they had a feeling of being degraded when compelled to eat the food of "savages." Young men of the "college type," however, found a mild flavor of adventure in experimenting with the food of strange people. They took readily to Eskimo cooking and seemed to consider it great sport. Doughnuts fried in seal oil were sampled as an adventure and their deliciousness surprised them. The sailors, however, grumbled severely about their dissatisfaction with the food and talked a great deal about what fine things they were accustomed to eating. What struck the college men as an adventure struck the sailors as a physical hardship and social indignity.

INFLUENCING FOOD ACCEPTABILITY

Basic Problems in Effecting Changes

The goal in changing food habits, as stated by Margaret Mead (60) during World War II, is to alter them so that they are based upon a tradition which embodies science, and to do so in such a way that they are sufficiently flexible to yield readily to new scientific findings. Before the most effective methods of changing food habits can be determined, it is necessary to know what must be accomplished — that is, know what must be changed in order to change the food prejudice.

Lowenberg (56) typifies one approach when she states, "The thing to do is to change the spinach, not the child." Actually, there are many ways by

which "the spinach can be changed." The most obvious is through different methods of preparation. Variety can also be obtained, even in times of shortages, by planning in purchasing and distribution. The acceptability of pemmican as an emergency ration has been increased by the addition of chili and onion powder to be used according to the tastes of the survivor.* Surviving downed Air Force personnel in the Far East during World War II and in the Korean conflict complained of the monotony of the rice diet. Some survivors, however, described an infinite variety of ways of preparing rice by mixing it with other foods -- clams, shrimp, pork, native seasonings, fruit, and various types of plant foods.

Macrae (58) as a result of his studies of feeding problems in the RAF, concluded that it is very often easier to influence the psychological factors than it is to make gross changes to improve the quality of the food or how it is prepared. He maintained that attitudes toward food were little related to either the actual quality or the method of preparation. There is reason to believe, however, that some of the methods described by Macrae contributed at least to improved preparation of meals.

Changing Frames of Reference

Apparently, a change in food acceptability must be accompanied by a change in the individual's frame of reference or in his perception of the food. Lewin (50) describes two major approaches to changing frames of reference. The first is to change the relative potencies of the frames of reference. For example, the wartime emphasis upon nutritional eating was planned to increase the relative potency of the "health" frame of reference. The second is to change the content of the frames of reference, that is, the foods related to them. During World War II shortages, the position of fowl changed from that of a "fuss" food eaten on Sundays in the direction of an everyday substitute for other meats which were less available. Changes in frames of reference may also change as a result of changes in belongingness to eating groups (family, school, factory, crew, etc.).

Basically, a change in frame of reference requires a change in evaluation or perception. A good example of how this is accomplished is found in Duncker's (29) experimental modification of children's food preferences through social suggestion. The food was presented as the work or favorite of some admired personality. Common today is the use by television of such personalities as Hopalong Cassidy, athletes, and other heroes to influence the food habits of children. The "Men of Distinction" appeal in advertising alcoholic beverages is also well-known. Duncker maintains that in changes of this type, we do not change our beliefs about the same object as originally perceived. Prestige suggestion adds to our knowledge about the object and the object is therefore perceived differently. Consequently, upon a change in the perception there must be a change in the valuation.

* Unpublished data collected by the Survival Research Field Unit.

Certain wide-spread changes in frames of reference may be observed over long periods of time. Stefansson, for example, has pointed out that "it is easy to see in the literature and history of western Europe... how the dominance of fat as a luxury and a delicacy has gradually waned, in step with the increased use of sugar" (78, pp. 116-117). He believes that this phenomenon has affected the acceptability of pemmican.

Stefansson gives a number of specific suggestions concerning changes in frames of reference necessary in adapting to pemmican (78, p. 96). He advises that most people find it helpful in getting used to pemmican to eat frequently and only when they feel like it rather than having set meals. He also cautions that there must be care to avoid over-eating. A hungry man used to bulky food will tend to "gobble down" much more than the lump the size of one-third of a water tumbler, an amount usually considered ample. He further cautions that the risk is less if you munch uncooked pemmican than if you cook it up in a mess and shovel it down with a fork. Some men also become alarmed when they begin an exclusive pemmican diet and then find that a bowel movement does not occur more than once every five or seven days. They do not know that this diet is one of such small residue that this is a quite normal occurrence. No physical discomfort results because there can be no gas in the intestines as long as the individual confines himself to meat. All of these factors necessitate changes in frames of reference of the usual orientation to eating.

