

## Methodology and Theory in Human Eating Research

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Current research in human eating is assessed from the perspective of current research methods which stress laboratory research, the use of artificial foods rather than real meals, shorter term studies, animal models, and abnormal eating models and an emphasis on sensory and physiological factors rather than social, cultural and contextual factors. The proposal is made to refocus more human eating research on real people eating real foods in real eating situations.

Over a number of years, my research interests have shifted toward understanding the factors which control human eating. What controls when we eat, what we eat, and why we eat? I have increasingly become concerned that the methodological approaches we employ to collect data, and the hypotheses and theories we use to identify, organize, and model variables limit our understanding of human eating. Others have also expressed concern about the prevailing methodology. Booth (1987) has called "... The study of human food consumption ... subscientific," (p. 1). He has proposed individualized causal analysis of eating, which involves laboratory-based experiments on simple food models. Kanarek & Orthen-Gambill (1986) have stated that "The whole question of the generalizability, or the external validity of experimental findings, is a serious issue in nutrition and behavior research" (p. 174). And Collier (1989) states, "From examining a single, simple, restricted, refined experimental situation, it is impossible to comprehend either the variety or possible patterns of the variables controlling them for even a single species, since the economic context is the major determinant" (p. 148). Hall (1987), in his overview of a recent conference, correctly portrays the enormity of the modelling problem as "... an extremely complex, multiple loop, non-linear feedback system..." (p. 470). He also states that "... observations of consumer eating behavior have validity only to the extent that they measure what people actually purchase and consume when unaware of being observed, in real life" (p. 462). What percentage of research in our field now takes place in "real life"? To probe this and related questions, I have catalogued several recent conference proceedings to determine what methods were used to collect the data for the research papers. I also catalogued the 31 research papers in the 1990 issues of *Appetite*. Finally, I obtained an on-line literature search for 1990 for the terms "food, select, choose, choice, human" which drew from Psychological Abstracts, Biological Abstracts, and Index Medicus. This search

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yielded 58 usable papers. The results of these searches will be used throughout a discussion of concerns about our field. This article is not intended to be an exhaustive review article with reference to every relevant paper, but rather is intended to stimulate open discussion of a number of key methodological and theoretical issues.

#### USE OF LABORATORY RESEARCH AND LABORATORY MODELS

Self-report surveys are an important source of information in psychology, nutrition, and related fields, but they should be balanced by studies which intentionally manipulate one or more variables to observe the effects. Self-report studies also need to be validated by direct observational studies. Almost all of the research done in our field, other than self-report, is conducted in laboratories. Some laboratories are designed for maximum individual isolation and control as in traditional taste-test booths. Others utilize group eating in a laboratory setting.

In the 1990 issues of *Appetite*, only one research paper reported work conducted in a real-life eating situation (Nakao *et al.*, 1990). Questionnaire studies were not included. In Thomson's 1988 book *Food Acceptability*, only one paper included data on non-laboratory eating (Meiselman *et al.*, 1988), again excluding questionnaire studies. In the 1986 book on *Diet and Behavior* (Anderson *et al.*, 1986) there are no studies based on observations of eating in a natural eating situation. In the 1990 literature search of 58 papers, 13 were in the laboratory, 20 were self-report studies, 21 were discussion papers and 4 were miscellaneous; no paper reported data from a real-life eating situation. Most of us would probably argue that people do not act the same way in the lab as in the home, cafeteria, or restaurant. At the present we do not know whether the same variables control their eating. As Paul Rozin pointed out at a recent meeting, subjects coming to a laboratory for a test have no other option except to eat. Can they reasonably reject the food, say they would rather eat later, say they would rather eat something else, etc? Our laboratory studies compel people to eat and then study the effect of various independent variables on this compelled eating. Although normal eating also contains situational, economic, and social constraints, the laboratory is not a scenario of normal eating in the real world.

Despite the obvious problem of studying eating in laboratory situations, very little research has tackled this problem. Obarzanek & Levitsky (1985) found good agreement between caloric intakes at home and in the lab, both determined from four subjects weighing their own food. While this study suggests that total energy intake might be resistant to differences in the two environments, it leaves unanswered how the many situational differences affect eating and whether unobtrusive measures would have found the same thing as self-weighing. More research of this type is clearly needed.

Another aspect of laboratory research is the need for and use of instructions. In natural eating situations people are not instructed to eat or to eat as much as they want. Instructions in the laboratory add to the unreal aspect and have potential biasing effects on eating. We do not know the effects of experimental instructions or of the internalized instructions which subjects bring to an experiment.

