FOOD HABITS, FOOD PREFERENCES AND THEIR DETERMINANTS: DIFFICULTIES IN SOCIAL AND BEHAVIOURAL MEASUREMENTS CRUCIAL TO NUTRITION

D.A. Booth, J.M.P. Edema and L. Stockley

This Workshop was convened because description and measurement of food habits and their determinants are crucial to the science of nutrition and its application to prevent disease, and such research requires expertise in the behavioural and social sciences. However, measurement of social factors and of behaviour are at the same time more crucial and more difficult than nutritionists often appreciate. The particular investigations presented in this Report illustrate the complexity of the problems and the wide range of approaches needed. This Chapter draws together in retrospect the reasons why no straightforward account of the measurement of food habits and preferences - let alone of their determinants - is available and thus why nutrition needs vigorous development of behavioural and social research.

First we consider the nature of food habits and hence what is involved in measuring them. It follows that further development of the quantitative description of behaviour towards foods would improve current methods for estimating individuals' actual intake of nutrients and for relating the time-course and pattern of nutrient intake to health.

Then we turn to the determinants of food habits - both the immediate preferences of the individual and the ultimate cultural and biographical influences on those proximal psychological dynamics. We have to assess the malleability of individuals' ingestive behaviour if nutrition is to fulfill its aim of advancing the dietary prevention of disease.

DESCRIBING FOOD HABITS

The aspect of diet that determines nutrition (apart from psychosomatic reactions to a believed property of a food) is the chemical composition of the foods and drinks that an individual ingests on a particular occasion and the interactions between the nutrients on each occasion and cumulatively over time, e.g. 24 hours. However, this chemical pattern over time depends entirely on the eating and drinking behaviour of individuals provided with foods and beverages.

Nutrition research and action depend on accurate description of such regularities in eating behaviour. Even an infrequent practice if many people do it - or a very frequent practice amongst a minority - may have a considerable impact on a nation's health.

Social behaviour, not physical intake

An eminent clinical nutritionist has once written that "The measurement of the habitual food intake of an individual must be among the most difficult tasks a physiologist can undertake". A large part of the difficulty is because a food habit is a person's behaviour organized under a culturally established linguistic construct. It is not a purely physical phenomenon.

A food habit, like any behaviour, is an expression of the thoughts and feelings of the individual. Whether we consider dietary practices or particular occasions of eating or drinking, nutritional behaviour has to be described from the point of view of the people who perform it, which involves the concepts of the society in which they live. Eating behaviour, like all psychological processes, is scientifically describable only in terms which make observable sense in the person's culture. It is an informationally structured behavioural process; it is not merely mouth movements and physicochemical transfer down the gullet.

Therefore it is in principle impossible to describe food habits merely in the terms of the natural sciences, even if we make the account extremely complex. Physiologists, chemists and medical scientists must not expect food habits or dietary practices to be quantifiable by the methods of their disciplines.

Behavioural nutrition of course needs food science and nutritional biochemistry. Yet it also needs the personal measurement techniques of experimental psychology, the social measurement techniques of economics, censuses and opinion polls, and the quantitative research techniques of ethnography, sociology and marketing, and indeed of research into policy, administration and law.

The requirements for measuring what is going on in the mind of the individual eater and for elucidating the cultural norms within which eaters operate are not met by standard social or market survey methods, despite the common assumption to the contrary in nutrition, food marketing and elsewhere. The aggregate statistics usually derived from surveys are in principle incapable of providing unambiguous evidence as to what individuals are doing or saying. Indeed, no statistics by themselves are capable of measuring the strength of a habit or any other psychological phenomenon. Statistical analysis serves merely to assess the predictive value of the results of a test if it were carried out under identical conditions on the same people. Mental measurement requires the performance of an individual in a validated test situation. Psychological data are not verbiage containing numbers or to which numbers have been assigned on

no independent basis. They are not private mumblings either: it is not reference to consciousness that makes data psychological. Such psychological measurement procedures are utterly dependent on verbal communication between investigator and respondent, however. For effective data collecting and for effective measurement analysis, there must be an accurate qualitative analysis of the accounts people give of the phenomena to be measured, e.g. by ethnography or focussed discussion.