Lewin's contention that frames of reference may be changed by changing an individual's belongingness to a group is supported by Sherif and Sherif's finding that the formation of prejudice is functionally related to becoming a group member -- to adopting the group and its values (norms). This line of thinking and the resulting experimentation which will be described in a later section has led to the dictum, "It is easier to change group attitudes than individual attitudes." Tendencies of the individual to change are likely to be smothered by the more embracing norms of his family, gang, or neighborhood. Even in animal experiments, such as those of Siegel (76), eating problems have been demonstrated to be related to feelings of security. Since much of an individual's feelings of security come from his belongingness to groups, it is logical to expect that one's group is a strong factor in his acceptability of certain foods.

Age has been mentioned by Stefansson (78) and others as a deterrent to changing the acceptability of new foods. Although she cites no research evidence, Donahue (25) maintains that old people can be trained to adopt new eating habits and that they derive the same exhilaration from learning and adopting new ideas as do young people. She does not, however, dispute medical opinion that the older person enjoys, prefers, and digests better the food he has been eating throughout his life.

Channels for Changing Frames of Reference

A major problem in changing frames of reference and consequently in changing food prejudices is in finding the proper channel through which information can be diffused. The first requisite for a "proper channel" is that it communicate the information, that the information reach those whom it is supposed to influence. The second requisite is that it be communicated through a channel which will make it acceptable. Otherwise, there may be a "boomerang effect" and efforts will serve only to stiffen

opposition in defense of existing attitudes.

Koos describes three approaches used to set up channels through which such information can be diffused (49, p. 74). These include: first, a spatial approach, such as the block plan; second, an organization approach which sets up a super-organization to dictate policies and procedures; third, by artificially constructed groups through which information is distributed. Koos concluded that the first is undesirable since it has been determined empirically that associations tend to form without regard to area limits. The second was considered weak because of its dependence upon the strength of individual personalities. The third often failed when initial enthusiasms had waned and left a residue of discouraged participants.

In the Mississippi food preparation studies reported by Dickins (23), influence of friends was found to be the most important means of getting housewives to actually try new dishes. The source of suggestion of about 30 per cent of the new dishes tried was a friend. In England during World War II considerable success was attained through food leaders, voluntary workers who kept in touch with the food advice centers, received leaflets from them for distribution, and often passed on cooking and nutrition hints by demonstrations in their own kitchens to small groups of housewives (6). English (30) and Young (88) have advocated the use of dieticians in hospitals as agents for disseminating information to hospitalized patients. They feel that the dietician should get out of the kitchen and become a part of the medical team. A part of this role would be to help modify faulty attitudes, give support to the dietary regimen which requires frequent contacts and the presence of a feminine and/or maternal figure, and supply a much needed interest in the patient's welfare.

Various types of printed media have also been credited with responsibility for changing food prejudices. Metzner (62) credits advertising with the ability to shift food values in spite of long periods of early learning. DuBois (78) credits the extensive writings of Stefansson and some of the nutritionists with dissipating the prejudices and fears concerning lean and fat meat. Cowing (20) has discussed the problems of writing in such a way as to sell good diet. She lists three levels of publications: first, reports which document research and technical articles for professional journals; second, publications for teachers, other dieticians, and students; and third, material written on the popular level to reach the layman or the average leader. It is with this third level that she is concerned. She sees the problem as one of translating technical concepts as well as technical language into popular language. She believes that such writing should be eye-catching and that one should write the way he talks.

Techniques for Changing Food Prejudices

Food Preparation Methods

Methods of food preparation have already been mentioned in connection with regional food prejudices. It is well-known that what makes good baked

beans for the Middle Westerner. To the New Englander, it is molasses sauce; to the Middle Westerner, it is tomato sauce. Some nutritionists have recommended that foods for mass-feeding be cooked without seasoning and that seasonings be provided separately so that the individual can season his food to suit his taste.

It was found by the Committee on Food Research that fish was one of the most unpopular items on the menu (15, p. 17). Fish was being served once a week and on fish-day, 20 per cent of the personnel failed to attend the meal. Only 50 to 60 per cent of the fish prepared was eaten. A survey showed that the largest determining factor was the method of preparation. Army cooks knew very little about cooking fish. The prevailing attitude was: "Fish is unpopular; I have to serve it once a week; the men don't like it and they aren't going to like it; why should I take any time or trouble in the preparation. Frying was almost the only method used. Where sauces and garnishes were served, consumption was invariably better. The Quartermaster Food and Container Institute for the Armed Forces then initiated an experiment designed to change the acceptability of fish through improved methods of preparation. Most of the test-group had prejudiced attitudes toward fish and many of them had never tried some of the varieties. Tremendous changes were effected with the test-group. Dieticians (33), in dealing with the problem of palatability versus nutritional values, have concluded that methods of cooking which will result in maximum retention of both palatability and vitamins are possible and that this is no longer an issue.