From such (laboratory) studies we develop hypotheses and models of what variables control (laboratory) eating. Variables not normally studied in the laboratory are sometimes added to models to provide greater reality. Most strategies for

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research do not begin by identifying which variables might be most important and then studying those. To date research and modelling has not prioritized the things that affect eating. This is evident by the lack of integrative review articles on human eating.

There are signs of change. There is a growing call for research in the environments in which people normally eat, especially in institutions such as prisons (Rauch, 1986) and hospitals (Rose, 1985; Fitz & Winkler, 1989). Kanarek & Orthen-Gambill (1986) call for "... quasi-natural studies that capture the advantages of both the laboratory and the 'real' world" (p. 174). Researchers like de Castro (1990) are beginning to examine the influences on non-laboratory eating.

#### USE OF ARTIFICIAL FOODS AND ARTIFICIAL MEALS

Food-related events can be conceptualized as involving individual foods, foods grouped into meals, and meals grouped into diets. Within this organization, the vast majority of human food research has been on items or meals. The traditions of laboratory control and simplicity combined with the tradition of rat pellets has produced an avoidance of real foods and real meals, or at least a preference for simplistic foods and meals. However, most meals in the real world involve choice and pattern.

Included in Makela's definition of a meal is the following: "Content and form, time and space play an important role in creating a meal as an entity. The familiarity, similarity, and recurrence of a meal lay a foundation to its recognition..." (1991, p. 161). Our studies, when done outside their normal eating places, inevitably change choices (or eliminate choice) and alter the patterns of eating. We do not serve in the laboratory, what people usually consume for breakfast, lunch, dinner, or snacks. When subjects are fed various milk shakes and other items, sometimes *ad libitum*, we increasingly label our studies as unreal.

How many of our studies involve real meals or diets constituted as the subjects would choose? In the recent book on *Food Acceptability* (Thomson, 1988) the vast majority of papers studied single food items; meals or diets were only studied through questionnaire or focus groups with one exception (Meiselman *et al.*, 1988). In the 1990 literature search, 14 papers examined items, 5 examined meals and 26 examined diets. Diets were examined using self-report ( $n=16$ ) and laboratory (4) methods with 6 discussion papers. In the volume on *Diet and Behavior* (1986) the chapter on Diet and Criminal Behavior does not present studies which have measured overall diet. The preferred method of examining diet and behavior in the book appears to be use of drugs, not diets. In the research papers in the journal *Appetite* during 1990 no human study examined diets (i.e., multiple meals) with anything other than questionnaires or dietary surveys. Moreover, eight studies used basic chemicals as stimuli and seven used food items. Of five human research papers studying meals four used sandwiches, and most meals offered no choice.

One advantage of studying people in natural eating situations is that the investigator does not have to make up a meal or a diet. The subjects' natural meal choices are available and the investigator can accept it unchanged or manipulate it. For example, more or less filling can be put into sandwiches, more or less fruit can be offered, desserts can be made more or less accessible, etc. But the very difficult task of constructing realistic items, meals, and diets is unnecessary.

## SHORT-TERM STUDIES AND MODELS

While many researchers acknowledge the patterns and habits of eating, little work is aimed at long-term effects. Naturally such studies involve more time, and potentially more resources and more subject time. But, at the present time, it is very difficult to apply what we know about one-time tests to questions of overall diet.

Obarzanek & Levitsky (1985) have summarized week-to-week intraclass correlation coefficients and coefficients of variation of 4-day caloric intakes for a number of studies. Variation in intake is clearly part of our pattern of eating. We should be studying long-term patterns to understand this variation. But studies of variety [see Spiegel & Stellar (1990) for a recent review] focus on intrameal variety. Nelson *et al.* (1989) have estimated the number of days needed for dietary records to correctly rank people according to nutrient intakes. Seven-day records were not enough for every nutrient and for every population sampled. Different populations require more or less data and different nutrients require more or less data. These two studies show the ever-growing complexity of measuring what people eat. Collecting food habits data in natural eating environments lends itself to longer-term studies. Participants are not asked to report to laboratories for prolonged periods of days or weeks. The cost and labor of providing laboratory meals is avoided.

## EMPHASIS ON SENSES AND PHYSIOLOGY

Because of the background and training of many of the researchers in this field, there has been a tendency to investigate sensory (Kare & Brand, 1986; Thomson, 1988) and internal physiological mechanisms in control of food intake. There is still relatively little research on social variables, situational variables and economic variables. This situation is changing as researchers demonstrate the powerful effects attributable to these variables, but much research is still devoted to the sensory and internal physiological variables.