So, measurement of transient eating behaviour and stable food habits requires more than fancy statistics and more than comprehension of the language of the respondent. It depends on a procedure that extracts some objective information concerning the relationship between the situation and the person, whether expressed symbolically in their words or concretely in what they do. The measurement of a food habit by verbal techniques involves a highly structured experimental question and answer. The qualitative description of food habits is no less objective in relying also on interpersonal interactions between investigators and respondents: the interview discussion is conceptually disciplined to assess topics beyond a predefined range, rather than being constrained to a few, perhaps quantifiable dimensions.

BEHAVIOURAL SCIENCE CONTRIBUTIONS TO NUTRIENT INTAKE MEASUREMENT

Nutrition studies often highlight various problems with current techniques of estimating nutrient intakes in free-living individuals and populations. Problems are also raised by some of the papers at this Workshop. The social and behavioural sciences can be called upon to tackle many of these difficulties. This presents them with an unusual challenge: behaviour does not usually have to be measured in a way that specifies its chemical effects, but nutrition requires estimates of nutrient intakes from descriptions of food and drink uses. In the future attention should be given to the specific brief of relating behavioural science to nutrient intake estimation. Some of the issues are outlined below.

Cultural apsects

Any scientist who seeks to describe and measure nutritional behaviour has to understand and put to use the everyday cognitive structures of the ordinary members of the culture, in addition to using the technical concepts relevant to food habits from both natural science and the social sciences. Because they

also are members of the culture they are studying, nutritionists do not necessarily notice all of the technical requirements for measuring spontaneous eating behaviour. Many decisions on the construction and coding of dietary records, interviewing methods, and terminology, are confidently made on an intuitive basis. Thus many issues are not adequately faced, including the validity (realism to undisturbed behaviour) and even the reliability (repeatability and specificity) with which eating behaviour is estimated.

With the exception of the collection of duplicate diets, all dietary methods depend on the respondents' descriptions of their own behaviour and the foods consumed. These descriptions are then interpreted by a dietitian who assigns code numbers from the food composition tables to each of the food terms used. This procedure relies on numerous untested assumptions. Probably many of the components of "coding error" are highly systematic, and therefore susceptible to objective elucidation.

The usefulness of a nutrient database will be crucially dependent on the linguistic and conceptual relationships between the entries to the tables and the culinary vocubulary and practices represented in each dietary record beging coded. So, to facilitate such projects, one of the most urgent tasks of behavioural nutrition is to specify valid, reliable and accurate inter-conversions of food descriptors.

The nations and regions of Europe and the ethnic grouping occupying a single location have sufficiently varied cuisines, markets, lifestyles, foods and cultural norms for any Europe-wide methodological framework to need separate specification in at least some respects for each sub-culture. Ethnographic and psychometric research is needed to ascertain the requirements for dietary measurement which arise from these cultural variations.

Behavioural aspects

From a behavioural science viewpoint, a distinction must be made between physical measurement of samples from a person's diet and procedures to make a realistic estimate of the amounts of food and drink that would have been consumed if the measurement were not being attempted. "Dietary intake" measurement is usually "diet sample" measurement in fact.

Actual intake is estimated from the measured or estimated physical samples on the basis of all sorts of empirical assumptions, which vary with method and situation. These assumptions should be routinely explained in research reports, to make clear the unknowns and the likely errors in the relation between the observed diet samples and the intake that the samples purport to represent (1).

Techniques have been developed for validly measuring some sorts of behaviour in everyday life. Attitude research (motivation) has in recent years found ways of relating more closely what people say to what they do. Social psychologists have worked hard at connecting behaviour in experimental tests to that in real life ("ecological validity"). These psychosocial research technologies have not as yet been transferred to nutrition research to any great extent. Intensive research is needed into methods of measuring ordinary eating without interfering with it.