Offering a Choice of Foods

The importance of variety and the desire for freedom of choice has already been discussed. Macrae (58) describes an interesting experiment in RAF messes which demonstrates how offering a choice of foods may be used in gaining greater acceptability for certain foods. When only two alternatives were offered, one of which was a cut from the joint, such as roast beef and the other a made-up dish, such as shepherd's pie, there were generally only about 10 per cent who chose the made-up dish. When two made-up dishes were offered, about 20 per cent chose each of the made-up dishes. The mess sergeant, by watching his made-up dishes, could regulate choices so as to get rid of his left-overs and also maintain the free choice more or less to the end of serving time.

Changing the Name

The role of semantic reactions and food prejudices has already been mentioned. One device which has been commonly used to change such prejudices is to change the label. Stefansson cites "blubber" as an interesting example (78, p. 121). Stefansson himself describes the taste of blubber as reminding him of "fresh cow's cream with a barely perceptible suggestion of walnut flavor. He admits, however, that Kane was probably correct when he exclaimed, "Oh, call it not blubber!" He recognized that the trouble was not with the thing itself but with the name, which had somehow acquired a "bad" connotation. Some believe that this connotation arose during the days of the whale "fishery" when animal oil was used in lamps in Europe and America. People occasionally

tasted the blubber and found it disagreeable, giving blubber its present connotation. Stefansson argues that it is illogical to have a revulsion against fresh blubber just because it gets rancid easily; this same disgust is not felt towards the names of cream and butter just because cream sours easily when it is not pasteurized and butter becomes rancid when it is not salted. There is, however, some prejudice against "sour cream" and some creameries have tried to overcome this by giving it a trade-name such as "Spumoni."

Psychotherapy

Since food aversions and allergies are so deeply rooted in personality adjustment, psychotherapy may be necessary to effect desired changes in food prejudices. Miller and Baruch (63) have described the psychological dynamics in allergic patients in group and individual psychotherapy. They concluded that the allergic patient characteristically used his allergy to gain affection from parents, to express hostility toward them and to hide the consequent guilt feelings from them and from himself. Thus, these needs becomes the focus of psychotherapy for allergic individuals. Cowles maintains that fears and food aversions are related and that the mother needs a comprehension of what the child's real fear is (21, p. 210).

In dealing with individual food prejudices, Stefansson recommends in his Arctic Manual (83) that new men be given an explanation of the psychological reactions they are likely to experience in shifting to a meat diet. He explains that any difficulties they may have will be "imaginary" or "psychological."

Group-Decision Techniques

A variety of group-decision experiments, stemming from Lewin's work for the Committee on Food Habits during World War II (50), has demonstrated the superiority of the group-discussion-decision method over the lecture and individual instruction as methods of influencing the acceptability of unpopular foods. His first experiment (50, 51) was carried out with about 120 women from varying economic levels in a medium-sized town in Iowa. The object was to influence them to use glandular meats during the meat shortage of World War II. The check-up after seven days showed that when the nutritionist functions in a group decision setting, the changes are definitely greater than when this same nutritionist functions in a lecture setting. No attempt was made to manipulate the group by high-pressure sales talks. The decisions were made by the individuals in the group setting. Lewin believed that the group setting gives the incentive for the decision, and facilitates and reinforces it.

Results similar to Lewin's first study were replicated in later experiments to influence the acceptability of milk, orange juice, cod liver oil, and other products (51). Radke and Caso (67) report similar results in experiments conducted as a part of the training of nutritionists.

Lewin in commenting on his first experiment stated that the group decision method seems to create a more favorable attitude. He warned, however, that if the group decision is based upon too small a majority, there is a danger of a "kick-back" which would be more precarious than the request method following the lecture.