What is the role of the senses in our long-term food habits? Mattes *et al.* (1990) have reported on decreased food acceptability and changes in body weight with taste and/or smell disorders. But they noted that understanding healthy people will be central to understanding sensory disturbances and eating. We need to understand what roles the senses have in everyday eating. Much of our daily food pattern appears habitual, almost separated from sensory cues. People do not choose what liquid to pour into their daily cereal, nor do they choose the sugar level of their orange juice. On the other hand, if the price of orange juice changes, or friends recommend a new juice, these might affect choice.

Not only have we over-studied the senses and physiological variables relative to other factors, we have failed to indicate how important these variables are in food choice. Fischler (1988) concludes that "Social and cultural factors play an important part in the selection of foods. . . . Neither nutritional value or sensory features of a potential food are reliable predictors for actual acceptance and consumption" (p. 193). There are some signs of shifting attention to social determinants of acceptance, for example, the work on appropriateness (Schutz, 1988; Kramer *et al.* 1992), and these trends need to be encouraged and broadened. As attention shifts to social and other determinants of human eating, researchers should find the relative

ease of studying these in the field and the relative difficulty of reproducing social effects in the laboratory.

#### ANIMAL MODELS OF HUMAN EATING

In the 1990 literature search, not restricting the search to human eating resulted in 166 listings. More than twice as many listings are for non-human papers as for human. Are human eating and animal eating controlled by the same variables (Boakes *et al.*, 1987; Kare & Brand, 1985)? If our goal is to determine what variables control food choices over long time periods in normal adults, then animal eating probably has little to offer. Certainly the basic physiological mechanisms of hunger and thirst overlap between humans and some other animals, but the effects of social, situational, and economic variables are very different.

Understanding animal eating is an interesting part of science, but the dangers of studying animals in order to understand humans have been noted by Leathwood (1986) among others. Collier (1989) has attempted to bridge the animal-human gap by moving away from what he calls "our long-time commitment to the study of feeding mechanisms, that is, proximate causation..." (p. 136). Collier presents a compelling story of the economics of eating for non-human animals. At the end of the story he refers back to humans to try to link-up. Although one must applaud the radical departure from traditional animal research in these studies, perhaps parallel studies with humans would further advance the understanding of human eating than exclusively animal research.

The tradition of animal behavior research has also brought with it a tradition of using comparable methods for animals and humans (LeMagen, 1987). Inbred rats raised in isolation in cages and fed lab chow cannot be used to study natural eating. Human research analogues of animal studies cannot achieve any more.

#### ABNORMAL VS. NORMAL EATING

In addition to the tradition of animal models of human eating we also must deal with the tradition of abnormal human models of normal human eating. A great deal of human eating research is aimed at understanding abnormal eating (Boakes *et al.*, 1987). In the 1990 literature search, one-third of the papers dealt with abnormal human populations. Such research is clearly of interest and importance in dealing with these major health issues. But studying abnormal eating is not the best way to learn how, why, and what normal people eat. One could argue the opposite, i.e., that an understanding of normal eating would help us understand what goes wrong in various disorders. Surely the lack of a clear picture of what variables are involved and how they function must stand in the way of a clear perspective on abnormal eating.

#### A PROPOSED STRATEGY: REAL MEALS, REAL PEOPLE, REAL SITUATIONS

My proposal to remedy the above concerns is to refocus human eating research towards greater use of real meals served to real people (not subjects), in real eating

situations. Such studies are not new. They have been done in a variety of environments with success. However, as the comments above indicate, such studies are by no means the norm.

One possible argument against such research is that most people do not have access to such real eating situations. With the existence of large food service operations in almost all larger institutions, factories, and schools, there are large numbers of people eating near almost all of us. Some food service operations are more accessible to research than others, but we have found that once the benefits of such research to the food service manager are pointed out, they become very supportive. Such benefits include quantitative information on what motivates the customer. Another possible argument against such research is cost. Such studies can be very expensive when special foods are required or when detailed nutritional intake from large samples is required. But many studies can be geared up or down to adjust to local resources.

This is not to suggest that all studies should be done in natural settings. Clearly some studies are best done, or can only be done, in laboratories using controlled food stimuli. It is not the presence of laboratory research which I am trying to change, but the ratio of laboratory to field research. We cannot hope to understand human eating until we study human eating.

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