The concept of "validation" in dietary intake measurement currently seems in danger of becoming restricted to comparison of estimates from food samples with estimates from urinary excretion samples. Convergent validation with the power gained from two very different estimation approaches is indeed the attractive prospect for the nutrients for which intake is excreted, although these are very limited in number even if extended by ethical labelling. Nevertheless, output sampling is also highly reactive. Urine collection could even affect eating decisions, let alone drinking. Furthermore, completeness of urine collection is not just a physiological problem to be solved by markers; it is also a problem of psychosocial methodology. That is, excretion samples will never provide "independent" validation of intake estimates on some external purely physical criterion. In everyday life, a person has considerable control over the voiding of urine. The investigator is interfering by any requirement to collect samples. Demonstrable failure to collect all the urine voided clearly invalidates that particular assessment. However, incomplete collection is also a symptom that other less obviously unsatisfactory assessments by the same method are invalid, because the output recovered is sometimes being changed by the research. This cryptic invalidation is not usually measured in frequency or extent and so invalidates the overall distribution of estimated intakes.

Social aspects

The terms "weighed record", "protocol", "recall", "history" and so on are often used as though they specify the test procedure and as though consequences for reliability and validity follow mechanically from such a behaviourally vague procedural label. These procedures are all, in their social aspects, relatively minor variations of the highly reactive (demanding), highly individual and highly interpersonal "method" of interviewing or questionnaire completion. A weighed record (even with microcomputer-automated weighings and

audiotaped or computer-keyed food naming), no less than a dietary history questionnaire, is the performance of a cognitively highly structured task and is also a psychosocial interaction between the investigator and a respondent who is not a passive subject and is influenced by beliefs and values.

Face-to-face interview is of course different from writing answers to a questionnaire (including recording diet) in the absence of the investigator. Yet there is no need merely to speculate about the differences for dietary intake estimation: they can be investigated and measured. A good deal is already known from over half a century of research on such differences in other contexts. Social researchers have compared personal interviewing (face-to-face or, recently, by telephone) with faceless and even voiceless questionnaires (received and returned by mail) and with personally delivered and collected self-completion forms. Much of this research has been on purely verbal responses, but not all: helping a victim in a public place, voting for a political candidate and spending money on particular retail goods are as concrete behaviours as eating an amount of a food.

Almost nothing can be learned by comparing nutrient intake values or variabilities obtained by different "methods" without monitoring the specific conditions of collection and analysis. Particular ways of asking frequency questions or cuing eating episode recall need comparing for particular circumstances and nutrients. Also, the analysis of such comparisons must be at the individual level, not the group level, so that the results can be applied to other similar situations. A group datum (a mean or a distribution of categories, for example) provides no basis for interpreting what went on with those people in that situation, let alone other people in other circumstances.

Recall or record?

Current opinion that "diet history does not measure actual food intake" is based on the gratuitous assumption that weighed records are a more valid basis for estimating intake than the most effective structured portion-sized questioning. Yet the basic question at stake is whether interfering with food habits is the best way of measuring what they normally are. The more careful reviews acknowledge that the problem has never been investigated satisfactorily, but still characterise it as a matter of a ragbag of sources of error, or as amenable to investigation by comparison of weighed intake with an even more intrusive physical measurement such as weighed duplicates.

There has in fact been a great deal of research on aspects of recall - such as perception of frequencies and probabilities, biases in numerical and other

ratings, direct and indirect scaling, cuing of recall and recognition, investigator demand, respondent self-presentation biases, stability of behaviour over time and situational context, and so on. Such findings should be applied and reassessed in nutrition contexts.

Properly developed, a combination of frequency and protocol recall procedures, cued and quantified by food examples, and physically calibrated in important specific aspects, may yield much better data than standard prospective dietary methods.

The "gold standards" of dietary assessment are not only of dubious validity - they are in danger of being used irrevantly to the main research problem of preventive nutrition. Extremes of intake are among the most likely dietary conditions to be relevant to potential causes of disease or ways of preventing it. Large-scale studies are needed to investigate low-prevalence extremes, but it is quite right to emphasise that large surveys do not justify poor methods. Nevertheless, precise physical measurement of food samples matters less if one is screening for relatively high or low intakes, rather than needing absolute estimates - and it would be pointless to aim for precision of weighed records much greater than that of the food composition tables. Properly structured quantitative questioning could well give sufficiently accurate data of high validity at much less cost than current approaches.

Representativeness over time

An important improvement of dietary intake assessment could come from development of behavioural measurements directed at variations in an individual's sources of nutrients across time. Daily nutrient intake is so variable that a long period of weighed intakes is required. Yet just such variability gives properly structured and interpreted history-taking the chance of providing data at least as good.