Other Group Influences

A number of other group influences were described by Macrae (58) in his RAF studies. One effective technique was to make evident to the men the amount of effort which was going into the preparation of their food. The men were reported to be well satisfied, although the food served was not very good. The interest shown by the officers was also found to be an important determining factor. When a station in West Africa was first visited, more than 80 per cent of the men had serious grumbles about their meals. The Commanding Officer was requested to pay very particular attention to the food served, and especially to visit the men's messes at least once daily and to impress the men that he was doing his utmost to satisfy them. After one week, further questioning revealed that serious complaints had been reduced from 80 to approximately 20 per cent. It is possible, of course, that the interest shown in the improvement of the feeding may have contributed to actual improvement in the preparation of the food. The important thing is that the acceptability of the food improved without making any gross changes in menus and the like.

Self-Regulation and Food Prejudices

Do we select foods which we need or foods which we like? This has been an issue of long-standing among both the animal psychologists and human nutritionists. Young's (89) 1949 review of the problem presents one of the more comprehensive treatments of the issues involved. He concluded that there are a good many impressive facts which indicate that food selection is not a dependable guide to the existence of bodily needs and that factors other than need are important determiners of food acceptance. Among these facts he included the following:

1. Marked food preferences develop when there is no known metabolic need and when growth and health are normal.
2. Rats accept with avidity a substance which meets no metabolic need.
3. The quantity of a particular food ingested varies markedly with its characteristics such as temperature, concentration of solution, texture, and the like, as well as with the surroundings of the food stuff which are not related to intrinsic properties.
4. If foodstuffs are presented under optimal conditions, an animal may eat to excess.
5. Rats sometimes fail to select foods in agreement with known bodily needs.

6. Toxic substances are occasionally accepted by animals and men with fatal results.
7. Animals and children, even adults, may refuse a medicine which has a foul odor despite the fact that the medicine is known to be curative.
8. Feeding habits may regulate the selection of foodstuffs with little regard to bodily needs.

Young concluded that although food selections are often in accord with nutritional needs, the correlation between need and acceptance is far from perfect. According to him, food acceptance is regulated by the characteristics of the food (palatability), by the environmental surroundings, by established feeding habits, as well as by intra-organic chemical conditions. This position, that the selection of foodstuffs is determined by the degree of enjoyment, is obviously different from the view that animals accept foods which they need to survive. Young maintains that the two interpretations are not logically opposed, and may be regarded as supplementary.

In the realm of human behavior, the issues discussed by Young become most clearly drawn in relation to child-rearing problems. English (30), declaring that self-regulation is in accord with democratic living and progressive education, advises that it is desirable to give the individual as much freedom as possible in the choice of his foods. He points out, however, that there are still many people who do not trust the child's ability to choose wisely and they cannot cooperate in any self-regulatory feeding program. English himself concludes that there are too many seductive influences to warrant giving a child complete freedom of choice or to dispense with guidance by elders toward what is desirable. He believes that compromise is necessary.

Brim (17) has discussed the problem in a similar vein in his study of the acceptance of new behavior in child-rearing. The focus of his study was the permissive feeding of children by a group of mothers. He found that acceptance requires an initial favorable change in expectations regarding the consequences of the new behavior (permissive feeding), and that these expectations must be sustained through a period of trial performance to the point at which the actual satisfying results of continued performance occur to stabilize the adoption of the new behavior.

The crucial question for survival is: To what extent can an individual in a survival emergency overcome his food prejudices and ingest the food necessary for his survival? While we have accounts of men who chose to die rather than eat the food available, we also have perhaps a much larger number of accounts of individuals who made quite remarkable adaptations. Braddon who survived a Japanese prison camp describes his handling of the problem as follows:

"First, I determined I would eat everything -- thus cats, dogs, frogs, snakes, bad fish, blown tinned food, snails, grubs, fungus, crude vegetable oil, green leaves from almost anything that grew, roots and rubber nuts all went the same remorseless route. In addition, I determined that I would never complain about any food we did receive,

because that might unnerve someone who had just steeled himself to swallow it: similarly, that I would not tolerate the company of anyone, however much I liked him, who himself complained." (16, p. 142).

Stefansson (83), on the basis of his observations concerning eating problems in the Arctic, concluded that the human digestive apparatus and the associated feelings and instincts do not automatically regulate food consumption in accord with needs. He particularly noticed this in regard to the overeating of fat. He explains that when you eat fat slowly, the goodness of the taste decreases so that it is almost possible to notice decreased palatability with successive mouthfuls. If fat and other food elements are mixed, however, as fat and lean are in pemmican, you are either tempted to overeat of fat in order to get enough lean or else you may become improperly nourished in that the excessive fat begins to nauseate you before you have had quite enough of the lean.