The variations in food intake that produce day-to-day swings in nutrient intake should be characterised in socially and personally meaningful terms. That is, descriptive sociobehavioural research oriented to ad hoc problems in nutrition should be promoted (to the benefit also of fundamental food habits research). The results would enable the design of methods of reporting food patterns over days of the week, seasons and eating locations. The line of structured and cued questioning that is required to measure a nutrient intake or pattern could be specified much more cogently than simply the number of days of recording. The assessment could go far beyond mere categorisation of individuals, and do it less obtrusively and more cost-effectively.

Unexplored epidemiology and intervention possibilities

Any chronic consequence of a diet for health must be mediated by both interaction and accumulation of nutrients's acute physiological actions. Habitual ultradian timecourses and combinations of nutrient intakes are therefore likely to be important. Usually only daily mean quantities of single nutrients have been considered in disease incidence and prevalence. Current knowledge of dose-time patterns and their variations across individuals is pitifully inadequate. Aetiologies (and then preventive measures) that could be examined in this way include amount-interval habits of salt intake in hypertension, temporally separated ingestion of macronutrients and weight loss (cf. thermogenesis), or combinations and concentrations of micronutrients in chronic degenerative diseases (cf. tapwater and CHD). It has been suggested that palatable energy causes extra eating and so has a chance of contributing to obesity; yet the behaviour patterns by which sugar or fat might stimulate energy intake have not been scientifically identified: the one set of evidence that there are circumstances in which sugar can stimulate intake provides purely group data on daily intakes. Does the palatability of sugar stimulate intake of soft drinks, snack foods, large desserts or what? And does sugar have a bigger effect on energy intake than separable starch or fat components of food? Although some recommendations regarding sugar intake still do not reflect it, the effects of fermentable carbohydrates on dental caries appear to have nothing to do directly with average daily amount but with the spacing of demineralising challenges, i.e. dental decay is affected by combination/sequence time-patterns of food behaviour.

Thus, even dietary records are grossly underanalysed for pattern. Histories too should be designed to pick up patterns - i.e. timed and sequenced consumption protocols and not only frequencies should be used. Subculturally meaningful pattern descriptions need to be constructed for coding these aspects of food habits into potentially health-relevant nutrient intake timecourses.

DETERMINANTS OF FOOD HABITS

The realistic description and measurement of food habits is only a start on the contributions of behavioural and social sciences to nutrition. An even richer and entirely distinctive role for sociology and psychology concerns the determinants of food habits.

To fulfill the aim of dietary presentation of diseases, the malleability of individuals' ingestive behaviour must be estimated - especially its more stable aspects, namely food habits and food preferences. Only when we know enough about the determinants of dietary practices and eating motivation in the various nations and subcultures will we be able to identify practicable changes in behaviour and food composition that would be likely to prevent disease. This requires measurement of all the major influences on dietary behaviour, whether they be economic, cultural, interpersonal, sensory or physiological. So the behavioural and the social sciences are as indispensible to research in preventive nutrition as the physiological sciences, food science and medical epidemiology.

It is a very complicated task to uncover the real determinants of food habits and to measure the strength of the varied influences on these habits in general or on a specific habit. Conclusive data showing differences in food habits between age groups, social classes, sexes, income groups or whatever, would be no proof or even evidence that such characteristics of individuals contribute to the causation of the dietary practices. Yet the task of identifying such causes cannot be evaded by research into the dietary prevention of disease, if intervention is to be effective.

The job is so difficult because good habits and other regularities in dietary behaviour have often become largely automatic behaviour, with origins forgotten and current motivation difficult to verbalize. Furthermore, the determinants of the food habits involve a whole "Culture of Eating", in which the eater's beliefs as to the resulting nutrient intakes or even just amounts of foods ingested constitute only one sector. They involve also the strengths and weaknesses of the eater's houdehols (2). Research into the effect of both on food habits, food intake and habit malleability is indispensable to effective programmes aimed at dietary prevention of disease. In this research the respondents will have to give their own accounts of the foods and dietary practices after which the investigator enquires. So the less well-known methods of ethnography will be needed, or psychological methods of exploring spontaneous construals of the world (such as the repertory grid technique (3,4)).

This is a new area of research and so some initial progress will need to be made before it will be possible to specify how such determinants of food habits should be measured, once they have been accurately described.

Such research will help nutritionists to see more clearly the differences between their ways of perceiving foods and the percepts of their clients and the general public. This should help bridge the gap of communication and

influence. Research attention should be turned from questions such as:
- do lay people know what nutritionists know?
- do people have the skills to apply such knowledge?
- are people willing to learn what would be better nutrition?
- are people willing to comply with official recommendations?

towards more efficacious questions such as:
- what relevant do people know from their own dietary culture?
- what skills relevant to good nutrition are there in existing household practices?
- what on their own criteria can people afford to invest in dietary prevention?
- what scope is there to put correct beliefs and useful skills to use within the household?

Immediate determinants

The culture of eating, together with any biological constraints, will establish an organization within an individual's eating behaviour that can be regarded as its proximal causal explanation (5). That is, the immediate determinants of nutrition are cognitive psychological processes. This explanatory ascription of dynamics to a person's acts, reactions and thinking can be called eating motivation, food acceptability attitudes, or - in the widest sense of the term - food preferences.

There is a common concept of food preference which is empirically dubious. This sense of "preference" is those influences on food-oriented behaviour that derive purely from perceived variations amongst foods themselves - commonly known as palatability. A person (or an animal) is assumed to show a consistent hierarchy of greater or less facilitation of selection across substances varying in composition, whether tested hungry or satiated, so long as tested "blind" to brand image etc. In fact, there is often no stable palatability hierarchy but the relative acceptability of a food depends on context.

The traditional scientific concept of food preference is intimately related to physical descriptions of eating habits. In fact, it is operationally identical to weighed intakes in a choice situation. In experimental psychology and in animal nutrition, "food preferences" have often been measured as the relative amounts actually eaten following selection. (The amount eaten of a single diet has even been called a "preference" or "appetite", relative to intake of a different diet on another occasion.) Furthermore, for better or for worse, this practice of measuring eating motivation as food intake at present extends to the validation of investigators' use of people's verbal statements

to measure their momentary dispositions to eat food (general appetite/satiety) and/or to eat one food rather than another (food-specific appetite/satiety or preference/aversion in the narrower sense): a higher appetite rating correlates with a greater food intake (6).

As often pointed out, however, a stricter measure of preference is given by the initial selection before ingestion has had the opportunity to exert some satiating influence. However, this measurement operation does not necessarily yield a stable preference, i.e. a palatability independent of context. The measured preference may be momentary only and specific to the context of the test. This concept of moment-to-moment preference (and aversion) or appetite (and satiety), i.e. transient eating motivational state, can be used to reduce the crude relative-intake preferences or eating-bout sizes to the accumulation of a series of selections or momentary facilitations (and inhibitions) of ingestion.

This sense of food preference, then, is of an attitude which is sensitive to more than the perceived composition of the food to which "preference" is explicitly referred in conversation. It is impossible that momentary preferences are generally invariant: for, despite the available range of foodstuffs remaining constant throughout a meal, the facilitation of eating does cause (temporarily) - eating does stop. Indeed, usually several foods are eaten in addition to the food that dominates the first mouthful. So bodily depletion and repletion, boredom with an item or its novelty, culturally meaningful times of day or stages in a meal, or interpersonal interaction are all part of the description of food preference in the widest sense and constitute the context for food preference in the narrower sense.

In short, the most mechanistic concept of food preference and aversion is the confluence of influences on an individual's momentary food-oriented behaviour.

Qualitative research and some experimental results (7) suggest that eating and drinking are often responses to a specific situation as a whole (the appetite Gestalt). Eating motivation therefore cannot necessarily be broken down for measurement purposes into a set of separate variables. Nevertheless, it is legitimate and indeed scientifically necessary to design and analyse investigations that attempt to help us to understand how one distinguishable category of influence works, or at most how a few work in interaction. The measurement of one category of the immediate influences on food acceptance requires controlling out influences not of interest during the verbal or behavioural test for strength of eating motivation (8). This has been done for simple cases of food

constituents and is feasible for contextual determinants such as social or physiological influences.