Stefansson developed some devices of his own in overcoming his own food prejudices. In learning to like boiled fish, he first took long walks to work up an appetite and then ate fresh salmon trout roasted. Finally, he started eating boiled fish from the trough with the Eskimos. In learning to like high fish, he employed a philosophizing technique. He concluded that if it is almost a mark of social distinction to be able to eat strong cheese with a straight face, and to relish smelly birds as do the English gentry, it should not be low practice to eat pungent fish. On the basis of such philosophizing, he tried the rotten fish one day and says that he liked it better than his first taste of Camembert. During the weeks which followed he became fond of high fish.

SUMMARY AND CONCLUSIONS

This report has brought together from a variety of sources existing information concerning the psychological and training factors affecting food acceptability in general and survival ration acceptability in particular.

World War II with its shortages of certain types of food stimulated a considerable amount of interest and research concerning food acceptability among both the civilian and military population. While the Korean conflict did not bring shortages for either the civilian or the military population, it has re-emphasized the problem of food acceptance as it affects individual survival among military personnel downed behind enemy lines. Problems of acceptability of emergency rations have long stimulated controversy. It has been demonstrated that soldiers will permit themselves to become sick and inefficient rather than eat a ration which they do not like. Pemmican, a meat food product bar, has been the center of several such controversies. Some have maintained that pemmican is unsatisfactory as an emergency ration; others have just as vigorously maintained that it is the most satisfactory emergency ration known.

The effects of food deprivation are well-known as a result of the Minnesota studies conducted during World War II. From the standpoint of survival under extreme conditions, perhaps the most serious effects are

those which lower the will-to-survive -- loss of ambition, narrowing of interests, increased emotional instability, deterioration of personal care, and reactions of resignation, passivity, "don't care." Complex reaction time, motor speed, hand and arm movement, word fluency, and spatial perception deteriorate. Perceptual speed, memory, number facility, and inductive reasoning, however, do not deteriorate.

Problems of food acceptance are particularly complex, since they are so intimately related to the emotions, sentiments, and prejudices.

Food acceptance testing methodology has been fairly well-developed. The nine-point hedonic scale has been most widely used. Thurston's introduction of "psychophysical scaling" and Dove's "appetite-levels" concept have provided useful refinements.

Several psychological studies have demonstrated relationships between food aversion and personality maladjustment. Early childhood experiences, feelings of insecurity, manifest anxiety, rigidity, and immaturity have also been shown to be related to food aversions.

Psychophysical factors such as odor, appearance, flavor, texture, and temperature are important, especially for children. Hot foods appear to be especially important among survivors of extreme conditions. Fatigue and other stresses serve as appetite depressors, accentuating food acceptability problems in survival situations. Real hunger, however, is a potent force in overcoming many food prejudices. Water deficit, the physiological concomitants of advanced age, and climate also affect food acceptability.

Food acceptability may also be viewed in terms of learning, motivation, and beliefs. Habit strength, variety, familiarity, and beliefs concerning what is harmful and what is beneficial, semantic reactions, and traumatic experiences connected with eating are especially potent.

Many problems of food acceptability arise from psychosocial and psychocultural factors. The influences of one's eating group are particularly potent both among children and among adults. Such influences may either deter or stimulate eating. The leadership of the group, the emotional atmosphere of the group, and group contagion are important. Family, regional, and national factors and the cultural traditions which they tend to perpetuate are also important determiners of food acceptability. The social structure of the individual's society and his status concepts may affect his acceptance of certain foods, particularly foods considered to be "low status."

The general goal in changing food habits is to alter them so that they are based upon a tradition which embodies science and are sufficiently flexible to yield readily to new scientific findings. Changing the food by different methods of preparation and provision of variety and choice provides one approach. Others argue that it is easier to influence the psychological factors than to make gross changes in the quality or the methods of preparation of the food. This involves changing frames of reference or perceptions. Several methods for changing frames of reference and perceptions have been described.

Channels for changing frames of reference include: the spatial approach, the organization approach, and artificially constructed groups. The influence of friends has been found to be the most potent influence in a number of studies. Food leaders, dieticians, printed media, and other channels have been discussed.

Techniques for changing food prejudices include: food preparation methods, offering a choice of foods, changing the name of the food, psychotherapy, group discussion-decision techniques, and other group influences. Self-regulation and food prejudices was also discussed and techniques for modifying one's own food prejudices were described.

While many factors have been found to be related to food acceptability and many techniques have proved to be potent in modifying food prejudices, it is believed that the most successful approach will be the one which takes into consideration as many as possible of the relevant factors.

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