It should be obvious that the use of the word "preference" in a question or answer is neither necessary nor sufficient to make the data reflect preference. Any verbal test actually measures preference only insofar as it predicts choice behaviour (narrow sense of preference) or eating behaviour (wide sense), regardless of what words are used. The concept of preference, in this sense, is of the state of an individual. It can never be a group datum, like the commonest choice among consumers. Market data and cultural norms can be predicted by aggregation of individual preferences but the reverse deduction is hazardous at best. A description of "how a food works", commercially or culturally, has to be built up from full analysis of the individual psychology of preference. Since it is individuals who are healthy or diseased as a result in part of nutrient intakes, the individualization required of analysis of immediate determinants of food preferences is suited to the problem of dietary prevention.

INTEGRATION OF FOOD-HABIT DETERMINANTS

At any given moment, the individual's form of ingestive acceptance is elicited and occasioned by the physical and social situation. However, this immediately determining eating motivation has itself been built up from physical and social experience. These past and current factors together are the distal influences and constraints on nutrition, or its ultimate determinants.

Note that ultimate "determinants" do not totally determine behaviour. They are influences that operate interactively ("epigenetically") over time through the intermediary proximal determinants within an individual. Furthermore, these immediate causal influences include any actual reasons operative in a person's actions towards food. Therefore, complete (even if probabilistic) causal explanation of behaviour leaves plenty of room for a person's reasoning to enter into intentional choosing amongst foods and eating situations. However, that is not to say that all or even most habitual or occasional food oriented behaviour is intentional, let alone deliberate; involuntary reactions may make a strong contribution to reasoned-out choices as well as to automatic ones.

INTERVENTION RESEARCH IMPLICATIONS

Evaluation

In Europe, the evaluation of prevention of disease-risk factors in dietary behaviour has generally been poor. Large-scale studies including any attempt to assess eating behaviour are virtually non-existent anywhere in the world (the Stanford Heart Disease Prevention Projects may be an exception). Yet the success or failure in representative individuals of any mass or selective attempt to promote healthy beliefs, values, skills, opportunities and behaviour is quite measurable for a small fraction of the cost of the intervention itself.

The behavioural impact of a change in food formulation, labelling or marketing or in nutrition information broadcasting or counselling should be objectively evaluated in a pilot test and then in operation. This must be at the psychological measurement level in adequate number of people having known characteristics, so that there are bases for generalising the evaluation to other situations. Aggregate data, even from representative samples, cannot reliably be used to construct better intervention in future.

Education and marketing

Nutrition activists, and indeed official policy, rely heavily on attempts to deliver mere nutritional information by broadcasting to small audiences and by personal counselling. In fact, there is also the more or less overt intention to persuade as well as to inform, i.e. to educate or indoctrinate, depending on one's value-judgment of the attitude change. However, the persuasion is ambivalent and muddled and therefore feeble. This reliance on formal and informal education is supplemented by the notion of encouraging the provision of options for the public to choose amongst. In such an approach to health promotion, political rhetoric and professional self-interest are in danger of overwhelming commonsense about human nature.

It is scientifically unrealistic and indeed morally irresponsible to allow the ethical and political necessity of freedom of choice to obscure the behavioural and social facts. We do not need scientific research to prove that the best of intentions are subject to constraints (e.g. unavailability of the healthy choice or insufficient money to pay for it) and sometimes to overwhelming counterinfluences, either from outside (e.g. tempting unhealthy choices) or from inside (e.g. emotional disruption of wise intentions). So, even when a person's behaviour can be categorised for the purposes of political debate as entirely voluntary and rational, his or her dietary choices are always

subject to strong influences from socio-economic context and the food and eating options made available by commercial design.

So nutrition education will not promote healthy eating unless it persuades as well as informs, unless it persuades appropriately those individuals who are indeed at risk from their eating and unless the resulting attitudes motivate intentions that are achievable in the current food market, lifestyles, skills and emotional make-ups.

All modes of intervention that openly and acceptably promote behaviour that avoids disease should be used. That includes the engineering of food products to many people's preferences in a manner that helps them eat healthily, whether the commercially viable decisions remove or add physically different alternatives from the market.

Hense, food marketing is central for human nutrition. A food has no health value unless it is eaten - which depends on its success in the market. So the health lobby should apply its vigour to positive cooperation with responsible industry to meet the joint criteria of commercial viability and health promotion.

Thus here lies a rich and almost unmined vein of applied behavioural research. We need to ascertain actionable facts about the interactions of food technology, finance and marketing with sensory and attitudinal preferences and situational influences in the individual's eating and drinking behaviour.

The aspects of eating motivation that is of most interest commercially is choice among types of foods and drinks, and especially amongst brands of a type. Choice at the point of purchase obviously has to be the immediate concern for a food distributor or producer. Nevertheless, choice at serving (and at preparation) is recognised as influencial on sales of fast-moving goods like foods and drinks. Furthermore, the continued sensory impressions during ingestion, the sensory and physiological after-effects, and the interaction of these experiences of a product with culinary and socio-economic contexts and expectations, all contribute to the portion-sizes eaten and to subsequent choices both between items and of amounts to be taken.

Purchasing that has become habitual is even more likely than decisions about new products to be dominated by this extensive past experience of product usage. Amounts eaten of the selected items are liable to affect pack-size preferences and product usage rates. Thus, the cognitive integration in the customer's "non-involved" choices may be quite complex, even without the serial information-processing or personal history of rational deliberation described in consumer behaviour textbooks.

PSYCHOLOGICALLY MEDIATED EFFECTS OF DIETARY PRACTICES

All the above considerations were confined to the use of the measurement of food habits and their determinants in order to provide valid and accurate estimates of nutrient intakes and their malleability, on the assumption that the physical effects of the nutrients themselves on the body will affect health and disease. However, a properly developed science of behavioural nutrition would not neglect in addition the various effects of the eater's perceptions of the diet and of expectations of the consequences of eating. These cognitively mediated (rather than direct toxic, microbiological or immune) effects of foods include psychosomatic aspects of emotional reactions. They also depend on the eater's perceptions of physical somatic reactions to eating and events coinciding with eating and the consequent attribution of these symptoms to particular foods eaten. The attribution of a physical symptom to a food, whether by reasoning or as a result of associative conditioning, is the usual basis of a food aversion.

Psychosomatic aspects of anxious reactions to suspected food intolerance could sometimes provide the only basis of genuinely physical symptoms (pure suggestion-based physical illness). Perhaps more commonly, a mild direct somatic effect of the diet could be physically worsened by cognitively triggered neural effects on the immune system of gastrointestinal processing.

Such distressed behavioural reactions to diet (however mediated) are now making substantial demands on professional services. A narrowly medical approach to diagnosis, management, treatment and prevention is even less appropriate than with readily diagnosed and treated physical disease. A relevant behavioural and social science research base is as essential as further physiopathological research (9) to the development of adequate professional responses to complaints of food intolerance.

DEVELOPMENT OF EUROPEAN BEHAVIOURAL AND SOCIAL NUTRITION

The determinants of eating behaviour and its regularities are matters within the primary technical expertise of the behavioural and social sciences such as psychology, anthropology, sociology and economics. In the case of behaviour towards ingested substances, these behavioural sciences must also interface realistically with the physics and chemistry of the substance (sensory determinants) and the physiology of its actions on the body that in

turn influence the appetite for it (somatic determinants).

Education, training and research in nutrition has traditionally been strong in physiology and biochemistry and sometimes in food science too. Yet the food chemistry and the tissue biochemistry yield no nutrition without also ingestive behaviour. However, very little is known about the determinants of food habits and food preferences. The behavioural and social sciences bave been grossly neglected (as elsewhere both in medical science and in retail product technology). Also, psychologists and sociologists have largely ignored the frequent and rich human behaviour of eating and drinking. Consequently, there are extremely small numbers of social and behavioural scientists working on nutritional topics and very few in any one European country. This shows in some methodological weaknesses of human nutrition research, the syllabus of degrees and professional training courses, and the irrationality and inefficacy of much official policy and professional activity concerning food and health.

Thus it is vital that efforts be made to develop the application of social and behavioural science to nutrition in Europe.

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